Fostering Recovery through Metaverse Business Modelling
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Fostering Recovery through Metaverse Business Modelling

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June 16-17, 2022
Bucharest University of Economic Studies, Romania

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Proceedings of the 5th International Conference
on Economics and Social Sciences

Computerized processing:
Claudia-Marinela Dumitru

The 5th International Conference on Economics and Social Sciences
Fostering recovery through metaverse business modelling
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Foreword

Alina Mihaela DIMA[1*]

Abstract

The *5th edition of the International Conference on Economics and Social Sciences* (ICESS), was organized by the Bucharest University of Economic Studies (BUES), on the 16-17 of June 2022, at BUES, and online.

This year's conference theme, *"Fostering recovery through metaverse business modelling"*, invited researchers, Ph.D. students, and practitioners to contribute to the development of innovatory instruments for businesses, nations, and education to rebound and adjust in light of recent international trends.

The unpredictability and challenges of the pandemic, together with innovations in virtual and augmented realities, 5G, social technologies, and cloud computing, created the optimum setting for the metaverse to take off. Many businesses realized that it is quite significant to reconfigure the workplace and started to consider the concept of the metaverse far beyond the entertainment industry. Over the coming years, an utterly fascinating interaction between the actual and virtual worlds must be attained; therefore, new technologies for engagement and data analysis in a digital shared setting are now being developed. Even though it is still in its early stages of development, the metaverse can be considered as an expansion of social media platforms and a way to make significantly more use of working remotely.

A scientific committee encompassing more than 65% foreigners, who provide feedback to the writers and choose the most pertinent research, demonstrates the ICESS's strong dedication to international cooperation. This year's ICESS served as an international platform for discussion, a training opportunity for PhD candidates, and a means of disseminating research. It hosted 200 paper presentations and welcomed 117 foreign participants from Europe, Asia, Africa, and North America.

The papers included in the conference proceedings represent a significant corpus of findings and solutions to current challenges. They include strategies for easing monetary policy shocks over the business cycle, the potential of a COVID-19 pandemic; contagion effect on the Romanian capital market; findings demonstrating

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* Editor.

a positive relationship between the volume of Google searches and stock prices; results of the composite index-based research for the top ten virtual currencies traded; analysis of foreign trade with the main categories of agro-food products providing evidence that the metaverse could also contribute to achieve the SDGs of UNESCO by lowering the expenses of (many) physical activities.

ICESS 2022 hosted two keynote speeches; a doctor honoris causa ceremony; the round table "Digital Disruption in Financial Markets"; and the plenary session "Economic Ideas and Political Action in Shaping Economic and Monetary Union: Pierre WERNER and Luxembourg" – including a presentation and the *documentary exhibition "Pierre Werner (1913-2002) – A life dedicated to Luxembourg and Europe"* – organized by the University of Luxembourg under the high patronage of Mrs. *Yuriko BACKES*, Minister of Finance of the Grand Duchy of Luxembourg, who addressed a *video message* to the conference. This plenary session had reviewed the history of the Economic and Monetary Union, Pierre Werner's political and theoretical views as Minister and Prime Minister from the end of World War II until 1984, and Luxembourg's contribution to the creation of the common European currency.

The presentation of the papers was organized in the following sections:
1. Resilient agri-food and environmental systems for sustainable development and Agile entrepreneurship;
2. Digital leadership and resilient entrepreneurship in the metaverse era;
3. Financial perspectives in turbulent times;
4. Building business in times of crisis through entrepreneurship;
5. Global world after crisis: towards a new economic model;
6. Experimental economics;
7. Applied economics and statistics and data science;
8. Innovative strategies and models in higher education;
9. Digitalization impact on economic recovery in the context of the COVID-19 pandemic;
10. Marketing and sustainability;
11. Management in the metaverse era – the role of digital transformation in fostering recovery of public and private organizations;
12. The role of accounting frameworks and digitalization in fostering recovery;
13. Current challenges within demographic data: measurement, collection, retrieval, analysis and reporting.

ICESS 2022 partnered with Sapienza University of Rome, EM Strasbourg Business School, the Higher Education and Research in Management of European Universities (HERMES) network, the Romanian Academy, Groupama, the Ministry of Finance of the Grand Duchy of Luxembourg, *Europe Direct* at the University of Luxembourg, the *University of Luxembourg* and *the Luxembourg Centre for Contemporary* and Digital History (C²DH).

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Economic Ideas and Political Action in Shaping Economic and Monetary Union: Pierre Werner and Luxembourg

Elena DANESCU[1]

> *Politicians think about the next elections.*
> *Statesmen think about the next generations.*
>
> Alcide De Gasperi

Introduction

The international financial centre in Luxembourg grew considerably in the 1960s, driven by proactive government policy, flexible regulation, a willingness to harness external opportunities (such as the 1963 US interest equalisation tax and the Bundesbank provisions introduced in 1968 and 1974) and the establishment of Community institutions and European funding institutions in the country. As Luxembourg was in a currency union with Belgium within the Belgium-Luxembourg Economic Union and did not have its own Central Bank, these developments were all the more meaningful.

The Grand Duchy of Luxembourg was one of the six founding countries of the European Coal and Steel Community (ECSC)[2] that launched the European integration, and when this historical process experienced a series of major crises – including the failure of the European Defence Community (EDC) and the European Political Community in 1954, the empty chair crisis in 1966 and General de Gaulle's veto on British accession in 1962 and 1967 –, Luxembourg set out on the path of European monetary integration, under the impetus of Pierre Werner (29 December 1913 - 24 June 2022), Finance Minister and Prime Minister for several decades. In October 1970, the Werner Report[3] provided a detailed blueprint for Economic and

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[2] The ECSC was established by the Treaty of Paris (which was signed on 18 April 1951 and expired on 23 July 2002).
[3] *Report to the Council and the Commission on the realisation by stages of economic and monetary union in the Community*, supplement to *Bulletin 11 of the European Communities*, Document L 6.956/II/70-D, 8 October 1970 (accessed 30 July 2022).

Monetary Union and laid the foundations for the euro, for which the Luxembourg international financial centre have served as a "laboratory".

Pierre Werner's Personal Background

Born on 29 December 1913 of Luxembourgish parents in Saint-André, near Lille (France), Pierre Werner attended his school education in Luxembourg, in a multicultural environment that was typical for Luxembourg, and in addition to the country's three languages (Luxembourgish, French, and German), he also learnt English and Italian, which broadened his cultural horizons. After his baccalaureate was obtained at the prestigious *Athenée (Lycée classique)* in Luxembourg City, he enrolled in 1934 the higher preparatory course in law in Luxembourg, before joining the Faculty of Law in Paris. At the same time, he attended courses at the École libre des sciences politiques (1935-1937). Particularly interested in his studies in company management and private finance, Werner builds strong ties with his teachers Jacques Rueff (1896-1978) and Wilfrid Baumgartner (1902-1978) (both future French Finance Ministers), Charles Rist (1874-1955) and André Siegfried (1875-1959), all of whom influenced his intellectual development and sparked his interest in the study of economic and monetary phenomena. In Paris he met another Luxembourg native, Robert Schuman (1886-1963), who at that time was a member of the French National Assembly and who was to become an iconic figure in the launch of post-war European integration. Back in Luxembourg as a young barrister, Werner secured in 1938 a six-month internship at the Banque Générale de Luxembourg (BGL). With the outbreak of the Second World War, he ended up staying there until 1944, receiving on-the-job training in the banking profession[4].

After the Liberation, Werner was hired as an attaché to the Ministry of Finance, and in 1945 the Prime Minister and Finance Minister Pierre Dupong (1885-1953) tasked him with carrying out a study of the reorganisation of the banking system in Luxembourg. Subsequently he was appointed banking Commissioner, in charge of the creation of an authority to organise and regulate the credit market and contributed to the establishment of international financial relations. Werner represented Luxembourg in international negotiations, particularly in Switzerland and within the BLEU and the Benelux, and he also took part in multilateral dealings relating to defence including NATO, the European Defence Community (EDC), and the Western European Union (WEU). At a very early stage, he became familiar with the International Monetary Fund (IMF), and in 1947 he succeeded in negotiating – alongside the Luxembourg Ambassador in Washington, Hugues Le Gallais (1896-1964) – a $12.7 million loan from the International Bank for Reconstruction

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[4] Approached by the Martin network of the French Resistance, Werner managed to pass to the Luxembourg government in exile in London a report on the monetary, financial and banking situation in the country in 1942. "Rapport sur la situation monétaire, financière et bancaire luxembourgeoise de 1942" drawn up by Pierre Werner in 1943 and sent to the government in exile in London through the Martin network. Centre for Documentation and Research into the Resistance, Luxembourg. Subsequently published in *Rappel – Organe de la Ligue luxembourgeoise des prisonniers et déportés politiques, Luxembourg*, 1 (1994). See Danescu, Elena. *Through a century of change: portrait of a pragmatic visionary.* In Journal of European Integration History, 20 (2018), pp.9-30.

and Development (IBRD) to rebuild the country ravaged by the war. Two years later, as government adviser and acting Secretary of the Council of Ministers, he was brought into direct contact with the country's general affairs and the European integration strategy. Werner had been aware of the importance of European issues since his university days, and his commitment to European unification took firm shape in 1949, when he became convinced of the urgent need for the countries of Western Europe to undertake the economic and political construction of a united Europe. His experience of working in the international arena, particularly his awareness of the weakness and the divided state of Europe, made it almost an intellectual obligation'[5].

On the day of his 40ᵗʰ birthday (29 December 1953), Werner was appointed Minister for Finance following the unexpected death of Pierre Dupong. This moment marked the rise of a decades-long career as a statesman, in which public finance and European integration played a prominent role. Werner headed the list of candidates for the Christian Social People's Party (CSV) in the parliamentary election on 1 February 1959 and was duly elected Minister of State (Prime Minister). For twenty years – from 1959 to 1974 and from 1979 to 1984 – he led the coalition cabinets that his party formed with either the Liberals or the Socialists. His role as Prime Minister was also combined with other ministerial portfolios in what were seen as priority areas for a country that was constantly innovating and developing. He served as Minister of Finance (1959-1964 and 1969-1974), for the Treasury (1964-1969 and 1979-1984) and for Foreign Affairs and Justice (1964-1967), as well as for the Civil Service (1967-1969) and for Cultural affairs (1969-1974 and 1979-1984).

In these capacities, he worked closely with successive governments over the years to diversify the economy, especially focusing on consolidating Luxembourg's transformation from a banking centre to an international financial centre from the 1960s onward, developing the audiovisual sector and, in particular, setting up the satellite project and nurturing the idea for a Luxembourg shipping flag. As Foreign Minister, Werner also helped to set up Luxembourg's own independent system of diplomacy, thereby continuing the process launched by Joseph Bech (1887-1975) at the start of the Second World War, and to form Luxembourg's diplomatic and intellectual elite.

By becoming more and more closely involved in the great issues of European integration, Werner was to leave his imprint on the key events in that process. Examples include the battle over the political seats of the institutions (1965), the enshrinement of Luxembourg as one of the permanent capitals of the European institutions, the "Luxembourg Compromise" (1966), the "Werner Report" (1970), and the consolidation of the Belgium – Luxembourg Economic Union (BLEU) (1982) and of the Benelux. In the period from 1960 to 1974 the Luxembourg Presidencies of the EC Council were held exclusively by various Werner governments in succession, and the Prime Minister, acting as President each time, successfully intervened as a mediator at European level on several occasions.

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[5] Werner, Pierre. *Itinéraires luxembourgeois et européens. Évolutions et souvenirs 1945-1985.* Luxembourg: Saint-Paul, 1992, Vol. I, p. 35.

In 1974, when the Christian Social Party (CSV), which had been in power since 1926, went into opposition for four years, Werner had a seat in the Chamber of Deputies and was chairman of his party's parliamentary group. During this period (1974-1979), he encouraged the CSV to play a constructive role in the consensus-based management of the steel crisis, which resulted in the establishment of the "steel tripartite" (an institutionalised platform for dialogue between the government, employers, and employees), which subsequently became well known as "the Luxembourg model for social consultation".

The CSV won the elections in 1979 and the new Werner government worked to ensure a smooth post-industrial transition for Luxembourg. It successfully overcame the unrest in the BLEU and for the first time laid down Luxembourg's monetary status in a comprehensive and coherent way. Werner took measures to transform his party and brought Jean-Claude Juncker, aged just 28, into the government as State Secretary for Labour. In July 1984, when his party again won the general election, Werner passed the baton to Jacques Santer (born in 1937) and withdrew from political life. He remained active in public affairs, particularly focusing his energies on the promotion of EMU and the euro – he was joint chairman, alongside Raymond Barre (1924-2007) of the ECU Institute in Lyon – and the development of the media and the audiovisual sphere, especially through the project for the *Société Européenne des Satellites* (SES), which he chaired the board from 1989 to 1996, and then becoming honorary chairman.

In recognition of Werner's lifelong commitment to a united Europe, he received the Robert Schuman Gold Medal in 1971 and the Prince of Asturias Award in 1998, sharing the latter award with his successor Jacques Santer[6] for their "contribution to the process of European monetary integration that has culminated in the creation of the euro".

Pierre Werner passed away on 24 June 2002, in Luxembourg City.

The Emergence of the Werner Report

The Hague Summit (1 and 2 December 1969) took place under the auspices of the "completion, enlargement, deepening" triptych. Regarding the "deepening" of the Community, two aspects stand out: political cooperation and monetary cooperation. The Heads of State agreed that a plan by stages should be drawn up by the Council in 1970 for the establishment of an economic and monetary union over a decade. An ad hoc committee formed of the leaders of the various specialised committees of the Commission was set up for this purpose[7], and Pierre Werner was

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[6] Jacques Santer was the Prime Minister of Luxembourg from 1984 to 1995, and the President of the European Commission from 1995 to 1999.

[7] These were the chairmen of the Monetary Committee (Bernard Clappier from France, who was also Deputy Governor of the Banque de France), the Committee of Governors of the Central Banks (Hubert Ansiaux from Belgium, Governor of the National Bank of Belgium), the Medium-Term Economic Policy Committee (Johann Baptist Schöllhorn from Germany, also State Secretary in the Federal Ministry of the Economy), the Conjunctural Policy Committee (Gerard Brouwers from the Netherlands, State Secretary in the Dutch Ministry of the Economy) and the Budgetary Committee (Gaetano Stammati from Italy, Treasurer-General in the Italian Ministry of the Treasury). The

appointed as chairman of the group, that was not just a highly political choice but a considered act in favour of a man with a strong reputation for forging a consensus.[8]

On 8 October 1970 in Luxembourg, Pierre Werner officially presented the plan by stages for an economic and monetary union (EMU) in the European Community (the Werner Report or the Werner Plan). This document was the result of seven months of discussions by a group of experts from the six Member States, chaired by the Luxembourg Prime Minister and Finance Minister. Alongside the consensus building, Werner provided a vital input to the substance of the plan by stages (a comparative overview, a parallel approach, a balanced final outcome, the external dimension of EMU).

The Werner Report set out the broad lines, principles, and stages of an EMU based on the principle of irreversibility and an approach rooted in perfect symmetry between the economic and monetary aspects, with political union as the ultimate objective. It provided for the creation of a "centre of decision for economic policy" that would be "politically responsible to a European Parliament" elected by universal suffrage, and a "Community system for the central banks". It introduced the notion of strong macroeconomic governance, requiring the coordination of budgetary and monetary policies, and full financial integration. It also envisaged the involvement of the "social partners" (employers and unions) in defining economic and monetary policy, since the social dimension was seen as an intrinsic part of the EMU. After officially acquainting itself with the Werner Report, the Commission of the European Communities drew up and submitted to the Council, on 29 October 1970, its own proposals and two motions for resolutions on the establishment by stages of economic and monetary union.[9]

Although it was ultimately not implemented, the Werner Report led to the creation of the European Monetary Cooperation Fund (EMCF) in 1973 in Luxembourg – the embryo of the future European Central Bank. This institutional architecture was inspired by the reflections on a European reserve fund initiated in 1948 by Robert Triffin (1911-1993) and subsequently developed through his discussions with Jean Monnet (1888-1979) and Pierre Werner. The three were committed to the European cause and shared the same vision of EMU, rooted in

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Commission was represented by the Director-General for Economic Affairs (DGII), Ugo Mosca. When the committee members chose their deputies, Schöllhorn turned to Hans Tietmeyer, an official in the Federal Ministry of the Economy with responsibility for the Common Market, and Ansiaux to Jacques Mertens de Wilmars, economic adviser to the National Bank of Belgium. Source: Pierre Werner family archive.

[8] See Danescu, Elena. 'Pierre Werner and Europe: The Family Archives Behind the Werner Report. Foreword by Jean-Claude Juncker, President of the European Commission, and Foreword by Professor Harold James (Princeton University)', Oxford: Palgrave Macmillan, 2019 (XXXIV + 520 pages).

[9] *Communication et propositions de la Commission au Conseil relatives à l'institution par étapes d'une union économique et monétaire de la Communauté* [Communication and proposals from the Commission to the Council on the establishment by stages of economic and monetary union], document COM (70)1250, 29 October 1970, in Official Journal of the European Communities, annex C 140 of 26 November 1970, supplement to bulletin 11/1970, Luxembourg, 11 November 1970 (accessed 30 July 2022).

"perfect parallelism", democratic strength and a social dimension. Robert Triffin and Jean Monnet, together with other members of Monnet's Action Committee for a United States of Europe, intended to work on the strategy devised by Pierre Werner to build a political consensus around the report.

Despite the fact that the Werner Report was effectively shelved in 1974 as a result of the collapse of the Bretton Woods system and the energy crisis, it largely inspired the Delors Report[10] (1989) and the 1992 Maastricht Treaty. The creation of the European Central Bank on 1 June 1998 and the introduction of the euro on 1 January 1999 marked the establishment of the EMU, although the asymmetry between the monetary and economic dimensions was a source of intrinsic weaknesses. But despite these structural defects, compounded by subsequent political and democratic upheavals and the global financial crisis, the EMU has proven resilient and the euro has maintained its credibility, attractiveness, and international role.

Monetary Innovation through the Luxembourg Financial Centre

As Finance Minister and later Prime Minister, Pierre Werner was well aware of the potential of the banking sector for the diversification of an economy that was entirely dominated by the steel industry. From the early 1950s onward, Werner called for the establishment of a European monetary system based on a unit of account (both for official and private usage) and a clearing house for central banks. He made monetary policy a pivotal part of his government's action, and the burgeoning Luxembourg financial centre (which experienced major growth in the early 1960s) served as a vanguard for a European currency unit. In 1968, this balanced monetarist began to advocate the idea of "parallelism".[11] The careful balance he imagined reappeared in the Werner Report of 1970, which was presented as a blueprint for EMU in the EU. For Werner, the economic union and the monetary union had to work in tandem, with the political union as the ultimate aim. He also believed that the social dimension was an intrinsic part of the EMU.[12]

The presence of the ECSC (1952) was followed by the relocation to Luxembourg of the Community's financial institutions, including the European Investment Bank (EIB), which established its headquarters therein 1968. Their presence gave the Luxembourg financial centre a European dimension, placing it in a strong position to become an "incubator" for monetary integration. [13] Banks such

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[10] *Report on economic and monetary union in the European Community (the Delors Report).* Committee for the Study of Economic and Monetary Union. Jacques Delors, chairman. Presented April 17, 1989 (accessed 30 July 2022).

[11] Werner, Pierre. Perspectives de la Politique Financière et Monétaire Européenne. *Address given at the CDU Economic Congress in Saarbrücken on 26 January 1968*. Source: Pierre Werner family archives. Also in Documentation bulletin, 24th year, No 2, Luxembourg: SIP, pp 3-9 (accessed 30 July 2022).

[12] See Danescu, Elena. *Pierre Werner, A visionary European and Consensus Builder*. In Dyson, K. & Maes, I. (eds/dirs), Architects of the Euro. Intellectuals in the making of European Monetary Union, Oxford: Oxford University Press, 2016, pp. 93-116.

[13] Maquil, Michel. *Genèse et le développement de la Place financière de Luxembourg*. Speech at Capital@work. Luxembourg, 12th. May 2015.

as Kredietbank Luxembourgeoise SA (KBL), Banque Internationale à Luxembourg (BIL), Banque et Caisse d'Epargne de l'Etat (BCCE) were able to capitalise on the emergence of the Euromarket. They engaged in transactions in the European Unit of Account (EUA) in the 1960s, the European Composite Unit (Eurco) in the 1970s and the European Currency Unit (ECU) in the 1980s – in particular via bonds issued by the EIB, for which the Luxembourg Stock Exchange (LuxSE) served as a hub, and granted credits and funding related to these units.

This resulted in the establishment of a specific financial market in Luxembourg, which also served as a laboratory for the euro prefigured by the Werner Report. "In 1996, a loan launched by the EIB made it the first financial operator to directly support the 1:1 parity between the ECU and the euro, thereby setting a key precedent for other borrowers and boosting financial market confidence in the future single currency. It also pioneered a strategy of euro-tributary issues, enabling issues in various national currencies to be converted into euros and all redenominated issues to be subsequently consolidated into a single euro issue." [14]

Conclusion

Pierre Werner was one of the rare statesmen to be associated with the major issues in European integration, from the Schuman Plan (1950) to the Fontainebleau European Summit (1984). As a result of his decades-long career at the highest political level and his capacity for influence, this prominent Christian Democratic intellectual and committed federalist played a major role in regional integration (BLEU, Benelux) and in EEC policy-making and gained a strong reputation for forging a political consensus between larger powers (Germany and France) and between diametrically opposed positions ("economists" versus "monetarists" in designing the EMU architecture through Werner Report). In this way, he succeeded in defending Luxembourg's vital interests, from the steel industry to the financial centre and to the seats of the European institutions. Werner was involved in the major ideological debates of the time and in the efforts to establish transnational guidelines and consensus on monetary matters. He was one of the first to develop develop arguments for a symmetrical economic and monetary union and for the "effective parallelism" principle.[15] After it had been shelved because of the worsening international situation, the Werner Plan continued to be a source of inspiration for further thinking on the question of monetary integration in Europe and a stimulus to many political and scholarly initiatives which later came into

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[14] See Cheng, Anqi. Research project (2018-2019) and Master thesis titled *Eurobonds in European units of account and their role in European monetary integration: From a Luxembourg perspective (1961-1981)*. Supervisor Dr Elena Danescu. University of Luxembourg (MAHEC, public defence on 4 September 2019). Non-published.

[15] Tietmeyer, Hans. *Der Werner-Bericht als Wegweiser für die Wirtschafts-und Währungsunion*. In Danescu, E. & Muñoz, S. (eds/dirs). Pierre Werner and Europe: His Approach, Action and Legacy. Proceedings of the international conference, Luxembourg, 27-28 November 2013, Bruxelles: P.I.E. Peter Lang, 2015, pp. 69-78.

being[16]. However, as Jacques Delors stated "[In the report by the Delors Committee] … we agreed on the three stages taken over from the Werner Report: stage one, devoted to enhancing coordination, from 1 July 1990; stage two, a transition stage on the way to the final stage, preparing the ground for what were ultimately to be the institutions of the Economic and Monetary Union; and the last stage, at which the exchange rates between the currencies themselves and between them and the single currency would be laid down irrevocably."[17]

Pierre Werner served as a mentor and leadership trend-setter for other leading political figures in Luxembourg. Since the time of Joseph Bech, from Pierre Werner and Gaston Thorn (1928-2007) to Jacques Santer and Jean-Claude Juncker, more recently, Luxembourg has proven itself to be a master of the art of political consensus and a rich source of great Europeans who have been able to find a way out of Europe's successive impasses. The influential nature of its leadership gave Luxembourg a role in the European integration process that far outweighed the country's socio-economic impact.

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[16] Werner, Pierre. *L'Union économique et monétaire d'un rapport à l'autre,* September 1989. Source: Pierre Werner family archives.

[17] Delors, Jacques. *Mémoires*, Paris : Éditions Plon, 2004, p. 338.

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Investigating Public-Private Partnership's Potential for Innovation in the Romanian Agriculture

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Abstract

The Romanian agricultural sector has had a difficult history over the past 100 years. Economic and social issues in the sector have influenced significantly Romanian economic development, and continue to represent a huge challenge in the current changing economic and social context fraught with risks from climate and demographic change, to change triggered by geopolitical and geo-economic realignments inside and outside the European Union. The financial-economic crisis, the austerity, the subsequent pandemic and now the conflictual circumstances imply identifying resilient and smart solutions for all sectors, but especially for ensuring sustainable agricultural growth at the EU and each member-state's level.

In difficult periods, mobilizing stakeholders from the public and private sector to ensure financing through investments and subsidies, should focus on public-private partnerships as a tool and not an objective for developing a resilient and sustainable agricultural sector at the country and the EU-27 level. The present paper shows some of the issues and main objectives that should guide this type of partnership in agriculture aimed at innovation and delivering viable solutions for Romania's rural area. Some good practice examples are analysed, and proposals are made regarding general framework solutions for actually operationalizing the potential of innovation and sustainable, smart growth in agriculture.

By considering the public-private partnership as a systemic innovation policy tool, we aim to identify the best improvements that, from a holistic perspective, could give answers to most pressing challenges regarding financing, avoiding negative demographic change, and strengthening the competitiveness of the Romanian agricultural sector. The main issue to tackle is the institutional economic, and stakeholders' framework, for which the strength and weaknesses are identified, and policy improvements suggested.

The results show that Romania has potential to strengthen an innovative, smart, and green national agricultural sector if the right measures are taken and public-private partnerships in the sector are approached flexibly.

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JEL Classification: O13, O17, O31, O43, Q01, Q15.

1. Introduction

The agricultural sector at both national and European Union level was somewhat neglected as compared to the other industry sectors, despite having its own representative Directorate General, and being included specifically in the EU funding opportunities. However, climate change, biodiversity and food safety challenges, to which the pandemic, and the current conflictual situation at the EU borders contributed, shed new light on the importance of the sector, and the impact it might have on the economic, social and even political outlook at the EU-27 and at each member state level.

In this context, the Common Agricultural Policy (CAP) while maintaining its core goals of improved productivity, stable markets, and ensuring reasonable food prices, and at the same time increasing the living standards of farmers has also been increasingly more focused on the value of innovation in the sector, as it will become one of the necessary and required features for the next programming period, 2023-2027.

Innovation thus proves to be relevant not only for industries that become more and more dependent on high-tech technologies, digitalization, and automation, but also for technologizing, and improving productivity, competitiveness, and sustainability of the agricultural sector, with impact on both the economic and social dimensions.

Obviously, this means that the issues that must be dealt with at policy and strategic level become more complex and need holistic approaches, as they are of interest for economic, and non-economic stakeholders in all and each economy at European and world level (Knickel et al., 2009), while innovation means transitioning to more sustainable agriculture, that involves stakeholders from various other sectors (Beers et al. 2013; Hermans et al., 2015 and 2019). The complexity requiring the involvement of stakeholders from other industry sectors, considering the current volatile economic, social and political environment, suggests that public-private partnership might be one of the better solutions for Romania's agricultural sectors, but also at the EU-27 level.

However, as shown by a recent European Court of Accounts special report (2018), public-private partnerships continue to be regarded with scepticism in most EU countries, a fact that has to do with several factors that need to be addressed, from legal-institutional ones, to those related to increased costs during the development of the projects, delays, and risk-sharing. While the pre-pandemic perspective was rather negative, the pandemic period, and the current period of uncertainty, corroborated with increased needs of satisfying demands from ensuring the necessary food-safety at the EU and world level to those of reducing to a 'net-zero' the carbon footprint indicates that public-private partnership might still be

a solution, if certain steps are taken and a reinterpretation of it especially from the institutional-legal perspective would be considered. For Romania, where the public-private partnership (PPP) is still at its beginning, and former experiences tend to continue discouraging such undertakings, it would be an opportunity to set the ground for new and innovative types of PPPs, which are instrumental and might even change the ranking of the country in terms of innovation.

The paper is structured as follows: First, we provide the background on the development of agriculture and the rural areas of our country. Next, we discuss the overall PPP framework at national and EU-level, and bring arguments for revising the legal-institutional framework as to extend the meaning and use of PPPs for generating innovation in the Romanian agricultural sector, and identify some recent opportunities in this respect. Finally, we present some examples of how agriculture and innovation might become drivers for the specific aims of the Green Deal if brought together, based on some insights delivered by the Analysis of the Needs within the National Strategic Plan 2021-2027, and the National Program for Rural Development 2014-2020.

2. Background

2.1 Agriculture

Romania's agriculture has a rich history, characterized by many disruptions and distortions influencing the institutional economic, social and cultural development of the country in all economic and social sectors.

For the purposes of our paper, we divided the important historical stages into three large historical periods:

a) The period of the Great Unions and shifting to a modern capitalist economy, respectively, the period of constituting the Romanian modern state, covering the entire time from 1864 to 1921, when the national objectives of Greater Romania were achieved:

The first step in the agricultural development of the country was made by the Agrarian Reform of 1863/1864 based on the French model, which meant parting with the feudal system by secularizing the wealth of monasteries (1863) and land endowments for the peasants (1864). It is the beginning of the peasants' question in Romania (Zamfir et al., 2019), due to the fact that it failed the natural progress present in western economies regarding landownership, redistribution of lands, land endowment for peasants, etc. The Agrarian Reform of 1864 did not solve any of these issues, as it only attenuated some, as land was still in abundance. Nonetheless, it was the beginning of a new stage, triggering increases in the number of the rural population, and in time, land became insufficient, and thus, this reform generated a rather hybrid economic and social structure, becoming one of the reasons for the subsequent crises in the last half of the 19ᵗʰ century (Dobrogeanu-Gherea, 1910) and thus creating a new type of 'serfdom' specific to the country; *neoiobagia*. It is the time when the land begins its fragmentation based on inheritance rules, and

researches show that by the end of the 19th century and the beginning of the 20th, 99% of the peasants who were farmers, represented less than half of total farmland as regards ownership, that is, there were 4171 owners totalling 54.7% from total farmland, while 920.939 peasants had properties that represented just 45.3% from total (Zamfir et al., 2019).

b) The interwar and first post-war period 1921-1948: accelerated industrialization fraught with economic, social, and political challenges 1921-1940; the communist system and the first signs of compromising free market, initiative, entrepreneurship in agriculture and industry.

While the poor peasants with incomes under 300 Lei per year represented 95.5% of farmer households, the middle and wealthy farmers had incomes varying between 300 and 10000 Lei and represented 4.3% of the farmer households, the rest being the upper-class (boyars) who had incomes above 10,000 Lei and represented 0.17% from farmer households. The conclusion is visible clearly: it is rather a feudalistic economy, not a capitalist one. The subsequent Agrarian Reform began in 1918 and was concluded in 1922. Its major objective was to cut down the numbers of great landowners, and to attenuate the social frictions generated by the peasants' circumstances. It failed, as one of the most important reasons was the excessive fragmentation of the land (Table 1).

Table 1. Size of properties, and weight of farming exploitations after the reform by 1922

Properties	Romania (1930) Households	Plot
Under 1 ha[*]	18,6%	1,6%
1–5 ha	56,6%	26,4%
Between 5–10 ha	16,9%	20,0%
10–50 ha	7,2%	19,8%
Over 50 ha	0,8%	32,2%

Source: V. Axenciuc, 1996, pp. 242-243, from C. Zamfir, *Istoria socială a României*, 2019 [*The social history of Romania*, 2019].

* Farm workers, that is, peasants without land or very few persons from other categories that also had a small garden.

c) The communist period 1945-1990: the development under a new and imposed economic system, the massive collectivization, and disruption of free-market institutions, compromising relevant economic institutions that are increasingly relevant nowadays.

The situation did not improve after the Second World War, when the capitalist road to modernizing the country was disrupted. It is the period which is at the basis of some significant institutional economic issues that impact the agricultural sector up to present: it compromises important institutional factors such as

ownership rights, how cooperatives are managed and profits are distributed, and even the notion of cooperative itself, which returns and may gain significance in the future regarding models of governance for the current period of 'disruptive' transitions (Menard, 2006). By the end of the collectivization process (1962), there were 6546 cooperatives and 3.194 thousand families in cooperatives. The process had, nevertheless, some beneficial results as it contributed to the sped-up modernization and incorporation of modern technologies (Table 2).

Table 2. Changes in technology, human resources and investments

| Years | Tractors (thou.) | Combines (thou.) | Experts | | Irrigated land (thou. ha) | Investments/year thou. USD |
			Tertiary education (thou.)	Upper secondary education (thou.)		
1950	14	0,0	3,3	3,1	43	45
1960	44	3,3	5,3	5,9	138	355
1970	107	23,7	16,4	12,8	665	858
1980	147	56,8	26,4	20,9	2048	1828

Source: V. Axenciuc, 2000, p. 155.

Over the entire communist period, despite investments from 1950 to 1989, the agricultural sector remained behind investments in industry at national level, and it failed to close the gap as compared with the agricultural sector from western countries. Investments in agriculture varied between 10.6% in 1950 to only 17.0% in 1989, much below the shares for industry for the same period 43.6% (1950) and 43.7% in 1989, a fact signalling the downward slope of the last year of communism, as industrial investments decreased constantly as of 1980, when they peaked by 50.9% (Murgescu, 2010, p. 338).

2.2 Public-Private Partnerships: Theory and Main Findings

Public-private partnerships are defined largely as a long-term contract between a private and a government entity for providing/supplying goods/assets, and public services, and in which the private partner assumes considerable risks, and the management responsibility, the remuneration being correlated with the performance (OECD, 2017). This general definition identifies and aims to cover the various legislative-institutional frameworks governing public-private partnerships. From legal perspective, this type of partnership occurs either in the framework of civil law, for most of the European countries, or according to common law, hence also a multitude of other definitions that might be encountered, and which show, finally, that public-private partnership should not be necessarily linked to concession, and that it might be reinterpreted so as to provide for (contractual or other arrangements) opportunities that would gain on multiple dimensions: interorganizational

relationships, cooperation, shared investment objectives, risk-sharing, etc. This means creating a more flexible and agile legislative-institutional framework for public-private partnerships, which again, could turn into a useful tool, and not objective in generating the outcomes aimed by the EU Green Deal Agenda, and especially in providing a more competitive and agile framework for improving overall sustainability and resilience in times of multiple risks, from climate, to demographic, social, and even political ones.

The need for reviewing the overall framework of the public-private partnership is substantiated by legislative initiatives in several EU-27 countries as, among others, in Germany (2017), France (2015 and 2016), Italy (2016). A particular case of interest is the Netherlands, a country which has used public-private partnerships extensively, including in agriculture by creating a favorable eco-system for agricultural innovation based on such partnerships (Hermans et al., 2019, Job et al., 2022).

On sectors, we noticed that most projects were in education (189), followed by transports (151) and healthcare (Figure 1), indicating the essential role played by education for the current stage in the development of the knowledge economy and society.

Figure 1. Total number of EU public-private partnership projects on sectors, 2010-2020
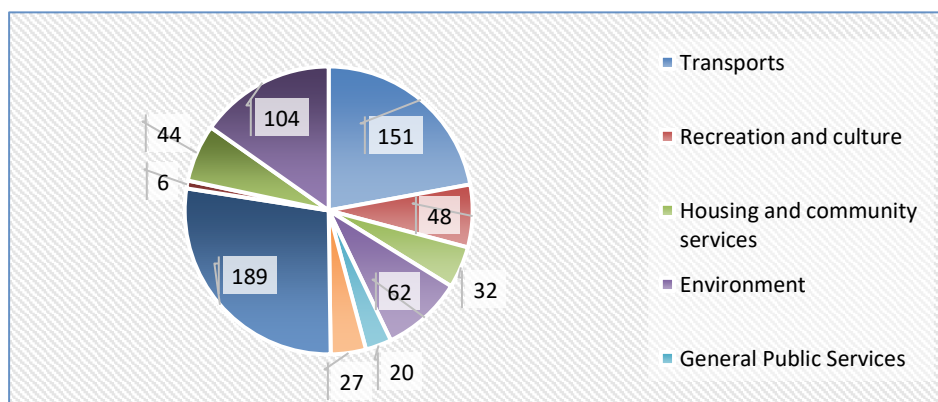
Source: Author's processing after European Investment Bank (2022), EPEC database, https//data.eib.org./epec.

However, if we consider the allocated amounts, we notice that the highest values were for transports' 90.192 billion euro, followed by healthcare 19.091 billion euro, and education with 14.888 billion euro (EIB, 2022). This is relevant and it might also be one of the reasons for the increased scepticism, as many of the projects in transports and healthcare recorded higher costs and delays, against the original provisions of the respective contracts.

The period 2016-2020 could be regarded as one of the most challenging, as public-private partnerships are subjected to reviews of the legal-institutional

framework, of the various types, forms, and dimensions they could gain, so that we might consider that the 'market' for public-private partnerships is still in development, and might have a long way to reach its maturity.

The pandemic of 2020 has emphasised the significance of public-private partnerships, as the evolution in the first half clearly indicates the trend of greenfield, and brownfield initiatives in the fight against the Covid-19 pandemic.

Currently, the main debates are focused on the main reasons for dysfunctions of the public-private partnership framework, and among the most interesting ones, are the institutional economic indicators that might contribute to an overall improved ecosystem for it respectively the institutional economic indicators regarding the financial autonomy of sub-national authorities, trust in official economic information, transparency of economic policies, level of corruption, efficiency of fiscal administration, and transparency in the field of public acquisitions. To these, other indicators might be added, for instance, the capacity of building clusters, the cooperation between universities and the private sector, human resources in science and technology, investments in research-development and innovation, as all these might create a more complete image about the interventions required for improving, expanding, rendering more flexible and agile public-private partnerships, in brief, for changing them into an actual tool in ensuring a climate favourable to change, to innovation, competitiveness, and sustainability for all economic sectors, including agriculture.

3. Public-Private Partnership's Potential for Innovation in Agriculture in Romania

Economic institutions take shape based on the interaction of endogenous and exogenous processes, and depend on hundreds and even thousands of years to be assimilated/embedded in society and culture, others, respectively, the 'rules of the game' (North, 1990) have a time horizon from 10 to 100 years, and on them depends the institutional environment of the countries expressed in constitutions, laws, bills, property rights, judicial system, etc., while shorter time horizons of 1 to 10 years refer to governance, and the formal and informal networks work in managing transaction costs. All these depend on how resources are allocated and the process of allocating resources, either tangible or intangible, is ongoing with no definite time horizons (Williamson, 1985; Voigt, 2013).

In Romania, a country which did not finish building and consolidating strong economic and social institutions in the shift from an agrarian land to a modern industrialised one, and where the disruption generated by the communist ruling even distorted some of the economic institutions relevant for public-private partnerships, making use of them as tools is almost inexistent over the entire period as of 1990 up to 2021. This is particularly relevant, if we consider that from a historical perspective, the first economic and social institutions were created in agriculture, with the emergence of the first generations of permanent settlements and tended crops. Therefore, if we aim to transform public-private partnership into a tool for

innovation in agriculture, we should consider as relevant how this could be applied considering the current situation in the Romanian agricultural sector.

A caveat is here necessary: we do not insist on the huge legislative body, but mention that reviewing the public-private partnership legislation is necessary, in particular for making it flexible, and encompassing more types of public-private partnerships. Moreover, it would be necessary to remove all overlaps with the Law of Concessions, and other provisions that do not clearly help in understanding the difference between public-private partnership and the legislation regarding public acquisitions.

Innovation is currently essential for ensuring economic growth, competitiveness, sustainability and resilience, and public-private partnership in agriculture might contribute to achieving some of the main objectives of this sector, from among which we mention promoting a smart, resilient, and diversified agricultural sector by providing assured and stable incomes to farmers, increasing the value added of the agricultural output, increasing the digitalisation level in the agro-food sector and in the rural area. Another main objective would be strengthening the socio-economic structure of rural areas by increasing quality of life, the numbers of youth involved in the agro-food sector and non-agricultural sector in the rural area, increasing the degree of using new technologies in the agro-food sector, and contributing to improving the demographic structure in the rural areas, including here the development of human resources that are attracted to work in the rural area based on new work typologies in accordance with the needs of an agricultural sector in full process of adjusting to the technologized and digitalized economy (Lumea Satului [Village's World], 2020).

From the perspective of institutional economic indicators, Romania has compared with other EU-countries, on a scale from 0 to 4, where 0 is worst and 4 is best, most challenges as regards financial autonomy of sub-national authority where it ranks 1.50, compared with Germany (3.0), or Poland (2.50), while Hungary is below Romania (0.50), just like Greece (1.0), Austria (0.50). Portugal is ranked at 2.00, according to data from 2012, while for the same indicator, in 2016 Romania registers a decrease in ranking to 1.00, the same as Spain from 2.50 in 2012, to 2.00 in 2016, while Hungary increases performance and leaps to 2.00 in 2016, France and Germany remain constant by 3.0. As regards trust in official economic information, and transparency of economic policies, Romania is at par with the other countries, respectively Germany, France, Poland, Portugal, Greece, etc. as all of them have slight variations between 3.0 and 4.0 on the scale. Also, regarding public acquisitions transparency, the situation is comparable. Nonetheless, a concerning factor is the level of corruption, where Romania has a considerable drop, signalling an increased perception about high corruption, as the value drops from 3.25 in 2012 which means mild corruption to 0.25 indicating concerning corruption (data from Institutional Profile Database, CEPII).

Other such indicators worth considering for public-private partnership as an innovation tool in the agricultural sectors are the capacity of public-private cooperation, where Romania has a very low capacity in both years with available

data (2012 and 2016), registering even a drop from 2.33 to 1.67, whereas other countries improved their capacity in this respect.

The pandemic period showed the capacity for taking initiative, and the year 2020, was taken a decisive step as the collaboration basis was laid between the League of Agricultural Producers Association from Romania and the Academy of Agricultural and Forestry Sciences "Gheorghe Ionescu-Sisesti" with the aim of pooling together resources and providing mutual support in the challenges generated by the new Common Agricultural Policy, and the pandemic and post-pandemic context.

Considering the aims and the transition from a mostly traditional and lagging agriculture to the new technologized and digitalized agriculture, according to our view, we consider that the holistic approach for ensuring the change of public-private partnership into an innovation tool in agriculture from a systemic perspective should begin by establishing the rules of the game, contributing to creating a formal and informal operational institutional framework. The first condition is to establish who is relevant and should take the lead, according to the objectives of the partnership. For instance, there are cases where the public authority should take the lead, when the initiatives refer to policy development, legislative issues, ensuring the necessary governmental agencies, and support organisations, while the private, entrepreneurial partner should take the lead in practical projects that aim to combine mixed-goals, for instance increasing agricultural output, while also obtaining profits from other related activities, for instance setting up small-scale energy generating facilities in the rural areas, while the education and research-development system should take lead in realizing technological and digital solutions and innovations for the rural area and for improving farming activities. A possible framework should also be considered with respect to the management, control, and risk-sharing capacities of each of the partners, and also applying the 'test before invest' principle by developing pilot-projects that would also encourage small farmers to pool together their resources in cooperatives, or other association alternatives for increasing the potential of the agricultural sector in Romania.

4. Conclusions

The public-private partnership solution needs a changed perspective from legal-institutional, economic, and social viewpoint not only in Romania, but also at the EU-27 level. Evidence is the few data available about such partnerships and the increased concerns about its use, while best practice examples, in particular for the agricultural sector, like the Netherlands, are barely reproduced or tested.

The required interventions, for changing public-private partnerships into an effective systemic tool of innovation for the Romanian agricultural sector, would be providing an improved framework for cooperation in a clear and transparent framework, improving the perception about corruption, improving trust and confidence in governmental economic/social information, encouraging the development of start-ups and SMEs tailored for the needs of the rural area and of the agro-food sector, etc.

Some effective measures would be reviewing and improving contract laws and frameworks, by rendering them more flexible, and improving on the definition of public-private partnership, in the spirit of the OECD broad definition, and extending its operation – at least at national level – so as to eliminate overlaps with the procurement/acquisitions law, as a first step. A necessary secondary step would be to extend its sphere, from limited strictly to concession, to something more, and setting up the framework for innovative cooperation between interested stakeholders from the agricultural sector and from other complementary (possibly) industrial sectors that use the goods provided by the agricultural sector in their manufacturing processes, for finished or semi-finished food- and other types of goods.

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Comparative Analysis of Wheat and Sunflower Seeds Branches in Romania and Serbia

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Abstract

Wheat and sunflower seeds are significant products to ensure domestic food security and international trade exchanges. The paper develops a comparative analysis between Romania and Serbia in those regarding the production and export potential of wheat and sunflower, considering that the topic is interesting to study in the current economic, social and political context. The article answers the questions: what role do Romania and Serbia play in the world market for wheat and sunflower seeds and is the current availability of wheat and sunflower seeds sufficient to cover domestic needs in Romania and Serbia? The objectives of the research are to identify the production and export potential for wheat and sunflower seeds and to estimate future trends in the production of these products. The main findings show that the production of wheat and sunflower seeds is sufficient to cover the domestic food security for both countries and to ensure future trade, despite the current unstable political and social situation in Eastern Europe.

Keywords: food security, wheat, sunflower seeds, Romania, Serbia.

Jel Classification: Q10, C53, F10.

1. Introduction

Agriculture is the sector of the economy that is dependent on the soil and the climate conditions, which are important to ensure the food needs of the population. It is characterized by distinct production structures that are not fully exploited and are maintained at a potential stage (Dumitru et al., 2022, Dumitru, 2017).

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Romania occupies an important place in terms of the agricultural area used at the EU level, ranking 6th with approximately 13.9 million hectares, after countries such as France, Spain, and Germany. Of the total area used, about 60% was cultivated arable land, of which 66% was cereals, such as wheat (25.7%) and maize (31.1%) (PwC, 2017).

Globally, the main wheat producing countries in 2019 were China, India, Russia, the United States, and France (FAO, 2019). Wheat is a product of great economic importance in Romania, as demonstrated by the large area cultivated and the volume of trade, both nationally and internationally. Furthermore, for producers, wheat is a main source of income and for consumers it contributes to the country's food security (Boboc, 2017; Arghiroiu, 2015).

Along with cereals, wheat, maize, etc., oilseed crops play an important role for both producers and consumers, both for the production of edible oil and biofuels. Globally, the leaders in sunflower production and trade are Argentina, Ukraine, and Russia, producing 52% of world production (FAOSTAT, 2022). As for Eastern Europe, the main producers are Romania, Bulgaria, Turkey, Moldova, and Serbia (Popescu, 2018, Petre, 2019).

In Serbia, among the predominant cereals, maize is cultivated in 56% of the total cereal area, followed by wheat, which occupies 35%, and represents up to 90% of the cereal area. Wheat appears to be a relatively stable crop, with small variations in production, much smaller than those recorded for maize cultivation (Novković, 2020). Sunflower is one of the most important crops for edible oil production in Serbia, with harvested areas ranging from 154,793 to 187,822 hectares, with an output of 294,502 to 454,282 tonnes, and average grain yields ranging from 1.9 to 2.4 tonnes/hectare (Branković, 2011; Novković, 2020).

Given the importance of wheat and sunflower crops in ensuring food security and in international trade, this paper will compare their situations in Romania and Serbia, which are among the main producing countries in Europe. The paper is structured in six parts. After the introduction, the problem to be studied is stated; then the research question and purpose are established. The fourth part presents the methods used and the results obtained in the following part. Finally, the conclusions of the research are drawn.

2. Problem Statement

Geopolitical changes in Europe in recent decades have had a direct impact on agricultural markets, such as world trade and food markets. Demand for food on world markets is growing due to international developments, global cereal consumption is estimated to increase by 11% by 2026 (Voicilaş, 2020).

The milling sector is dependent on the cereals sector, with extremely high cereal exports and the bakery sector importing large quantities of products to meet domestic demand. The year 2017 presented the highest values in terms of imported quantities of bakery products between 2012 and 2017, with the imported quantity being 140,730 tons, worth 325,978 thousand euros, while the quantity exported by Romania was 59,094 tons, with a value of 139,898 thousand euros (Radu, 2019).

In Romania, the area cultivated with oilseeds reached almost 2 million hectares. Rainfall levels increased soil moisture throughout the country, creating favorable conditions for germination and spring growth. Farmers have reported this in all of Romania, and the annual sunflower harvest is very good, although in the South-Eastern and the Western Region production is 10-25% lower than last year (Iancu, 2022; Micu, 2022).

In Serbia, the sunflower-growing area ranged from 16,415 hectares to 199,316 hectares, with family farms growing sunflowers in 66.8% of the total area. Among the challenges encountered in the market are the rising prices of inputs and primary products, family farms are severely affected, and the only solution is continuous monitoring of profitability (Todorović, 2010).

The importance of wheat and sunflowers in ensuring food security for the population, farmers' income, and international trade makes it an interesting topic to study, especially in the current socioeconomic and political context. Wheat and sunflower prices have increased in recent months due to the uncertain political situation in Eastern Europe: in the week 7-13 April 2022, the average price of sunflower was 625 Euros/tonne, compared to 506 Euros/tonne at the beginning of March, according to the quotations of the Romanian Commodity Exchange (https://www.brm.ro/cotatii-cereale/, 2022), indicating a 23% increase in just a few weeks. The price of wheat rose from 257 Euros/tonne to 307 Euros/tonne in the same period, an increase of 19%. Furthermore, FAO statistics show the same price increases for cereals and sunflower seeds.

3. Research Questions and Objectives

In view of the above, the article aims to answer the following questions: What role do Eastern European countries play in the world market for wheat and sunflower seeds?; Is the current availability of wheat and sunflower sufficient to cover domestic needs in Romania and Serbia?

The objectives of the research are to identify the production and export potential of wheat and sunflower in Romania and Serbia and to estimate future trends for the production of these products.

The research hypothesis is that Romanian and Serbian outputs of wheat and sunflower seeds are sufficient to cover the domestic food security and the foreign trade, although the current unstable political and social situation in Eastern Europe. The assumption is based on previous research (Turek et al., 2018), showing that Romania ranked first among the top sunflower seeds exporters in 2014, with $546,644,000 export value (FAOSTAT).

4. Research Methods

The research is based on data provided by the Food and Agriculture Organization of the United Nations and the Trade Map. Based on the data, forecasts will be made using the Excel function FORECAST. This function predicts values based on data

that exist along with a linear trend and calculates these predictions of future values using linear regression.

The main indicators comparatively analysed are: area and production of sunflower seeds and wheat, export potential of Romania and Serbia for the two crops, and performance of the wheat and sunflower seeds branches in Romania for the time horizon 2021-2030, in the context of existing situations (COVID-19 pandemic, war in Eastern Europe).

5. Findings

In Romania, the area cultivated with sunflowers in 2015 recorded more than 1 million hectares, reaching in 2020 a cultivated area of about 1.2 hectares, showing an increase of more than 18% in the period under review. Sunflower seeds' yield increased by 4%, from 1770 kg/ha in 2015, to 1840 kg/ha in 2020. In 2015, Romania produced 1.15 million tonnes of sunflower seeds, reaching a production of about 2.2 million tonnes in 2020, an increase of 23% (Table 1).

Table 1. Main technical indicators for sunflower cultivation

Country	Indicator	2015	2016	2017	2018	2019	2020	2020/2015 (%)
Romania	Total area (ha)	1,009,140	1,038,414	999,162	1,006,990	1,282,700	1,194,320	18.35
	Average production (kg/ha)	1,769	1,957	2,915	3,041	2,782	1,840	4.03
	Total production (tonnes)	1,785,771	2,032,340	2,912,743	3,062,690	3,569,150	2,198,670	23.12
Serbia	Total area (ha)	166,192	200,299	219,338	239,148	219,404	221,149	33.07
	Average production (kg/ha)	2,630	3,101	2,464	3,068	3,323	2,879	9.47
	Total production (tonnes)	437,084	621,127	540,590	733,706	729,079	636,688	45.67

Source: FAO.

In 2015, Serbia had an area under sunflower cultivation of 166.1 thousand hectares, reaching 221.1 thousand hectares in 2020, an increase of 33%. In terms of average sunflower production, Serbia has seen an increase of 9.5%, from 2630 kg/ha to 2880 kg/ha. The total sunflower seed production recorded by Serbia in 2020 was 636.7 thousand tonnes, an increase of more than 45% compared to the production recorded in 2015 (437 thousand tonnes).

It can be seen that in 2020, the sunflower growing area in Romania is five times larger than the area cultivated by Serbia, and in terms of production, Romania recorded 3 times higher production than Serbia (Table 1). This indicates a higher level of average production in Serbia compared to Romania, as can be seen in Table 1.

Table 2. Evolution of main technical indicators for wheat cultivation

Country	Indicator	2015	2016	2017	2018	2019	2020	2020/2015 (%)
Romania	Total area (ha)	2,102,444	2,135,304	2,051,664	2,116,150	2,168,370	2,281,690	8.53
	Average production (kg/ha)	3,787	3,948	4,891	4,793	4,748	2,960	-21.83
	Total production (tonnes)	7,962,421	8,431,131	10,034,955	10,143,670	10,297,110	6,754,530	-15.17
Serbia	Total area (ha)	589,922	595,118	556,115	643,083	577,499	581,128	-1.49
	Average production (kg/ha)	4,116	4,847	4,092	4,574	4,389	4,944	20.13
	Total production (tonnes)	2,428,203	2,884,537	2,275,623	2,941,601	2,534,643	2,873,503	18.34

Source: FAO.

In Romania, the wheat area increased by 8% in 2020 (2.53 million hectares), compared to the area recorded in 2015 (2.1 million hectares). Wheat yield decreased by approximately 22%, from 3780 kg/ha in 2015 to 2960 kg/ha in 2020. Total production also decreased by more than 15% in 2020 (6.7 million tonnes), compared to production in 2015 (8 million tonnes).

In Serbia, the wheat area decreased by 1.5% in 2020 when 581 thousand hectares were recorded, compared to the area in 2015 (590 thousand hectares). Although the cultivated area decreases, the average yield increases by 20% in 2020 (4.94 kg/ha) compared to 2015 (4.12 kg/ha). Total production increased by 18% in 2020 (2.9 million tonnes) compared to 2015 (2.4 million tonnes).

Thus, it can be seen that Romania's wheat area in 2020 was higher, about 4 times higher than the area recorded in Serbia, and Romania's production was twice as high (Table 2), again indicating higher wheat yields in Serbia compared to Romania.

Figure 1. Romania's export potential for sunflowers
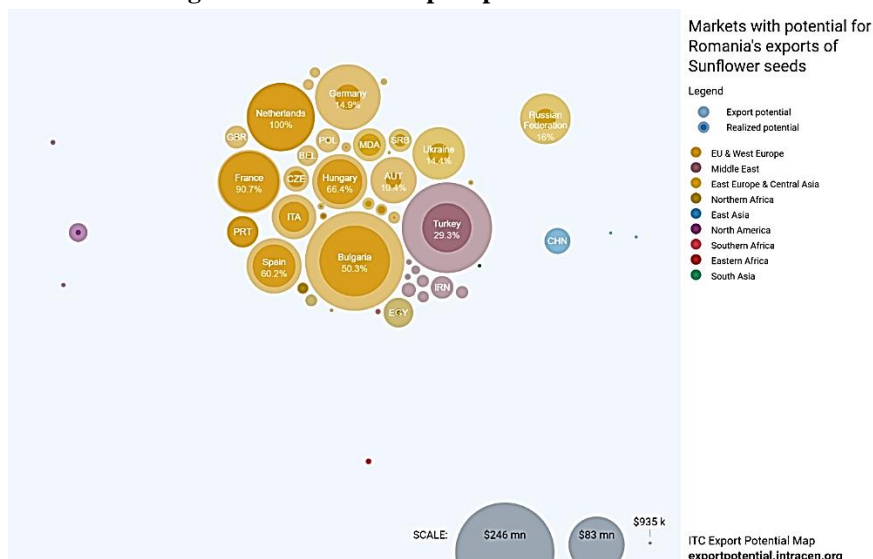
Source: intracen.org.

According to the intracen.org website, the markets with the highest potential for sunflower exports are Bulgaria, Turkey, and the Netherlands. Current exports to Bulgaria amount to $124 million and the remaining potential would be $123 million, while in the case of Turkey, current exports amount to $60 million and the remaining potential would be $145 million (Figure 1).

Figure 2. Romania's wheat export potential
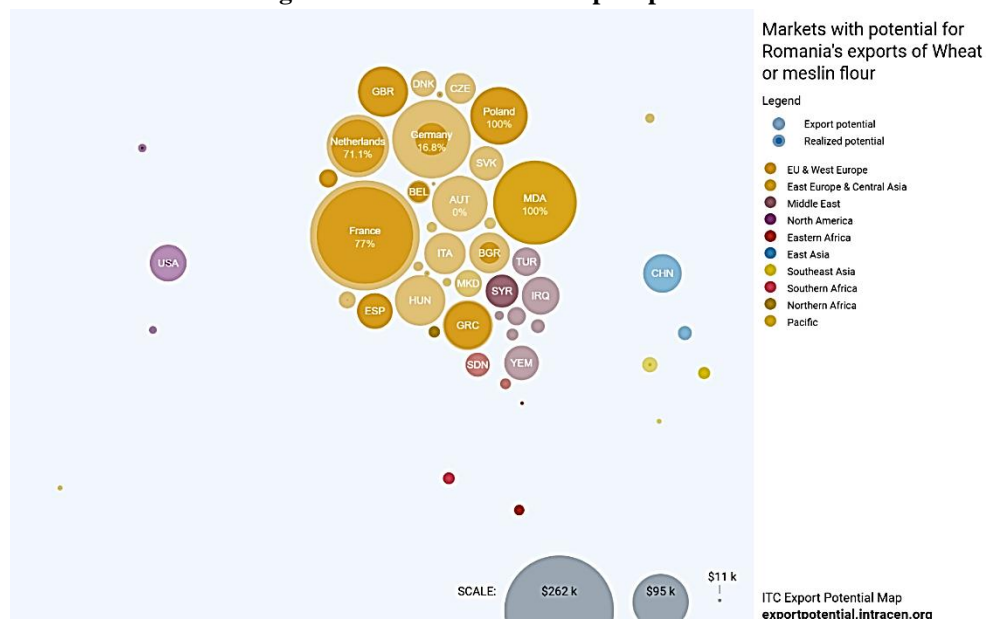
Source: intracen.org.

In the case of wheat, the markets with the highest potential for Romanian exports are France, Moldova, and Germany. Current wheat exports to France are worth $202 million, and the remaining potential is around $60 million. And in the case of Germany, current wheat exports stand at $26 million, but the remaining export potential would be $128 million (Figure 2).

Table 3. World's main sunflower producers in 2019 (tonnes)

Country	Production	% of Top 25
Russia	15,379,287	28,31%
Ukraine	15,254,120	28,08%
Argentina	3,825,750	7,04%
Romania	3,569,150	6,57%
China	2,420,000	4,45%
Serbia	729,079	1,34%

Source: FAO.

In 2019, at the world level, the first place was occupied by Russia with 15.4 million tonnes, followed by Ukraine with a production of 15.3 million tonnes and Argentina with 3.8 million tonnes. Romania is an important player in the oilseed market, ranking fourth in 2019 in sunflower production. Serbia also ranks 15th with a production of 729 thousand tonnes (Table 3).

Figure 3. The area under sunflower in Romania, trends and estimates (ha)
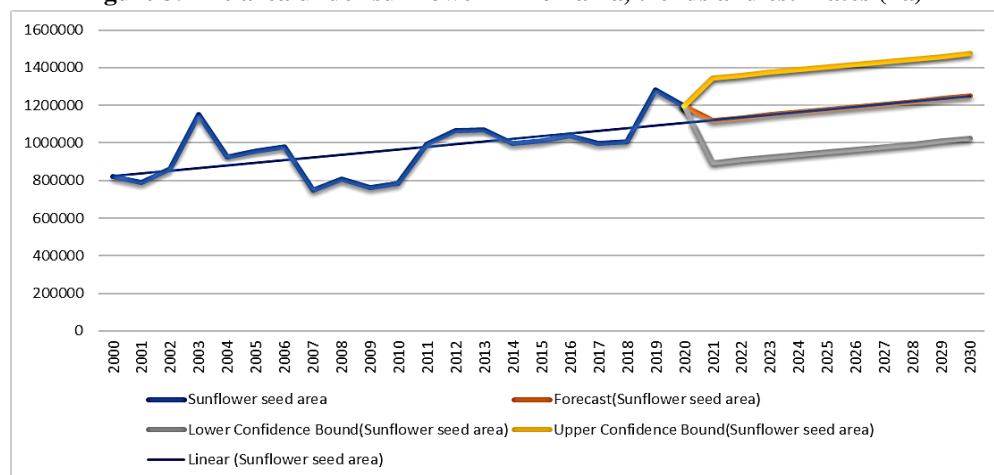
Source: Own processing based on FAO data.

In 2000, the area under sunflower cultivation was about 822.1 thousand hectares, reaching a cultivated area of about 1.2 million hectares in 2020. It is estimated that the area under sunflowers in 2030 will be more than 1.2 million hectares. The pessimistic variant estimates an area of 1 million hectares, while the optimistic variant estimates an area of 1.5 million hectares in 2030 (Figure 3).

Figure 4. Sunflower seeds production in Romania, trends and estimates (tonnes)
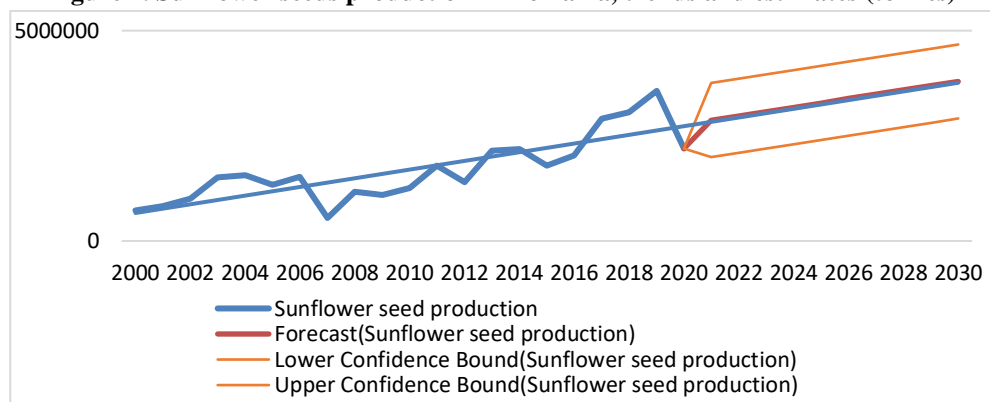
Source: Own processing based on FAO data.

Sunflower seed production in 2000 was around 270.8 thousand tonnes, reaching 2.2 million tonnes in 2020. According to estimates, 3.9 million tonnes will be produced in 2030, an increase of 77% compared to 2020. The pessimistic scenario also estimates sunflower seed production of around 3 million tonnes, while the optimistic scenario estimates production of 4.8 million tonnes in 2030 (Figure 4).

Figure 5. Wheat area in Romania, trends and estimates (ha)
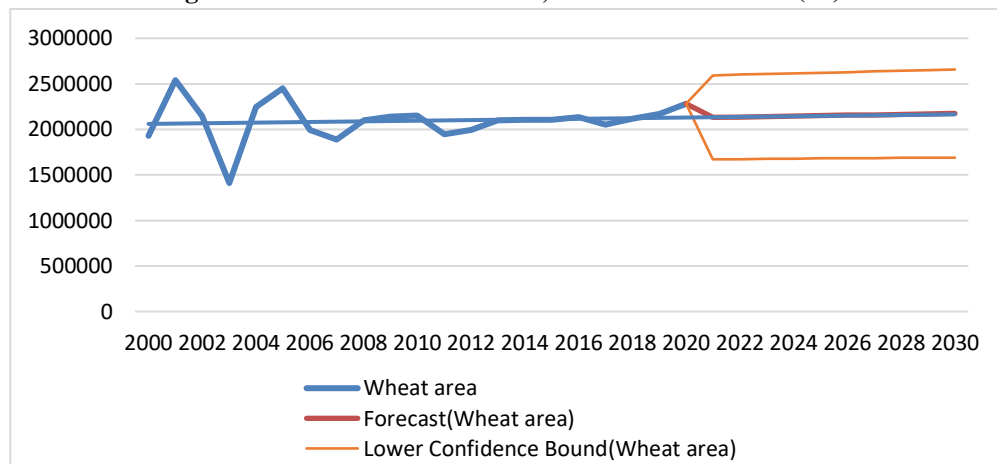
Source: Own processing based on FAO data.

Regarding the evolution of the wheat area in Romania, in 2000 an area of 1.9 million hectares was recorded, reaching a cultivated area of 2.3 million hectares in 2020. Estimates show that in 2030 the wheat area will reach 2.2 million hectares, a decrease of 4.3% compared to 2020. The optimistic scenario estimates a cultivated area of 2.6 million hectares, while the pessimistic scenario estimates a cultivated area of 1.7 million hectares in 2030 (Figure 5).

Figure 6. Wheat production in Romania, trends and estimates (tonnes)
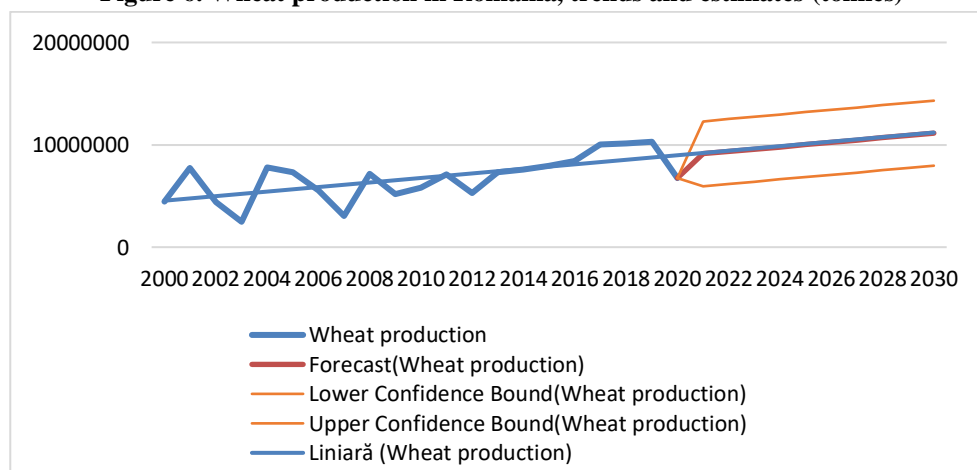
Source: Own processing based on FAO data.

Wheat production in 2000 was 4.4 million tonnes, which increased to 6.7 million tonnes in 2020. Production in 2030 is estimated to be 16 million tonnes, up 138% from 2020. The optimistic scenario estimates production at 14.1 million tonnes, while the pessimistic scenario estimates production at 8 million tonnes in 2030 (Figure 6).

Figure 7. The area under wheat in Serbia, trends and estimates (ha)
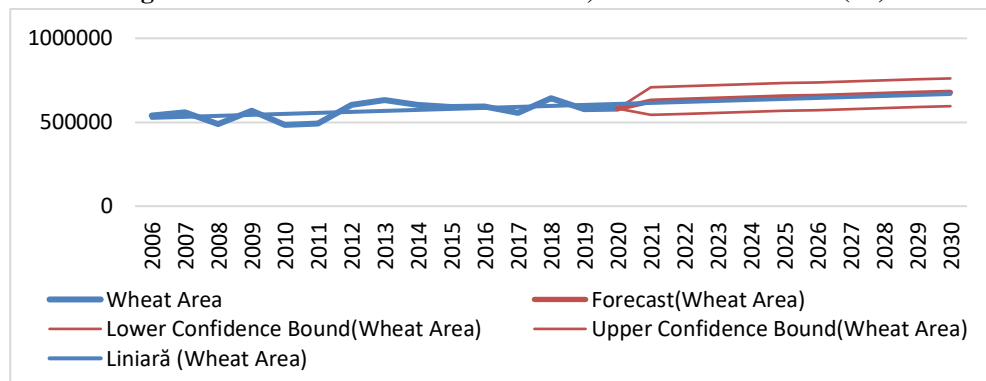
Source: Own processing based on FAO data.

In 2006, Serbia recorded an area of 539,813 hectares of wheat cultivation, reaching 581,128 hectares in 2020. According to estimates, in 2030 Serbia will cultivate wheat on 690,000 hectares, an increase of 17.7% compared to the area recorded in 2020. The optimistic variant estimates an area of 780,000 hectares and the pessimistic variant estimates 600,000 hectares (Figure 7).

Figure 8. Wheat production in Serbia, trends and estimates (tonnes)
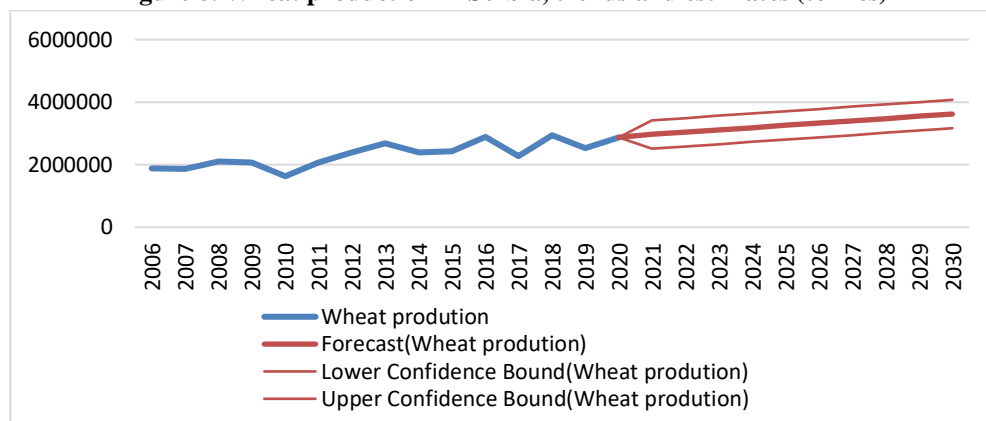
Source: Own processing based on FAO data.

In Serbia, wheat production in 2006 was 1,875,335 tonnes, reaching 2,873,503 tonnes in 2020. According to estimates, in 2030 production will reach 3,600,000 tonnes, the optimistic variant estimating production of over

4,000,000 tonnes, while the pessimistic variant estimates production of 3,200,000 tonnes (Figure 8).

Table 4. Comparative analysis of wheat balance in Romania and Serbia (1000 tonnes)

Specification	România		Serbia	
	2018	**2019**	**2018**	**2019**
Production	10,143.67	10,297.11	2,941.60	2,534.64
Import Quantity	692.64	853.98	0,95	1.09
Stock Variation	820.01	1,099.59	73,23	428.83
Export Quantity	5,880.52	6,103.15	1,107.38	324.41
Feed	370.32	493.66	310.80	367.35
Seed	889.49	584.63	137.42	166.06
Loss	22.00	15.62	73.71	49.08
Processed	2,853.33	2,853.33	1,240.00	1,200.00

Source: FAO.

In 2019, Romania recorded a production of 10.3 million tonnes of wheat, to which 854 thousand tons of imported wheat were added. At the same time, the quantity exported was 6.1 million tonnes, while animal feed, sowing and losses totalled 1.1 million tonnes, to which was added the 2.85 million tonnes intended for processing, resulting in a change in stocks of around 1.1 million tonnes.

In the case of Serbia, production in 2019 totaled 2.53 million tonnes, of which 429 thousand tonnes were exported, while animal feed, sowing and losses totalled 582 thousand tonnes, resulting in a stock change of 428 thousand tonnes.

Both Romania and Serbia, in terms of wheat, it can be said to ensure food security (Table 4).

6. Conclusions

The results of the study show that the wheat sectors in Romania and Serbia registered growth in both area and production in the reference period 2016-2020. Therefore, the wheat area in Romania increased by 18% in 2020 compared to 2016, while in Serbia the area increased by 33% in the same period. In terms of total production, in Serbia it increased by 9% in 2020 compared to 2016, while in Romania it increased by only 4%. Sunflower cultivation in Romania increased by approximately 9% in terms of area cultivated in 2020 compared to 2016, while Serbia recorded a decrease of 1.5%. In terms of yields, Romania recorded a 22% decrease in average production in 2020 compared to 2016, while Serbia recorded an increase of more than 20%.

According to estimates, the area under sunflower in Romania will remain at 1.2 million hectares in 2030. In the case of sunflower seed production, estimates show that it will reach 3.9 million tonnes in 2030, an increase of 77% compared to the production recorded in 2020. The estimates of the wheat area in 2020 show a decrease of 4.3% in 2030 (2.2 million hectares) compared to the area in 2020 (2.3 million hectares). Wheat production estimates show a significant

increase of 138% in 2030 (16 million hectares), compared to production in 2020 (6.7 million tonnes).

These results validate the hypothesis that the Romanian and Serbian outputs of wheat and sunflower seeds are sufficient to cover the domestic food security and the foreign trade. Future research should consider the political risks that could be significant drivers in agricultural output achievement, logistic issues that could block the proper distribution of cereals, and other unpredictable factors.

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Trends of Vegetables Market in Romania

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Abstract

The paper presented the main directions and trends that are manifested on the Romanian vegetable market in order to identify the market perspectives in the context of a sustainable development of the agri-food market. The agri-food sector is currently facing a reduction in the pressure on resources by reducing meat consumption and increasing the consumption of vegetables and fruits, which is one of the global directions that should be followed. In Romania, the vegetable market is a dynamic, characterized by a specific behavior resulting from the following characteristics: seasonality of products, high degree of perishability, specific areas of production, and automatic demand and supply. The paper begins with a brief review of the data on the Romanian market of vegetable products. From the statistical data published by the National Institute of Statistics in Food Balances from 2015-2020, it was found that both the demand and the supply increased at these times; however, it was found that the supply is higher reduced face. This is why it is necessary to carry out imports of vegetable products.

Keywords: vegetables, demand, supply, trade balance, Romania.

JEL Classification: Q13.

1. Introduction

In Romania, the vegetable market has certain peculiarities that differentiate it from the markets of other agricultural products, among which the most important are the following: atomization of supply and demand, seasonality of vegetable products, vegetable zoning, and the existence of a poorly developed marketing system. On the other hand, the demand for vegetable products is continuous,

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while the supply is seasonal. This generates increased price volatility in these product categories.

Romania ranks 5th in the top countries producing fruits and vegetables in Europe, after countries such as Spain, Italy, Poland, and Greece. Surprisingly, despite this excellent position, the country still has to import more than 65% of the fruits and 40% of the vegetables consumed (Best food importers, 2017).

Romania exported in 2020 a quantity of vegetables of approx. 35,320 metric tons. In 2019, Romania sold approximately 61,368 tons of vegetables. Only for 2019, the Romanian vegetable market increased, the change being 26.085% compared to 2018. Between 2017 and 2019, vegetable exports decreased by -5.7%. Regarding the value of exports, in 2019 Romania sold vegetables worth 179.41 million USD, registering a decrease of -20.66% compared to the total export of vegetables in 2018, respectively, 226.136 million USD. Romania's most popular vegetable destinations are Armenia, Hungary, Italy, Greece, and the United Kingdom (UK) (Selina Wamucii, 2022).

Market prices for vegetables have fallen. Before 2019, a kilogram of vegetables for export cost USD 2.87 in 2017 and USD 4.65 in 2018. Starting in 2019, the export price decreased to USD 2.92 per kilogram, by -37.076% more reduced. Currently, the price range for Romanian vegetables is between 2.92 USD and 4.65 USD per kilogram, in the national currency being 11.91 lei per kg. The average price per ton is 2923.48 USD in Iasi and Bucharest (Selina Wamucii, 2022).

2. Problem Statement

According to the Food and Agriculture Organization (FAO), it is recommended to eat different types of vegetables depending on the age group. For consumers over 12 years of age, vegetables in a quantity of 350g / day are recommended. This consumption leads to an average annual consumption of 120 kg of vegetables. However, at the national level, the consumption of vegetables is lower than the recommendations of nutritionists, although their consumption brings many health benefits (Soare et al., 2017).

The United Nations report states that only high-middle-income countries have enough fruits and vegetables available to consumers, so that the 400 g per day recommendations can be met globally, so low-income countries rely on cereals. To ensure the food security of the population, the food pattern being transferred to a secondary plan (Lădaru et al., 2020).

According to a study conducted at the the European Union (EU) level in 2014, it was found that Romania is on the last place in the ranking in terms of consumption of fruits and vegetables. The first places in the ranking are occupied by countries such as: Greece, Croatia, and Slovenia (Soare et al., 2016).

The research conducted by Constantin et al., 2022, specifies that the diet of Romanians is quite diverse and ensures nutritional security, although low income levels have been observed in some regions of the country, which influences the buying behavior of food.

At the market level, demand is a deciding factor. It decides how much to produce for that market. Potential demand is heavily influenced by consumption patterns and physiological needs, while actual demand is influenced by consumer purchasing power. The supply of vegetables should meet the demand. This being quantitatively influenced by the cultivated area and qualitatively by the yields obtained (Turek et al., 2008).

Previous research (Ion et al., 2015) shows that domestic vegetable production does not cover domestic consumption, the main reasons being the specific demand and supply of agricultural products and the high losses in this sector. The latter are largely recorded in the field, during transport, due to its poor transport and poor storage, due to the lack of shelters to ensure optimal climatic conditions for storing vegetables.

Romania has a high production potential, being able to produce a wide variety of vegetable varieties throughout the year due to its climate and soil conditions that give them a special taste. Vegetable production is seasonal, which means that it cannot meet the needs of the market at all times of the year (Popescu, 2013).

Vegetable production requires a very high consumption of factors of production, especially labor. The assortments of vegetables on the market are varied, and the production of vegetables has different destinations, such as: for fresh consumption, processing, and export that requires the organization of distribution channels to consumers (Ion & Dobre, 2015).

3. Research Questions / Aims of the Research

This research aims to analyze the market with the general objective of identifying the main trends of the Romanian vegetable market. The paper aims to answer one of the most important questions for those working in this market, namely: "What are the trends in the Romanian vegetable market?" Also, another question that underlies the research refers to the supply of the necessary vegetables, namely: "If the demand is greater than the supply?"

The results of the research will help farmers, processors and retailers in their efforts to make investments in certain branches of this industry and to better understand the factors that have a direct impact on the consumption and production of vegetables in Romania.

4. Research Methods

The paper is based on statistical data provided by the National Institute of Statistics, on food balances in 2015-2020, from which data were collected on resources, its components (usable production and imports) and uses with its components (export, domestic availability for consumption, intermediate consumption, total losses, stock change, and availability for human consumption).

The research method used in conducting the study consisted of quantitative and qualitative analysis of data, in order to highlight the trend of evolution of the statistical indicators analyzed. The demand of the vegetable market was

substantially supported (in time), being taken into account several time series, in order to be able to identify the trends and changes on the market, respectively, on the demand and supply of vegetables.

5. Findings

In a statistical approach, the nutritional balances were analyzed for the main vegetables obtained in Romania, respectively: legumes, vegetables and vegetable products, tomatoes, dried onions, cabbage, and edible roots, the data being expressed in tons of fresh vegetables.

Table 1. Nutrition balance for pulses at the levels of the period 2015-2020

GRAIN LEGUMES	Years						
	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2020/2015**
	tons	tons	tons	tons	tons	tons	%
A. RESOURCES	101440	127682	366646	232820	275274	163737	161,41
1. Usable production	75757	99312	301680	191475	236423	121679	160,62
2. Import	25683	28370	64966	41345	38851	42058	163,76
B. USES	101440	127682	366646	232820	275274	163737	161,41
3. Export	3554	63023	197037	69000	76872	5612	157,91
4. Internal availability for consumption	97886	64659	169609	163820	198402	158125	161,54
5. Intermediate consumption	32355	31654	104212	81335	113456	91949	284,19
5.1 Seed consumption	11679	12815	32807	36660	42980	34580	296,09
5.2 Feed consumption	20676	18839	71405	44675	70476	57369	277,47
5.3 Industrial processing	-	-	-	-	-	-	-
5.4 Industrial transformation	-	-	-	-	-	-	-
6. Total losses	446	206	1391	476	785	254	56,95
7. Stock change (±)	2619	-8023	16994	2952	5848	-2934	-112,03
8. Available for human consumption	62466	40822	47012	79057	78313	68856	110,23

Source: Food balances 2015-2020, INS.

The total resources of legume grains decreased in 2020, by 111.5 thousand tons, compared to the previous year, mainly due to the decrease in production. Imports increased by approx. 163.76% in 2020 (42.058 tons) compared to 2015 when 25,683 tons were registered (Table 1).

Figure 1. Dynamics of trade balance for pulses (tons)
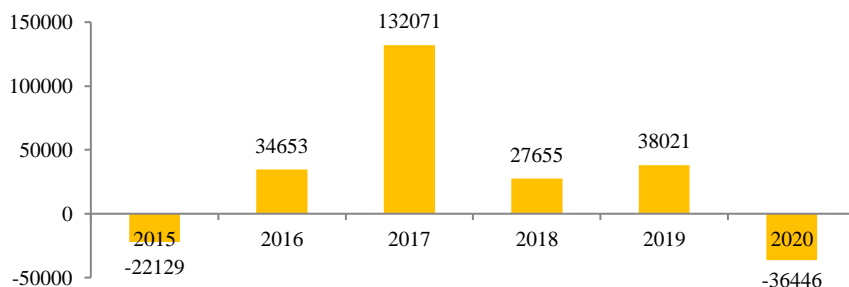
Source: processing data from the 2015-2020 food balances, INS.

Analyzing the dynamics of the trade balance in the analyzed period, a variation of it was noticed in the legume grains. In 2015, the trade balance registered a deficit of 22.129 tons. After a relatively stable period with positive values, the trade balance reached a deficit of 36.446 tons in 2020 (Figure 1).

Table 2. Food balance for vegetables and vegetable products for the period 2015-2020

VEGETABLES AND VEGETABLE PRODUCTS	Years						
	2015	2016	2017	2018	2019	2020	2020/2015
	tons	tons	tons	tons	tons	tons	%
A. RESOURCES	3709369	3550011	3751276	3985390	3800291	3784193	102,02
1. Usable production	3123575	2880833	3084932	3213561	3010704	2970641	95,10
2. Import	585794	669178	666344	771829	789587	813552	138,88
B. USES	3709369	3550011	3751276	3985390	3800291	3784193	102,02
3. Export	59837	43654	54799	61842	57101	80085	133,84
4. Internal availability for consumption	3649532	3506357	3696477	3923548	3743190	3704108	101,50
5. Intermediate consumption	140481	127956	132495	138240	130848	128979	91,81
5.1 Seed consumption	3063	2939	2912	2984	2933	2891	94,38
5.2 Feed consumption	137418	125017	129583	135256	127915	126088	91,76
5.3 Industrial processing	-	-	-	-	-	-	
5.4 Industrial transformation	-	-	-	-	-	-	
6. Total losses	291329	270110	289103	309750	291403	294101	100,95
7. Stock change (±)	76936	37289	99099	97048	23882	47968	62,35
8. Available for human consumption	3140786	3071002	3175780	3378510	3297057	3233060	102,94

Source: Food balances 2015-2020, INS.

For vegetables and vegetable products in 2020, the total resources were lower than in the previous year by 16.09 thousand tons (Table 2).

Figure 2. Dynamics of trade balance for vegetables and vegetable products (tons)
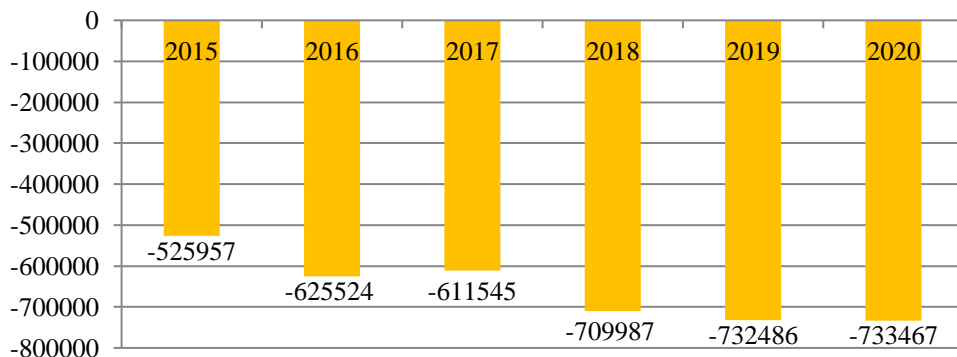
Source: processing data from the 2015-2020 food balances, INS.

Regarding the dynamics of the trade balance registered in vegetables and vegetable products, a significant increase of the deficit was observed in the analyzed period, thus in 2020, the deficit reached 733.467 tons, 39% higher than in 2015, respectively 525.957 tons (Figure 2).

Table 3. Nutrition balance for tomatoes for the period 2015-2020

TOMATOES (equivalent to fresh vegetables)	Years						
	2015	2016	2017	2018	2019	2020	2020/2015
	tons	tons	tons	tons	tons	tons	%
A. RESOURCES	943323	904756	917240	1012202	978126	1022008	108,34
1. Usable production	695188	627177	679807	742899	689401	698424	100,47
2. Import	248135	277579	237433	269303	288725	323584	130,41
B. USES	943323	904756	917240	1012202	978126	1022008	108,34
3. Export	4421	3291	3987	4678	6442	8792	198,87
4. Internal availability for consumption	938902	901465	913253	1007524	971684	1013216	107,91
5. Intermediate consumption	-	-	-	-	-	-	-
5.1 Seed consumption	-	-	-	-	-	-	-
5.2 Feed consumption	-	-	-	-	-	-	-
5.3 Industrial processing	-	-	-	-	-	-	-
5.4 Industrial transformation	-	-	-	-	-	-	-
6. Total losses	176771	161625	172651	189068	177005	180565	102,15
7. Stock change (±)	-2299	-15406	3470	13085	-7815	21083	-917,05
8. Available for human consumption	764430	755246	737132	805371	802494	811568	106,17

Source: Food balances 2015-2020, INS.

The total resources of tomatoes (equivalent to fresh vegetables) in 2020 were 43.8 thousand tons higher than in the previous year, mainly due to the increase in production (Table 3).

Figure 3. Dynamics of the trade balance for tomatoes (tons)
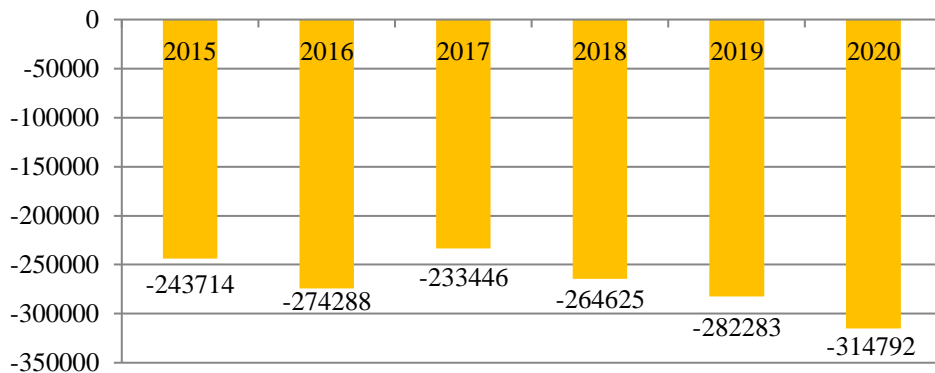
Source: processing data from the 2015-2020 food balances, INS.

In the period 2015-2020, the trade balance for tomatoes was deficient. In 2015, the trade balance registered a deficit of 243.714 tons, in 2020 it reached a deficit of 314.792 tons (Figure 3).

Table 4 Nutrition balance for dried onions in the period 2015-2020

DRIED ONIONS (equivalent to fresh vegetables)	Years						
	2015	2016	2017	2018	2019	2020	2020/2015
	tons	tons	tons	tons	tons	tons	%
A. RESOURCES	417478	404470	415620	460586	452776	408373	97,82
1. Usable production	353622	325074	352165	350159	340635	326740	92,40
2. Import	63856	79396	63455	110427	112141	81633	127,84
B. USES	417478	404470	415620	460586	452776	408373	97,82
3. Export	1663	666	1368	1520	1014	1937	116,48
4. Internal availability for consumption	415815	403804	414252	459066	451762	406436	97,74
5. Intermediate consumption	433	386	418	434	425	405	93,53
5.1 Seed consumption	433	386	418	434	425	405	93,53
5.2 Feed consumption	-	-	-	-	-	-	-
5.3 Industrial processing	-	-	-	-	-	-	-
5.4 Industrial transformation	-	-	-	-	-	-	-
6. Total losses	12664	12440	12813	14160	13910	12567	99,23
7. Stock change (±)	-13390	-10941	10364	1440	-3479	-4588	34,26
8. Available for human consumption	416108	401919	390657	443032	440906	398052	95,66

Source: Food balances 2015-2020, INS.

For dried onions, the total resources (equivalent to fresh vegetables) in 2020 (408.373 tons) were reduced by 44.4 thousand tons compared to the previous year (452.776 tons) (Table 4).

Figure 4. Dynamics of the trade balance for dried onions (tons)
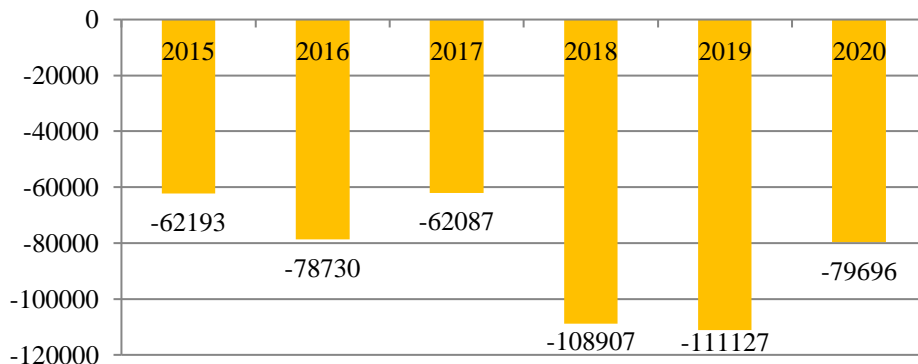
Source: processing data from the 2015-2020 food balances, INS.

Regarding the dynamics of the trade balance recorded for dried onions, there was an increase in the deficit in the analyzed period, so in 2020, the deficit reached 79.696 tons, 28% higher than in 2015, respectively 62.193 tons.

Table 5. Food balance for cabbage in the period 2015-2020

CABBAGE (equivalent to fresh vegetables)	Years						
	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2020/2015**
	tons	tons	tons	tons	tons	tons	%
A. RESOURCES	1086472	1018824	1052568	1097213	1015208	1003455	92,36
1. Usable production	1066299	992398	1026575	1065537	985842	973667	91,31
2. Import	20173	26426	25993	31676	29366	29788	147,66
B. USES	1086472	1018824	1052568	1097213	1015208	1003455	92,36
3. Export	1792	1424	2061	2090	3332	2819	157,31
4. Internal availability for consumption	1084680	1017400	1050507	1095123	1011876	1000636	92,25
5. Intermediate consumption	106630	99240	102658	106554	98584	97367	91,31
5.1 Seed consumption	-	-	-	-	-	-	-
5.2 Feed consumption	106630	99240	102658	106554	98584	97367	91,31
5.3 Industrial processing	-	-	-	-	-	-	-
5.4 Industrial transformation	-	-	-	-	-	-	-
6. Total losses	34706	32536	33625	35034	32412	32055	92,36
7. Stock change (±)	108591	75915	80666	86633	32183	31391	28,91
8. Available for human consumption	834753	809709	833558	866902	848697	839823	100,61

Source: Food balances 2015-2020, INS.

The total resources of cabbage (in the equivalent of fresh vegetables), in the year 2020, were lower than those of the previous year by 11.7 thousand tons, due to the decrease of the production mainly (Table 5).

Figure 5. Trade balance in cabbage (tons)
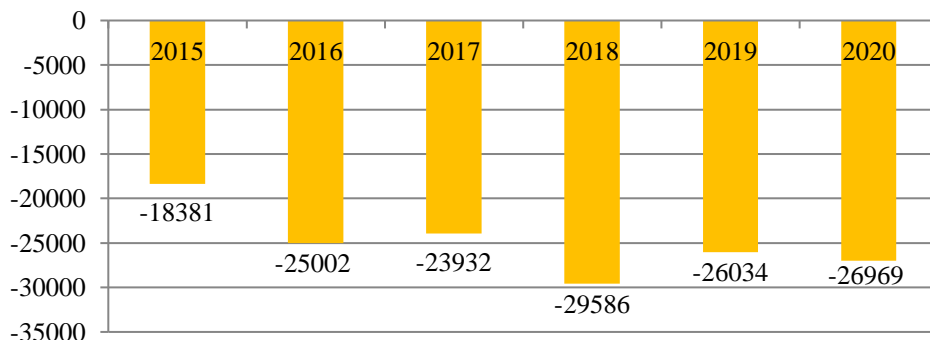
Source: processing data from the 2015-2020 food balances, INS.

Analyzing the dynamics of the trade balance registered in cabbage, a significant increase of the deficit in the analyzed period was noticed, from 18.381 tons in 2015 to 26.969 tons in 2020, the increase being of 47%.

Table 6. Food balance for edible roots in the period 2015-2020

EDIBLE ROOTS (equivalent to fresh vegetables)	Years						
	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2020/2015**
	tons	tons	tons	tons	tons	tons	%
A. RESOURCES	308196	290904	309566	330441	313910	295347	95,83
1. Usable production	227004	219232	217874	232836	226192	208130	91,69
2. Import	81192	71672	91692	97605	87718	87217	107,42
B. USES	308196	290904	309566	330441	313910	295347	95,83
3. Export	1634	273	565	1026	979	1851	113,28
4. Internal availability for consumption	306562	290631	309001	329415	312931	293496	95,74
5. Intermediate consumption	20430	19731	19609	20955	20357	18732	91,69
5.1 Seed consumption	-	-	-	-	-	-	-
5.2 Feed consumption	20430	19731	19609	20955	20357	18732	91,69
5.3 Industrial processing	-	-	-	-	-	-	-
5.4 Industrial transformation	-	-	-	-	-	-	-
6. Total losses	6267	5913	6293	6715	6379	6004	95,80
7. Stock change (±)	-1803	-1563	1100	219	336	-927	51,41
8. Available for human consumption	281668	266550	281999	301526	285859	269687	95,75

Source: Food balances 2015-2020, INS.

The total resources of edible roots (equivalent to fresh vegetables), in 2020, were lower than in the previous year by 18.5 thousand tons, mainly due to the decrease in production (Table 6).

Figure 6. Dynamics of the trade balance for edible roots (tons)
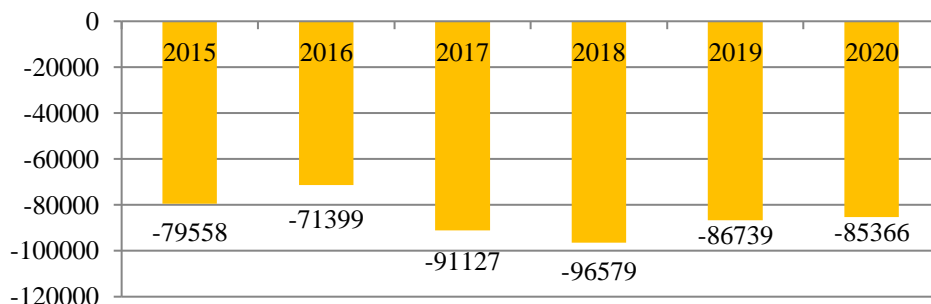
Source: processing data from the 2015-2020 food balances, INS.

In the case of edible roots, the registered trade balance was a deficient one, at the level of the analyzed period, respectively 2015-2020 the deficit showed increases reaching thus in 2020 to 85.366 tons, higher by 7.3% than in 2015, respectively, 79.558 tons.

Vegetable production per capita is higher in Romania compared to the average production per capita in the EU. On average, consumption increased in a positive way reflecting the production and imports obtained (Popescu, 2013).

In the period 2015-2020, the average annual per capita consumption of vegetables increased. For vegetables, the average consumption increased by approx. 112.5% in 2020 (3.6 kilograms / inhabitant) compared to the respective reference year 2015, when a consumption of 3.2 kilograms / inhabitant was reported.

Figure 7. Dynamics of the average annual consumption per inhabitant, for vegetables (kg)
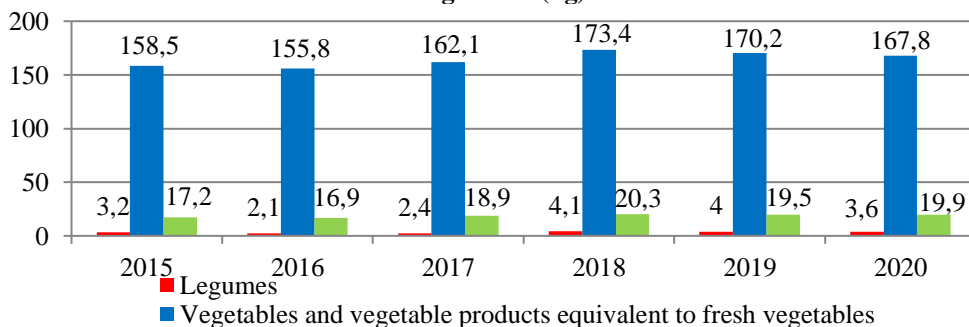
Source: processing data from the 2015-2020 food balances, IN.

Regarding the consumption of vegetables and vegetable products in the equivalent of fresh vegetables, there was an increase of 105% in the analyzed period, from 158.5 kg / inhabitant in 2015 to 167.8 kg / inhabitant in 2020 (Figure 7).

Figure 8. The average prices of the main vegetable products for the whole country in the period 2015-2020 (lei/kg)
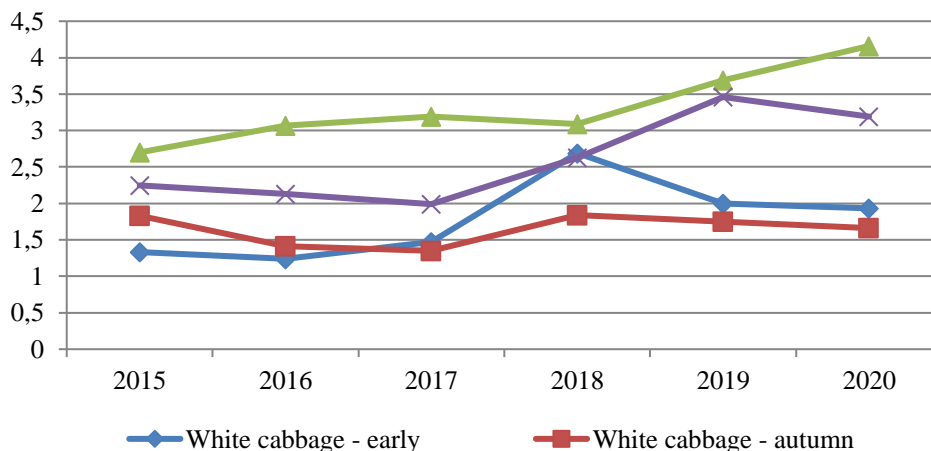
Source: processing data from the 2015-2020 food balances, INS.

The average prices of early white cabbage and autumn white cabbage increased during the analyzed period by 156% and 118%, respectively. Regarding the average price of tomatoes in the field, it varied between 2.7 lei/kg in 2015 and 4.16 lei/kg in 2020, when there was an increase of 136%. For dried onions, the average annual price varied between 1.99 lei/kg in 2017 and 3.46 in 2019, with an increase of approximately 150% during the period.

6. Conclusions

Current research shows that the Romanian vegetable market is dynamic, with both demand and supply on an upward trend. However, the need for vegetable products cannot be met from domestic production, as imports have increased significantly in recent years. The supply of vegetable products is relatively unstable; this situation leads to the appearance of obstacles in the organization of production and marketing activities in this sector, for which it is very necessary to concentrate production to purchase large quantities of goods.

Following the research, it was found that self-consumption remains a feature of the Romanian vegetable market, as it was in the previous period. Given the particularly important role that vegetables play in their diet, their role is also highlighted in the place they have in the healthy food pyramid, as they are in the second position, the future strategic directions of the vegetable market would be it must focus on encouraging the consumption and export of vegetables, which requires the production of a large quantity of vegetables from domestic production.

Given that Romania is a net importer of agri-food products, with the exception of cereals, the level of competitiveness is constantly declining, vegetable production should increase in order to better cover the needs of the internal market and to support exports to the EU market.

Acknowledgment

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Understanding the Factors Underlying Czech Consumers' Choice of Healthy Food: a Conceptual Framework

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Abstract

Obesity and other diet-related diseases remain a significant public health concern around the world. Besides, obesity rates continue to overwhelm in the Czech Republic, pressing policymakers to design interventions that support disease prevention and promote overall health among the population. However, crafting effective interventions requires comprehensive knowledge about consumers' food choices and dietary patterns, which remains limited in the context of Czechia. In an attempt to narrow this gap, this paper presents a conceptual framework for understanding the factors underlying Czech consumers' choice of healthy food. A comprehensive review and synthesis of the literature in various domains was performed to establish the concept. Founded on the theory of planned behavior, it is postulated that consumers' attitudes toward healthy food form their intention to consume healthy food. Concurrently, the attitude toward healthy food is preceded by food choice motives (e.g., health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern). It is also argued that personality traits could potentially moderate the strength of motive-attitude-intention relationships. It is important to empirically examine the parameter relationships specified in the proposed research framework to expand theoretical knowledge about the motivation, attitude, and intention paradigm and the indirect effects of personality traits. Most importantly, future empirical assessment of the research model will offer practical insights into the design of behavioral interventions that promote healthy dietary patterns and promote overall health among Czech consumers, especially in the post-pandemic era.

Keywords: personality traits, theory of planned behaviour, healthy food choice, consumer behaviour.

JEL Classification: M30, I12, E20.

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1. Introduction

The increasing urbanization of societies is inciting the shifts in lifestyles, consumption, and dietary patterns among consumers, exacerbating the gravity of obesity and other diet-related health concerns (World Health Organization, 2020). The World Health Organization (WHO) continues to emphasize the urgency in addressing the issue of "globesity" as it escalates around the world. The WHO instituted a global strategy framework that promotes a cooperative response effort from the civil society and stakeholders in the public and private sectors. It mainly encompasses supporting healthy diets and physical activity towards disease prevention and overall health promotion, consequently reducing healthcare expenditures and yielding economic incentives.

The Czech Republic is one of the European countries that suffers from a high incidence of obesity. Obesity rates reached 20% of the population in 2017, exceeding the 15% EU average (OECD/European Observatory on Health Systems and Policies, 2019). Rising unemployment, poor sleeping habits for certain groups of the population (Olišarová et al., 2018), low physical activity, high tobacco/cigarette consumption, and alcohol consumption all contributed to the prevalence of obesity in the country (Fialova, 2018). Overweight and obesity appear to be most common among men, people over the age of 64, people living in rural areas, and lower socioeconomic class (Marques et al., 2018, Olišarová et al., 2018).

National policies and programs combatting diet-related health concerns are still underdeveloped in the Czech Republic (Voráčová et al., 2015). Some efforts are being made to increase nutrition literacy, and reportedly more and more Czech consumers express interest in calories, carbohydrates, and sugar information on food (Vesela et al., 2021). However, the prevalence of overweight and obesity continues to challenge the country. The trend is even stretching toward children (Landovska, 2021). Family affluence seems to be a contributing factor (Sigmund et al., 2018), where overweight problems among adolescents and school children have been found in families with lower welfare. Furthermore, Czech children and adolescents have a low daily consumption of fruit and vegetables compared to other European countries (Voracova et al., 2015).

Obesity and dietary issues are important economic discourses. The associated costs of these problems seem to increase substantially in the future, especially when left ignored. As this transpires, Czech health care may become unsustainable as obesity among adults and children grows (Landovska, 2021, Vesela et al., 2021). Only a handful of research investigations accent the eating habits in the Czech Republic (Vesela et al., 2021) to promote healthy dietary patterns and consequently alleviate obesity and dietary-related issues. Little is known about Czech consumers' motives and other factors influencing their food choices. Securing information on such matters is crucial, as the efficacy of the proposed resolution demands a comprehensive understanding of the population's behavior regarding food consumption.

2. Problem Statement

Urging consumers to adopt a healthy dietary pattern demands understanding their food choices' motives (Mielmann & Brunner, 2020). Scholars claim that health considerations do not solely drive healthy food selection or dietary habits. Individuals hold on to different motives (i.e., health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern) in selecting food (Steptoe et al., 1995). The level at which these motives affect their food consumption varies in different socioeconomic and cultural settings. As far as the existing literature is concerned, knowledge about the motives and biases toward healthy food consumption among Czech consumers remains limited. It is critical to acquire information about such matters to devise countermeasures that alleviate obesity and other diet-related issues pervading the country.

Meanwhile, the choice of what food to consume may also be affected by personality traits. Previous studies operationalized the five-factor theory of personality (i.e., openness, extraversion, conscientiousness, agreeableness, and neuroticism) to predict general health-related behaviors (Bogg & Roberts, 2004), eating habits (Mõttus et al., 2012), acceptance of controversial food technology (Lin et al., 2019), and in other contexts. Nystrand et al. (2021) reveal the significance of personality traits in functional food consumption, featuring the dominant influence of *conscientiousness, agreeableness, and neuroticism.* However, the authors suggested incorporating the moderator-mediator interaction effects of health habits, eating values, or attitudes towards food.

Notably, recent studies reported that the ongoing pandemic engendered a shift in consumer behaviour in general (Di Crosta et al., 2021; Guthrie et al., 2021; Hesham et al., 2021). Given the pandemic's economic and social repercussions, it is argued that consumers' overall consumption habits and food choices may have changed. In addition, the initial observation of Snuggs & McGregor (2021) reveals that consumers have amended priorities and needs since the pandemic-related measures were enforced. The authors point out that the pandemic caused anxiety and a feeling of loneliness among consumers, which have changed their shopping patterns and even caused weight gain. Głabska et al. (2020) assert the role of pandemic stressors in changing the dynamics behind the motives and the choice of healthy food. Tribst et al. (2021) highlight improvements in diet quality during the pandemic for Brazilians who have adequate time to cook, have positive feelings and are not overworked. Enriquez-Martinez et al. (2021) also reported that eating habits are mostly left unchanged during the pandemic, yet, lifestyle changes and anxiety levels suffuse. The authors argue that individuals with high anxiety levels and who were positively diagnosed with COVID-19 adopted changes in dietary patterns favoring healthier food alternatives. Essentially, the evidence reported on consumer changes in consumption habits is still contrasting on a country-to-country basis. More research is needed to comprehensively understand people's dietary patterns as influenced by the pandemic occurrence. These are important to design and implement custom policies and inventions that promote health in the post-pandemic world.

3. Research Questions / Aims of the Research

This paper reviews the literature and presents a conceptual framework for understanding the factors that influence the consumers' intention to consume healthy food. Based on the theory of planned behaviour, this work elucidates the motivations underlying consumers' healthy food choices and the potential role of individual personality traits on their food choice. Alternately, this study addresses the following research questions: i) what are the potential determinants of consumers' intention to consume healthy food?; ii) what motives influence consumers' cognitive evaluation to consume healthy food?; iii) what is the role of personality traits in food choice?

4. Research Methods

This paper used data from secondary literature sources to secure sufficient theoretical support in developing the conceptual framework for understanding consumers' choice of healthy food in the Czech Republic. *Google Scholar*, *Web of Science, and Scopus* databases were consulted, and queering keywords like *"healthy food," "food choice motives*," "*theory of planned behaviour," and "personality and consumer behaviour."* The keyword search resulted in a considerable number of research articles. Hence, the articles were carefully chosen based on three major screening criteria: a) articulates the determinants/factors related to healthy food choice, b) theory of planned behaviour and food choice, and c) personality traits and food choice. As the study aims to explore and bridge the relationships between food choice motives, the theory of planned behaviour, and personality traits, the review of the articles focuses on identifying potential links between the concepts in the healthy food choice context. Subsequently, the accumulated evidence was used to develop and explain the conceptual framework presented in this paper.

5. Findings

5.1 Theory of Planned Behaviour and Food Choice

Several studies have utilized the Theory of Planned Behaviour (TPB) (Ajzen, 1991) to explain consumer behaviour in diverse social contexts. The theory postulates that behavioural intention is a proximal determinant of actual behaviour (Ajzen, 1991; Armitage & Conner, 2001). Meanwhile, behavioural intention is influenced by attitudes (*appraisal of a given behaviour*), subjective norms (*perceived social pressure affecting a given behaviour*), and perceived behaviour control *(perceived ease of performing a given behaviour*) (Ajzen, 1991) (p. 188). A review of the literature reveals that dietary patterns (M. S. McDermott et al., 2015), food choice (Dowd & Burke, 2013; Nardi et al., 2019), and health-related behaviour in general (McEachan et al., 2011) can be robustly explained by the TPB model. Existing meta-analytic evidence also argues that the attitude exerts the strongest effect among other predictors of behavioural intention in the TPB model (Máirtín S. McDermott et al., 2015; McEachan et al., 2011; Nardi et al., 2019). Despite the robustness and flexibility of the TPB model to explain such behaviours, pioneering

authors of TPB assert the importance of understanding salient belief factors that shape attitude and other predictors of behavioural intentions (Ajzen, 1991).

5.2 Food Choice Motivations

Previous studies have investigated the underlying motivations of consumers in selecting food. Scholars typically operationalized the food choice questionnaire (FCQ), pioneered by Steptoe et al. (1995), to measure and identify what motives unpin consumers' food-related choices. The FCQ underscores nine food choice motives: health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern. However, the authors accentuate differences in the relevance of each motive according to sex, age, and income (Steptoe et al., 1995). For example, individuals in the low socioeconomic class tend to choose food for price and social reasons (Moraes et al., 2020). Young people's awareness of the health and nutrition aspects of food remains poor (Marsola et al., 2020). For parents choosing food for children, the motivations for weight control, price, and mood were insignificant (Roos et al., 2012).

Moreover, the evidence acquired from recent studies similarly reported the varying extent to which the motives influence food choice. For example, consumers driven by convenience motivation are more likely to consume fast food, processed, and less healthy food (Marsola et al., 2020). In cultures that emphasize the importance of body image, food selection is influenced by nutrient content and weight control motives (Gong et al., 2020). In the incidence of the COVID-19 pandemic, recent findings reported the relevance of health motives in the dietary patterns of consumers (Tan et al., 2021). Many more FCQ-research replications have been done; however, as context and regional variations matter, pressed FCQ variables to be re-examined, revised, and adjusted (Pula et al., 2014).

5.3 The Role of Personality Traits on Food Choice

The extent to which people prefer healthy food has become an important research theme, but preferences may differ due to personality traits. Several studies have associated five-factor personality traits: openness, extraversion, conscientiousness, agreeableness, and neuroticism with food choice. Existing evidence reported the importance of personality dimensions in explaining health behaviour, and thus should be used as input when designing health interventions. For example, high levels of neuroticism were more likely to consume carbohydrate-rich and salty foods (Golestanbagh et al., 2021; Pfeiler & Egloff, 2020; Keller & Siegrist, 2015). Neurotic or emotionally unstable individuals appear to engage in counter-regulatory emotional eating, consuming sweet and savory foods to cope with mood or unpleasant feelings (Keller & Siegrist, 2015; Golestanbagh et al., 2021). Meanwhile, the people's propensity to consume nutritious foods was favourably associated with their level of conscientiousness (Golestanbagh et al., 2021; Machado-Oliveira et al., 2020). Conscientious individuals are determined and deliberate and thus more

concerned with maintaining healthy eating habits and avoiding negative long-term health consequences (Nystrand et al., 2021).

Moreover, a high level of openness was connected with increased consumption of fruits, vegetables, salads, and fish among pregnant women in the US (Leszko et al., 2020). Individuals who score well on agreeableness exhibit trust, simplicity, camaraderie, and a great capacity for adapting to people and surroundings. Kessler et al. (2016) reported that vegan consumers exhibit more open and agreeable personalities and manifest universalistic and ethical motives in consuming food. In the Netherlands, in addition to openness, extraversion was the most consistently observed personality predictor of increased fruit and vegetable consumption among students (Conner et al., 2017). Extraversion is associated with increased urgency and motivation, enabling individuals to overcome innate aversions to fruit and vegetables (Conner et al., 2017).

5.4 The Conceptual Framework

Given the arguments presented above, this work postulates a potential association of food choice motives in the attitude-intention nexus within the bounds of TPB. A few attempts have been made to explore and validate such a conception. For example, Kim & Jeon (2020) associated motives (i.e., health, sensory response, mood, and weight control) in consumers' cognitive evaluation (attitude) and the selection of chocolate products. Ahmad et al. (2020) similarly investigated the link between food choice motives (i.e., health, mood, familiarity, sensory appeal, natural content, and price) towards attitude and consumption of ethnic food in Pakistan. Studies on the choice of organic food products also postulate the link behind food choice motives and constructs in the TPB model (Chen, 2007; Lee et al., 2015). These investigations imply that bearing certain food choice motivations influence the attitude formation toward the food product and its subsequent consumption. However, what food choice motivations and the extent of their influence on attitude vary from country to country. Pearcey & Zhan (2018) argue that food cultures, social and economic situations, and other contextual factors affect the differences in food choice motivation scores across nationalities. Furthermore, this work emphasizes that personality traits can strengthen or weaken the relationships between the consumers' food choice motivations and attitudes toward healthy food (Figure 1). Empirical evidence to validate the study's research concept can help design custom strategies and interventions to address obesity and other diet-related health issues in less-explored territories, such as the Czech Republic.

Figure 1. Conceptual framework for healthy food consumption
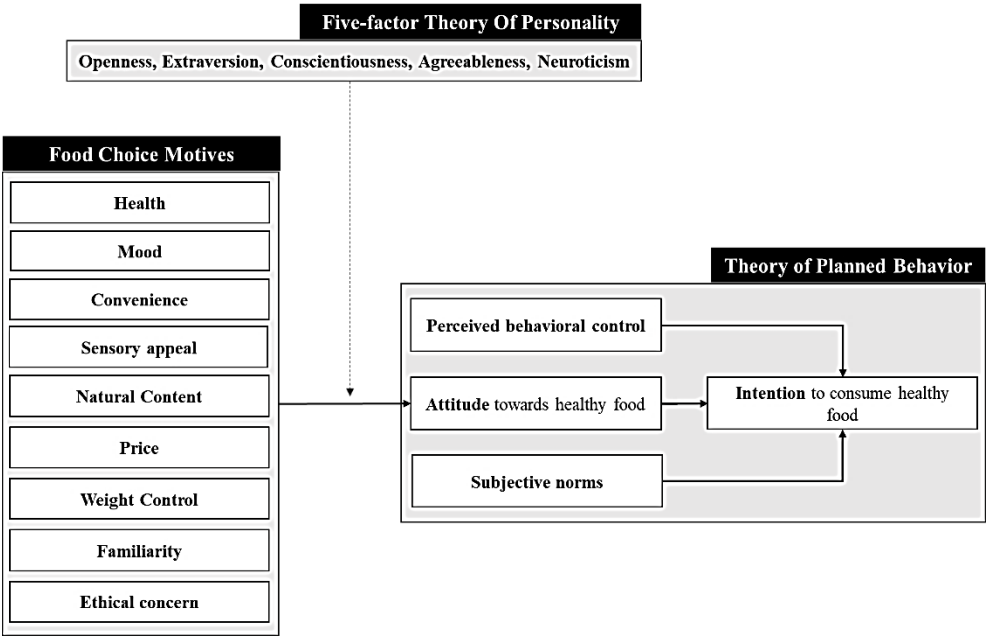
Source: Authors' own creation.

6. Conclusions

This paper presents a conceptual framework for understanding the factors influencing consumers' choice of healthy food. Building on the theory of planned behaviour (TPB), this work proposes that consumers' attitudes toward healthy food, subjective norms, and perceived behavioural control can predict healthy food consumption intentions. Meanwhile, it is postulated that consumers' food choice motivations form part of one's appraisal (attitudes) of eating healthy food. Previous findings also reported the role of personality traits on food choice and consumption. Therefore, this study argues that the strength of motives - attitude relationships can be moderated by personality traits. This work contributes to the literature by expounding on the potential links among consumers' food choice motives, attitudes, and intention to consume healthy food, including the possible indirect effects of personality traits.

Nevertheless, to validate the study's postulations, future studies should empirically test the conceptual model proposed by the study, especially in countries facing overwhelming obesity rates (e.g., the Czech Republic). With the growing importance of health and lifestyle adaptation from the current COVID-19 pandemic, such investigations can secure information required to design more targeted public policy interventions addressing costs associated with obesity and other diet-related health issues.

Acknowledgment

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Transition toward Sustainable Hydrogen Based Economy. Scenario Analysis on Alternative Paths

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Abstract

Hydrogen is considered an alternative energy source that can help decarbonize industrial processes and economic sectors that use it (fertilizers, construction materials, petrochemicals) where reducing carbon emissions is both urgent and difficult to realize. At present, the amount of hydrogen used in the European Union remains limited and is largely produced from fossil fuels. The aim of the European Union strategy is to decarbonize hydrogen production and extend its use to sectors where it can replace fossil fuels. The current production cost for hydrogen based on fossil fuels, considering the Steam Methane Reforming (SMR) process, is highly dependent on natural gas prices and CO_2 cost. However, the cost of hydrogen from alternative sources depends on a different energy price – electricity. This article analyzes the production cost for different technologies and the associated CO_2 emission with the aim to identify the sustainable one that can provide the transition towards Sustainable Hydrogen based economy. A scenario-based analysis of the main costs drivers, evaluation of the CO_2 emission along the value chain and the impact on the relevant economic sectors for the low CO_2 Hydrogen production was performed. The goal of the article is to propose a basis for selecting the most sustainable technology, the prerequisites for an energy transition towards a hydrogen-based economy, and to investigate the critical links between a low CO_2 Hydrogen transition strategy and other energy strategies. The findings indicates that low-cost renewable electricity is one of the most important pre-requisite for facilitating the transition, together with a coherent long-term CO_2 emission policy.

Keywords: green hydrogen, renewables, low CO_2 emission hydrogen, energy transition, sustainability, zero-emission economy.

JEL Classification: Q42 Q56.

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1. Introduction

Hydrogen is used today predominantly as a raw material, mainly in the chemical and oil industries, but if it is used as a fuel or for transport and storage of energy, it can help achieve the 2050 climate neutrality goal of the European Green Pact, being an important part of the solution, as long as hydrogen production takes place in a sustainable way, without climate impact through CO_2 emissions.

Hydrogen can be produced by the process of coal gasification, a technology more than 100 years old, relatively cheap, but very polluting with significant emissions of CO, CO_2, CH_4 (also called "brown hydrogen"). The alternative of obtaining hydrogen by catalytic reforming with water vapor of methane gas ("grey hydrogen") has a lower impact on the environment, but even in this case CO_2 emissions are significantly high, not to allow the transition to an economy based on Hydrogen as an alternative to fossil fuels.

The development of "clean" technologies for hydrogen production by electrolysis ("green hydrogen") having as energy source electricity produced from renewable sources - solar, wind, or biomass - opened the prospect of an energy transition to an economy based on hydrogen consumption from clean sources instead of fossil fuels. Although the product of such technology is "clean", both the cost of production and the need for electricity from renewable sources remain the main obstacles in achieving the energy transition. (Spiers et al., 2018)

Hydrogen is considered an alternative energy source, especially for industrial processes that require high temperatures (IEA, 2019), it can help decarbonize industrial processes and economic sectors where reducing carbon emissions is both urgent and difficult to be realized. At present, the amount of hydrogen used in the European Union remains limited and is largely produced from fossil fuels (European Commission, 2020). The aim of the strategy is to decarbonize hydrogen production, which is possible by rapidly reducing the cost of renewable energy and accelerating technological developments, and to extend its use to sectors where it can replace fossil fuels.

World primary energy consumption was 14.281 million tons of oil equivalent in 2018 (IEA, 2021). More than 81.7% of it was primary energy sources from fossil fuels (coal, oil, and natural gas), and the electricity consumed that year was generated in proportion of 74.5% from fossil fuels. The transition to a zero CO_2 emissions economy requires both a change in the energy mix in the primary source and the decarbonization of electricity as a secondary energy source, doubled by the use of a new one, which allows both long-distance transport and high temperatures industrial processes, generated with low CO_2 emissions.

2. Problem Statement

Hydrogen is not a primary source of energy but is an attractive alternative to transporting energy when hydrogen is separated from the rest of the elements. Hydrogen production methods are classified according to the primary energy used and the H_2 generation method (Figure 1). According to primary energy, it is

classified as follows: primary source of fossil fuels, nuclear energy, and renewable energy.

Figure 1. Hydrogen production methods
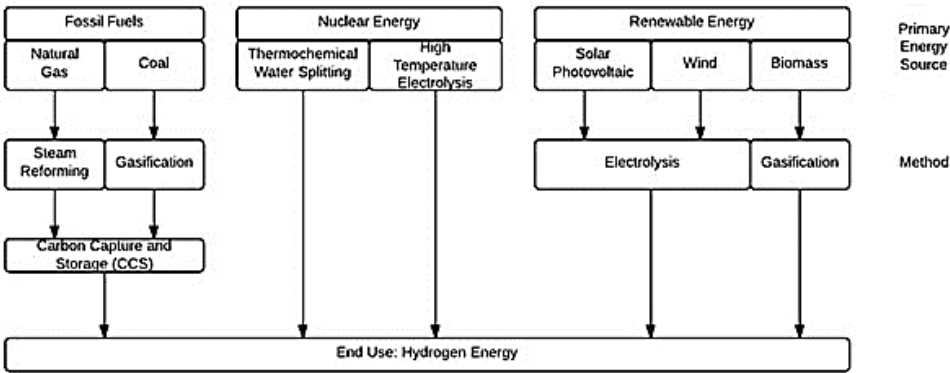
Source: adapted from Rand et al., 2009.

"Hydrogen based on fossil fuels" refers to hydrogen produced by a variety of processes that use fossil fuels as raw material, in particular natural gas reformation or coal gasification. This type of hydrogen constitutes the bulk of the hydrogen produced today. The challenges of generating hydrogen from fossil fuels from the respective significant CO_2 emissions were a continuous preoccupation of scholars (Quarton et al., 2020) as they can be managed with the help of Carbon Capture and Storage technologies (CCS). However, the economics of capturing CO_2 and the challenges of transport and storage limited the application of this technology. If the associated CO_2 emission is captured (Soltani et al., 2014) or a different process to split H_2 from CH_4 – pyrolysis – is used (Dagle et al., 2017), the greenhouse gas emissions from hydrogen production from fossil fuels with carbon capture or pyrolysis becomes lower than those from hydrogen from fossil fuels, but the variable efficiency of greenhouse gas capture must be considered (maximum 90%).

"Hydrogen based on electricity" refers to the hydrogen produced by the electrolysis of water (using an electrolyzing process, where electricity is used to split H_2 out of H_2O), regardless of the source of electricity. Greenhouse gas emissions from the entire life cycle of hydrogen-based electricity production depend on how electricity is produced (Rissman et al., 2020).

The current Levelized Cost of Hydrogen (LCOH) for hydrogen based on fossil fuels is estimated to be around EUR 1.5 / kg for the EU, considering the Steam Methane Reforming (SMR) process being highly dependent on natural gas prices (Parkinson et al., 2018) and factoring the USD inflation rate and USD/EUR exchange rate in order to adjust the 2019 USD computed price of 1.35 (Al-Qahtani et al., 2021) and CO_2 cost adjustment. The range of the SMR based Hydrogen production cost without CO_2 Carbon Capture and Utilization/Storage is presented in several other research as being from 1.03 to 1.92 USD/kg, with natural gas price

considered at 3.25 to 10.32 USD/GJ. However, the cost of hydrogen from alternative sources is depending on a different energy price – electricity.

In addition to the economic aspect of hydrogen production, the environment impact of the alternative low CO_2 Hydrogen during the entire life cycle was assessed based on Global Warning Potential (GWP) and Acidification Potential (AP) (Ozbilen et al., 2012). GWP is determined in equivalent gCO_2 and by CO_2 emissions of the respective technology during the life cycle, while PA measures the equivalent gSO_2 and reflects the changes in environment acidity of the lifetime use of the respective technology. The key takeaway of this research is the fact that renewable-based hydrogen production has a different impact based on the source of electricity, wind or solar, wind-based hydrogen production having the lowest values (Figure 2). In case of solar based renewable electricity hydrogen production, both indicators are higher than for the hydrogen production based on thermochemical water split using nuclear energy (Ozbilen et al., 2013), indicating that further analysis on nuclear based hydrogen production is necessary.

Figure 2. Potential of the Global Warming Effect and Acidification potential for some of the H_2 production methods
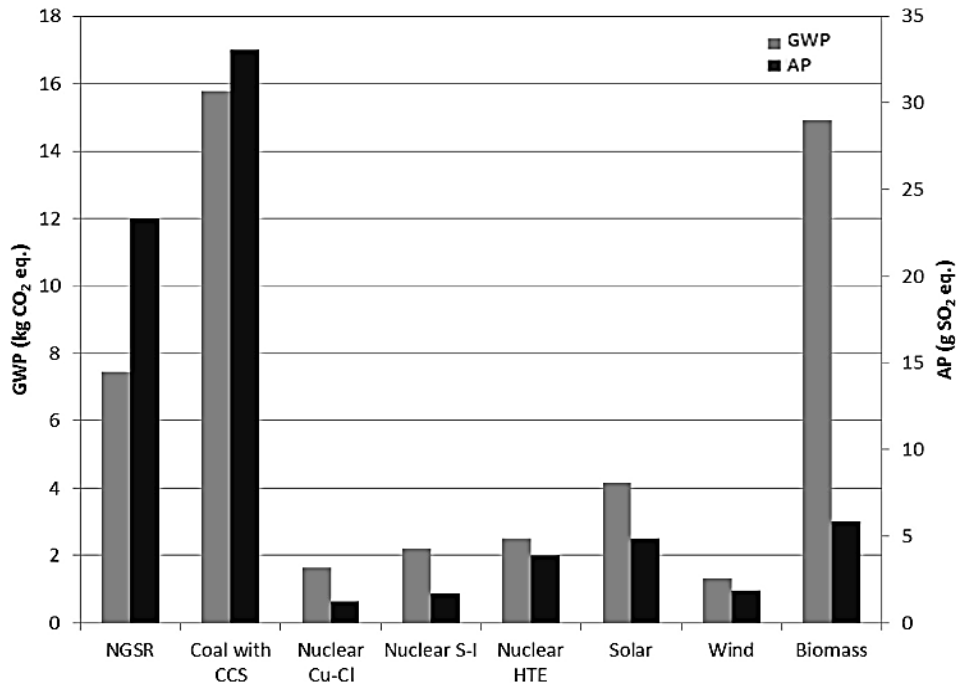
Source: Ozbilen et al, 2012.

Another method of analyzing hydrogen production technologies is to link the lifecycle analysis of the impact on health, the environment, and the availability of resources together with the standard cost of hydrogen production (Al-Qahtani et al., 2021). This analysis compares the alternatives to hydrogen production versus the

most widespread method today, natural gas reforming (SMR), starting from the analysis of the maturity of alternative technologies (Thomas et al., 2018).

3. Research Questions / Aims of the Research

As presented above, several methods of assessing the environmental impact of hydrogen production technologies exist in the literature, most of them considering the multiple environmental impact dimensions in their approaches. In order to be able to assess the suitability of different low CO_2 emission Hydrogen production technologies for transition toward a 'zero emission' economy, this paper proposes the focus on one dimension for the environment impact: the life-cycle CO_2 emission, one dimension for natural resources: electricity demand, and one dimension for social impact: production costs.

The aim of the research is to provide the basis to select the most sustainable low CO_2, to identify the prerequisites for an energy transition towards a hydrogen-based economy, and to highlight the critical links between a Low CO_2 Hydrogen transition strategy and other energy strategies.

The research hypotheses were defined as: Green H_2 production has different sustainability based on the source of green electricity and the transition toward low CO_2 hydrogen production requires an additional strategy for renewable energy generation development. For the selected Hydrogen production technologies, a case study methodology was used to model the investment and operation of Hydrogen production units, all of them generating 1 t/h of Hydrogen, running 8400 hours per year.

4. Research Methods

For the environmental dimension, the CO_2 life-time assessment methodology was based on Standard emissions for processing according to the International Sustainability & Carbon Certification 205 Greenhouse gas emissions standard.

The natural resource dimension, the electricity demand, the mass balance approach was used to determine out of each case study, the hourly electricity demand. Furthermore, using a projected scenario for low CO_2 Hydrogen demand in Romania for 2030, 2040 and 2050 the overall demand in renewable capacity was determined, considering the specific green electricity of each hydrogen case. The research highlighted the need for further analysis of the freshwater demand impact and mitigation methods.

Regarding the social impact dimension, the discounted free cash flow analysis was used for modelling the profitability of each selected Hydrogen production technologies (Remer et al., 1995). This methodology was used to determine the production cost at which the investment is becoming profitable, making the transition from conventional hydrogen production technologies toward low CO_2 emission ones. The main assumptions set was identical for each business case, considering a start of investment in 2023, 15 years operation, commercial operation date January 2026, 16% tax rate, and 8% discount rate. As the production cost

was determined to be highly dependent on the electricity price, the research methodology extended the case study with sensitivity analyses on the power price and capital expenditures.

5. Findings

The case study output with respect to mass balance, associated CO_2 emission, demand for green power, water or methane or bio stock based liquefied petroleum gas (bio-LPG) overview is presented in Figure 3.

Figure 3. Relevant options to produce hydrogen with low CO_2 emission and the corresponding mass balance
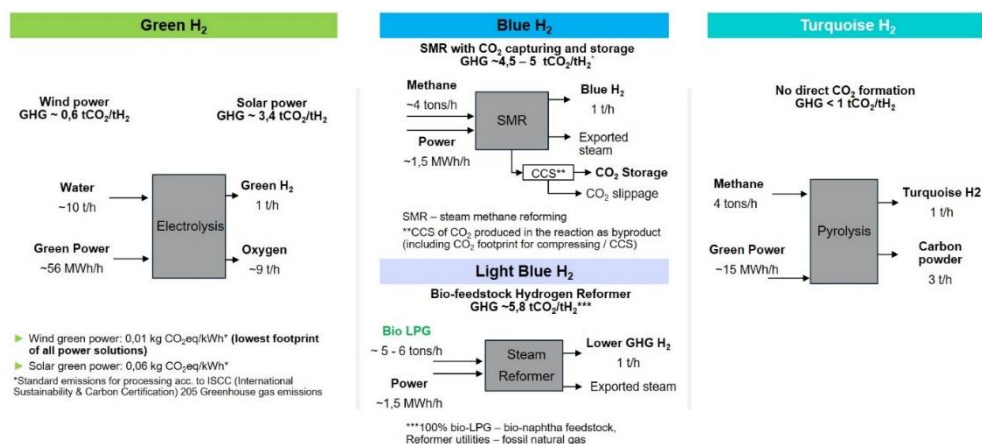
Source: Authors' own research results/contribution.

From the electricity consumption point of view, the demand for green power is the highest in the case of Green H_2, more than 3 times higher than for Turquoise H_2 (methane pyrolysis), while the ratio of power demand between Green H_2 and conventional Steam Methane reforming with Carbon Capture and Storage or bio-feedstock based steam reforming is more than 37 times higher in case of Green H_2. The research considered the green power demand as a very sensitive aspect for the assessment of the sustainability of low CO_2 Hydrogen production and further assessed the impact at the Romanian power generation level.

Regarding the main feedstock, splitting 1 t/h of H_2 from fresh water using electrolysis requires a 10 times higher mass of feedstock. In the case of conventional Hydrogen production with Carbon Capture and Storage, the ratio is 4 to 1. The same ratio is valid for Hydrogen production out of methane pyrolysis and slightly higher in case of using bio-feedstock. It is important to mention the fact that for the latest mentioned technology there is CO_2 emission generated in the Steam Reforming process, but as long as the source is bio-methane, the respective emissions are not considered as additional ones.

The demand of 10 t/h of freshwater for green hydrogen production will require either access to the respective volume or water treatment plant for desalinization and treatment to meet the technical requirements for electrolysis. This finding indicates that further analysis on freshwater impact is needed, or assessment of additional cost impact into the business case for desalinization and water treatment capacities if limiting the freshwater consumption will be considered.

The combined green energy demand and CO_2 emission were considered in order to select the technologies from the environment and natural resource dimensions. Using natural gas-based hydrogen production (grey H_2), the most used today' H_2 technology as reference, the research identified Green Hydrogen as better solution than Carbon Capture and Storage of the current H_2 production technology from natural gas. More than this, the Solar-based Green H_2 is more having more than 3 times higher impact compared with Wind-based one, making it the attractive Green H_2 production solution. Hydrogen pyrolysis (turquoise H_2) is the technology with the lowest combined CO_2 emission and power demand, even if the technology is still in its early stage (Figure 4).

Figure 4. Overview of CO₂ footprint and Power demand for selected H₂ production technologies
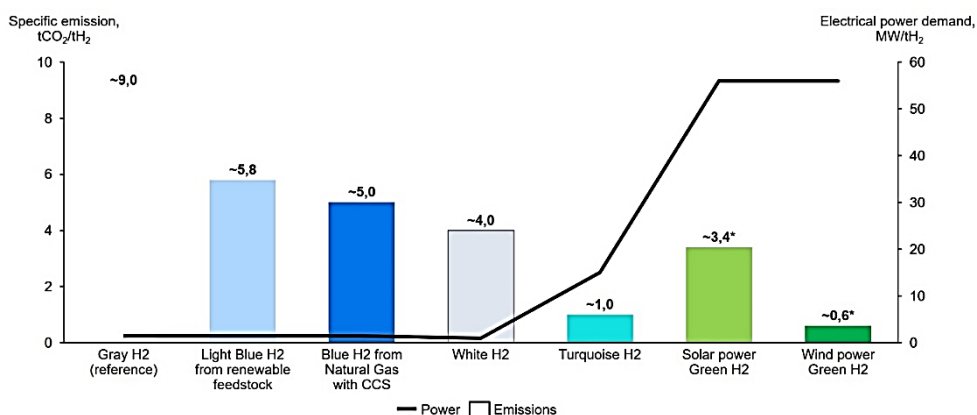
Source: Authors' own research results/contribution.

It is important to highlight that the same ranking is observed between solar and wind-based hydrogen production, as per the research performed using CML 2001 methodology, developed by Institute of Environmental Sciences, Leiden University, and The Netherlands, to assess the environmental impact of selected hydrogen production methods. (Ozbilen et al., 2013). The Methane Pyrolysis technology has the lowest CO_2 emission from all gassed based hydrogen production ones, having the carbon black as a by-product. (Amin et al., 2011)

Furthermore, the 56 MWh/h of green electricity necessary to produce 1 t/h H_2 using electrolysis creates additional power demand compared to the baseline scenario, the one that H2 demand and production remains as per today, and the

renewable capacity addition is determined by the transition of the power sector to low CO_2 emission production capacities.

The capacity factor for a renewable power plant reflects the ratio between the electrical output of the respective renewable capacity over one year to the installed capacity (the maximum possible generation in one hour). It is strongly correlated with the availability of the respective renewable resource for the area where the capacity is located. Considering the average capacity factor for wind, solar, and hydro-based power plants in Romania, each 1 MWh/h or green electricity will require 6.6 MW of photovoltaic installed capacity, 3.9 MW of wind installed capacity or 2.9 MW of hydro installed capacity.

The research generated a projection which considered that all today H_2 demand will be covered from Green H_2 until 2025, while additional H_2 demand will gradually develop because of economy transition towards zero-emission. The exiting Steam Methane Reforming Hydrogen production that covers the today demand in Romania cannot be replaced instantly with alternative low CO_2 emission hydrogen production technologies, therefore a 11,000 t/year of hydrogen produced from Green H_2 capacities was projected. The scenario was developed by considering transport and industrial processes (petrochemistry and metallurgy) as the first to switch and request more green hydrogen in order to meet their suitability targets. This is leading to considering 55,000 t/year of H_2 demand in 2030, out of which 50,000 t/year from Green H_2 and a small fraction of 5,000 t/year from low greenhouse gas technologies such as bio-feedstock steam reforming. The scenario was considering an accelerated transition starting with 2040, towards 600,000 t/year of H_2 out of which 14,000 t/year from low greenhouse gas and 36,000 t/year from steam methane reforming with carbon capture and storage. Going further in time, for a significant transition in the most energy-intensive economic sectors of the Romanian economy, the projected Hydrogen demand is 2,400,000 t/years out of which the gross is produced with Green H_2 technology – 2,200,000 t/year – no additional production from low greenhouse gas or steam methane reforming with carbon capture and storage capacities, but the maturity of Turquoise H_2 technology was considered, leading to 100,000 t/year H_2 produce from natural gas pyrolysis.

Using the generated H_2 demand projection and considering the capacity factor for each renewable technology installed in Romania, the H_2 projection translates into the needs to install 1195 MW of photovoltaic power plants just to meet the expected 182 MWh/h green power demand for producing 11,000 t/year H_2 (Figure 5). This represents 31% of the expected additional 3700 MW of photovoltaic power plants promoted investments in the Romanian 2021-2030 Integrated National Energy and Climate Plan (INECP, 2022).

Figure 5. Renewable power demand for H$_2$ production
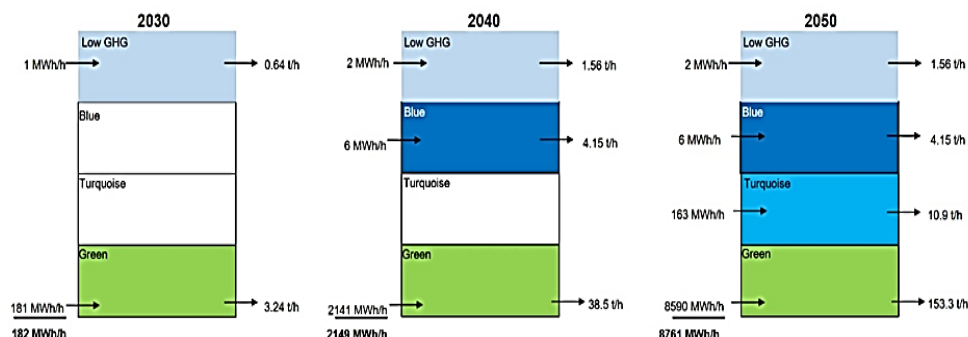
Source: Authors' own research results/contribution.

The 3rd dimension analysis on the production costs comparing the same low-CO$_2$ hydrogen technologies using the current Steam Methane Reforming (Grey H$_2$) as reference. The breakeven cost of production for this case is 2,3 EUR/kg, while for Green H2 is 6,6 EUR/kg, 4,2 EUR/kg for Blue H$_2$ (Steam Methane Reforming with Carbon Capture and Storage), 3,7 EUR/kg for Turquoise H2 (methane pyrolysis) and ultimately, 2,6 EUR/kg for Light Blue H$_2$ (bio-feedstock low greenhouse gas steam reform).

The discounted cash flow analysis considered 80 EUR/MWh for the electricity price, and the break-even costs were determined at the production facility in order to be able to compare with reference case (steam methane reforming on consumption point). If the loading facility is added, an additional 0,8 EUR/MWh must be considered, in addition to the transport and delivery to the consumption points.

At the electricity price of the base scenario, there was no H$_2$ technology ready to be deployed today and the gap to the reference case (Grey H$_2$) was the minimum for the bio-feedstock technology, the one with the most limited supply. The biggest gap was in the case of the Green H$_2$, a technology that recorded a significant advance and is ready to be deployed today, as long as there is green energy available.

However, the sensitivity analysis on the green power price pointed out a 34% increase in the breakeven price in case of 50% electricity price increase. As the green power demand is a linear parameter of the model, the sensitivity analysis is linear, with significant deviations due to green electricity price, as it can be seen in Figure 6. The rate-of-return sensitivity was computed for 11%, as the model is considering in the reference case 8% rate of return, while other researchers are considering a weighted average cost of capital of 10%.

A further analysis on capital expenditures was performed in order to identify the necessary technology cost reductions and subsidies that will make Green H$_2$ competitive with Grey H$_2$, the reference case. Starting from the base case of the model, a 0,6 EUR/kg cost reduction can be obtained in the case of 30% non-refundable financing. Scale-up of full supply chain and industrialization of fuel cell, hydrogen tank manufacturing and economy of scale in hydrogen capacity design and construction was estimated to reduce the total investment costs by another

50%, case that will take out another 0,55 EUR/kg cost reduction. Combining both technology cost reduction and non-refundable funds, the breakeven production cost for Green H_2 is reduced to 4,95 EUR/kg versus 2,3 EUR/kg for the reference case of Grey H_2. Adding the loading and transportation cost it can be more than double compared with an on-site steam methane reforming production unit. While the technology development will reduce the investment costs, lowering the production cost, the technical challenges of transporting the hydrogen will require for on-site, de-centralized Green H_2 production.

Figure 6. Green energy price sensitivity for Green H2 production
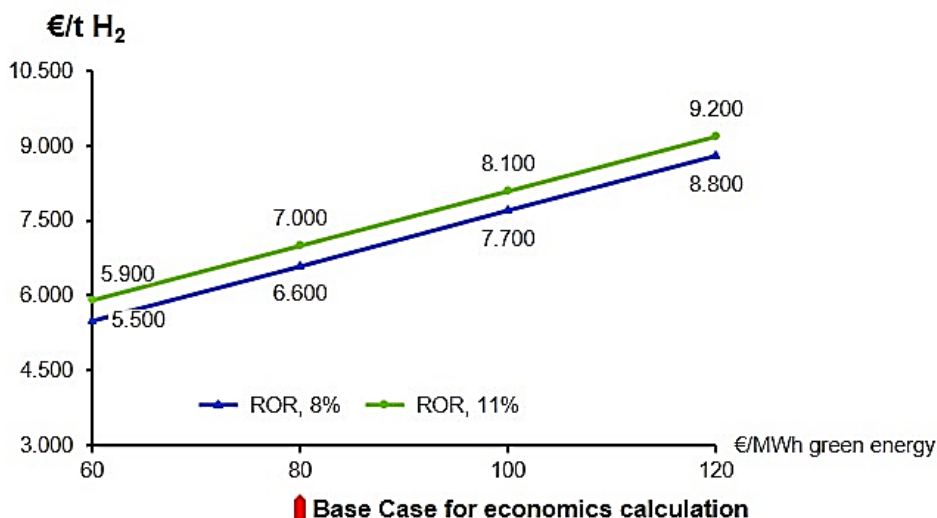
Source: Authors' own research results/contribution.

6. Conclusions

The hypothesis that suitability of Green H_2 is not equal was demonstrated by the fact that even if the green power demand is the same, the associated life cycle CO_2 emission of 1 MWh produced by a photovoltaic power plant is approx. 6 times higher than 1 MWh produced from a wind power plant.

The second research hypothesis that the transition toward low CO_2 hydrogen production requires additional strategy for renewable energy generation development was demonstrated by the expected additional renewable capacity needed to fulfil the green electricity demand in a low CO_2 emission hydrogen demand projection. The existing Romanian Energy Strategy (INECP, 2022) considers investments of around 2,300 MW of wind power plants and 3,700 MW of photovoltaic power plants while at the same time 1,100 MW of gas fired power plant compensates for the reduction of 700 MW of coal power plants. The demand for green electricity for H_2 was projected to be 2,149 MWh/h by 2040, while the Integrated National Energy and Climate Plan increase is expected to reach

1,153 MWh/h by 2030. The additional 1,000 MWh/h that must be invested until 2040 is not considered under any current energy sector strategy and might render the investments in low CO_2 hydrogen production capacities useless if they cannot use renewable generated power.

The results suggest that access to low-cost renewable electricity will be the most important factor in driving the production cost down, a decentralized onsite production will further reduce the losses, and wind-based renewable energy will have the lowest CO_2 emission across the entire life cycle.

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The New Frontier of EU Energy: "Green Pass" for Nuclear Energy and Natural Gas. Political Approaches and State Dynamics

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Abstract

The European Union's effort to reach the targets set by the Green Deal has met with a concrete barrier to potential energy crises fuelled by the scarcity of green energy resources. The introduction of nuclear energy along with natural gas thus becomes a controversial desideratum. This paper aims to analyse the issue of integrating the two new resources into the green energy catalogue. The analysis is divided into two sections. The first will focus on a qualitative approach by analysing the gaps and issues of labelling these resources in the 'green' sphere of the European Union by highlighting production disparities, pro-nuclear lobbying and differentiated political views. The second approach will use quantitative methods to capture possible adjustments of the ranking of the EU countries in terms of sustainability, fulfilment of the objectives assumed through the Green Deal, and energy production. Both sections of the analysis will help us to outline the change generated by the new European directive on the labelling of nuclear energy and natural gas as green energy, forming a future perspective for the European energy gear.

Keywords: green energy, nuclear energy, natural gas, sustainability, energy efficiency.

JEL Classification: O13, P28, P48, Q4.

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1. Introduction

The emerging energy crisis in the European Union needs to be addressed early, and the Member States' machinery needs to start interacting productively and building a future of European energy independence as quickly as possible. This European independence has a political and security dimension, and its foundations lie in the production of clean, non-polluting energy that complies with the European Agenda 2030 and the Green Deal agreement.

In the current context, there are several factors pushing this much needed change. Decades of reliance on fossil fuel energy and the high cost of fossil fuel energy are encouraging the rapid adoption of renewable energy (Papiez et al., 2018).

In addition to the cost factor of using expensive fuels to produce energy, there are the carbon dioxide emissions and pollution that fuel the global environmental crisis (Marques & Fuinhas, 2011).

At this delicate juncture with environmental, political, and security implications, the European Union's Kyoto commitment to reduce nuclear capacity had to be reconsidered, and the commitment to phase out nuclear energy production capacity was nullified. The commitment at that time could not foresee the fragility that the energy grid would acquire. This fragility began to be addressed by the European Commission and nuclear power and gas received the green label.

Taking all these factors into account, our paper will focus on two systems: an analysis of the current energy situation that will highlight the current fragility of the system, examine potential barriers and limitations and present the relevance of using nuclear and natural gas energy potential on the one hand, then we will focus on a comprehensive-quantitative analysis in the second part of the paper that will present data and test two functional hypotheses centred on the creation of European nuclear energy hubs and the concept of energy self-sufficiency.

2. Problem Statement

The European green energy context and the clear objectives set by the European Union in 2019 face adaptive and functional difficulties due to the deteriorating international context caused by the Russian-Ukrainian conflict. In this context, the targets set to reduce resource consumption in relation to economic growth and eliminate CO_2 emissions (European Commission, 2019a) undergo adaptations and aids. The most recent adjustment being the labelling of nuclear energy and natural gas on the list of green energy sources.

The systemic fragility of European energy production is amply presented in a study by Kuik (2003), which highlights the energy dependence that the European Union has in terms of imports; thus, in 2019 Europe imports according to data provided by the European Commission represented 61% of the total energy resources needed (European Commission, 2019b). At the time of the study, the EU's dependence on imports stood at 42%, and according to Kuik's predictions, this pre-recession dependence will reach 70% in 2030. The most critical issue in the current context is that Russia is the main supplier of oil (27%) and gas (41%)

(Eurostat, 2022), and this pressure on the existence of energy dependence must be adjusted by identifying alternative sources of imports while increasing the exploitation of nuclear energy and natural gas as viable and resilient energy sources for the whole European community.

The use of nuclear energy in a safe, gradual and well-regulated environment in terms of national safety and nuclear waste management (which does not yet have a clear structure at European level) will be a first step towards making the stability of the European community permanent. Ristic et al. (2019) rank the yield of energy resources in the following order: nuclear, geothermal, wind with a high production rate, then hydropower, oil and biomass. Based on this classification, we consider that the application of the green label for nuclear energy is an important first step to be taken, the next one being the creation of European nuclear energy production centres or an increase of the production potential in each country.

In order to better substantiate the need to expand nuclear energy production to stabilise European energy-economic security and limit dependencies, it is very important to observe global trends, which, according to data presented by the World Nuclear Association, nuclear energy production is on an upward trend "the nuclear capacity growth will be around 25 % in difference of only 25 years (2015 to 2040)" (World Nuclear Association, 2022a). An example of good practice among European countries is France, which uses nuclear energy to cover 70% of the country's energy needs and is currently building a new nuclear facility. Other countries such as Hungary, Slovenia (together with Croatia), Czech Republic, and Slovakia are planning to expand their nuclear power generators network (World Nuclear Association, 2022b).

This expansion has several limitations that we have considered. Two of these physical limitations are identified by Ujita et al. (2006), namely carbon control and nuclear cost condition. The graph in Figure 1 shows these interactions and how, over a time horizon limited to the year 2100, this production will have the upward (Ujita et al., 2006).

Figure 1. Nuclear Generation power expansion
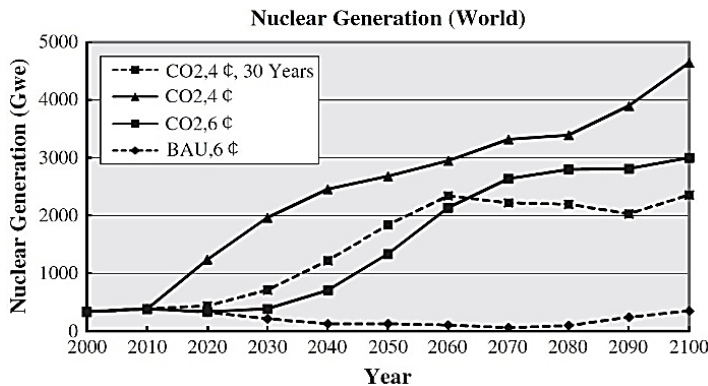
Source: Ujita et al., 2016.

Another resource that can be used to complement and support the European energy plan toward the goal of stability is natural gas. Many European countries are energy-dependent on this resource. Romania, Poland, Germany, Austria, and Croatia (European Network of Transmission System Operators Transparency platform, 2021) are just a few of them.

The green label has been assigned to this resource because of the low CO_2 emissions that the exploitation of this resource releases and comes as a functional alternative for countries that are still in the process of implementing green energy technologies. The disadvantages of this system are the limited gas reserve of the EU and the limited external access to natural gas supply, the main pipeline being the Russian one and passing through an area whose fragile security can no longer guarantee the integrity of the transmission system, while the rest of the pipeline projects are still under construction. Another vulnerability is the political and economic link that the strategic gas supply structure may have within the European Union (Kuzemko et al., 2019).

The problem of energy security can be addressed by a beneficial mix of eco-friendly energy resources. As we have presented, many authors identify the nuclear solution as viable and resilient, deserving the green label, and in combination with other energy resources, energy imports can be gradually reduced, leading to continental independence, and Europe can become a central player in the production, storage, and energy export.

3. Research Questions / Aims of the Research

Given the European Union's aim of reducing external energy independence and forming a stable and functioning internal grid, the first question to be answered in this study is the following:

Q1: Does nuclear energy have a future in the European Union?

Some of Europe's current nuclear power plants are already ageing, reaching the end of their operating life (The Consultative Forum for the Environment and Sustainable Development, 2000). In this context, new facilities will have to be built, existing ones will have to be modernised, or their lifetime will simply have to be extended, implying in this sector the need for a European and national analysis for each individual country regarding the prolonged use of these plants under a well-defined safety management system.

Q2: To what extent and in what strategic direction should the European Union pursue nuclear energy production?

There are currently 103 nuclear reactors in the European Union with a production capacity of 100 GWe. They operate in 13 of the 27 member states (World Nuclear Association, 2022c). In our research, we will highlight what is the production optimum that needs to be reached to meet the strategic directions for European energy security. Bearing in mind that using nuclear energy, the EU manages to avoid pollution by twelve million tonnes of carbon dioxide emissions every year (European

Commission, 2000), the strategic approach highlighted is the most beneficial in the production-implementation-security ratio.

Q3: Should regions with nuclear potential be developed into supply centres for the whole community in an equal-European contribution format?

The details and answers to this question will be explored by studying and analysing the factors of nuclear production, and then extending them within working hypotheses centred on European production clusters.

Q4: What is the level of resilient energy sufficiency that the European Union needs to achieve, and how does it affect production centres?

Establishing the optimal parameters that European nuclear power production centres will have to achieve and the burden that will be placed on them will give us a practical dimension in the implementation framework.

4. Research Methods

The study highlights the potential of nuclear energy and natural gas to ensure energy efficiency within the European Union and reduce its dependence on imports. As a result, several factors were considered relevant for quantitative analysis, according to previous studies by researchers in the field:

- Gross and net production of electricity and derived heat based on nuclear power;
- Production of nuclear fuel elements;
- Number of operable reactors;
- Gross and net production of electricity and derived heat based on natural gas;
- Primary energy consumption;
- Final energy consumption;
- Energy imports dependency.

The chosen period was 2020 for all indicators presented, and the data source is Eurostat. The observations are represented by the 27 countries of the European Union. Data cleaning and calculation methods have been applied in the Statistical Analysis System (SAS). The standardisation of the values was done using z scores, the power of a factor was determined using the principal component analysis, while the weight within the cluster with the help of relevant equations. The final aggregation led to the creation of a score for each country, necessary to establish their importance in achieving energy independence of the European Union, helped by nuclear power and natural gas.

In a more detailed approach, the z scores standardisation method was considered to ensure the comparability of data by converting them into standard units. The formula for a population is the following:

$$z_{ij} = \left(X_{ij} - \mu\right)/\sigma \tag{1}$$

where X_{ij} stands for the initial value of the ith factor and the jth country, while μ and σ are the population mean and standard deviation respectively.

The principal component analysis was used to determine which variables explain more of the variation in the analysed phenomenon. As a result, a correlation matrix was created from the correlation coefficients calculated for each pair of indicators

(Khatun, 2007; Sharma, 2008; James et al., 2017). For the 6 clusters considered for the analysis, we have determined the same number of 7x7 matrixes.

The weights have been further calculated using the correlation coefficient for each factor combination divided by the root square of the sum of all coefficients in the correlation matrix, as stated by the formula below (Sharma, 2008):

$$w_1 = \sum r_{xiy1} / \sqrt{\sum r_{x.y.}} \qquad (2)$$

A total of 7 weights were determined for the score calculation.

The last step was to aggregate the resulted values after weights have been applied to show the final score of the nuclear and natural gas efficiency, necessary for assessing the energy self-sufficiency of a country.

5. Findings

The summary of the factors included in the analysis is presented in Table 1. For the year 2020 there were no missing values, while the data has been normalized to prevent biased output. The gross production of nuclear electricity and the number of nuclear reactors showed high values for France and null for 15 of the 27 member states of the EU. Nuclear fuel element production, on the other hand, is available in only five EU states. Germany, France, and Italy used energy the most, while the smaller states such as Luxembourg, Cyprus, and Malta used 70 times less energy for households and industry than the first ones. The latter three were the most dependent on imports in 2020, while Estonia, Romania, and Sweden were the least dependent.

Table 1. Descriptive analysis of the factors

Variable	Mean	Std Dev	Minimum	Maximum	N
Nuclear_El_Prod	24743.26	68496.30	0	353832.87	27
Nuclear_F_Prod	72.8888889	180.0803952	0	705.0000000	27
Primary_En_Cons	45.7962963	64.2214975	0.7400000	262.4900000	27
Final_En_Cons	2259.11	1007.49	1062.50	6006.80	27
Imp_Indep	41.9851111	21.1282739	2.4400000	89.4980000	27
No_Reactors	3.8518519	10.7083853	0	56.0000000	27
Gas_El_Prod	10160.93	15470.90	0	55891.04	27

Source: Authors' calculation.

The first hypothesis is defined as the first step in our quantitative approach, as it specifies the objective of focusing on the countries with the greatest potential to host European energy hubs based on nuclear and natural gas resources.

The classification of the European countries will follow the six system development regions presented in Figure 2, as stated by the European Association for the Cooperation of Transmission System Operators in the Regional Investment Plans for 2021, namely the Baltic Sea, North Sea, Continental Central East, Continental South West, Continental South East, and Continental Central South (ENTSO-E, 2020).

Figure 2. System development regions

Source: ENTSO-E, 2020.

The first step in our approach is to clearly separate the countries within the clusters set a priori by measuring the power of each member in the cluster. The countries that are part of more than one cluster and need only a specific one are represented by Germany (member of 4 groups), France and Slovenia with 3 groups, Denmark, Croatia, Italy, Hungary, Austria, Poland, and Romania in 2 clusters each.

Table 2 highlights the calculated weights for each variable. Therefore, we can determine the factors that have the greatest impact in each group. Specifically, nuclear energy production influences most regions, including the Baltic Sea and the Central East. Natural gas is highly demanded in the same areas, with more potential in the Central East region.

Table 2. Calculated weights per variable and region

Variable	BS	NS	CE	SW	SE	CS
Nuclear_El_Prod	0.954637	0.949615	0.955263	0.898489	0.669172	0.975738
Nuclear_F_Prod	0.731636	0.973069	0.718726	0.983741	0.449743	0.991639
Primary_En_Cons	0.621009	0.822367	0.819522	0.990265	0.536299	0.66949
Final_En_Cons	0.553317	-0.36542	0.224034	0.943469	0.302745	-0.26589
Imp_Indep	0.083441	0.577131	-0.07836	-0.75753	0.741442	0.464344
No_Reactors	0.86895	0.905485	0.469935	0.88057	0.668632	0.941803
Gas_El_Prod	0.59371	0.456875	0.905898	0.41397	0.334748	0.065502

Source: Authors' calculation.

The results of PCA and the weighting calculation are presented in Table 3. The resulting scores have pointed out that Austria, Germany, and Poland will join the Central East region, the North Sea region will incorporate Denmark and France, while in the South East we will preserve the rest of the countries included initially in more than one cluster. The Central South region will be excluded from the analysis due to the lack of allocated members.

Table 3. Calculated scores per cluster

Baltic Sea	Score	North Sea	Score	Central East	Score	South West	Score	South East	Score
Sweden	4.37	**France**	8.34	**Germany**	8.30	**Spain**	-1.28	**Romania**	2.93
Finland	1.84	Netherlands	-0.82	Czechia	0.89	Portugal	-4.63	Hungary	2.46
Estonia	-2.25	Denmark	-1.59	Slovakia	-1.40			Bulgaria	1.62
Latvia	-2.44	Belgium	-1.61	Austria	-1.43			Italy	0.99
Lithuania	-2.63	Ireland	-2.04	Poland	-1.75			Slovenia	0.53
		Luxembourg	-4.24					Croatia	-1.25
								Greece	-1.78
								Cyprus	-2.38
								Malta	-3.10

Source: Authors' calculation.

The Principal Component Analysis was used to determine the factors that would have a higher impact on the decision to locate the energy hub and assign weights in a way that maximizes the sum of correlation squares. Therefore, Sweden was chosen as the nuclear and natural gas energetic hub for the Baltic Sea, France for the North Sea, Germany for the Central East, Spain for the South West, while Romania would host the hub for the South East.

The second hypothesis acts as the second step in our analysis and will help us determine the level of self-sufficiency for each European country and, implicitly, the European Union. The analysis will continue with the calculation of the required level of nuclear energy production to cover the gap that prevents the reach of the targets. The delta between primary production and final consumption of energy from all sources was the example that has revealed for 2020 three main exporters, Bulgaria, Estonia, and Sweden. Using the regional classification, the Baltic Sea is the least dependent on energy imports, followed by the South West, while the Central East seems to have the largest dependence.

Table 4 presents the amount necessary in Gwh to reach the sufficiency level for each group, based on data for 2020 for primary production and final consumption of energy.

Table 4. Energy amounts to reach self-sufficiency

Cluster	Amount to be produced yearly (Gwh)
BS	47113.06
NS	604138.90
CE	1437702.20
SW	527074.06
SE	1013181.40

Source: Authors' calculation.

As a result, the European Union had to reach in 2020 an energy sufficiency level of 10301441 Gwh, while the actual gap was situated around 3629210 Gwh. Following the results of the previous step, the European Union should invest in

Sweden, France, Germany, Spain, and Romania the equivalent of 3629210 Gwh in nuclear and natural gas infrastructure.

6. Conclusions

The study reveals several answers to the questions that arise from the potential risks of energy shortcomings in the European Union.

Our research scope has challenged different topics in the natural gas and nuclear energy sectors, by presenting the current status and potential development, as well as the hypothesis of creating energy hubs across Europe to reach a total production capacity at least equal to the household and industrial consumption in 2020.

Starting from the decision to include the energy produced from nuclear power and natural gas, an important step would be to decide whether the approach of having nuclear energy production hubs may be a faster way to reach an empirical self-sufficiency threshold at a European level. Our analysis has proven that five out of six existing clusters would be an optimal solution, with France, Germany, Romania, Spain, and Sweden as nuclear energy hubs, due to their existing infrastructure and regional potential to reach efficiency goals. Furthermore, based on 2020 data, the European Union will need to invest the equivalent of 3629210 Gwh in nuclear and natural gas infrastructure in these countries to reach the level of self-sufficiency.

The limitations of the study were mainly caused by the lack of studies on the hypotheses analysed, as well as a small number of data sets available for the quantitative approach.

The topic can be further improved with comparative analysis of different natural resources, as well as with cost and opportunity calculus.

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Romanian Smart Villages Conceptualization and Bibliometric Analysis

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Abstract

In this paper, the researchers explore the Smart Village concept, which implies the social innovation and economic growth, as both a conceptual and practical means of delivering positive social, economic and environmental outcomes in rural areas of Romania.

Smart Villages are rural communities that use innovative solutions to build their capacity to meet social, economic and environmental challenges, building on the strengths of the community, including local authorities as well as opportunities in the area.

This study proposes an analysis of the main factors that can contribute to the development of rural areas. In this context, the partnerships/cooperation between local actors, professionalization of local actors and LEADR approach, can be the support tools for implementing intelligent solutions in Smart rural areas. The research innovation is determined through the multiple ways of defining and prospecting this approach in the current paper and its applicability in the Rural Romanian.

In this sense, the authors propose to analyze and present through a SWOT analysis and a quantitative international abstract and citation database analysis the new trends regarding this new rural concept of Smart Villages.

The main objective of the current analysis is to highlight the key concepts resulting from the bibliometric analysis and to determine what the scientific community is currently focusing on.

Keywords: Smart Village, Rural Development, sustainability, digitalization, research papers.

JEL Classification: Q01, Q19.

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1. Introduction

Many of the policies and financial instruments offered by the European Commission already provide valuable building blocks for the socio-economic consolidation of the smart villages of the European Union. Smart villages is a relatively new concept in the field of EU policy making and as such in our country. The emerging concept of smart villages refers to rural areas and communities that build on their existing strengths and assets, as well as the development of new opportunities.

In smart villages, both traditional and new networks and services are being enhanced through digital technologies, telecommunications, innovation, and better use of knowledge for the benefit of local people and businesses.

Technologies and digital innovations can support quality of life, a higher standard of living, public services for citizens, better use of resources, less impact on the environment, and new opportunities for rural value chains in terms of improved products and processes. The concept of Smart Villages does not propose a single solution for everyone; it is based on the needs and potential of the territory, but especially on the administrative organization capacity of the leaders of a rural community.

According to the new EU policies and strategies, Smart village is an autonomous structure capable of managing its own development projects and solving the problems generated by a series of administrative and economic disfunctions. The smart village must not ignore the social dimension, which implies the existence of a climate of equity, by fighting poverty and eliminating discrimination between generations, while the presentation of the rural dimension highlights the importance of processes related to land use and urban planning. The development of smart villages therefore implies an economic and social development with a direct impact on the quality of life of members of the rural community and on their expectations in relation to the actions of public authorities. (EC, 2017).

Now, in Romania, a direct and concrete planning of smart village policies is not yet drawn, however, smart villages cannot be implemented without the concept of Smart Village assimilation, which cannot be applied in isolation and must be incorporated in the existing strategies for development of rural regions and localities. In this sense, actions are taken to define this concept, and to generate a common policy from all the factors involved in rural development, and finally, to identify the investments needed to achieve this concept.

The Stage of Knowing the Problem

Based on integrated strategic approaches that reflect EU priorities as well as the needs of a territory, the Rural Development Programs 2007-2013 (MADR(a), 2021) and 2014-2020 (MADR(b), 2021) as well as the new NSS 2023-2027, have supported, support, and will continue to support a mix of measures to contribute to when implementing the new Smart Village Concept. These measures include rural

business development, including farm modernization, investment in small-scale local infrastructure and connectivity projects, village renewal, knowledge development, knowledge sharing, and bottom-up initiatives.

Smart & technological requirements are the key to successful implementation. The Internet of Things (IoT) is a primary provider of information sharing and control platforms for various decisions and smart devices. This novel technology has proven to be one of increased efficiency, time execution reduction, and cost reduction (Degada, Thapliyal, Mohanty, 2021).

Smart village concept is a broad perspective approach conditioned by the localization, as well as the social and economic aspects of the community. The vulnerabilities that the respective community cannot overcome should be overpassed by the ability of innovation absorption and skill acquisition (Adamowicz, Zwolińska-Ligaj, 2020).

Rural development policy also hosts LEADER, a bottom-up approach to local development, which is a vehicle for social innovation and local capacity building, empowering rural citizens to take ownership of their area development through design and implementation. Local Development Strategies (SDL) and projects.

Financing smart villages remains the main problem because certain funding flows ("measures") of rural development programs can contribute to smart approaches to villages more than others. Applied "individually", they will not be enough to cover the real need for funds. In particular, the coordinated and harmonized use of different types of EAFRD interventions would be needed to effectively support smart villages.

An interesting solution could be to achieve integrated support by creating a single fund to finance the creation of a Smart Village. This would be an ideal scenario in which portions of different funds should be allocated specifically to support smart village approaches. This could be done experimentally (through a pilot approach), setting aside only a relatively small proportion of the relevant funds. An important advantage for those who seek to apply for these funds is that they do not have to act on several funds at once, each fund having a precise destination and specific rules.

Figure 1. Factor that could improve support for smart villages
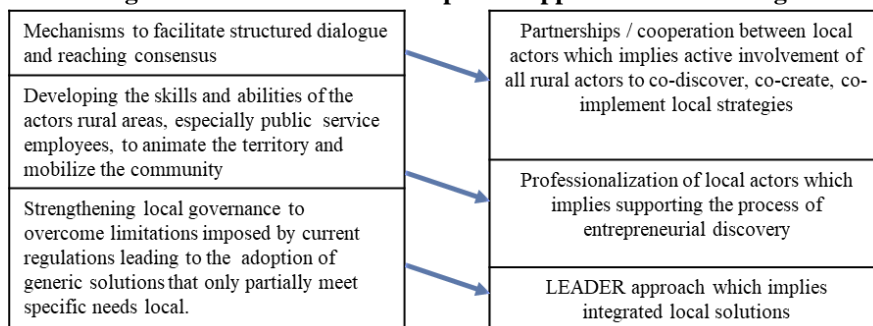
Source: Authors' conceptualization.

In the above figure are presented the main factors that can contribute to revitalization of smart rural areas in our country and the expected results.

1.1 Material and Method

In order to substantiate the methodology of this case study, the classical tools of observation and examination were used. Procedures based on factual analysis were used, an intensive documentation at the level of the existing literature in this new field. The methodology of the paper has as direct tools the collection of information from the specialized literature and from the existing practice at the level of the relevant public institutions in our country, respectively, MADR, AFIR, as well as aspects related to the activity of the Local Action Groups and RNDR. On the other hand, the new provisions and guidance documents in this field were analyzed, offered and consolidated by the new CAP post 2020, the new PNS 2023-2027 and the European Network for Rural Development (ENRD, 2021).

In this context, the authors of this study case, developed a SWOT Analysis on the concept of Smart Village in Romania, based on data and information collected in the present research.

Table 1. SWOT analysis on the concept of Smart Village in Romania in the context of the Post 2020 CAP

Strengths	Weaknesses	Opportunities	Threats
Stresses the importance of a participatory approach; Requires the development of a holistic strategy at the local level; Allows focus on technological innovation (digitization) and social innovation; Focuses more on local communities than on ATU level; Adds value to local communities. <u>Dimensions and areas of activity</u> *1. Administration* **Public Services** - Efficiency of administrative services; Use of ICT to provide services to the community **Transparency** - Governmental info transparency and Financial transparency **Policies** - Improving management / leadership; Public participation *2. Technology* **ICT** - Internet access; IT infrastructure **Technologies** specific to the rural environment Sensor-based technologies used in agriculture and animal husbandry; IoT- The Internet operation of physical devices that have network connectivity that allows the collection and exchange of data between them. *3. Resources* **Natural resources** - The condition of the ground; Access to running water; Energy supply, including renewable **Economic resources** - Agriculture; Fishing; Animal farms **Human resources** - The rural community; Level of education; Opening to the new *4. Village services / Public services* **Essential services** - Health services; Educational services, Economic services Entrepreneurship; Access to jobs; Economic institutions; Distribution / logistics facilities *5. Standard of living* **Security and comfort** - Waste management; Environment protection; Public safety; Disaster management **Access to public services** - Green space facilities; Sports field; Banking services; Road and bridge infrastructure *6. Socio-historical, cultural and religious*	- Creates confusion (without a well-defined implementation framework); - Doubles an already existing concept; - There is no clear policy to include this concept; - The focus is too local; - Focuses too little on digitization; - Lack of or limited access to the internet and digitization in some rural areas; - Digitization level still low in the agricultural sector, at the level of farms and farmers; - Low level of education of young farmers (31.6% of EU farm managers 28 have basic and complete agricultural education while 96.7% of Romanian managers had only practical agricultural experience, compared to the EU average of 68.3 %);	- Creation of fiscal facilities granted by the state; - EU funding through EAFRD RDNP 2020, respectively Strategic Plan (SP) 2023-2027; - Alignment with the principles of the Green Agreement; - Achieving integrated support by creating a single fund to finance the creation of a Smart Village; - Government support by creating a special fund to support smart villages; - The creation of a structure to coordinate several funds involved in the investments needed to achieve the concept of smart village; - Increased digitalization trends and the development of "remote" jobs in the context of the evolution of the COVID-19; - Increasing access to national / EU funding programs dedicated to the innovation research sector;	- entry of new competitors on the market; - calamity of crops due to natural phenomena; - increasing the poverty rate in the conditions of the economic crisis; - relatively constant demand.

Source: Authors' conceptualization.

1.2 Programs, Respectively Policies that Could Have a Positive Influence on the Development of Smart Village in Romania

Combining research and innovation, the Horizon 2020 program can also make a significant contribution to Smart Villages' building strategies, which can ensure technology transfer in many areas of interest to Smart Villages. Seen as a means of stimulating growth and creating jobs, Horizon 2020 benefits from the political support of European leaders and members of the European Parliament.

Horizon 2020 includes several elements relevant to the development of smart villages. In Social Challenge 2, a special call for "rural renaissance" is closely related to the development of the knowledge base for smart villages. The idea behind the Smart Villages strategy is that, although the rural environment faces many challenges today, rural areas offer different and very valuable things for the whole of European society. The EU's strategy is to ensure that people in rural areas have access to educational training to develop their knowledge and skills, jobs and services comparable to those in urban areas, and that the community is connected to transport and utility networks.

The Smart Villages Action Plan finds many initiatives in the areas of rural development, regional policy, transport, energy, digital, and research.

1.3 Cross-Cutting Issues: Cooperation, Recovery, and the Green Agreement

The main consideration in the context of the new Post 2020 CAP is the existence of specific support for the emerging cooperation of smart villages, and / or support for cooperation between villages and other types of areas (cities) or other stakeholders (e.g., research). The Strategic Plan Regulation stipulates that when providing investment support, Member States should provide special attention to the overall cross-cutting goal of modernizing the sector by encouraging the adoption and exchange of knowledge, innovation, and digitalization in agriculture and rural areas. Support for investment in the deployment of digital technologies in agriculture, forestry, and rural areas, such as investments in precision agriculture, Smart Villages, rural enterprises, and ICT infrastructure, should be included in the description of the CAP Strategic Plans on its contribution to general transversal support and consolidation of "Environmental protection, including biodiversity and climate action, and to contribute to the achievement of the Union's environmental and climate objectives, including the commitments made under the Paris Agreement".

Support from Member States should make it possible to establish and implement cooperation between at least two entities in order to achieve the objectives of the CAP. Support can involve, among many other environmental and climate collective actions and actions; promoting the short supply chain and local markets; pilot projects; EIP Task Force projects for agricultural productivity and sustainable local development projects, Smart Villages, agricultural partnerships; networks and clusters; social agriculture; community-supported agriculture; LEADER actions;

and the establishment of producer groups and producer organizations, as well as other forms of cooperation deemed necessary to achieve the specific objectives of the CAP.

Among the cooperation proposals mentioned in Article 71 on Cooperation, emphasis is placed on the possibility / need for cooperation in order to achieve and implement strategies for smart villages.

"A smarter, more modern and sustainable CAP must embrace research and innovation in order to serve the multifunctionality of the Union's agricultural, forestry, and food systems by investing in technological development and digitalization, as well as improving the effective adoption and implementation of technologies, in particular digital technologies, as well as increased access and exchange of impartial, solid, relevant, and new knowledge ".

For the financial programming period 2023-2027, the latest form of the new strategic plan regulation provides for the allocation of interventions set by Member States with the objectives of the Green Agreement on achieving climate neutrality by 2050. To this end, the Commission undertakes to assess the combined contribution of interventions. Member States' strategic plans to meet the Union's environmental and climate commitments, those arising from the European Green Agreement.

Supporting and improving the protection of the environment and climate action and contributing to the achievement of the Union's environmental and climate objectives are a high priority in the future of the Union's agriculture and forestry. The optimal combination of types of action to address these targets will vary from one Member State to another, including reductions in greenhouse gas emissions and increased carbon sequestration, which are very important in mitigating climate change. Article 6.d of the same regulation, which refers to the Specific Objectives of the Strategic Plans that aim to contribute to climate change mitigation and adaptation, including by reducing greenhouse gas emissions and improving carbon sequestration, and promoting sustainable energy.

At this moment, the National Strategic Plan for the programming period 2023-2027 related to our country, Variant 1, was sent to the European Commission on February 28, 2022, and in the next 6 calendar months, Romania will receive comments and then be approved (MADR(c), 2021).

The section on digitalization and computerization, in the new PNS 2023-2027 with reference to the agricultural sector and rural development, aims to establish / adapt a system of knowledge and innovation in agriculture (AKIS), but also to support through LEADER actions aimed at revitalizing services through digital and social innovation, improving services in LEADER territories (smart villages) - where these types of needs have been identified at the level of each local community in Romania.

The new concept for Romania on innovation in agriculture introduced in PNS 2023-2027 is AKIS, a concept that together with vocational training and counselling services, is part of the category of horizontal interventions needed for

the development of future agriculture in the context of new challenges such as climate change, digitalization, precision agriculture, etc.

2. The Smart Village Concept in the Research Literature & Analysis

A concept that was briefly exposed during the September 2016 European Commission rural stakeholders 'meeting in Cork, Ireland, the" Smart Village "proposition was necessary in order to diminish the rural-urban digital gap; to provide growth prospects to both villages and rural areas; none of them could be achieved without thriving entrepreneurship environment or fully unlocking local actors potential. Part of the Common Agricultural Policy, the European Agricultural Fund for Rural Development, with finances of almost 100 billion EUR across the EU 2014-2020 multiannual framework (EC, 2017). The main objective of a smart village is to empower ecosystems and generate growth, innovation, and sustainable development, therefore, the topic of Smart Village should dictate the future of local rural development in the upcoming period (Profiroiu, Radulescu, 2019).

The main objective of the current analysis is to highlight the key concepts that result from the Smart Village term interrogation and to determine what the scientific community is focusing on.

The current analysis has taken into consideration, up to this point, the local aspects of the Smart Village concept, which is interlinked with the sustainable development ability of rural communities; in the following chapter of the paper, the applicability and research interest of this topic will be assessed using consecrated research methods such as the one of bibliometrics. In order to perform this query, the present paper aims to interrogate and quantitatively measure the latest scientific database for this subject. A number of 578 research papers have been identified as the study's population using the "Smart Village" key for both title and abstract, in the Web of Science Database, papers that will be scrutinized in the following paragraphs.

Figure 2. Yearly number of papers on the topic of "Smart Village"
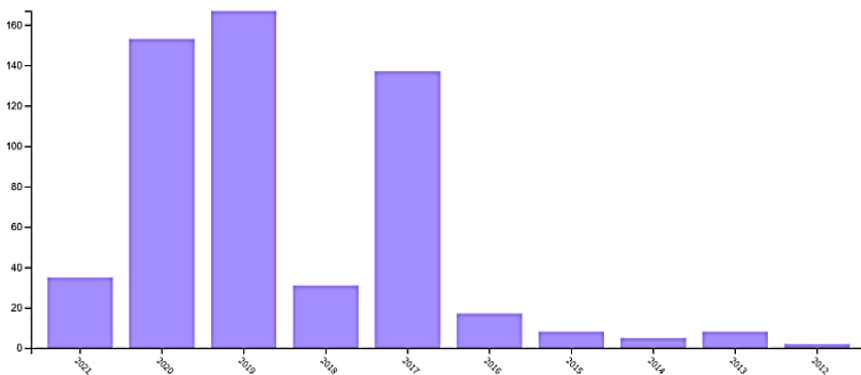
Source: Author's concept using Web of Science.

As seen in Figure 2, the research interest has drastically increased in the last couple of years, year 2019 marks the maximum value with more than 160 papers on this topic, the increasing interest matches with the concept introduction in late 2016. More than 90% of the papers have been published since 2017, but what exactly these work papers focus on will be observed in the following figure (Figure 3), describing the Web of Science topics; Engineering related orientations, together with Sustainable and Technological. Technology marks the importance of innovation that is directly linked to engineering and science. Fewer papers belong to the economic sphere (pink and brown), marking the lack of applicability and concept preparedness.

Figure 3. Number of papers on the topic of "Smart Village" by scientific category
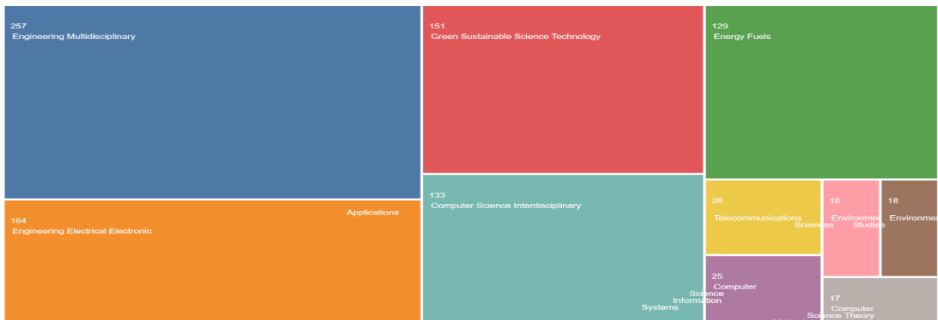
Source: Author's concept using Web of Science.

Going through the 578 research titles, only one paper marks the presence of "Romania" within the title line, strong indication that the paper relates to Romanian smart villages, an immaterial number that clearly marks the novelty of the current studied topic, same results can be drawn from the abstract inspection, the only one being published in 2019. Searching for the "European Union or EU" within the title, 2 papers appear, a situation with a slight change over the abstract search, where 15 papers could be identified directly referring to the European Union as study population or research focus. A more detailed term analysis will be conducted in the following paragraphs, using the VOS Viewer software to draw the term correlation maps.

Figure 4. Term map based on "Smart village" search on Web of Science engine
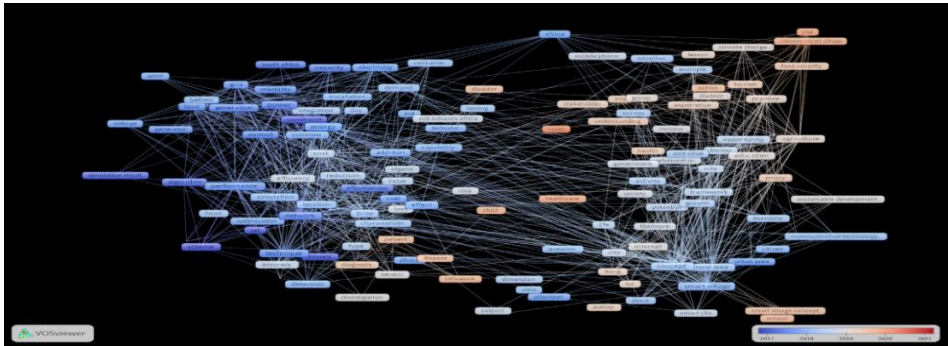
Source: Author's concept using Web of Science & VOS Viewer.

The first picture of the correlated terms (Figure 4) points out the multitude of interlinked word clusters by publishing year, the cloud being mostly blue, indicating the numerous papers written before 2020. The clusters contain 140 items and 5 major clusters have been identified, the first one containing 38 terms with parts of the "smart" concept, integrating terms like: efficiency, energy, grid, optimization, performance, optimization and wind; the second cluster containing 35 items containing parts of the "village" concept with notes as: agriculture, climate change, education, farmer, food security; the third cluster with 34 items focusing on the health related aspects; the 4th cluster with 30 items linking the rural with the urban concept of smart living, also enhancing the economic side of the theme; and the 5th cluster with only 3 terms, representing the most high-tech cloud with the Internet of Things concept in the middle.

Figure 5. Term map based on "Smart village" link
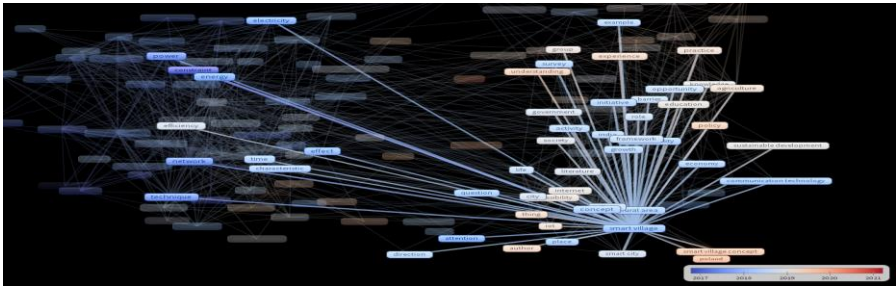
Source: Author's concept using Web of Science & VOS Viewer.

The smart village item in the above figure (Figure 5) as the central term points out links to both pre and post 2019 terms, such as network, power, rural area, initiative, opportunity, policy, sustainable development, agriculture and also the internet of things concept that is in strong relationship with. The smart village subject that can definitely co-exist in perfect harmony with the smart city orientation and such alignment at all levels could not be achieved without a few things that have already been mentioned in the last chapters and also visible within the links: rural sustainable development, social and economic growth, ways of implementation and local communities.

Figure 6. Most relevant terms
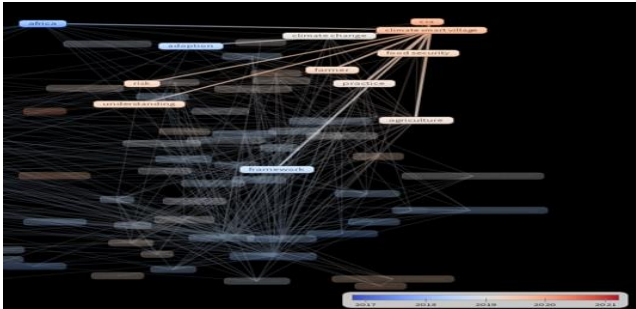
Source: Author's concept using Web of Science & VOS Viewer.

In the above figure (Figure 6) the top two terms by relevance strength generated by the used software can be seen, these two terms occur in more than 10 papers each and refer to the climate smart village and CSA (climate smart agriculture), both concepts being also recognized as recent research interest between, shaping the future path that a rural community should follow in order to secure the status of a smart village through climate neutrality within the community and climate-friendly agricultural practices.

Figure 7. Rural area linkages
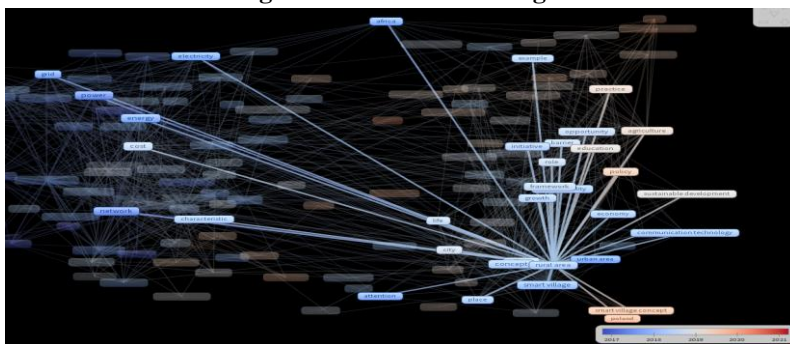
Source: Author's concept using Web of Science & VOS Viewer.

In the above figure (Figure 7) the central aspect of the new research theme has been selected - the rural areas – the resulting parallels to other clusters and publishing years present how the smart village concept can be applied into reality, using the energetical breakthrough and sustainable development practices, framed properly as a tailored policy that can be achieved through education, practice, well-defined role of the agriculture and using efficient communication across stakeholders.

In the last paragraphs a couple of points have been addressed in order to successfully implement the smart village concept, these research themes assessed through the quantitative analysis do represent key points and opportunities that should not be skipped when actions are considered to shape the future of Romanian rural communities.

3. Conclusions

The digital era of today's world means that the population is witnessing the dawn of a new approach in the agricultural sector, which relies on a joint effort to meet growing global nutrition needs and the future challenges, given the fast-growing pace of the global population. This factor alone has led to an increasingly more pressing demand for a vast array of agricultural products, while maintaining an eco-friendly perspective.

Given the need to produce more and faster in a sustainable way, precision agriculture has the remarkable potential to rapidly become an essential tool for the sustainability of the agricultural sector and increasing competitiveness. The use of innovative technologies generates socio-economic effects such as: increased

production, improved working conditions of farmers, maintaining soil structure, preserving and improving soil characteristics, increased soil water supply, reducing crop irrigation costs, reduced costs with the administration of plant protection products and chemical fertilizers, the use of genetic material resistant to drought and certain diseases and pests, etc.

Considering that the widespread adoption of cutting edge technologies and / or new agricultural practices usually modifies the exchange of knowledge from farmer to farmer, but also between farming communities with the support of third parties, such as associative forms in the agricultural sector, farmers organizations, local civil society organizations, agricultural research and development units should become more and more useful and necessary.

The modest collaboration between farmers and entities that promote research and innovation has led to a limited transfer of knowledge and technological solutions from suppliers to farmers, mainly on specific issues. It is therefore necessary for farmers, consultants, research units and other stakeholders to work together in order to identify innovative solutions to the specific problems facing the sector, such as the use of environmentally friendly practices, optimizing the use of resources and factors of production.

The implementation of leading-edge technologies and processes adapted to the needs of the farmers of today, developed and supported by research and innovation activities, will generate positive socio-economic and environmental consequences, which will increase the performance of farms while maintaining a low impact on the environment.

Furthermore, in order to meet European standards, the approach needs to focus on how digitalization supports on-farm efficiency and performance. Strategic advice on digitalization and e-infrastructure is needed, as it is linked to knowledge exchange, communication, dissemination, and operation.

The research focus has been demonstrated throughout the paper that is oriented in boosting this novel concept, and also via the proposed methods, the Romanian Rural side can think of the complete incorporation of this structure in development individual objectives.

Within the Local Development Strategies, the concept of "Smart Villages" can be supported, by increasing smart village development projects that aim to capitalize on the willingness and knowledge of local communities to identify solutions using technology and innovation. This will offer the prospects of an improved life quality in rural areas, address depopulation and demographic challenges, remodelling the quality of local services in the field of health and safety of citizens and laying out the prospects of a transition to a circular, low-carbon economy, as well as the digitalization of social, administrative and educational sectors.

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Analysis of Foreign Trade with the Main Categories of Agro-Food Products, Parallel Romania - Italy

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Abstract

This paper aims to study the dynamics and structure of foreign trade in agro-food products according to the combined nomenclature of Romania and Italy. In this regard, with the help of statistical data taken from databases: the National Institute of Statistics, for Romania, and the International Trade Center, for Italy, the dynamics of exports, imports, and, at the same time, the trade balance were analysed. The degree of concentration of both imported and exported products was further analysed to determine whether or not there was a concentration on a particular chapter of the Combined Nomenclature.

Keywords: Romania, Italy, foreign trade, trade balance.

JEL Classification: Q17, F10.

1. Introduction

The analysis of external trade is an extremely important topic, especially in today's socio-economic-political context. This article aims to highlight a comparative analysis of foreign trade in agro-food products from Romania and Italy.

The existence of trade was necessary because people began to communicate with each other; initially people were content with very little and worked hard to produce everything they needed; over time, as civilization developed, their needs increased, only by exchange to satisfy (Pațac, 2008).

International trade is an independent branch of the economy that includes commercial transactions or cooperative economic and technical science actions with

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foreigners in goods, works, services, financial transactions, insurance, tourism and, in general, any conduct or business (Vișan, 1999).

2. Problem Statement

According to the literature, Gavrilescu (2019) finds that Romania's international agricultural and food trade has changed significantly in terms of trade policy, as well as the geographic focus and composition of imports and exports. Economic and political reforms have led to major changes in the functioning of the agro-food sector and the agro-food chain, resulting in a severe imbalance between domestic supply and demand; as a result, imports far outnumber exports (International Trade and Regional Integration, n.d.).

According to the conclusions reached by the authors Nica & Stoian (2018), the trend of imports is constant while the development of exports oscillates, so the dynamics of the trade balance is given by the trend. „*Concerning the import of agro-food products, their growth rate was higher than that of exports with agro-food products, the trade balance of this product category being deficient*."

According to Rusali (2010), who conducted an overview of foreign trade in agro-food products in Romania, the author concluded that the results show a decrease in domestic performance in the face of increasing external competitiveness, with significant implications for both the food industry and the agricultural sector, requiring a redesign of market strategies. It also states that the competitiveness rating of Romanian food products shows a commercial disadvantage compared to EU products, reliance on imports of processed products and animal origin, and low competitiveness of the processing sector is the main disadvantage for achieving higher export earnings (Rusali, 2010; Pătărlăgeanu et al., 2020).

According to Caiazza & Volpe (2014) „agro-food industry has great relevance in Italy". Studying competitiveness, the authors concluded that strategic actions to support the internationalization process of agro-food companies must be based on innovation to improve quality and international certification. The main drivers behind the internationalization strategy are the need for more markets and the search for opportunities to increase profits. In the process of internationalization, the industry faces the threat of unfair competition and counterfeiting. Other issues depend on cultural differences that affect competition due to differences in product quality and imagery (Caiazza, Vople, 2012).

3. Research Questions / Aims of the Research

This research aims to identify the dynamics of imports and exports of agro-food products from Romania and Italy through a comparative analysis, as well as to determine the balance of trade for these products.

At the same time, we want to determine the degree of concentration of imports and exports for these categories of products, both in Italy and in Romania, and this last part contributes to the formulation of the research question, namely, what is the degree of concentration of imports and exports of agro-food products in Romania and in Italy.

Making also a hypothesis to the research question, formulated above, we consider that the degree of concentration of exports is higher than that of imports, both for Romania and Italy; but also, the hypothesis that the degree of concentration of Italy's foreign trade is lower than that of Romania.

4. Research Methods

The aim of this paper is to make a comparative analysis of foreign trade in agro-food products in Romania and Italy. To this end, the dynamics of imports and exports were analysed using statistical data, respectively, the National Institute of Statistics for Romania's trade and the International Trade Centre for Italy's trade. In view of the European Union rules, Romania and Italy also classify marketed products according to the Combined Nomenclature, so the first 24 chapters of the nomenclature, i.e. the first 4 sections of the same nomenclature, were considered agro-food products.

The gap between exports and imports was used to determine and analyse the evolution of the trade balance. At the end of the study, the aim was to carry out an analysis in order to determine the degree of concentration of imports and exports by product category, so for this analysis the GINI coefficient was determined, using the following formula (Dorfman, 1979; Abounoori, McCloughan, 2003):

$$\text{Gini Coefficient} = \sqrt{\frac{n * \sum_{i=1}^{n} p_i^2 - 1}{n-1}} \text{, where:}$$

pi – share of each indicator observation in the total;
n – number of observable units.

5. Findings

According to the Combined Nomenclature, the first 24 chapters represent the totality of agro-food products, so the dynamics of imports, exports and the determination of the trade balance in these 24 chapters will be analysed.

Table 1. Dynamics of agro-food imports into Romania, thousands of euros

Group	Category	Imports				
		2016	2017	2018	2019	2020
1	Live animals	165,129	179,025	180,031	184,781	183,945
2	Meat and edible meat offal	645,828	760,266	820,597	940,884	910,482
3	Fish and crustaceans, molluscs and other aquatic invertebrates	174,145	195,503	207,138	207,505	196,529
4	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	401,736	497,252	501,506	576,786	640,640
5	Products of animal origin, not elsewhere specified or included	53,916	56,571	64,525	69,697	64,037
6	Live trees and other plants; bulbs, roots, and the like; cut flowers and ornamental foliage	115,000	129,113	133,086	153,320	151,242
7	Edible vegetables and certain roots and tubers	365,037	410,293	424,054	517,167	484,696

Group	Category	Imports				
		2016	2017	2018	2019	2020
8	Edible fruit and nuts; peel of citrus fruit or melons	563,740	638,723	639,209	653,460	704,893
9	Coffee, tea, maté and spices	243,096	248,235	241,740	253,426	271,060
10	Cereals	592,125	467,766	324,849	397,554	703,190
11	Products of the milling industry; malt; starches; inulin; wheat gluten	105,247	102,253	100,988	113,656	112,524
12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder	315,696	368,008	429,075	397,420	461,403
13	Lac; gums, resins and other vegetable saps and extracts	27,859	29,646	22,486	28,293	31,255
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	1,588	1,411	1,125	1,843	1,538
15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	189,372	191,964	172,245	173,686	202,038
16	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	149,902	189,719	212,313	249,327	272,087
17	Sugars and sugar confectionery	280,959	288,299	264,659	302,793	270,065
18	Cocoa and cocoa preparations	267,062	276,621	294,578	350,116	333,604
19	Preparations of cereals, flour, starch or milk; pastrycooks' products	404,462	452,899	490,207	546,305	566,941
20	Preparations of vegetables, fruit, nuts or other parts of plants	279,825	297,731	332,003	374,265	385,016
21	Miscellaneous edible preparations	407,387	451,983	498,020	547,390	555,812
22	Beverages, spirits and vinegar	323,234	359,616	396,827	494,456	498,385
23	Residues and waste from the food industries; prepared animal fodder	394,517	458,488	506,088	532,568	575,989
24	Tobacco and manufactured tobacco substitutes	322,199	371,748	377,697	364,418	355,128

Source: National Institute of Statistics (NIS).

As can be seen in Table 1, Romania's imports of agro-food products increased during the review period for most of the chapters analyzed in the nomenclature. The highest import value was recorded in 2019 for the Meat and edible meat offal category, with an import value of 940.88 million euros. On the contrary, the category with the lowest imports was Vegetable plaiting materials with a minimum value recorded in 2018 of €1.13 million.

On average, for the last five years, the situation is as follows: Meat and edible meat offal ranks first with an average annual import value of 815.6 million euro, followed by Edible fruit and nuts; peel of citrus fruit or melons with an average annual value of 640 million euro, and dairy produce ranks third with an average import value of 523.5 million euro.

Looking at the dynamics, of the 24 chapters in the nomenclature, only two show a decreasing average annual rate, namely the categories: Vegetable plaiting materials with an annual rate of -0.8% and Sugars and sugar confectionery with an average annual rate of -0.98%, while the other 22 chapters record increases in imports, the highest being for the category Preparations of meat, of fish or of crustaceans, molluscs, or other aquatic invertebrates with an average annual increase of 16%.

Table 2. Dynamics of Romania's agro-food exports, thousand euros

Group	Category	Exports				
		2016	2017	2018	2019	2020
1	Live animals	373,203	424,290	375,833	437,135	405,621
2	Meat and edible meat offal	238,586	281,216	263,617	238,229	195,179
3	Fish and crustaceans, molluscs and other aquatic invertebrates	18,799	18,870	20,923	20,438	20,733
4	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	155,824	189,041	198,846	199,789	198,859
5	Products of animal origin, not elsewhere specified or included	27,555	32,844	36,008	32,473	24,779
6	Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage	2,821	3,230	2,847	2,445	2,416
7	Edible vegetables and certain roots and tubers	86,407	139,661	97,063	95,632	93,612
8	Edible fruit and nuts; peel of citrus fruit or melons	54,038	65,354	66,217	61,345	79,418
9	Coffee, tea, maté and spices	24,929	26,073	24,046	28,352	29,537
10	Cereals	2,097,250	1,980,693	2,175,910	2,585,351	2,169,442
11	Products of the milling industry; malt; starches; inulin; wheat gluten	26,866	17,450	12,685	16,963	18,684
12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder	1,141,696	1,267,076	1,210,098	1,083,265	955,996
13	Lac; gums, resins and other vegetable saps and extracts	1,027	1,058	1,057	1,434	953
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	2,459	1,417	940	1,363	1,157
15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	194,056	211,079	224,211	224,491	194,977
16	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	137,418	146,147	169,786	182,503	195,264
17	Sugars and sugar confectionery	63,602	57,124	47,222	40,610	42,148
18	Cocoa and cocoa preparations	76,588	84,316	83,074	116,348	106,839
19	Preparations of cereals, flour, starch or milk; pastrycooks' products	154,263	172,458	187,817	217,453	221,890
20	Preparations of vegetables, fruit, nuts or other parts of plants	55,072	67,062	66,444	67,603	73,142
21	Miscellaneous edible preparations	167,303	181,694	172,166	183,287	196,462
22	Beverages, spirits and vinegar	118,439	133,497	152,036	164,616	156,964

Group	Category	Exports				
		2016	2017	2018	2019	2020
23	Residues and waste from the food industries; prepared animal fodder	181,295	175,198	220,430	236,580	234,038
24	Tobacco and manufactured tobacco substitutes	769,738	729,705	692,197	947,308	1,375,940

Source: National Institute of Statistics (NIS).

In terms of Romania's exports over the same period of time, there is quite a big difference compared to imports, in the sense that the value of exports is lower than that of imports. The highest value of Romania's exports, by chapters of the nomenclature, was recorded in 2019, for Cereals with a value of 2.585 billion euros. In the opposite direction, the lowest value of exports for a single chapter of the nomenclature was recorded for Vegetable plaiting materials, in 2018, being 940 thousand euros.

In terms of annual average, the highest export values in the last five years were recorded in the following sections: Cereals, with an average annual export value of €2.2 billion, followed by Oil seeds and oleaginous fruits; miscellaneous grains, seeds, and fruit; industrial or medicinal plants; straw and fodder, with an average annual export value of €1.13 billion, and in third place was Tobacco and manufactured tobacco substitutes with an average annual export value of €902.98 million. In terms of average annual value over the last five years, the last-ranked category is Lac; gums, resins, and other vegetable saps and extracts, with an average annual export value of €1.1 million.

Analysing the dynamics, out of the 24 chapters of the nomenclature, for Romania's exports, 17 register a positive dynamic and 7 register a negative dynamics. Of the categories with the highest annual increases, the first two are Tobacco and manufactured tobacco substitutes, with an average annual increase of 15.6%, followed by Edible fruit and nuts; peel of citrus fruit or melons with an average annual growth rate of 10.1%. At the other end of the scale, the slowest annual growth rates were recorded in the categories: Vegetable plaiting materials, with an average annual rate of -17.17%, and Sugars and sugar confectionery, with an average annual rate of -9.77%.

Table 3. Dynamics of the trade balance for agro-food products in Romania, thousands of euros

Group	Category	Trade balance				
		2016	2017	2018	2019	2020
1	Live animals	208,074	245,265	195,802	252,354	221,676
2	Meat and edible meat offal	-407,242	-479,050	-556,980	-702,655	-715,303
3	Fish and crustaceans, molluscs and other aquatic invertebrates	-155,346	-176,633	-186,215	-187,067	-175,796
4	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	-245,912	-308,211	-302,660	-376,997	-441,781

Group	Category	Trade balance				
		2016	2017	2018	2019	2020
5	Products of animal origin, not elsewhere specified or included	-26,361	-23,727	-28,517	-37,224	-39,258
6	Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage	-112,179	-125,883	-130,239	-150,875	-148,826
7	Edible vegetables and certain roots and tubers	-278,630	-270,632	-326,991	-421,535	-391,084
8	Edible fruit and nuts; peel of citrus fruit or melons	-509,702	-573,369	-572,992	-592,115	-625,475
9	Coffee, tea, maté and spices	-218,167	-222,162	-217,694	-225,074	-241,523
10	Cereals	1,505,125	1,512,927	1,851,061	2,187,797	1,466,252
11	Products of the milling industry; malt; starches; inulin; wheat gluten	-78,381	-84,803	-88,303	-96,693	-93,840
12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder	826,000	899,068	781,023	685,845	494,593
13	Lac; gums, resins and other vegetable saps and extracts	-26,832	-28,588	-21,429	-26,859	-30,302
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	871	6	-185	-480	-381
15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	4,684	19,115	51,966	50,805	-7,061
16	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	-12,484	-43,572	-42,527	-66,824	-76,823
17	Sugars and sugar confectionery	-217,357	-231,175	-217,437	-262,183	-227,917
18	Cocoa and cocoa preparations	-190,474	-192,305	-211,504	-233,768	-226,765
19	Preparations of cereals, flour, starch or milk; pastrycooks' products	-250,199	-280,441	-302,390	-328,852	-345,051
20	Preparations of vegetables, fruit, nuts or other parts of plants	-224,753	-230,669	-265,559	-306,662	-311,874
21	Miscellaneous edible preparations	-240,084	-270,289	-325,854	-364,103	-359,350
22	Beverages, spirits and vinegar	-204,795	-226,119	-244,791	-329,840	-341,421
23	Residues and waste from the food industries; prepared animal fodder	-213,222	-283,290	-285,658	-295,988	-341,951
24	Tobacco and manufactured tobacco substitutes	447,539	357,957	314,500	582,890	1,020,812
	TOTAL	**-619,827**	**-1,016,580**	**-1,133,573**	**-1,246,103**	**-1,938,449**

Source: Authors' calculations based on NIS data.

Analyzing the trade balance, i.e., the difference between the value of exports and imports, for Romanian agro-alimentary products, the following can be observed. In the last five years, three chapters have been completely in surplus, namely: Cereals, Oil seeds and oleaginous fruits and Tobacco and manufactured tobacco substitutes, and 2 chapters out of 24 have been partially in surplus, namely Vegetable plaiting materials and Animal or vegetable fats and oils and their cleavage products.

At the total level, it can be seen that the trade balance for agro-food products, i.e. for the 24 chapters of the nomenclature, is in deficit in each of the last five years, ranging from -619 million euros in 2016 to almost -2 billion euros in 2020.

The largest deficit was recorded in 2020 for the Meat and edible meat off al category, which was € 715 million, and the largest surplus was recorded in the cereal category in 2019 being of € 2.188 billion.

Looking at the average over the last five years, the situation changes slightly, with five categories showing a surplus, namely Cereals with an average annual surplus of €1.7 billion, followed by Oil seeds and oleaginous fruits with €737.3 million, Tobacco and manufactured tobacco substitutes with €544.7 million, Live animals with €224.6 million and Animal or vegetable fats and oils and their cleavage products with €23.9 million. At the other end of the scale are Meat and edible meat offal with a deficit of 572.2 million euro and Edible fruit and nuts; peel of citrus fruit or melons with a deficit of 574.7 million euro.

In order to carry out a comparative analysis in terms of external trade in agro-food products, a similar analysis was carried out for Italy.

Table 4. Dynamics of agro-food imports in Italy, thousands of euro

Group	Category	Imports				
		2016	2017	2018	2019	2020
1	Live animals	1,451,539	1,563,889	1,569,384	1,205,664	1,485,933
2	Meat and edible meat offal	4,273,821	4,493,510	4,373,618	4,694,436	4,137,451
3	Fish and crustaceans, molluscs and other aquatic invertebrates	4,413,911	4,576,300	4,669,898	4,679,241	3,935,680
4	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	3,339,043	3,756,983	3,758,810	3,842,986	3,490,802
5	Products of animal origin, not elsewhere specified or included	200,809	210,776	226,187	256,028	223,027
6	Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage	542,488	56,303	51,919	397,215	470,687
7	Edible vegetables and certain roots and tubers	1,525,013	1,623,281	1,527,259	1,781,757	1,634,125
8	Edible fruit and nuts; peel of citrus fruit or melons	3,096,890	3,143,431	3,133,745	3,415,403	3,452,442
9	Coffee, tea, maté and spices	1,702,789	1,785,471	1,645,602	1,611,272	1,476,072
10	Cereals	2,811,206	2,856,588	2,863,445	3,069,324	3,149,849
11	Products of the milling industry; malt; starches; inulin; wheat gluten	273,305	297,594	32,887	327,798	336,275

Group	Category	Imports				
		2016	**2017**	**2018**	**2019**	**2020**
12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder	1,245,480	1,270,588	1,315,760	1,476,730	1,568,663
13	Lac; gums, resins and other vegetable saps and extracts	183,714	193,047	198,839	212,283	203,495
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	22,121	21,049	17,055	17,747	19,168
15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	3,773,463	4,069,970	3,575,755	3,462,911	3,583,394
16	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	1,418,900	1,502,215	1,550,742	1,516,140	1,553,423
17	Sugars and sugar confectionery	1,042,547	1,091,444	901,416	91,489	948,038
18	Cocoa and cocoa preparations	1,145,857	1,141,714	1,076,248	1,129,407	1,199,831
19	Preparations of cereals, flour, starch or milk; pastrycooks' products	1,385,014	1,452,692	1,495,197	1,504,541	1,409,900
20	Preparations of vegetables, fruit, nuts or other parts of plants	1,188,015	1,201,221	1,209,402	1,246,824	1,176,186
21	Miscellaneous edible preparations	1,113,801	1,123,306	1,163,195	1,191,268	1,170,580
22	Beverages, spirits and vinegar	1,623,514	1,746,210	1,914,833	1,985,148	1,811,621
23	Residues and waste from the food industries; prepared animal fodder	1,918,666	1,945,125	2,029,701	1,957,701	1,960,810
24	Tobacco and manufactured tobacco substitutes	2,102,603	2,093,435	2,125,742	2,062,427	1,925,043

Source: International Trade Center (ITC).

As can be seen in Table 4, Italy's imports of agro-food products have increased over the period under review for a good part of the chapters analysed in the nomenclature. The highest import value was recorded in 2017 for the category Animal or vegetable fats and oils and their cleavage products, with an import value of € 4.69 billion. Conversely, the category that recorded the lowest imports was Vegetable plaiting materials with a minimum value recorded in 2018 of € 17 million.

On average, over the last five years, the situation is as follows: Fish and crustaceans, molluscs and other aquatic invertebrates is in first place with an average annual import value of EUR 4.455 billion, followed by Meat and edible meat off al with an average annual value of EUR 4.395 billion, and Animal or vegetable fats and oils and their cleavage products in third place with an average import value of EUR 3.693 billion.

Analyzing from the perspective of dynamics, among the 24 chapters of the nomenclature, nine record a decreasing average annual rate, the first categories, according to the largest decrease being: Vegetable plaiting materials with an annual rate of -3.52% and S Coffee, tea, maté and spices with an average annual rate of

-3.5%, while the other 15 chapters record increases in imports, the highest being for the category Oil seeds and oleaginous fruits with an average annual increase of 5.9%.

Table 5. Italy's agro-food export dynamics, thousands of euros

Group	Category	Exports				
		2016	2017	2018	2019	2020
1	Live animals	51,846	47,367	47,655	39,617	32,948
2	Meat and edible meat offal	2,121,278	2,181,284	2,098,108	2,133,082	2,063,582
3	Fish and crustaceans, molluscs and other aquatic invertebrates	413,012	431,002	429,398	425,921	384,041
4	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	2,807,681	3,138,297	3,284,829	3,698,216	3,623,999
5	Products of animal origin, not elsewhere specified or included	115,166	138,787	158,875	159,217	159,970
6	Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage	757,099	834,279	885,379	899,571	906,317
7	Edible vegetables and certain roots and tubers	1,528,985	1,547,699	1,525,390	1,603,105	1,582,537
8	Edible fruit and nuts; peel of citrus fruit or melons	3,557,388	3,694,523	3,410,661	3,351,608	3,574,141
9	Coffee, tea, maté and spices	1,457,190	1,510,673	1,503,359	1,614,780	1,557,341
10	Cereals	703,739	757,241	626,636	644,405	723,998
11	Products of the milling industry; malt; starches; inulin; wheat gluten	308,146	34,668	372,846	393,779	405,708
12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder	506,876	518,501	544,764	593,948	602,731
13	Lac; gums, resins and other vegetable saps and extracts	231,649	196,114	225,402	267,754	301,812
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	4,652	4,789	54	6,068	7,166
15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	2,148,279	2,144,417	2,061,122	1,968,933	2,103,532
16	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	1,005,708	1,075,329	1,116,187	1,166,868	1,239,484
17	Sugars and sugar confectionery	359,552	366,444	338,428	335,548	325,293
18	Cocoa and cocoa preparations	1,535,089	1,803,527	1,817,437	1,944,515	1,900,033
19	Preparations of cereals, flour, starch or milk; pastrycooks' products	4,446,215	4,668,335	4,858,399	5,427,472	5,849,580
20	Preparations of vegetables, fruit, nuts or other parts of plants	3,187,980	3,256,077	3,400,611	3,534,903	3,765,764
21	Miscellaneous edible preparations	1,986,236	2,267,598	2,473,281	2,642,949	2,815,827

Group	Category	Exports				
		2016	2017	2018	2019	2020
22	Beverages, spirits and vinegar	7,953,662	8,544,071	9,065,224	9,709,996	9,532,706
23	Residues and waste from the food industries; prepared animal fodder	788,911	879,406	942,792	968,977	1,045,587
24	Tobacco and manufactured tobacco substitutes	446,109	948,404	909,572	1,551,367	1,801,143

Source: International Trade Center (ITC).

With regard to exports from Italy during the same period, there is no difference from imports in that the value of exports is close to that of imports. The highest value of Italy's exports, by chapters of the nomenclature, was recorded in 2019, for Beverages, spirits and vinegar, with a value of € 9.71 billion. In the opposite direction, the lowest value of exports for a single chapter of the nomenclature was recorded for Vegetable plaiting materials, in 2018, being € 54 thousand.

In terms of annual average, the highest export values over the last five years were recorded in the following categories: Beverages, spirits, and vinegar, with an average annual export value of € 8.96 billion, followed by Preparations of cereals, flour, starch, or milk; pastrycooks' products, with an average annual export value of €5.05 billion, and in third place was Edible fruit and nuts; peel of citrus fruit or melons with an average annual export value of €3.517 billion. In terms of average annual value over the last five years, the last ranked category is Vegetable plaiting materials, with an average annual export value of €4.55 million.

Analysing the dynamics, out of the 24 chapters of the nomenclature, for Italy's exports, 19 show positive dynamics and 5 show negative dynamics. Of the categories with the highest annual increases, the first two are Vegetable plaiting materials, with an average annual increase of 11.4%, followed by Miscellaneous edible preparations with an average annual growth rate of 9.11%. At the other end of the scale, the slowest annual growth rates were recorded for Live animals, with an average annual rate of -10.7%, and Sugars and sugar confectionery, with an average annual rate of -2.5%.

Table 6. Trade balance dynamics for agro-food products in Italy

Group	Category	Trade balance				
		2016	2017	2018	2019	2020
1	Live animals	-1,399,693	-1,516,522	-1,521,729	-1,166,047	-1,452,985
2	Meat and edible meat offal	-2,152,543	-2,312,226	-2,275,510	-2,561,354	-2,073,869
3	Fish and crustaceans, molluscs and other aquatic invertebrates	-4,000,899	-4,145,298	-4,240,500	-4,253,320	-3,551,639
4	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	-531,362	-618,686	-473,981	-144,770	133,197

Group	Category	Trade balance				
		2016	2017	2018	2019	2020
5	Products of animal origin, not elsewhere specified or included	-85,643	-71,989	-67,312	-96,811	-63,057
6	Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage	214,611	777,976	833,460	502,356	435,630
7	Edible vegetables and certain roots and tubers	3,972	-75,582	-1,869	-178,652	-51,588
8	Edible fruit and nuts; peel of citrus fruit or melons	460,498	551,092	276,916	-63,795	121,699
9	Coffee, tea, maté and spices	-245,599	-274,798	-142,243	3,508	81,269
10	Cereals	-2,107,467	-2,099,347	-2,236,809	-2,424,919	-2,425,851
11	Products of the milling industry; malt; starches; inulin; wheat gluten	34,841	-262,926	339,959	65,981	69,433
12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder	-738,604	-752,087	-770,996	-882,782	-965,932
13	Lac; gums, resins and other vegetable saps and extracts	47,935	3,067	26,563	55,471	98,317
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	-17,469	-16,260	-17,001	-11,679	-12,002
15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	-1,625,184	-1,925,553	-1,514,633	-1,493,978	-1,479,862
16	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	-413,192	-426,886	-434,555	-349,272	-313,939
17	Sugars and sugar confectionery	-682,995	-725,000	-562,988	244,059	-622,745
18	Cocoa and cocoa preparations	389,232	661,813	741,189	815,108	700,202
19	Preparations of cereals, flour, starch or milk; pastrycooks' products	3,061,201	3,215,643	3,363,202	3,922,931	4,439,680
20	Preparations of vegetables, fruit, nuts or other parts of plants	1,999,965	2,054,856	2,191,209	2,288,079	2,589,578
21	Miscellaneous edible preparations	872,435	1,144,292	1,310,086	1,451,681	1,645,247
22	Beverages, spirits and vinegar	6,330,148	6,797,861	7,150,391	7,724,848	7,721,085
23	Residues and waste from the food industries; prepared animal fodder	-1,129,755	-1,065,719	-1,086,909	-988,724	-915,223
24	Tobacco and manufactured tobacco substitutes	-1,656,494	-1,145,031	-1,216,170	-511,060	-123,900
	TOTAL	**-3,370,045**	**-2,225,293**	**-328,212**	**1,948,878**	**3,984,765**

Source: Authors' calculations based on ITC data.

An analysis of the trade balance, i.e. the difference between the value of exports and imports, for agro-food products from Italy shows the following. In the last five years, 7 chapters have been completely in surplus and 6 other chapters out of 24 have been partially in surplus.

At the total level, it can be observed that the trade balance for agro-food products, i.e. for the 24 chapters of the nomenclature, is in deficit in the first three years analysed (2016-2018) with values ranging from - 328.2 million euros to - 3.37 billion euros. In the last two years, the balance became in surplus, reaching a value of 3.985 billion euros in the last year analysed. Averaged over the five years analysed, there is a surplus of 2 million euros per year.

The largest deficit was recorded in 2019 for the category Fish and crustaceans, molluscs and other aquatic invertebrates at €4.25 billion and the largest surplus was recorded in the category Beverages, spirits and vinegar in 2019 at €7.725 billion.

Averaged over the last five years, the situation changes slightly, with five categories showing a surplus, namely Beverages, spirits and vinegar with an average annual surplus of €7.15 billion, followed by Preparations of cereals, flour, starch or milk; pastrycooks' products with €3.6 billion, Preparations of vegetables, fruit, nuts or other parts of plants with €2.225 billion, Miscellaneous edible preparations with €1.285 billion and Cocoa and cocoa preparations with €661.5 million. At the other end of the scale are Fish and crustaceans, molluscs and other aquatic invertebrates with a deficit of 4.038 billion euro and Meat and edible meat offal with a deficit of 2.275 billion euro.

Following this analysis of foreign trade, for the two main forms of trade, i.e. imports and exports, it is possible to determine, with the help of the Gini coefficient, the degree of concentration of imports and exports for both Romania and Italy. A high value of the coefficient implies a high degree of concentration, which would mean that either imports or exports orbit around certain main chapters, while the rest of the chapters in the nomenclature would have a low weight, and conversely, a low value would imply a low or non-existent degree of concentration, which would imply that imports or exports are evenly distributed for each chapter, with somewhat similar weights.

Table 7. Determination of Gini coefficients for the value of imports and exports of Romania and Italy and their average over the last 5 years

GINI coefficient	2016	2017	2018	2019	2020	Average
Romania						
Imports	0.124	0.125	0.129	0.130	0.132	0.128
Exports	0.374	0.352	0.366	0.381	0.358	0.366
Italy						
Imports	0.148	0.155	0.156	0.159	0.143	0.152
Exports	0.231	0.231	0.235	0.235	0.230	0.233

Source: Authors' calculations.

As it can be seen from Table 7, for Romania's imports, the Gini coefficients for each year from 2016-2020 tend more towards zero, ranging from 0.124 to 0.132, with an annual average of 0.128. These values imply a low degree of concentration, to non-existent, which is not necessarily a good thing. The lack of a degree of concentration actually means that the weight of each chapter of the nomenclature in terms of imports by Romania is similar to that of another chapter, which leads to the idea that Romania imports a similar level of each group of agro-food products, which is not sustainable.

Analysing the degree of concentration of the value of Romania's exports, by chapters of the nomenclature, one can observe Gini coefficient values ranging from 0.352 to 0.381, with an annual average of 0.366, which is close to the middle of the range (of 0.5), i.e., there is some concentration in terms of Romania's export of agro-food products, again a less favourable situation, in the sense that Romania excels at exporting only in certain chapters of the nomenclature.

The situation is similar in Italy, but at a slightly different level, the average concentration ratio for imports recorded by Italy being 0.152 (with annual variations ranging from 0.143 to 0.159), which is higher than in the case of Romania, thus with a slightly higher degree of concentration, a slightly better situation in the sense that agro-food imports are higher for certain categories, but not by much.

Italy is in a much better position when it comes to agro-food exports, with an average annual concentration ratio of 0.233 (ranging from 0.23 to 0.235), which shows that the weights of each chapter in the nomenclature are similar when it comes to exports, representing a sustainable development in this respect.

6. Conclusions

As regards Romania's imports of agro-food products, they are increasing for most of the chapters analysed in the Combined Nomenclature, except for two categories. Therefore, Romania records significant increases in imports, which is less sustainable. On the other hand, in terms of exports of agro-food products, there are quite a number of chapters (seven) for which there are decreases in the value of exports, while the level between exports and imports is much higher. Therefore, this situation leads to a deficit trade balance in Romania, which is increasingly unbalanced, reaching a deficit of almost €2 billion last year.

As far as Italy's foreign trade is concerned, it can be seen that, in terms of dynamics, imports have decreased for nine of the 24 chapters, thus Italy is trying to decrease its dependence on imports, while, on the other hand, export dynamics show increases for 19 of the 24 chapters analysed, as Italy is increasing its competitiveness in this area. This situation is also observed in the analysis of the trade balance, while in the first three years of the period analysed there was a trade deficit, in the last two years analysed (2019 and 2020) Italy's trade in agro-food products recorded a surplus, reaching a trade balance value of almost 4 billion euros.

Although it is natural for a country to import every product needed for consumption by its population, and at the same time, given culture, tradition, climate, customs and other exogenous and endogenous factors, exports are directed towards

certain categories/chapters of the nomenclature, and therefore the degree of concentration of exports is higher than that of imports, the situation in Romania is far too lagged, with very low Gini coefficients for imports, which leads to a lack of concentration (in other words, Romania imports almost every agro-food product in a similar way), and the degree of concentration for exports is quite high (in other words, Romania relies on exporting a few categories/chapters of agro-food products).

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Key Barriers that Prevent the Development and Implementation of Power Purchase Agreement in the Transition Process to a Zero Carbon Economy

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Abstract

To comply with the promotion of green energy and to enable the transition to a zero carbon economy requires the development of increasingly easier tools which can help the achievement of new climate targets. A facile way to do this is to participate in bilateral power purchase agreements (PPAs) with renewable producers (REP).

Although a PPA can be drafted in a very flexible way, its main purpose is to offer the possibility to buy future green renewable energy from a seller at an agreed price. This is the reason why PPAs are financially attractive for the seller due to their price certainty, but they can also offer uncertainty for the buyer due to the uncertainty of the future green energy production. This situation complicates things when it comes to concluding such contracts, the above-mentioned uncertainty jeopardizing the objectives considered at the time of signing PPA, on one hand and, on the other hand, complicating the efficiency of the demand. To this are added legislative changes that may not always have a beneficial effect on the sustainability of PPAs.

For this research questionnaires and interviews with experts in the energy field are used, both carried out at the level of the Romanian energy market.

This article aims to investigate the main barriers that prevent the development of PPAs and make these contract more difficult or less attractive to be accessed, especially for buyers.

The results suggest that there is an interest shown by both buyers and sellers, even if the level of knowledge on such contracts is at an average level. It is also clear that the more people are familiar with the benefits of PPAs, the more their intention to conclude such contracts is higher, especially when we are talking about industrial consumers, where the benefits of using green energy have a higher impact on their expenditures.

Keywords: Power Purchase Agreement, Barriers, Renewable Energy, Green Energy, Zero Carbon Economy, Climate Neutrality.

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1. Introduction

Everywhere in the world, there is a huge need to reduce CO_2 emissions, this being the reason why beginning from a certain point is crucial (Sklepovič, 2022). From what we can see, more and more countries and institutions show an increasingly interest in the acceleration of their decarbonisation system by reducing the greenhouse gases (Iancu, 2021). At this moment, we can see that there is a huge need to make global, national, and local policy changes, as long as we all know that the global warming or climate change are very dangerous, this aspect being shown in many reports from World Wide Organisation and from the intensity of this phenomenon we can convince us alone.

Due to this fact, green and clean energy are very seriously taken into consideration, their development making the subject of many debates, and climate neutrality could easily be gained through renewables. The achievement of the European Union's goals and the reduction of CO2 emissions by 2050 are the objectives that must be fulfilled as quickly as possible (Soeiro, 2020).

Despite the high initial costs, technology and user, the benefits brought by renewables are many more and their results are far from encouraging, the creation of a green global economy that could fight against air pollution and climate change being primordial (Taghizadeh-Hesary, 2021). The legislative part is playing a huge role in the development and in the encouragement of the use of renewable energy, as well as in the transition to green energy acceleration, PPAs being one of the many aspects that we are talking about when it comes to legal aspects in the renewable energy field development.

PPAs are contracts concluded between an energy buyer and an energy seller, who buy and sell a certain amount of energy, energy that is or will be generated by a renewable asset. What is very important to understand is that both the investors and creditors from non-subsidized markets are able to invest in renewable energy projects.

Therefore, the possibility of creating energy from renewable sources, as well as the purpose of these PPAs to create a fair agreement and with as few risks as possible between the parties, are two aspects that need to be given more attention (Mendicino, 2019).

The purpose of this article is to study and examine the key barriers that prevent the development and implementation of a Power Purchase Agreement in the transition process to a zero-carbon economy.

So, while PPAs can help the transition to green energy in many ways, they face several barriers that prevent their implementation and development, and although the benefits and advantages brought by PPAs are very high, these barriers make people reluctant in getting involved in such a project. Among these barriers we mention level of knowledge, the attitude, state's implications, and the level of development of the market, the level of promotion, risks, and legal consequences.

This article has the following structure: The introduction presents Power Purchase Agreement Concept, the advantages and the disadvantages they assume. In Section 2, PPAs are defined with an analysis of the main scientific sources. In Section 3, the research methodology is presented, which consists of a workshop with energy experts and a questionnaire. Section 4 presents the main research results, and last but not least the final section shows the main conclusion. Bibliographic references complete this article.

2. Power Purchase Agreement in the Scientific Literature

When we talk about renewable energy, we talk about PPAs, which are one of the most important ways that help achieve climate neutrality, when it comes to legal proceedings. Their complexity is very well known, and many aspects should be taken into consideration when signing a PPA. The aforementioned complexity is given primarily by the long-term negotiations, this being the reason why the clauses should be accurate and very clear.

We have heard many times the question – When is the usage of Power Purchase Agreement necessary? – The answer is very simple: PPAs are useful when:

- The financing of the project can be unsecure, and there is a need to secure the amount of energy bought and the price offered;
- There is likely to exist an event that can provide energy at a lower price – in this case, PPAs provide the security to be safeguarded from such a situation;
- It might be that one or some of your most important buyers want to get most of the production. For example, when a government public service wants to buy the entire amount of energy produced by a power plant – in this moment the government must know the price that must be paid for that energy, as well as that it is the first that can buy that energy;
- The society will want the security of the income, and the buyer wants to have the certainty of the required quantity of energy.

Also, PPAs are highly attractive to renewable energy producers, especially because they offer a security of price for a forthcoming unsecure energy amount. Buyers are attended to sign PPAs due to the durability they offer. Anyway, for buyers, the insecurity of energy quantity produced by renewable energy producers can bring both economic and technological difficulty. (PWC, 2016; Yashar, 2021)

At the same time, we have to mention that both decreasing the risks for developers and fiscal parties and encouraging the use of renewables make from PPA a very profitable and attractive mechanism. Due to the simple fact that the mechanism is purchased directly from the seller, this contract appears to be more and more reliable. It seems that according to inverstors, banks are the most accurate when it comes to invest in green energy, being closely followed by financial instruments such as European Funds, state aid, and so on.

In the analysis of PPAs, we should take into consideration all types of renewable sources (solar, wind, hydro or maritime), because all these types offer these contracts special characteristics, this being the reason why geographical distribution is an

important aspect that should be taken into account when we want to get involved in such a project (Soeiro, 2020).

The investment in green energy also means a step forward in the development of green energy, and it draws the attention that many more societies can get involved in this project as long as the private system is not very interested in this aspect, according to Doval & Negulescu (2014) (Doval, 2014).

From the point of view of Taghizadeh-Hesary et al. (Taghizadeh-Hesary, 2021), one of the best ways to get funding for green energy development are PPAs, considering, at the same time, that the evolution of this field will increase significantly if the private sector will get more involved. Also, they consider that PPAs are the most competent instrument in the development of renewable energy as well as in the improvement of the relationship that exists between the seller and the buyer of green energy.

It happens also that the purchased energy limit is obtained, the offtake has the possibility not to pay anymore the required contractual price, and the excess of energy could be bought at a reduced price or not at all. This is the moment when the seller has the possibility (according to some PPAs) to sell the energy that is in excess into the spot market, where he can obtain lower or higher prices (Bruck, 2021).

PPAs have many advantages as well as disadvantages that we should talk about. Regarding those in the first category, we mention the security of the price for a long period, the chance to invest in electrical energy plants, the decrease of potential risk that may come together with the transaction of electrical power, and last, but not least, the price, which can be established in several forms, for example contracts for difference, fixed, or variable.

Regarding the disadvantages, we have to mention the complexity of the contracts due to the fact that they require a longer time to be completed, the variation of the price, which could result in negative prices for the contracting parties, the quantity of the produced energy may fluctuate, principally when we speak about wind/solar energy (Pexapark, 2021). In the event that the contracted amount of energy cannot be offered, then financial or physical compensations will be offered, being possible even to reach the situation of contracting a third person, an electricity trader, who can supply this energy instead of the producer.

So signing PPAs jeopardized the durability of buyers' goals for a long time due to the insecurity of the energy and made their energy request harder in the near future. This is the reason why buyers want a prospective energy security from producers in order to make a viable plan that can offer a trustworthy and financial backup purchase, for example trading in day-ahead electricity markets (Delmarva Power & Light Company, 2008).

3. Research Questions

We begin the presentation by talking about the attitude of the survey participants toward PPAs (Figure 1) and, as far as we can see, only one person opposes, 2 persons are indifferent, 6 respondents prefer another type of contract through which to

purchase electricity, but not necessarily from renewable energy sources, while the remaining 53 respondents show a positive attitude and are in favor of signing PPAs.

Figure 1. The attitude towards PPAs
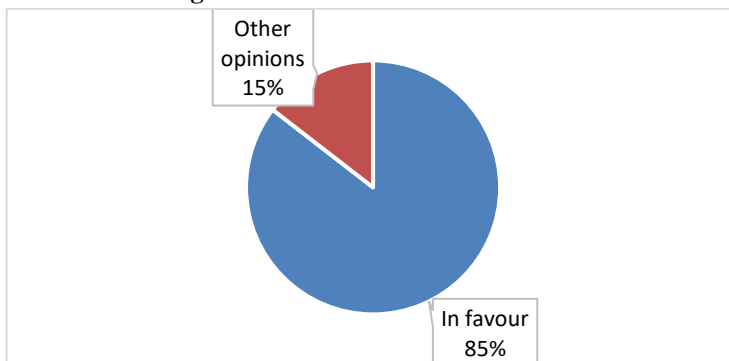
Source: Questionnaire Analysis.

The distribution is interesting and shows us, on one hand, that PPA is needed and, on the other hand, that PPA is an important element for the energy transition for the development of the projects.

The starting point is that there is a positive attitude towards such a contract, which is seen as necessary for the development of new production capacity.

But now a question arises: why do people who completed the questionnaire have such a positive attitude towards PPAs?

The answer to this question should be linked to the answers to the question "Why do you consider it necessary to promote these PPAs?" (Figure 2).

Figure 2. The reasons why the promotion of PPA is required
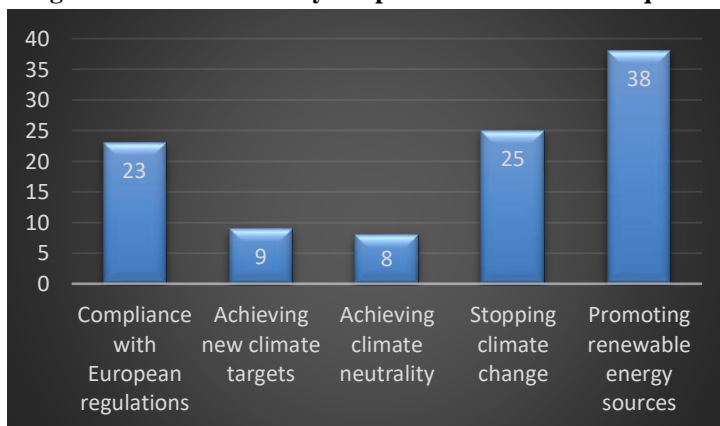
Source: Questionnaire Analysis.

The variants to this question were as follows:
a. Compliance with regulations established at the European level;
b. Achieving new climate targets;

c. Achieving climate neutrality;

d. Stopping climate change;

e. Promoting renewable energy sources.

Analyzing the received answers, we can see that there were persons who chose answer a) - compliance with European regulations, from which we can conclude that the meaning and role of PPAs are not known, due to the fact that PPA is not a European Regulation, but a commercial agreement between parties.

This situation gives rise to the following discussion: although there is a positive attitude towards PPA, the mechanism is not fully understood, at least for those who responded, which shows that there is no understanding of the true role of PPA.

Because this type of contract is considered necessary to achieve climate neutrality, it shows that there is a misunderstanding of its true role, as well as the fact that PPA is a risk management tool for a developer.

If we proceed to a correlation of the answers from the question regarding the reason why PPAs promotion is necessary with the 4 answer options, it results that the positive attitude is built on a lack of understanding of the market mechanism.

Therefore, PPAs are necessary, and despite the fact that not many people have understood their real meaning, namely the promotion of renewable energy sources, coupled with the high degree of acceptance, we can say that the level of understanding of PPA mechanism is relatively low.

Another aspect that caught the attention of the panel of experts is the answers to the question regarding the involvement of the state in the development of PPAs (Figure 3).

Figure 3. State involvement
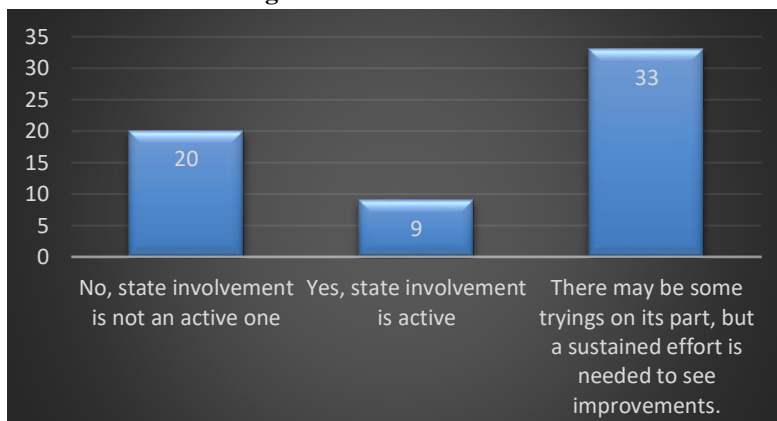
Source: Questionnaire Analysis.

The answer to this question should be correlated with the results given to the attitude question, from which we can observe that although there is a great acceptance of PPAs and the respondents are in their favor and consider them necessary, the state is still not considered active in PPAs' development.

Other questions that the focus group answered are "If this statistical answer is correct?" and "Why would the role of the state be relevant?"

The answer would be affirmative, the statistics are correct, and the role of the state is understood by experts as the role of the regulator. For example, regarding the Romanian market, unfortunately, in the period 2012-2020 such contracts were not allowed, the wholesale electricity transactions being limited only on centralized platforms and only on standard products. This situation forced the appearance of liquidity on the market, but at the same time, this measure, although beneficial for the formation of a market at the beginning, had a boomerang effect, as it destroyed the ability of market participants to negotiate non-standard contracts.

Another analysis is given by comparing the answers of the persons who consider that the state is involved / not involved in the development of the PPAs in relation to the general questions about the respondent. The results are also interesting and prove that the more connected people are in the energy market and the better they know these regulations, the more they appreciate that the involvement of the state is very small. Proof of this is the fact that only 9 respondents consider that the state is involved, respondents whose monthly consumption is between 0-50 MW, which proves that the state is an active element only for people with low energy consumption, the others, as we have shown before, not having such a good opinion of the involvement of the state.

From what we can see, those who consider that the state, in the person of the regulator, does not do enough, so as to create favourable conditions for signing such contracts are those who in a way or another work in the energy field. There was no desire from the part of the authorized institutions to regulate such contracts, the change being made by the issuance and entry into force of Regulation no. 943/2019 of the European Union.

However, no matter what the regulator does, signing a PPA means the will of the parties and, respectively, the producer to be willing to sell electricity at the price that the buyer is willing to buy. Or a PPA by definition is a long-term nonstandard product contract. The state cannot intervene and force / set the price, in case the parties cannot find a price to accept together. Therefore, yes, it is necessary for the regulator to allow PPAs and to have an institutional framework that guarantees their functioning as a legal element, respectively, as a contract. Apart from that, regarding the operation of PPAs, there must be people who take risks, no matter whether we talk about the seller or the buyer.

In conclusion, the regulator should get involved, make PPAs known, and allow them, respectively, to create the institutional framework to run such contracts.

Another aspect discussed was based on the correlation between the attitude of the participants and the types of renewable sources energy considered at the signing of the PPAs (Figure 4).

Figure 4. Type of renewable resources used in signing the PPAs
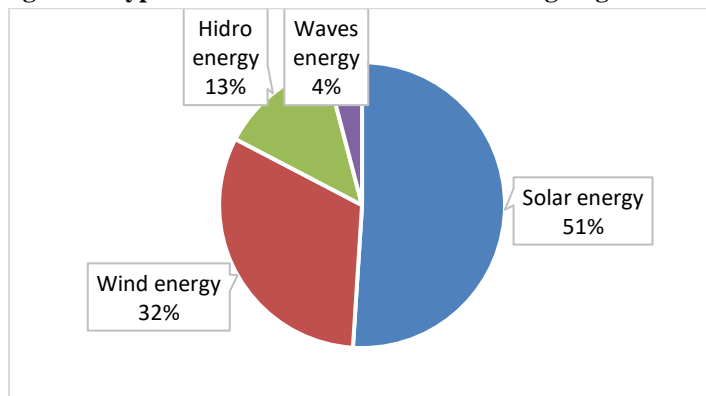
Source: Questionnaire Analysis.

The answers prove that the most used form of energy would be solar energy, which leads us to see that although the technology behind PPA is not relevant, the production profile, the imbalances and risks associated with such a contract are highly dependent on technology. Therefore, they will be reflected in the price of the PPA type contract. It is understood from this graphic that those who participated in the study are willing to purchase energy from solar production, because they feel that they can more easily determine the risks associated with production, in comparison to wind, which is less predictable, with larger deviations. Practically, in this way it is easier to understand solar production and to determine the risk assumed when contracting.

From the analysis of the questionnaire from the point of view of the period for which such a contract would be concluded, we can see that buyers are willing to close the contract and assume the price risk only for 1-5 years (Figure 5), while the sellers, in their majority, only discuss in the long run period (Figure 6).

Figure 5. Contractual period from the buyers' point of view
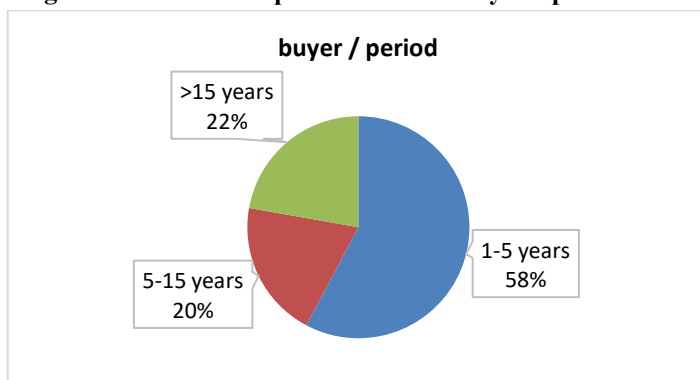
Source: Questionnaire Analysis.

Figure 6. Contractual period from the sellers' point of view
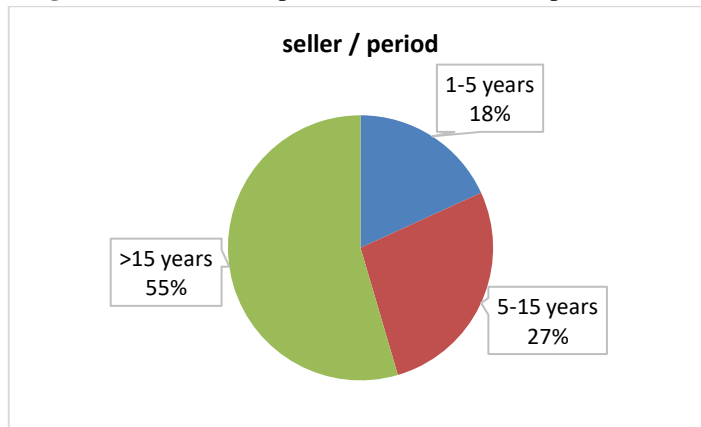
Source: Questionnaire Analysis.

Asked what would be the reason for these results, the experts answered that this is normal, precisely because PPAs involve assuming a long-term price risk and analyzing the difference in terms of time considered by the producer, who is the seller, and the buyer, who is the supplier, we identify another major problem in the sense that there is no payback in any renewable project between 1 and 5 years. The need of the energy seller, who is the producer, is to insure the price during the financing period, which is usually equal to the payback, what means that a contract should be concluded for 10 years or more.

Regarding the price, from what we can see, the buyers preferences are equally divided between fix and CfD price (43% - Figure 7), while sellers prefer CfD (64%) and variable (27%) – Figure 8.

Figure 7. The price from the buyers' point of view
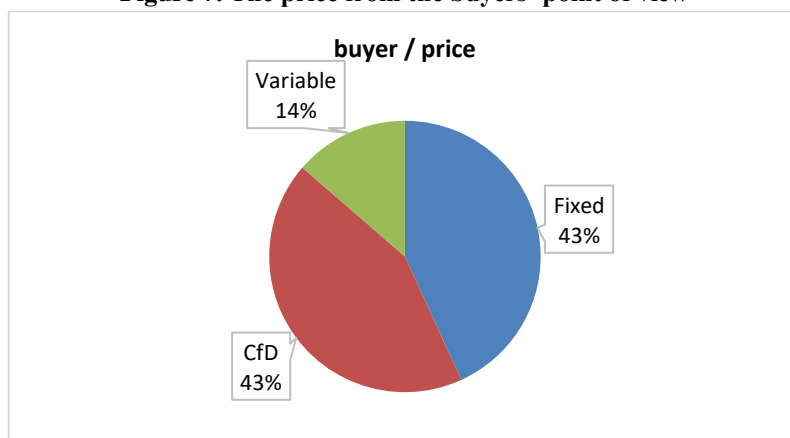
Source: Questionnaire Analysis.

Figure 8. The price from the sellers' point of view
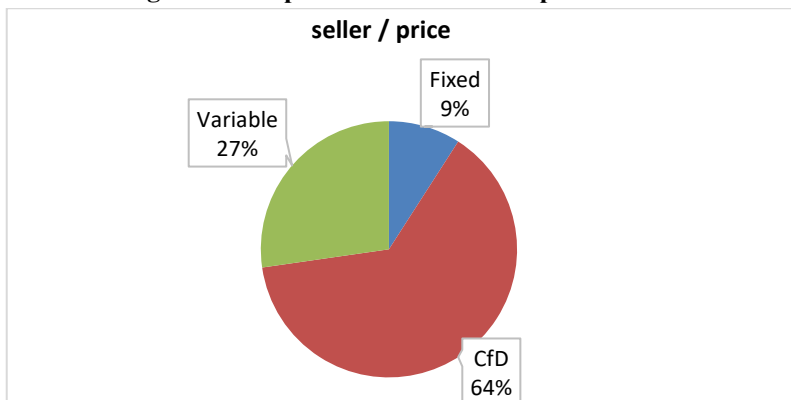
Source: Questionnaire Analysis.

About CfD, we have to mention that they are named "contracts for difference" and refer to a contract that enables two parties to enter into an agreement to trade on financial instruments based on the price difference between the entry prices and closing prices. If the closing trade price is higher than the opening price, then the seller will pay the buyer the difference, which is the buyer's profit. The opposite is also true, meaning that if the current asset price is lower at the exit price than the value at the contract's opening, then the seller, rather than the buyer, will benefit from the difference.

This chart shows the different understanding that sellers have now - they are not looking for PPA signings to finance projects, but are looking for PPA signatures to limit their exposure to price variations, as such they want to capture PPA prices as high as possible, reason for which they resort to prices set in the form of CfD or variable prices, so that they can maximize their profit.

The buyers, however, know that they are taking the risks (Figure 7) and therefore they want a fixed price, so that they can limit the cost of the purchase, given that the risks are subsequent, once they have been assumed in the contract (Figure 8).

The second thesis would be that at the moment the sellers expect an ascending price trend and they are not willing to set the price, having the feeling that there is a high potential given by the energy transition, the replacement of capacities in Romania, and so on.

4. Research Methods

The main objective of this research is to study and examine the key barriers that prevent the development and implementation of the Power Purchase Agreement in the transition process to a zero carbon economy.

The research methodology used in this paper is based on two steps: in step 1 a panel of experts from energy field was invited to a workshop in order to formulate the first hypothesis regarding the key barriers that prevent the development and

implementation of Power Purchase Agreement as they appear to be from the questionnaire.

The participants were: energy trader, responsible for purchasing for a portfolio of the top 10 universal customer suppliers in Romania, developer of renewable projects, renewable electricity producer, average industrial consumer (category C3).

These experts were randomly selected from the list of respondents from the questionnaire, without knowing their answers, their role being to expose their opinion on PPAs' barriers based on the questionnaire results.

The formulation of questionnaires realised in step 2 had the main purpose to determine the role of PPAs for the achievement of new climate targets. It has to be mentioned that the respondents fall into several categories representing different fields of activity, such as energy experts and financial accounting experts, energy producers and industrial and small consumers, this research being made at the level of the Romanian energy market, namely Bucharest county. The survey involved 62 respondents (Table 1).

Table 1. Respondent Profile

Category	Level	Procentage
Respondent type	Industrial consumer	45.2%
	Small consumer	19.4%
	Producer	9.7%
	Energy Experts	12.9%
	Financial Expert	12.9%
Level of knowledge	None	19.4%
	Beginner	21.0%
	Medium	27.4%
	Advanced	17.7%
	Proficiency	3.2%
Fiscal Value	< 60 000 €	24.2%
	60 000 € - 500 000 €	4.8%
	500 000 €- 1000 000 €	1.6%
	> 1000 000 €	3.2%
	Preferred not to answer	41.9%
Annual Energy Consumption	0-50MWh	40.3%
	50 – 100 MWh	16.1%
	100 – 500 MWh	19.4%
	> 500 MWh	6.5%

Source: Questionnaire Analysis.

The idea of this questionnaire was to find out and to analyse the level of PPAs in the Romanian energy market. So, in this questionnaire, the level of knowledge about

PPAs was analysed by different stakeholders: industrial and small energy consumers, energy producers, and last but not least energy, financial and accounting experts. In addition, were examined the attitude towards this contract and the point of view regarding the legally implementation of the PPAs, for example price, risks, parties or contractual period.

The profile of the people who answered the questionnaire is detailed in Table 1.

5. Findings

Results

Referring to Figure 1 regarding the attitude towards PPAs, we can see that 85% of the participants are in favour of these contracts while 15% have other opinion. This means that the respondents have a very positive attitude towards PPAs and they are in favour of signing them.

Figure 2 talks about the type of renewable resources used in signing PPAs. From what we can see, 51% of the interweed prefer solar energy, because it is easier to purchase this energy from solar production and the risks are easily to be determined, while the other half is split between wind energy (32%), hidro energy (13%) and waves energy (4,5%), which proves that people still show a slight reluctance to these energy sources.

The third figure is entitled – The reasons why the promotion of PPA is required - and shows that most of the respondents (38%) will choose to sign a PPA in order to promote renewable energy sources. Although the majority will choose a PPA due to the above mentioned reason, we can see that there is a missunderstanding of the true role of PPA as long as the next reason among the respondent's preferences is compliance with European regulations (23%) and stopping climate change (25%) – which do not represent the true role of PPA. From this point we can say that the level of understanding PPA mechanism is relatively low.

The next two figures speak about the contractual period from the point of view of the buyer and from the point of view of the seller. From what we can see, while the buyer prefer short term period 1-5 years (58%), the seller will definitely agree to sign a PPA for a long term period, this meaning more than 15 years (55%), the following variants of the periods being equaly split in the contractual parties preferences (buyer period: 5-15 years – 20%, more than 15years - 22%; seller period: 1-5 - 18% and 5-15 - 27%).

Figures 7 and 8 are about the price from both the buyer's and the seller's point of view. From what we can see, both sides are in favor of having the price established under the form of contracts for difference, even if in the case of the buyer the preferences regarding the establishment of the price in the form of CfDs are equal to the preferences regarding the fixed price. But from the perspective of creating new capacity, the only type of contract that banks or financiers would be willing to accept is a fixed-price PPA or a CfD that is built from a strike price (reference price) to cover the investment and accepted profit.

The last figure speaks about the state's involvement and shows that most of the respondents believe that there may be some trying on its part, but a sustained effort is needed to see improvements. So, although, many persons have a positive attitude towards PPAs, only 9% from them believe that the state is active in PPA's development. Therefore, urgent measures should be taken by the state in order to make PPAs count on increasing the use of energy from renewable energy sources.

6. Conclusions

This study has investigated the key barriers that prevent the development and implementation of the Power Purchase Agreement in the transition process to a zero carbon economy.

A first conclusion that can be drawn from these answers would be that the present situation very well outlined by statistics shows that in fact although the existence of PPA is desired, its role and need are not well explained and therefore misunderstood by market participants.

Another conclusion would be that this type of contract is necessary both for the producer of renewable energy, but also for any producer who wants to make an investment in a new production capacity and wants to limit his exposure to market risk, in the time that he gets finance, but this type of exposure will not be accepted by his financer. This is why banks or credit institutions that finance such investments, respectively, investment funds or even private investors will always want to have a mechanism for managing this risk.

Anyway, another proved aspect is that although the attitude and acceptance are not perceived in unison, the results are encouraging, but we must understand that a better communication is needed so that market participants, from regulator to beneficiary, understand the need, the utility and the mechanism behind them.

Another conclusion of our survey would be that although PPAs are open to regulation and no longer banned, unfortunately, the parties are not able to find a common point of risk assessment in the long-run period, taking into consideration that the sellers want more than 15 years, while the buyers prefer a short-term period from 1 to 5 years.

From the point of view of the price, we can see that while buyers agree to sign this contract at a fixed price, the sellers prefer CfD or variable prices, which is understandable. But from the perspective of creating new capacity, the only type of contract that banks or financiers would be willing to accept is a fixed-price PPA or a CfD that is built from a strike price (reference price) to cover the investment and accepted profit.

As a general conclusion, what the panel of experts concluded based on the results of the questionnaire analysis is that the barriers do not necessarily come from the lack of regulation, but also from the lack of fair pricing experience and the respondents' desire to participate, being necessary for the state to take several measures that will lead to the development and popularization of PPAs in Romania.

Furthermore, in terms of the barriers considered in this analysis, we can conclude that these are: lack of knowledge about what it really means to sign a PPA (although

there is a positive attitude, the lack of knowledge will make if not impossible, at least very difficult to implement this type of contract), the involvement of the state, which, unfortunately, is not an active one, the period for which this contract should be signed, since potential buyers prefer a short period (1-5 years) and the producers want a longer period (more than 15 years), the price in question, which can be either fixed or set in the form of a contract for difference, and last but not least, the type of renewable energy used, most of the respondents preferring solar energy because, they believe, it would be easier to insure the risks in relation to the amount of energy produced.

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Concerns about Food Safety among Polish Consumers

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Abstract

Food safety is very important for all of us because we are all food consumers. Food safety influences our health. Consumers are becoming more and more aware of the impact of various factors on their health. They are also increasingly selective and demanding of food because they can choose from a wide range of food products. The paper presents the result of the survey made with CAWI method in Poland in 2020 among 2,000 consumers. The aim of this research was to characterize consumers' perception, attitudes toward various aspects of food safety. Consumers were asked to evaluate the influence of the selected factors/ingredients on their health, such as: residues of antibiotics, residues of pesticides, trans fats, food colorings, food preservatives, environmental pollution, sweeteners, and GMO. The highest level of concerns was expressed for residual antibiotics and hormones 80.4% (harmful and very harmful), pollution from the environment 78.7% (harmful and very harmful), pesticides residues 78.2% (harmful and very harmful), trans fats 69.4% (harmful and very harmful).

The results show that there are many food concerns among consumers. This identification helps to formulate the main fields of information about the various aspects of food safety that should be offered to consumers. The results also provide information to food authorities and food producers about the factors/ingredients that are not accepted by consumers to encourage them to take action to minimize the concerns that arise.

Keywords: food safety, consumer, food concern, food.

1. Introduction

Food safety is the most important characteristic of food because the lack of food safety influences our health (Badrie et al., 2006; Grunert, 2005; Rohr A. et al., 2005; Bukachi et al., 2021; New Food Magazine, 2021; Bolek, 2020, Franc-Dąbrowska et al., 2021, Jenkins et al., 2021). Food safety is regulated by national and international laws. Consumers are becoming more and more aware of food safety. They know the relationship between the quality and safety of the food consumed and health. Many

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factors influence the quality and safety of food, i.e. the environment, the way of food production, and new technologies. According to many studies, among the main food safety concerns by consumers the following can be mentioned: GMO, food preservatives, various additives, pollution from the environment, residues of pesticides, antibiotics, and hormones. For example, the residues of pesticides in vegetables, cereals, fruits, and nuts were the most reported alarm notification in the RASFF system in 2020 (Report RASFF 2020). RASSF stands for Rapid Alert System for Food and Feed. It was created in 1979. RASFF enables information to be shared efficiently between its members (EU Member State national food safety authorities, Commission, EFSA, ESA, Norway, Liechtenstein, Iceland, and Switzerland). RASFF is a key tool to ensure the flow of information to allow for a swift reaction when risks to public health are detected in the food chain. Consumers do not want to consume ingredients that are harmful, not natural, or unknown. Nowadays in the food market there is a wide variety of food products, so consumers have higher requirements and can choose the products that meet these requirements.

2. Problem Statement

Consumers do not have as much knowledge about food safety as scientists do and perceive some aspects of food safety and quality in a different way. It is worth knowing the main consumers concerns of food to provide them with products they accept, as well as to educate consumers. Food safety is one of many factors that influence their food choice - 50 percent of respondents ranked it in the top three criteria they use in their food-purchase decisions (Eurobarometer survey, 2019). Research on food safety concerns is conducted quite often, which shows the importance of this subject. For example - the consumers participating in the survey Eurobarometer 2019 (Food safety in the EU) were asked how much they are focused on food safety. The results show that consumers are interested in food safety. The majority of the respondents (71%) said either that food safety is among their concerns (43%) or that they take it for granted that the food sold is safe (23%). 63% of Polish consumers admitted that either that food safety is among their concerns (33%) or that they take it for granted that the food sold is safe (30%), 59% of consumers in Romania agreed that either that food safety is among their concerns (39%) or that they take it for granted that the food sold is safe (18%). Based on the 2019 FDA's Food Safety and Nutrition Survey, the major food safety concerns can be identified. Among them are: pesticides in food (1475 answers for "extremely concerned"), antibiotics in food (872 answers for "extremely concerned").

3. Research Questions / Aims of the Research

The aim of the research is to identify the main consumers concerns about the food safety. The research questions are the following:
1) Do consumers differentiate the perception of the food concerns? Are they all perceived as harmful or very harmful?
2) Which factors/characteristics/ingredients are consumers afraid of most?

3) Can we identify some differences in perception of these factors/ingredients, i.e. because of the gender of the age of consumers?

4. Research Methods

The research process consisted of the following stages:
– developing research methodology;
– consultation of the research tool;
– sample selection, implementation of the measuring phase of the survey;
– developing a statistical report;
– developing a final report.

The study was carried out using the CAWI (Computer-Assisted Web Interviewing) technique based on conducting a computer-supervised Internet survey in Poland in 2020. The questionnaire consisted of 23 closed-typed questions. The sample consisted of 2000 people selected taking into account the place of residence (voivodship), gender, and age. Respondents were also characterized in terms of education and material status. The exact distribution of the sample taking into account gender, age, and place of residence is presented below. It reflects the structure of the population of adult Poles residing in the country.

Numeric variables were characterized using basic descriptive statistics: cardinality (N), arithmetic mean (mean), standard deviation (SD), median, lower and upper quartile (IQR), minimum and maximum values (range). Group comparisons were made using Chi-square test. The value of significance (p) was set at 0.05. Calculations were made in the R program (ver. 3.5).

The sample was representative for the whole country. 1049 women and 951 men were interviewed. Among the respondents, 42.4% were the sole decision-makers in the purchase of food products. About 49.7% of the respondents said they make the majority of purchasing decisions for the household. The smallest group (7.9%) were people for whom someone else makes the majority of purchasing decisions. In the survey, respondents also specified their education, size of place of residence, and net income per family member. Most respondents had secondary education (32.2%) and basic vocational education (30.7%). Persons with higher education constituted 26.9%, and the remaining 10.3% of respondents had primary / lower secondary education. Persons with a net income not exceeding PLN 1200 (about 300 €) per person constituted about 19.1% of the total number of respondents. One fifth of the survey participants (20.0%) indicated an income of PLN 1201 to 1600(301 to 400 €), and respondents declaring income per person within PLN 1601-2000 (401 to 500€) net constituted 20.7% of all respondents. Income in the amount of 2001-2400 (501 to 600 €) was indicated by 19.5% of respondents, and 20.9% of respondents had income per one person exceeding PLN 2400 (+600 €) net. People living in the village accounted for 19.9% of the total, while about 23.0% of the respondents were city dwellers up to 50,000 inhabitants. Approximately 29.0% of the respondents were residents of cities with 50 to 250 thousand inhabitants and 14.7% lived in cities with 250 to 500 thousand inhabitants. The least 13.5% of the respondents lived in cities with more than 500,000 inhabitants (Table 1).

Table 1. Characteristics of the respondents

Voivodship	Woman (age)						Man (age)						Total
	18-29	30-39	40-49	50-59	60-69	+70	18-29	30-39	40-49	50-59	60-69	+70	
Dolnośląskie	12	16	13	11	15	13	12	16	13	11	13	8	**153**
Kujawsko-pomorskie	10	10	9	9	10	9	10	11	9	8	8	5	**108**
Lubelskie	10	10	9	9	10	10	10	11	9	8	8	6	**110**
Lubuskie	4	5	5	4	5	4	5	5	5	4	4	2	**52**
Łódzkie	11	12	11	10	13	13	11	12	11	9	10	7	**130**
Małopolskie	16	18	15	13	14	15	16	18	15	13	12	9	**174**
Mazowieckie	23	29	25	20	25	25	23	28	25	19	20	14	**276**
Opolskie	4	5	5	4	5	5	4	5	5	4	4	3	**53**
Podkarpackie	10	11	9	9	9	9	11	11	10	9	8	5	**111**
Podlaskie	6	6	5	5	5	6	6	6	5	5	4	3	**62**
Pomorskie	11	12	10	9	10	9	11	12	11	9	9	6	**119**
Śląskie	19	23	21	20	22	21	20	23	21	19	19	13	**241**
Świętokrzyskie	6	6	5	5	6	6	6	6	6	5	5	4	**66**
Warmińsko-mazurskie	7	7	6	6	7	6	7	8	6	6	6	3	**75**
Wielkopolskie	16	18	16	14	16	14	16	19	16	13	13	8	**179**
Zachodniopomorskie	7	9	8	7	9	7	8	9	8	7	8	4	**91**
Total	**172**	**197**	**172**	**155**	**181**	**172**	**176**	**200**	**175**	**149**	**151**	**100**	**2000**

Source: Own elaboration.

5. Findings

Consumers were asked to assess the impact of the following food safety factors on health, to express their concerns about food safety toward: antibiotics and hormones residues, pesticides residues, environmental pollution, trans fats, sweeteners, GMO, food preservatives, colourings. They indicated the impact by choosing the strength of the negative impact: lack of the impact, little harmful, middle harmful, harmful, very harmful, no opinion. Major consumers concerns regard:

– residual antibiotics and hormones 80.4% (harmful and very harmful);
– pollution from the environment 78.7% (harmful and very harmful);
– pesticides residues 78.2% (harmful and very harmful);
– trans fats 69.4% (harmful and very harmful).

The Polish society is largely homogeneous in its opinions. On the basis of chi2 test, it was stated that the answers varied only on two characteristics of the respondents: the age of the respondents and their gender. Young people (18 to 29 years of age) believed more often than other respondents that the above-mentioned factors had little or no harmful effect on health. This was the case of: GMO (22.1% of indications), sweeteners (15.5% of indications), colourings (24.4% of

indications), food preservatives (14.4% of indications), trans fats (9.2% of indications) and residual antibiotics and hormones (8.9% of indications). The answers varied significantly also based on the gender of the respondents. Women more often than men assessed these characteristics as more harmful. The percentage of the indications harmful and very harmful were higher by women than by men.

Food safety concerns may appear at each stage of the food chain, at production stages (unregulated use of pesticides, poor post-harvest handling), during food processing (unregulated use of additives, contaminated water), during transport and sedition, as well as during food preparation (in the local food environment (unhygienic food outlets) or at the consumer level (unhygienic food preparation and storage practices home (Kang'ethe et al., 2020; Iguori et al., 2022). As the results of the Eurobarometer 2019 survey on food safety show that the three main concerns of food safety are: the misuse of antibiotics, hormones and steroids in farm animals (44%), *pesticide* residues in food (39%), and food additives (36%). These were also among the main concerns reported in the 2010 Eurobarometer on food safety. The FDA's Food Safety and Nutrition Survey 2019 gave some key finding on food safety: Consumers think that people are more likely to get a foodborne illness from food prepared in a restaurant than from food prepared at home – Few respondents (15%) thought it was "very common" for people to get food poisoning because of the way food is prepared at home, compared to 29% who thought it was "very common" to get food poisoning because of the way food is prepared in restaurants. Consumers are more concerned about raw chicken and raw beef than raw vegetables or fruit being contaminated – More respondents thought that raw chicken (93%) and raw beef (66%) were "likely or highly likely" to have germs than raw vegetables (9%) or fruit (6%).

The residues of pesticides are one of the biggest concerns about food safety among consumers according to, for example, the FDA's Food Safety and Nutrition Survey 2019. Glyphosate that is of common use in agriculture and in cities to control weeds, and is a main carcinogenic agent (Araújo et al. 2016; Benbrook 2016). As Carvalho (2017) says, the maximum tolerated limits of residues in foods have been decreasing over the years, although exposure has not decreased sufficiently. Antibiotics are used in food production prophylactically, as well as to treat infections. It is important to control the amount of the antibiotics used to prevent their residues in food. The presence of antibiotics in the food supply has raised concerns about their possible role in increasing antibiotic resistance and hypersensitivity reactions (Landers et al., 2012; Solensky, 2003; Singer et al., 2003; Welsh et al., 2019). Brewer & Rojas (2008) emphasize that concerns about the residues of hormones, antibiotics, or GMO food result in purchase decisions. In their research, they showed that about one-third of consumers would not purchase food because of the abovementioned concerns, and more than 20% have reduced their consumption of some foods because they think they contain genetically modified organisms or are derived from animals treated with hormones or antibiotics.

Although three decades have passed since genetically modified organisms were used in food production, this issue is still one of the major consumers concerns

(Palmieri et al., 2020). However, when comparing the results of the Eurobarometer survey in 2019 and in 2010 it can be seen that these concerns decreased (from 66% in 2010 to 27% in 2019). In general, consumers disapprove of the use of GM food. However, American consumers are more accepting of genetically modified foods than European consumers (Le Marrea et al., 2007). In fact, the European consumers are extremely interested in traditional and local food products (Dekhili et al., 2011; Perito et al., 2019). The main concerns about the GMO food are the effects on personal health and environmental impacts (Zilberman et al., 2013; Tas et al., 2015).

Perito et al. (2020) say that in recent years considerable attention has been observed toward natural alternatives to synthetic preservatives. Consumers prefer food with no additives, but if not available, consumers will choose foods containing natural additives over synthetic analogues. They prefer natural products (Devcich et al., 2007; Carocho et al., 2014; Bearth et al., 2014; Coderoni & Perito, 2020).

Oplatowska-Stachowiak & Elliott (2016) characterized consumers' concerns about colourings in food. On the basis of their research, it can be concluded that the most important food safety concerns in the field of food colors are the lack of uniform regulation concerning legal food colors worldwide and the possible link of artificial colors to hyperactive behavior.

Figure 1. Food safety concerns among Polish consumers
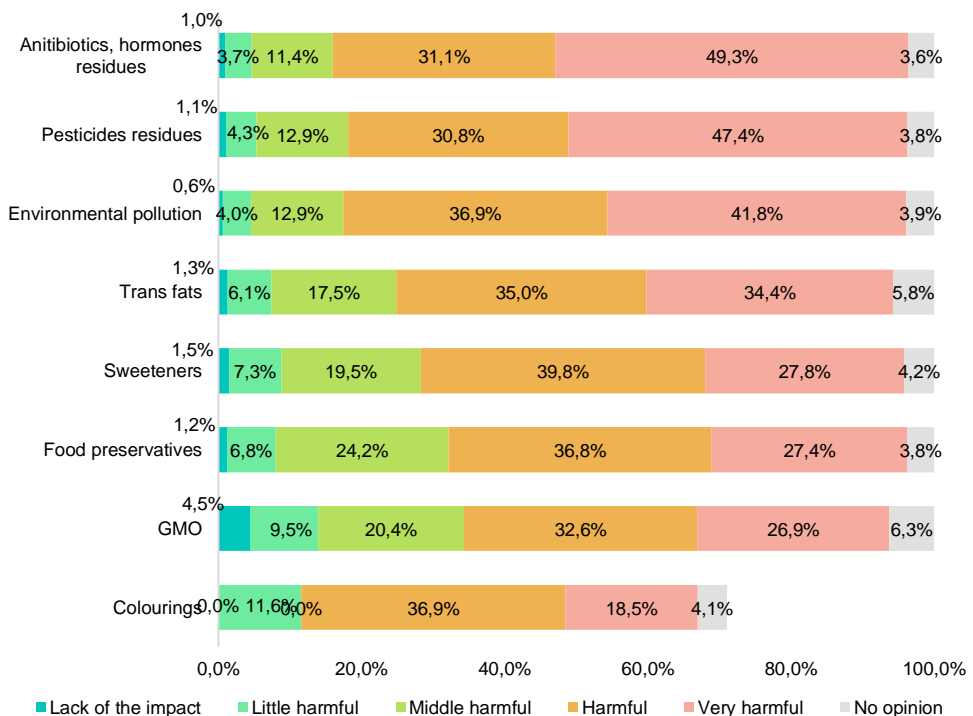
Source: Own elaboration.

6. Conclusions

The results of the survey show that consumers differentiate the perception of food concerns – some of them are perceived to be more harmful (i.e. the residues of hormones, antibiotics, pesticides, pollution from the environment) and some less harmful i.e. food colourings. The highest level of concerns was observed with regard to the residues of antibiotics and hormones 80.4% (harmful and very harmful), pollution from the environment 78.7% (harmful and very harmful), and residues of pesticides 78.2% (harmful and very harmful). The answers varied on two socio-economic characteristics – the age and the gender. Young people have the tendency to perceive the risk as lower than others. In this research, young consumers evaluate the negative impact lower than others. On the other hand, women more often expressed higher harmfulness than men. It was shown that food safety has many factors. It is the most important characteristics of food for both consumers and regulatory institutions. Many surveys and reports show that the biggest consumers concerns are residues of substances such as hormones, antibiotics, and pollution from the environment. It shows that a holistic view of the food chain is needed. Consumers are also afraid of food preservatives as a kind of chemical substances in food. Consumers concerns are the subject of various reports what shows the importance of food safety and is the sign of consumers' interest in food safety. The engagement of all food chain actors should remain at least at the same level as it is now. The Food 2030 strategy emphasize the need to look at the food system by three main goals: food safety, food security, and food sustainability.

Acknowledgements

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Local Development Initiatives on the Black Sea Coast in Romania

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Abstract

The analysis of the specialized literature reveals the fact that the policies adopted and implemented at European level are based on the common and unitary approach of the development directions of agriculture and of the rural environment. If initially the attention was directed strictly to agriculture, later, the policies gave a special importance to the development of the rural environment in its integrity. Thus, actions were supported that address the most pressing issues of the rural area in the economic, social, and cultural field, with the use of local resources and potential. The most appropriate tool for carrying out these actions is the LEADER instrument, which is based on a bottom-up approach to both problems and solutions, with the involvement of local actors in decision-making.

The article presents an analysis of the financing for agriculture and rural space at the European and Romanian level, focusing on the impact of the LEADER instrument on the Romanian communities in the Black Sea area, from an economic and social point of view. The analysis covers the period between 2012 and 2021 and is carried out using the specific bibliography, establishing the relevant indicators, collecting the necessary data, and processing them to determine the result of the working hypothesis. The results of the study show that LEADER registers an increasing coverage of the rural area, with a special impact for a sustainable and sustainable development. The LAGs representing the communities on the Romanian shores of the Black Sea are a catalyst meant to accelerate the trends of integrated development of areas that have common characteristics, by enhancing local resources and developing cooperation with other communities. Increasing the quality of life of their own residents.

Keywords: LEADER, local development, Local Action Group, common agricultural policy, rural development.

JEL Classification: Q01, Q14, Q18.

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1. Introduction

In the context of the implementation of the Common Agricultural Policy, at the European level, a common approach has been pursued to the development directions of both agriculture and the rural area in general, with all its problems. The European Union (EU) has embraced the LEADER method and supported it from the beginning, the main source of funding being the European Fund for Agriculture and Rural Development (EAFRD), along the way, it has been taken over by three other EU funds: European Regional Development Fund, European Social and European Maritime Fund by scaling to urban areas, coastal areas, and social issues. LEADER initiatives are also present in non-EU countries, such as Moldova, Turkey, Georgia, Africa, Latin America, and China.

Over five programming periods, the EU has allocated and monitored the use of funds for rural development through the LEADER instrument, and for the future period, 2023-2027, the specific regulation also provides for at least 5% of the value of Member States' Strategic Programs to be used for LEADER (EU, 2021). LEADER concept was first implemented in France in 1991 by Local Action Groups (LAGs), under the title: "Liaison Entre Actions de Développement de l'Economie Rurale", being taken the acronyms of the words and used as a brand for everything that has developed so far around this idea. The phenomenon has grown and been taken over by many states, so we are currently talking about 3134 LAGs, of which 2786 LAGs act in the field of rural development and cover 61% of the rural population in the European Union (ENRD, 2022). With Romania's accession to the European Union in 2007, funding for local development through LEADER has been provided in the National Rural Development Programs. This bottom-up approach has begun and is on the rise - with 163 LAGs set up in 2007-2013, in 2014-2020 239 LAGs operate (Ex-post evaluation study of the 2007-2013 NRDP, 2017, Rusu, 2021).

The article aims to present LEADER evolution in Romania, with a specific analysis for the LAGs in the Black Sea area, Constanța, and Tulcea counties. The article looks at the impact that the bottom-up approach has had in this region, from a social and economic point of view.

2. Problem Statement

Scientific research has focused on the rural environment over time, it being an intensely debated topic. The rural environment must be perceived as a multisectoral, vibrant space, in which, in addition to agriculture - which remains the most common activity, the economic, social, and cultural levels develop and find here important resources on which to base themselves. In the context of rural development, the same trend is found in European Union funds: at the beginning, the funds were directed to support agricultural practices, following the inclusion in financing policies and socio-economic and cultural aspects, and for the future a considerable amount will be directed to environmental issues. Part of the literature shows that the impact of Common Agricultural Policy (CAP) on rural development is not significant, but has

a positive influence on the population, with insignificant effects in terms of economic production, takeover of farms by young people, gender equality and positive effects on the jobs created. However, because the studies only cover certain periods of implementation of the CAP and follow a limited set of indicators collected from restricted areas, this conclusion does not seem to have the desired accuracy, the effects of the applied policies cannot be precisely determined (Lillemets, Fertő, Viira, 2022). The European Union has always paid special attention to supporting agriculture and developing and revitalizing rural areas. The CAP applies to all Member States and is funded by the EU budget (Garzon, 2006).

In 1980, the EU allocation dedicated to agriculture represents 65.5% of the total budget, and in 2020 it reaches 35% (Figure 1). The decreasing trend of the allocated budget was balanced with the introduction in the other funds of some objectives aimed at the development of the rural environment (COM, 2021).

Figure 1. Evolution of agricultural expenditure within the total EU budget
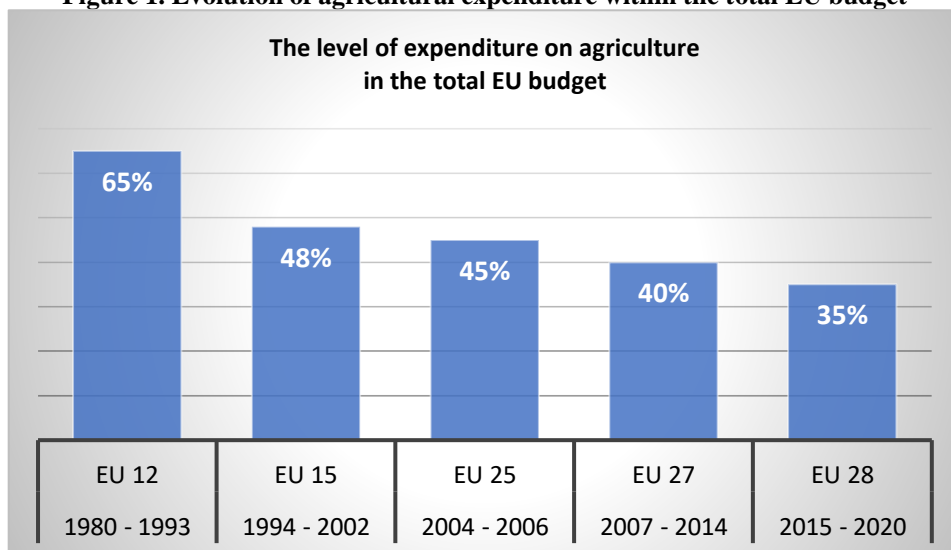
Source: Authors' analysis with information from https://ec.europa.eu.

To set annual commitment ceilings for each sector supported at Member State level, the European Commission is proposing to the European Parliament for approval Multiannual Financial Frameworks, which cover a period of at least 5 years. Each multiannual financial framework is regulated by legislation which contains the general and specific objectives for the respective stage, rules for granting and managing funds, verification, and control of the beneficiaries of financing, monitoring, and reporting of results (Table 1). Six multiannual financial frameworks are established, with specific European regulations, including the future period 2023-2027. Given the problems raised by the COVID-19 pandemic crisis, the 2014-2020 cycle was extended until 2022.

Table 1. European legislation on programming periods

Financing period	Specific European legislation
1988 - 1994	Decision 88/377/ECC
1995 - 1999	Decision 94/729/EC
2000 - 2006	Regulation EC 1258/1999
2007 - 2013	Regulation 1698/2005
2014 - 2020 - 2022	Regulation 1305/2013
2023 - 2027	Regulation 2115/2021

Source: Authors' analysis with information from https://eur-lex.europa.eu/.

Each Member State is the beneficiary of funding for transposition into the national program for the implementation of the regulations of the Agriculture and Rural Development Fund, to be available to the EU budget. The approach to agricultural policies has been divided into two main directions: Pillar I – direct payments and market support payments and Pillar II – Rural development, farm modernization and agri-environmental measures. The new CAP will be implemented from 1th January 2023 and aims to simplify and streamline interventions for agriculture and rural development that encompass environmental ambitions - established by the European Green Deal (COM, 2021).

Romania's Situation

The urban population is the majority in Romania, but compared to other EU countries, Romania has a share of the rural population of 45.1% according to National Institute of Statistics data, while the European average reaches 29.1% (Eurostat, 2021). In the post-war period, the rural population represented almost 80% of the total population (Pascaru, 2012; Rotariu, 2017). The causes of the migration of the population from the village to the city are based on the forced industrialization closely related to the need for labour, educational and sanitary facilities, the high standard of living in the urban environment compared to the rural one, ready-built houses. It is necessary to support Romanian rural communities so that the rural family is encouraged and supported to develop in the environment of which it is part. The three great poles of power of rural life are: family, property, and production in direct connection with a fourth, the market, according to the publication "Old problems, new relationships in agriculture" (Popescu, 2013). The way in which the rural area developed after the fall of communism and the structure of activities carried out locally are related to multiple factors such as alienation of land to non-residents, shortcomings in the functionality of the land market related to property rights, lack of agricultural land valuation and forestry as a basis for setting trading prices, low incomes from agriculture, advanced age of farmers (Popescu, 2017). Romania benefited from 1.5 billion euros in 2000-2006 - the pre-accession funds SAPARD, together with the candidate states from Central and Eastern Europe, destined to prepare the participation in the Community Agricultural Policy. In 2007, with Romania's accession to the EU, it benefited from a total public value of 9.2 billion euros, through the National Rural Development Program 2007-2013,

to participate in achieving the common European objectives. In the period 2014-2020, Romania made available to rural areas 10.9 billion Euros, to which were added 2.1 billion EUR 0.6 billion of future funds for the transition period and EUR 0.6 billion - additional funds from the European Union Recovery Instrument - EURI following the COVID-19 pandemic crisis (NRDP, 2022). Experimental partnerships have been created as initiatives of local actors who have realized that the real problems of small communities in rural areas, they also find their solution locally, using existing resources and attracting funding from various sources. From the very beginning, for the LEADER method to work, 7 basic principles have been established, which must be activated simultaneously to obtain the expected results (ENRD, 2022). These principles aim at the bottom-up approach to problems and solutions from a homogeneous territory from a socio-economic point of view, the establishment of a partnership formed by the representatives of the sectors from the community, and the establishment of interconnected relations between partners, community, and decision makers, elaboration of a territorial strategy, identification of innovative solutions, and cooperation with other similar structures (Figure 2).

Figure 2. LEADER Principles

Source: Authors' processing with information from https://enrd.ec.europa.eu/leader-clld/leader-toolkit.
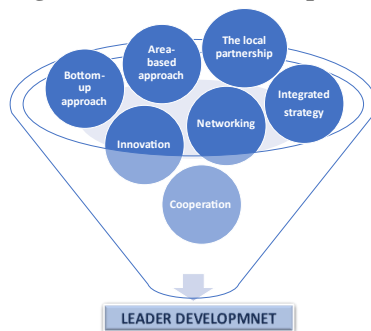
Over time, LEADER has been funded by structural funds, funds for agriculture and rural development, regional development funds, social funds, funds for aquaculture and fisheries, and has proven to be the longest-running instrument that has spread both as a cover territorial as well as directions of action, being in a continuous development. If in 1991, with 217 LAGs, it started from simple tools to support farmers, now, through the LEADER method, the 3134 LAGs support various issues: agriculture, rural development, tourism, digitalization, social issues, mobility issues, cultural heritage, fishing, and aquaculture, etc. (Ballesterosa, Hernández, 2016). In Romania, LEADER was included in the National Rural Development Program 2007-2013 as the 4th axis of financing with an allocation of 386 million euros, representing 4.1% of the total public allocation of NRDP (NRDP, 2015). Being a completely new approach for the Romanian rural area, 163 LAGs were started to operate only in 2012. Although this was a delay, the LAGs took shape and

the results of the implementation of local development strategies were above expectations. The success of the first programming period has made things considerably better in the second financial year (2014-2020), with 239 LAGs being set up covering almost 92% of the territory consisting of communes and small towns, less than 20,000 inhabitants, benefiting from an allocation of approximately 7% of the total value of NRDP (NRDP, 2022).

3. Research Questions / Aims of the Research

The article aims to review the development interventions used by the EU for agriculture and rural areas in general, by establishing development directions within the common agricultural policy and the financing instruments made available to the Member States. Research focuses on analysing the impact of LEADER in the counties on the Black Sea coast of Romania, analysing all available information related to the achievements of LAGs operating in this area.

4. Research Methods

The methodology used for this study is a combination of the literature with an analysis of data from the monitoring system, as well as the LEADER tool through NRDP 2007-2013, respectively, NRDP 2014-2020, and internal databases, as well as the databases provided by the EU, were used to achieve the purpose of the study and to reach relevant conclusions. The phrase @program LEADER @ generates over 7,280 million results on the Google's search engine in Romania, which creates a special interest in approaching this topic. The word group @Local action group @ returned more than 282,000 results, @Leader @ returned 208,000 results, which narrowed the search. Several scientific articles, papers, and publications have been studied for a detailed and well-structured document. Statistical data were used mainly on the website of the Agency for Financing Rural Investments, the Ministry of Agriculture and Rural Development, and on the website of the National Institute of Statistics.

5. Findings

The analysis of the implementation of LEADER in the period 2012-2021 in the counties of Constanța and Tulcea, counties located in the extreme SE of Romania, which borders the Black Sea coast, was the subject of a useful case study for research.

With an area of 7,071 km2, Constanta County represents 3% of Romania's territory. Constanta County includes 3 municipalities, 8 cities, and 59 communes. According to the information available on the database of the National Institute of Statistics on July 1, 2021 (NIS, 2021), statistical data on the population residing in the county show that 67.82% is urban population and 32.18.% is rural population out of the total population of 758,186. The natural potential of the region and the climatic conditions are favourable for the development of agricultural activities. The economy of Constanta County is diversified, mainly agricultural, but, by going

to the Black Sea, Constanta county has a very developed tourist base (Integrated Sustainable Development Strategy of Constanta County, 2019).

The surface of Tulcea county is 8499 Km^2 and represents 3.6% of the country's surface, a percentage that places it in the first places in the country in size. A large part of the territory of Tulcea County is occupied by the Danube Delta Biosphere Reserve. Of the total agricultural land, approximately 17% are in the Danube Delta area (NIS, 2021). There are 3 municipalities, 4 cities, and 46 communes in Tulcea County. The population of Tulcea County according to NIS on July 1, 2021 (NIS, 2021) was 229,953 inhabitants, of which 112,983 urban population and 116,970 rural population. Tulcea county has a special potential for the realization of those agricultural productions that would support the development of a representative zootechnical sector through the number and structure of the livestock (Integrated Sustainable Development Strategy of Tulcea County, 2014).

In the financial year 2007-2013, 163 LAGs were supported, of which in Constanta and Tulcea counties a no. of 5 LAGs, representing 3.06%. In Constanta, 3 LAGs were financed: Constanta Centre LAG, Constanta South LAG, Central Dobrogea LAG with a total value of Local Development Strategies of 8.5 million euros. At the level of the LAGs from Constanta County, 73 projects with a total value of 5,489,604 Euros were supported. The competitiveness of the agricultural sector was supported, young farmers, small farms, and the development of agricultural holdings being financed with more than 3 million euros. Also, 22 local public administration projects were supported, aimed at increasing the quality of life through services dedicated to the community, with a value of almost 2.5 million euros.

Figure 3. Number and value of agriculture projects depending on the beneficiary category

Source: Authors' analysis with information from https://www.afir.info/opendata.
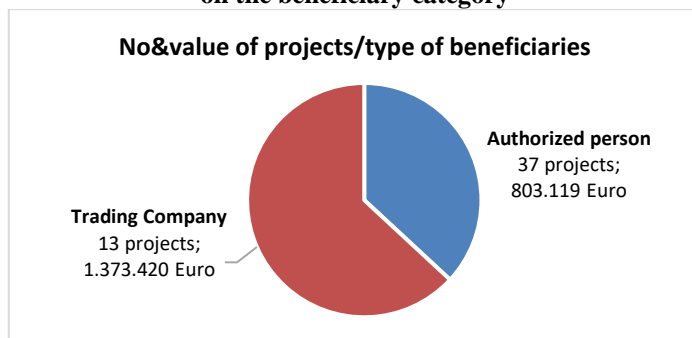
From the analysis of the categories of financing beneficiaries, among the projects to support agricultural activities, most were implemented by beneficiaries with a simple form of organization, family type, these projects have but a lower value than the value of projects implemented by companies (Figure 3). In Tulcea, 2 LAGs were financed: The Danube Delta LAG and Valea Telitei LAG with a total value of Local Development Strategies of 5.7 million euros. Through the 2 LAGs, 72 projects with

a total value of more than 4 million euros were financed, of which 50 projects were for the support of agricultural activities with a value of more than 1.8 million euros, implemented by beneficiaries with the form simple to organize, and 22 projects with a value of more than 2 million euros for serving communities and for the development of tourism.

In the 2014-2020 programming period, LEADER funded projects with a focus on solving specific problems at the local level. The implementation of the Local Development Strategies is still ongoing, with completion in 2025. During this period, 12 LAGs are supported in Constanta and Tulcea counties, representing 5.02% of the total of 239 LAGs from all over the country. In Constanta County, in the period 2014-2020, there are 7 LAGs: Constanta Centre LAG, Canal Danube-Black Sea LAG 2016, Constanta South LAG, Dobrogea Verde LAG, Dobrogea Centrala LAG, Histria-Razim-Hamangia LAG, Dobrogea Sud LAG- West, which covers the entire area of the county, except for cities with more than 20,000 inhabitants. Through the 7 LAGs in Constanta County, 15.9 million euros were made available to local communities. At the end of 2021, the LAGs selected and funded 127 local initiatives worth more than 10.2 million euros, of which 57 agricultural projects with a value of more than 4.2 million euros, 35 non-agricultural projects with a value of more than 2.7 million euros and 35 investments of local public administrations with a value of 3.2 million euros.

Figure 4. Number and value of agricultural and non-agricultural projects by the type of beneficiary

Source: Authors' processing with information from https://www.afir.info/opendata.
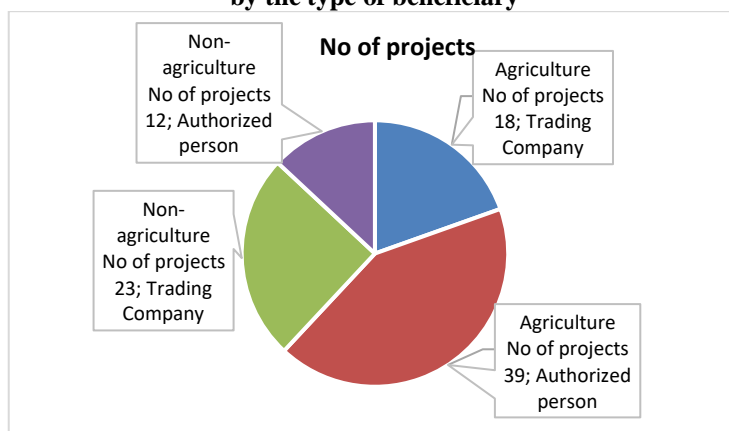
LEADER beneficiaries from Constanta County fall into the following categories: 18 companies that benefited from 1.7 million euros for agricultural measures, and 39 authorized individuals (Figure 4), family businesses, and individual companies benefiting from 2.4 million euros. For non-agricultural investments, 23 companies received support of 1.9 million euros, and 12 authorized individuals received 0.8 million euros.

In Tulcea County, in the period 2014-2020, 5 LAGs were financed, with the full coverage of the LEADER eligible territory in the county: Macinului Mountains-Old Danube LAG, Razim LAG, Danube Delta LAG, North Dobrogea LAG, People of the Delta LAG with a total value of 14.3 million euros for local communities. At the end of 2021, the LAGs supported 177 local projects with a value of more than 10.2 million euros, of which 46 agricultural projects with a value of 2.3 million euros, 66 non-agricultural projects with a value of over 3 million euros and 61 investments of local public administrations with a value of 4.7 million euros.

Figure 5. Number and value of agricultural and non-agricultural projects by the type of beneficiary

Source: Authors' processing with information from https://www.afir.info/opendata.
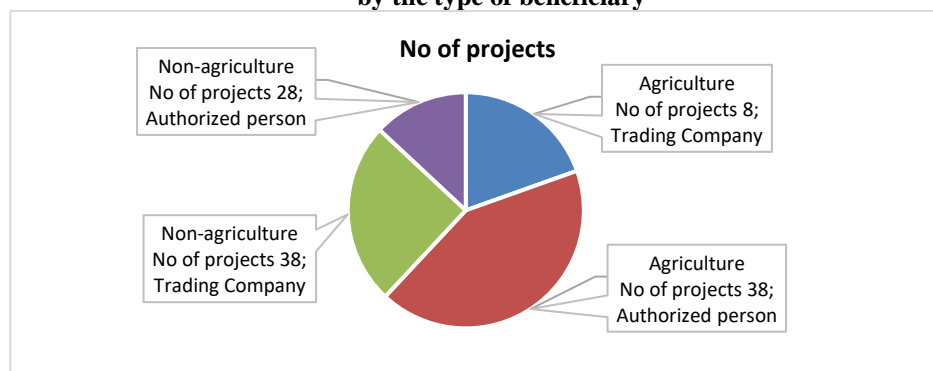
LEADER beneficiaries from Tulcea County are 8 companies with a value of 285,000 euros and 38 authorized natural persons with a value of 2,042,142 for agricultural type measures: 38 companies with a value of 1,717,257 euros and 28 authorized individuals with a value of 1,373,176 euros (Figure 5). If in the first funding period 2007-2013 163 LAGs were set up, in the 2014-2020 stage they received funding for 239 LAGs, replacing the existing model.

6. Conclusions

The research results clearly shows an increasing trend of beneficiaries in the period 2014-2020 compared to the first period. The analysis of the data showed the use of considerably higher funding for the development of agricultural holdings, to support the initiatives of local entrepreneurs and community services. Even if the analysis did not include values of economic indicators, such as the variation of the gross domestic product, those presented in the article demonstrate that the LEADER tool has made an important contribution to rural development in Constanta and Tulcea Counties in the local economy, aligning agricultural activities with European requirements, creating opportunities for entrepreneurs to diversify their incomes, with the support of the authorities by developing small-scale infrastructure and services for the community. This paper can be the starting point for a more in-depth analysis of the LEADER impact at the sectoral level for the studied area. Also, the same working methodology can be applied for other areas in Romania.

Acknowledgment

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The Evolution of the Total Waste Generated and Recycled in Romania

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Abstract

The change in consumption patterns in the sense of growth and the evolution of technology can have side effects on the environment and thus on the health of citizens if it is not properly supported by a waste management process. Waste management includes all activities of collection, transport, treatment, recovery, and disposal of waste. Improper waste management can have negative effects on the environment, affecting the soil, animals, the atmosphere, etc. One of the major problems facing Romania is waste management. This paper analyzes the evolution of the main types of waste generated and recycled, but also those generated by economic activities in the period 2014-2018 in Romania. Thus, in 2018, were generated 203017193 tons, among which 200027786 tons were treated. The amount of waste recycled in 2014 has a proportion of 3.71% of the total, while in 2018, the degree of recovery decreased to 3.12%. Regarding the recycling by category, in 2018 from the amount of waste generated were recycled 26.18% metal wastes, 91.35% glass, 82.18% paper and cardboard and 72.85% plastic, the recycling rates being lower than in 2014. In order to achieve the objectives set out in the national and European waste legislation, Romania must make considerable efforts in the coming years.

Keywords: recycling rate, hazardous waste, primary waste, plastic.

JEL Classification: Q53.

1. Introduction

Current issues affecting the population include climate change, urbanization, and the scarcity of natural resources. To meet their effects, the emphasis is on stimulating waste recycling. Given the growing world population, the need for materials is also growing, and recycling must be a necessary condition. Raw materials are essential for ensuring the transition to green energy technologies, growth, and sustainable

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consumption. Waste recycling reduces the need for raw materials, having direct effects on natural resource reserves.

2. Problem Statement

Improper waste management is a major cause of environmental pollution and threats to human health, and at the same time reflects the inefficient use of natural resources (Olaru, Zecheru, 2016). Mankind is urged to contribute to reducing the impact caused by its activities on nature, by promoting sustainable development, which takes into account: economic development, social welfare, and environmental protection.

In recent decades, the economic growth of the European Union countries has led to an increase in living standards and consumption (Nastase et al., 2019). According to Eurostat, Europeans' waste generation is constantly rising, in 2018 the amount of waste reached 2.3 billion tons, which means 5.2 tons of waste per EU inhabitant (Waste statistics, 2021).

Waste treatment methods vary as well as is their source. In principle, waste can be taken out of the economic circuit (disposed of), stored or incinerated, or reintroduced into the circuit (recovered). In Europe, but also in Romania, the sorting and selective collection of waste is practiced, waste management being an objective to be achieved according to the 2030 Agenda. In Romania, as in other parts of the world, waste, the result of human activity, is a very topical issue, being a result of both the diversification and the increase of the generated quantities (Oroian et al., 2009).

Currently, environmental protection is a global priority, the green economy being the result of a process that can reduce inequality, resource scarcity, and environmental risks (UNEP, 2011). However, a significant share of the total amount of waste is non-biodegradable materials (plastic, glass, metal, etc.) which are considered by European legislation as agents of soil pollution and contamination. The current concept of waste is based on the adoption of new technologies that produce as little waste as possible, in a form that is as easy to treat. Waste management technologies such as storage and incineration are not a complete solution to existing problems (Olaru, Zecheru, 2016). In addition, institutions should continuously improve the use of waste by turning it into useful products. Successful implementation of a sustainable waste management system involves major changes in current practices, requiring the participation of all segments of society: individuals as consumers, businesses, social and economic institutions, and public authorities (Oroian et al., 2009).

Recycling is a key element of waste reduction. Researchers state that "waste recycling helps to extend the life and usefulness of products that have achieved their original purpose by producing many items that are usable (Baud et al., 2004). In order to achieve an optimal level of recycling for all products, new technological solutions are needed to improve both the quantity and quality of raw materials recovered from new sources, i.e., optimal recycling, such as recycling metals from complex final products (Sustainable supply of raw materials, 2016).

Recycled materials can be capitalized on by reintroducing them into the economy as new substances or products. The reconsideration of the human-environment-science equation in an intense period of modernization, rapid evolution, and technologicalization is mandatory, taking into account the extremely current and pronounced economic dimension of contemporary society (Vermesan et al., 2020). Although waste management continues to improve in the EU, the European economy is losing a significant amount of potential "secondary raw materials" (metals, wood, glass, paper, plastics) (Olaru, Zecheru, 2016).

For a good management of the generated waste, Romania must have a good collection infrastructure, to have well-defined environmental policies, and to integrate the environmental concerns in the economic and social decisions. Thus, a first step towards solving it is the increasing involvement of people for the correct collection of waste and the awareness that it can be a real resource if it is managed correctly.

Although Romania is not completely fulfilling its goal of recycling materials, it still has efforts to make to reach the required target. This may be due to the fact that Romania probably does not have the necessary capacity for processing or fails to export some of the waste to other countries for recycling. It can also capitalize on these recycled materials by making smart use of materials and increasing the use of recycled materials. In this sense, the purpose of the study is to assess the situation of waste generated and recycled in Romania in the period 2014-2018.

3. Research Questions / Aims of the Research

The research aimed to evaluate the waste generated and recycled in Romania in the period 2014-2018.

4. Research Methods

In order to achieve the aim of the research, official statistics from international databases (Eurostat) were used until the last available date regarding the waste generated and recycled in Romania in the period 2014-2018. The research is also based on studies from the literature. The data were extracted and processed in dynamics, as average and percentage, by graphical representations in order to highlight the situation in the mentioned period. The indicators taken into account were: the amount of total waste generated, both by component and by category, the amount of waste treated, the waste generated by main activities, the amount of waste recycled, and by category, the recycling rate of waste.

5. Findings

Waste generated

The total amount of hazardous and non-hazardous waste generated in Romania during 2014-2018 has steadily increased (Figure 1) despite legislative efforts to reduce it. In 2014, the total amount of waste generated by Romania was

176,607,415 tons, of which 99.48% were primary waste and 0.53% secondary. The situation will be similar for the following years.

Figure 1. The evolution of hazardous and non-hazardous waste generated and treated in the period 2014-2018 (t)
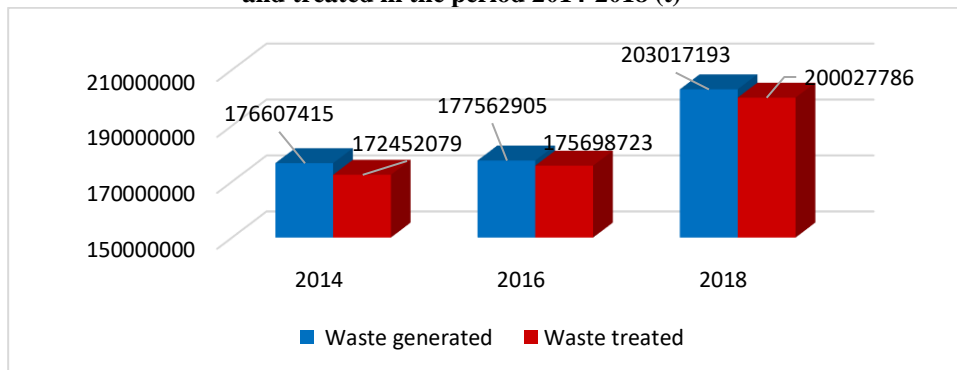
Source: own representation based on data available at https://ec.europa.eu/eurostat.

As other other authors have identified, the amount of waste people generate has increased with the evolution of technology and the increase in the number of daily activities (Jigani et al., 2020). According to other authors (Iacoboaea et al., 2013), some of the reasons for this increase may be economic growth and intense urbanization. Additionally, the amount of treated waste increased at the same time, but the quantities differ, from 172,452,079 t in 2014 to 200,027,786 t in 2018. This fact is also due to the need to treat this waste and increase the attention paid to environmental protection.

Regarding the amount of total waste, they include primary waste and secondary waste.

Figure 2. Total waste generated by source in the period 2014-2016 (t)

Source: own representation based on data available at https://ec.europa.eu/eurostat.
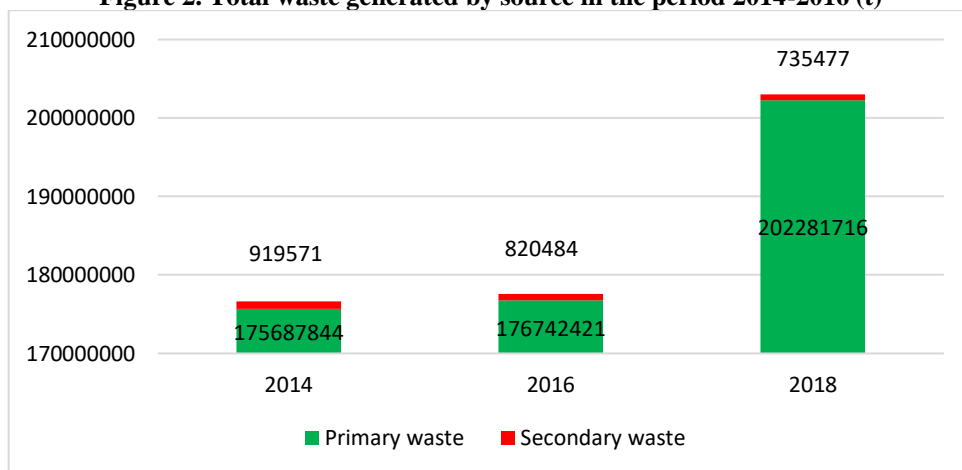
In the period 2014-2018, the amount of primary waste increased from 175,687,844 t to 202,281,716 t, while the secondary one decreased from 919,571 t to 735,477 t (Figure 2). Thus, if at the beginning of the analyzed period of the total waste generated in 2014 and 2016 the proportion was 99.6% primary waste and secondary waste being only 0.5%. This is mainly due to the materials and means used in production.

During the analyzed period, there is an increase in both the total amount of waste generated and in waste by category.

Regarding the waste of ferrous and non-ferrous metals, the quantity generated in 2014 was 91,168 t (representing 0.5% of the total waste generated), while the recycled one was smaller, namely 34,624 (Fig. 3). In 2018, the situation was similar, the waste generated being 183,203 t (representing 0.9% of the total waste generated), and recycled only 47,969 t. Thus, the amount of metal waste generated in 2018 doubled compared to 2014, representing a 100% increase. In 2016, the amount of recycled waste was closer to that generated. These differences may be due to the fact that the metals are difficult to process and require certain special treatments in order to be reused.

Figure 3. The evolution of ferrous and non-ferrous metal waste in period 2014-2018 (t)
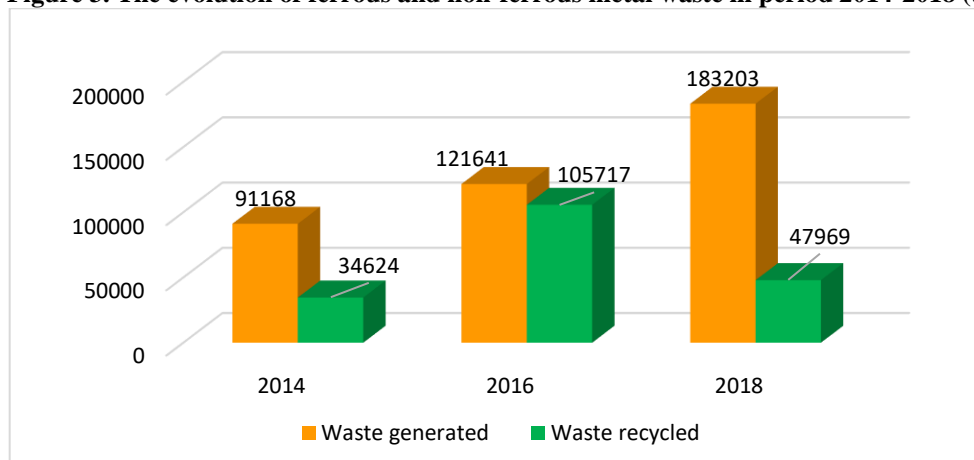
Source: own representation based on data available at https://ec.europa.eu/eurostat.

Regarding the glass waste, it was found that in the period 2014-2018, the quantities of waste generated gradually increased from 197,787t to 283,511 t, meaning an increase of approximately 43%. Compared to the total amount of waste generated in Romania, it is found that glass waste represents very low values of 0.11% and 0.14%, respectively, in this period. Also, comparing the quantity of waste generated with the recycled one, it is found that almost all the quantity generated during this period was recycled, this having an ascending trend from 160,380 t in 2014 to 258,991 t in 2018.

Figure 4. The evolution of glass waste in the period 2014-2018 (t)
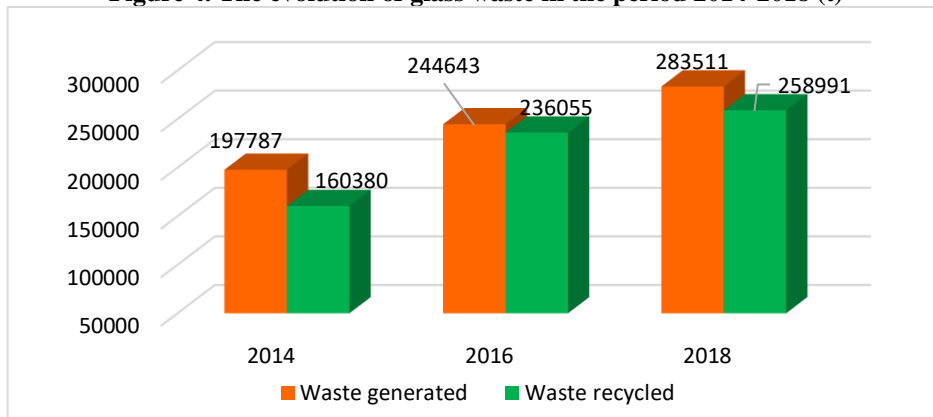
Source: own representation based on data available at https://ec.europa.eu/eurostat.

Regarding paper and cardboard waste, the amount generated in 2014 was 506,379 t, gradually increasing until 2018 to 653,446 t, representing an increase of approximately 30%. Taking into account the quantity generated, it is found to be higher both in 2014 and in 2018, compared to the quantity recycled. The biggest difference is in 2014 when only 70% of the generated quantity was recycled (out of 506,370 t, only 355,804t were recycled). The exception is the year 2016, when almost all the amount generated was recycled using different methods. This may be due to the fluctuations in the consumption patterns of the citizens, but also to the applied national legislation.

Figure 5. The evolution of paper and cardboard waste in the period 2014-2018 (t)
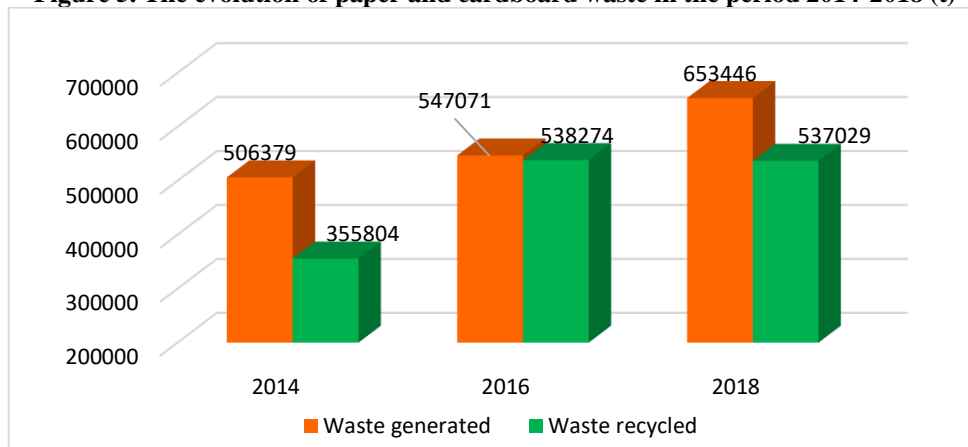
Source: Own representation based on data available at https://ec.europa.eu/eurostat.

If we refer to plastic waste in the period 2014-2018, it is found that in 2014 the amount generated was 345617 t, and in the following years it decreased, reaching in 2018 to 301379 t (being a decrease of approximately 12%). This fact demonstrates

that Romania is trying to align itself with the regulations imposed by the European Union, being at the same time a global concern to reduce the plastic and replace it with less environmentally harmful materials. Also, out of the amount of plastic generated in 2016 of 280235 t, almost all was recycled, approximately 10% remaining unrecycled.

Figure 6. The evolution of plastic waste in the period 2014-2018 (t)
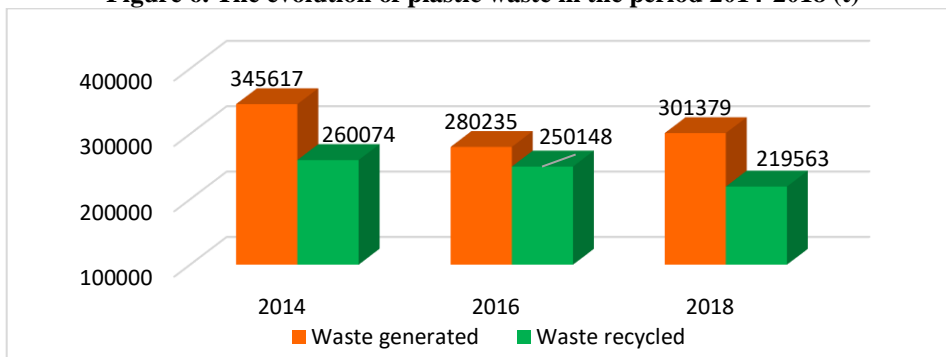
Source: own representation based on data available at https://ec.europa.eu/eurostat.

Waste generated on the main activities

In the period 2014-2018, in the mining industry, the largest amount of hazardous industrial waste is generated, representing approximately 90% of the total amount of waste generated from the activities of the economy. Furthermore, the activities with important shares are those of production (manufacturing of approximately 4% in 2018) and those of electricity of approximately 3.5% in 2018.

Regarding the amount of waste generated by the main activities of the economy, it is found that the largest share in the period 2014-2018 has the activities in the mining industry. Waste from agriculture, forestry, fishing, and construction waste have the lowest shares below 1% of the total amount of waste generated by all activities.

Figure 7. Waste generated by main activities in the period 2014-2018 (t)
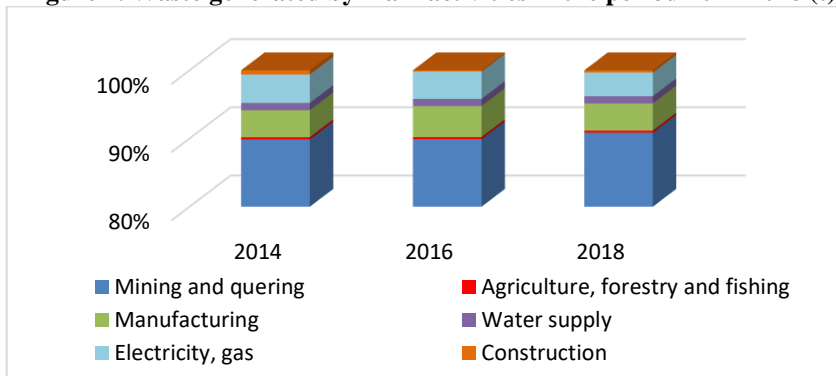
Source: own representation based on data available at https://ec.europa.eu/eurostat.

These weights can be attributed to the low recovery of waste, and as stated by some authors (Oroian et al., 2009), over 90% of industrial waste generated in Romania is eliminated by storage.

Recycled waste

The amount of waste recycled in 2014 is 6,554,814 tons, the highest recovery / recycling rates being obtained from the activities of waste recovery and recycling of paper and cardboard waste (5.43%), followed by plastic (3.97%), glass (2.45%) and metals (0.53%). In 2018, the recycled quantities increased for the studied categories, so the recycled amount of paper and cardboard increased by about 3 percent, reaching 8.49%, in the case of recycled quantities of glass it reached 4.09%, and ferrous metals and non-ferrous at 0.76%. The exception is the amount of recycled plastics which has decreased to 3.47%. This situation may also be due to the promotion of the use of landfills in Romania and also in other countries with low recycling rates (Bulgaria, Greece, Poalnd and Finland) compared to other countries (Italy and Germany) that have had very high recycling rates (https://www.europarl.europa.eu/news/ro/headlines/society/2018).

The increases for certain categories may be due to national and international legislation, but also to Romania's concern for environmental protection. Achieving European targets requires further efforts in this area. In order to achieve an optimal level of recycling for all products, new technological solutions are needed to improve both the quantity and quality of raw materials recovered from new sources, i.e. optimal recycling, such as recycling of metals from complex products (Sustainable supply of raw materials, 2016).

Figure 8. Quantity of recycled waste by category (tons)
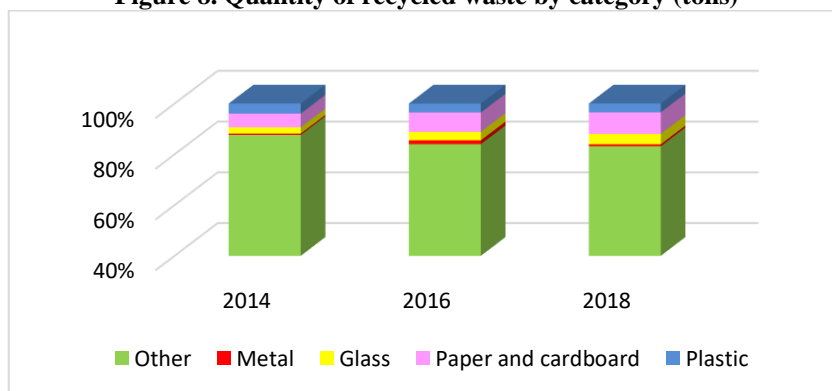
Source: own representation based on data available at https://ec.europa.eu/eurostat.

The analyzed period shows a low waste recycling rate, but also an oscillating one, possibly being a consequence of the current legislation in the field of environment.

Also, the amount of waste recycled at the beginning of the analyzed period, 2014, occupies a proportion of 3.71% of the total, following a slight increase in 2016 of 3.98%, while at the end of 2018, the degree of recovery decreased to 3.12%

(Table 1). In Romania, waste disposal is the main option for waste management, so that, in the analyzed period, less than 4% of the total hazardous and non-hazardous waste generated is recycled.

Table 1. Recycling rate for total hazardous and non-hazardous waste

Year	Generated (T)	Recycled (T)	Recycling rate (%)
2014	176607415	6554814	3,71
2016	177562905	7070019	3,98
2018	203017193	6326465	3,12
Average	185729171	6650432	3,6

Source: Own calculation based on data available at https://ec.europa.eu/eurostat.

Regarding waste by categories, in 2018 waste was recycled from the amount generated 26.18% of ferrous and non-ferrous metals, 91.35% of glass, 82.18% of paper and cardboard, and 72.85% of plastic (Table 2). The proposed recycling targets are 55% of the amount of plastic waste, 75% metal, 75% glass, 75% paper and cardboard by 2025 (PNGD, 2014-2020).

Table 2. Recycling rate by waste category in 2018

Year	Generated (T)	Recycled (T)	Recycling rate (%)
Ferrous and non-ferrous metals	183203	47969	26,18
Glass	283511	258991	91,35
Paper and cardboard	653446	537029	82,18
Plastic	301379	219563	72,85

Source: Own calculation based on data available at https://ec.europa.eu/eurostat.

These low recycling rates in Romania, during the analyzed period, may be due to the selective waste collection systems that may not work at their optimum potential to provide wider access to recyclable products.

6. Conclusions

In the period 2014-2018, the total amount of waste generated in Romania increased from 176607415 t to 203017193 t, respectively, by 14.95%, of which on average 99.6% were primary waste and 0.4% secondary.

Regarding the amount of waste recycled at the beginning of the period, in 2014, it occupies a proportion of 3.71% of the total. Although progress has been made in this sector, in 2018 the rate decreased to 3.12%.

Implementing effective waste reduction programs can reduce the negative impact of waste on human quality of life and the environment. It can be appreciated that waste can be taken out of the economic circuit by obtaining higher recycling rates as a method of recovery. Good waste management in Romania needs the application

and observance of the legislation in force and of innovative technologies that will reduce the use of the raw material or to include the capitalization of the waste.

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Research on the Agro-Food Trade Balance of Romania

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Abstract

One of the founding principles of the European Union was free trade between all member states. In Romania, an EU member since 2007, the trade deficit for agro-food products has grown rapidly in recent years, reaching €8.3 billion in 2020, €1.08 billion higher than in the previous year. The aim of the paper is to highlight the evolution of trade and trade balance with the main categories of agro-food products in Romania. In order to achieve this aim, indicators contributing to the trade balance were analysed. The analysed indicators are import, export and trade balance for cereals, vegetables, and meat, at the Romanian level, in the period 2010-2020. In addition, the SPSS software was used to estimate the trade balance for the next decade. Cereals show a positive medium-term outlook driven by strong demand, thus in 2020 Romania's trade balance with cereals recorded a surplus of 7.8 million tons, equivalent to 1.4 billion euros, while the trade balance with vegetables and meat recorded a trade deficit of 625 thousand tons, and 381 thousand tons respectively.

Keywords: import, export, trade balance, Romania, forecasting, SPSS.

JEL Classification: Q10, Q17.

1. Introduction

Trade is an economic concept involving the buying and selling of products, goods, or services, which includes a payment made by a buyer to a seller or involves the exchange of products, goods, or services between two parties (Sanghoon, 2002). The exchange of goods, services, or even the exchange of capital across the borders of a country or across international territories represents the foreign trade. In most

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countries, foreign trade accounts for a significant share of the gross domestic product (GDP). Industrialisation, the advanced development of transport, globalisation, the emergence of multinational corporations, etc. have a major impact on trade. Foreign trade includes: imports - the purchase of goods (goods or services) from another country, e.g. the import of exotic fruit (bananas, oranges, etc.) from Greece, Turkey, etc. for sale in Romania and exports - the sale of goods or services to another country: for example, the export of cereals (wheat, maize, sunflower) from Romania to other countries such as Egypt, Turkey, Spain, etc. In 2020, Romania was the world's largest exporter of sunflower (€622 million) and sheep and goats (€264 million) at the European Union level (Guvernul României, 2021).

The difference between the value of exported goods or services and the value of imported goods or services represents the trade balance. The trade balance can be positive when exports exceed imports or negative when imports exceed exports (AmosWEB LLC, 2000-2022). Although the trade balance represents the net level of trade over a given period, it reflects past actions or expectations and future actions in the presence of adjustment costs. To better understand the concept of the trade balance, Victor A. Canto and Andy Wiese, in their study "Trade Balance - A deteriorating trade balance means that the future looks brighter", explained that a simple way to understand this, is to correlate a country, a household, or a public trade company, noting that for each case there are ongoing concerns that focus not only on the present situation but also on estimates. Also, in the same study, it is argued that excessive consumption, reflected by the trade deficit for goods or services, is financed by households through borrowing; more specifically, it is supported by the flow of capital that finances investment in human capital (Canto, Weise, 2018).

Overall, Romania's agro-food trade balance has the potential to be a systemic risk. One reason for triggering this risk is related to the relationship between the current account deficit and financial crises. The account deficit is the central element that contributed to the unfavourable evolution of the trade balance, and the deterioration of the current account deficit is also an element that led to the outbreak of financial crises. Other reasons that contributed to the triggering of systemic risk are related to food security and low productivity in agriculture (CNSM, 2020). In terms of importance for economic growth, deterioration of the trade balance has been found to have a negative impact on economic growth and vice versa (Abbas et al., 2013; Cetintas 2008; Matthias, Jens, 2012). The results of a multivariate regression were obtained in the paper "Trade Balance Effects on Economic Growth: Evidence from European Union Countries", confirms the statistically significant negative impact of trade balance on economic growth (Deimante et al., 2020).

2. Problem Statement

Since 1990, when imports resumed, and until now, Romania's trade in agro-food products has always been in deficit, except for two years, 2013 and 2014. The main factors contributing to the dismantling of agro-food chains have been the change in the agricultural land regime and land ownership. Additionally, the return of

agricultural land to its former owners had serious effects on the productivity and efficiency of agricultural production (Gavrilescu, 2018; Albert, 2018).

According to a study conducted in 2018 by Flanders Investment & Trade, based on European Commission data, a forecast of the Romanian economy for the next period was made, and at that time, it was expected that the main growth engine of the Romanian economy would be private consumption. In the same study, it was mentioned that "imports will continue to grow at a higher rate than exports in the period 2019-2020", which has happened, with exports making a negative contribution to real GDP growth (Flanders Investment & Trade (2018).

The literature in Romania on national competitiveness, crop production, trade balance, and the links between the three indicators is not so extensive. Romania has the potential to be competitive in the global agro-food chain by processing raw materials and exporting processed food, but the economic reality shows the opposite (Constantin et al. 2022). In another study, Andrei et al. argue that in order for agriculture to be efficient and have a high level of competitiveness, there is a need for a polyvalence of both intra- and extra-EU trade. In agriculture, as in any other economic sector or area, trade should make a significant contribution to the creation of real added value for stakeholders (Andrei et al., 2020). The export of agricultural products is a key element for a viable and sustainable agriculture, as well as for the development of rural areas in Romania (Ciutacu et al., 2015). Starting from the assumption that agriculture is the main activity carried out in rural areas in Romania, stimulating and activating the export of agricultural products and activating trade links within this sector can be an important tool in the development of agricultural productivity and rural space (Ciupagea, 2004).

At the European level, the sharp rise in prices for agricultural products, a consequence of events and trade disruptions closely linked to the rise in energy and input prices, has led to the stimulation and activation of trade. Thus, agro-food trade at the EU level reached €32801 billion, representing an annual increase of 7.2%, while agro-food exports increased by €198 billion, representing an annual increase of 7.3% (European Commission, 2022).

3. Research Questions / Aims of the Research

The research hypothesis starts with the premise that Romania's agro-food trade faces a number of problems and focuses on answering the question of how viable it is. The objectives of the research are to identify the results reflecting the situation of Romania's agro-food trade balance, to analyse the trade in cereals, vegetables, and animal products (meat), and to forecast the trade balance, looking forward to 2030. To achieve these objectives, a qualitative and quantitative research of data on the import and export of the aforementioned agricultural products is carried out.

4. Research Methods

The paper is based on statistical data provided by the International Trade Centre on Romania's imports, exports, and trade balance for cereals, vegetables, and meat

for the period 2010-2020. The research method used consisted of a quantitative and qualitative analysis of the statistical data in order to highlight the evolution of trade and trade balance with the main categories of agro-food products in Romania. Also, by means of SPSS software, the trade balance was forecast for the next period, to 2030, using the Forecasting method.

5. Findings

At the national level, agriculture is the most important branch of the economy in relation to the size of the rural population and employment. In Romania, 46.2% of the population lives in rural areas (Romania in figures, NSI, 2019). Approximately 30% of the country's population is employed in agriculture, so the social role of agriculture must also be taken into account, which, according to the provisions of the Common Agricultural Policy, is at the same time the space where most farmers live, the natural environment under their care, and the cultural heritage inherited from one generation to the next. Compared to other EU countries, the agricultural sector in Romania accounts for a high percentage of gross value added (Figure 1).

Figure 1. Agriculture, forestry and fishing, value added (% of GDP)

Source: World Bank.

Due to the emergence of new global challenges with long-term implications, the world is undergoing a process of structural transformation, which requires the development of a strategic vision and the implementation of concrete actions by national authorities. Demand for food is expected to increase by 70% by 2050 due to population and income growth, and for the agro-food sector this represents both an opportunity and a challenge. These trends have a strong impact on the demand for agricultural products, as the European market is expected to offer limited opportunities for expansion (Strategy for the Development of the Agrifood Sector in the Medium and Long Term Horizon 2020-2030, 2015).

Cereal exports show an upward trend, so in 2020 the total amount of cereals exported was 11.4 million tons, equivalent to €2.14 billion, approximately 13.6% less compared to 2019. In terms of value, the highest exports were recorded in 2019,

approximately € 2.15 billion, 20.7% more than in 2020 (Figure 2). Romania, in the period 2010-2020, exported an average of 9.5 million tons of cereals to EU countries and third countries, with the largest quantity exported to Egypt, Spain, and Jordan.

Figure 2. Evolution of cereals exports and imports, 2010-2020

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Import Val (thousand euros)	239851	322888	365100	314800	283987	525364	576489	424112	322269	397813	704940
Import Cant(Tons)	1295661	1242683	1415496	1239792	1310097	2874608	2831872	2350021	1472296	1755090	3369650
Export Val (thousand euros)	882572	1053547	1312326	1961742	1963869	1971321	2056143	1966822	2158053	2588109	2143535
Export Cant(Tons)	5373279	4719798	5345350	9199089	9012652	10491217	11798521	11154856	9568120	13005494	11417752

Source: www.intracen.org.

At the same time, there were also cereal imports, which in 2020 were of around 3.3 million tons, or €704 million, 92% more than in 2019. It can be noted that the value of cereal imports in 2020 is approximately 3 times higher than in 2010 (Figure 2). Romania is a transit country; imports do not remain in the country but exit as exports, through the Constanța terminal (MADR, 2020).

Figure 3. Evolution of the trade balance for cereals in Romania, 2010-2020 (tons)
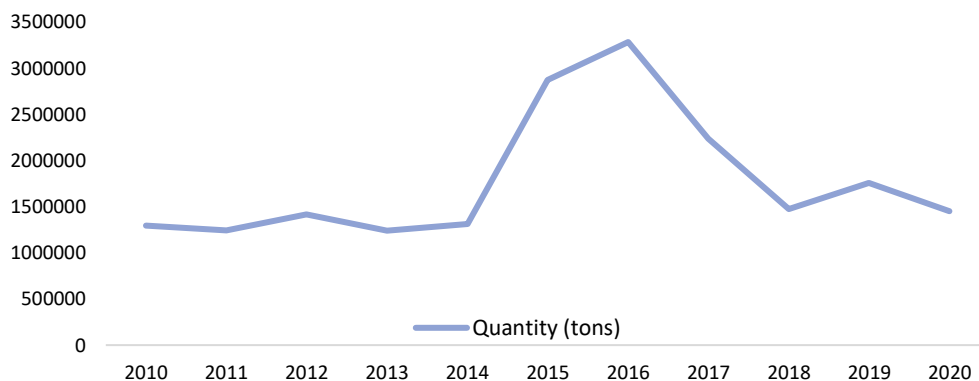
Source: Processing based on ITC data.

The main sales markets for cereals in 2020 were Bulgaria and Hungary for wheat, France and Bulgaria for maize, Hungary and France for barley, etc. The value of cereal exports far exceeds the value of imports, resulting in a trade surplus. In 2020, Romania's trade balance recorded a surplus of 7.8 million tons, equivalent to €1.4 billion. Among the EU-27 countries, Romania ranks 3ʳᵈ in terms of the amount

of cereals exported, with a value of €2.14 million (Figure 3). Based on the estimate of a decrease in domestic cereal production coupled with an increase in imported quantities, it is possible to forecast Romania's cereal trade balance for the next 10 years. Therefore, the presence of factors with a positive impact, such as: favourable weather and climate conditions for a good development of the cereals sector, the presence of soils of a high quality for the normal development of cereals, the production in favorable conditions of raw materials for processing, the level of subsidies under the Common Agricultural Policy of the European Union, as well as the existence of possibilities for the development of innovative technologies, are elements that can contribute to a further increase in domestic production implicit in exports.

Figure 4. Forecasting the trade balance for cereals, horizon 2030 (tons)
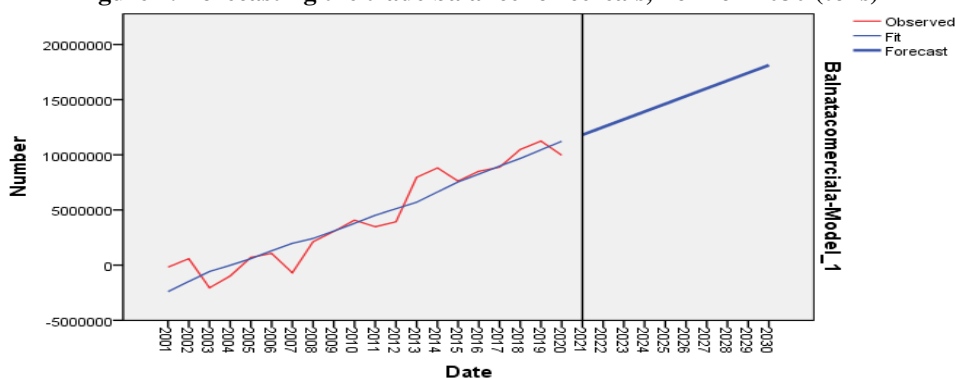
Source: Processing based on ITC data.

In 2001 the trade balance for cereals was negative (-178 thousand tons). Therefore, by observing the upward trend of the trade balance, a model was created in which the evolution of the trade balance in the following period, until 2030, was forecast. According to the model, in 2030, Romania could have a surplus of 18.1 million tons (Figure 4).

Figure 5. Vegetable export and import trends, 2010-2020

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Import Val (thousand euros)	14425	74516	51328	76265	14442	58750	45633	81742	77051	78848	80165
Import Cant (Tons)	330408	473069	81498	409394	715124	472551	686758	450527	775794	402367	375666
Export Val (thousand euros)	62198	48824	64537	132078	73880	86477	119134	63960	195330	95151
Export Cant (Tons)	88759	554953	13149	85147	829459	300495	638240	741675	615503	0269

Source: www.intracen.org.

Imports of vegetables show an overall upward trend, with a slight decrease in 2020 when the value of imports was €480 million, 7.2% less than 2019. It can be seen that the value of vegetable imports in 2020 is 3 times higher than in 2010 (Figure 5). The import values are higher compared to the values recorded for vegetable exports, therefore strategies need to be developed for each vegetable group, to identify solutions to balance the trade balance. From a quantitative point of view, the highest value of vegetable imports was recorded in 2019, around 740 thousand tons, 9.6% higher than in 2020. The decrease in imported quantities imported in 2020 could be attributed to export COVID-19 pandemic and the limitations by some countries. Due to restrictions in terms of shop, market, or restaurant closures, producers have not been able to make use of the production obtained (Figure 5). Therefore, there has been a decrease in demand throughout the period of the emergency and beyond, leading farmers to reduce areas or switch to other crops. It is noted that for the whole period analyzed, 2010-2020, Romania's trade balance for vegetables shows a deficit, reaching 625 thousand tons in 2020, equivalent to 423 million euro (Figure 6). In the vegetable category, tomatoes, cucumbers, potatoes, beans, and garlic are in the top positions in terms of deficit. The main EU countries from which Romania imports vegetables are Greece, Germany, the Netherlands, Poland, and Spain.

Figure 6. Evolution of Romania's vegetable trade balance, 2010-2020 (tons)
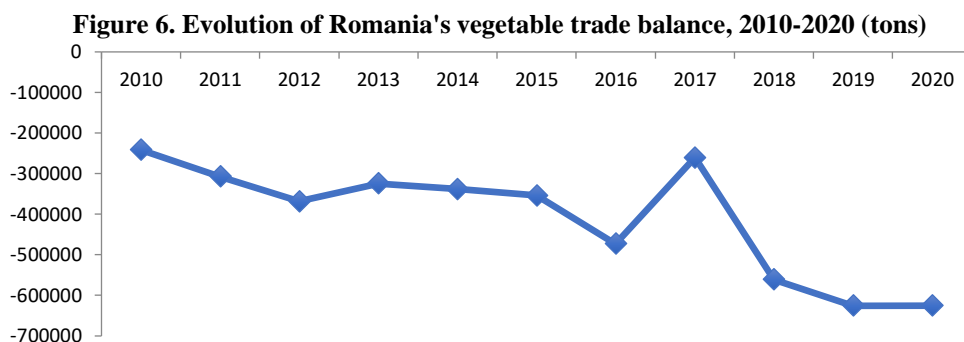
Source: Processing based on ITC data.

Due to massive imports, the vegetable sector is the most affected. One way to correct the trade balance may be to improve yields per hectare, which could help solve the problems of vegetable availability. At the same time, it should be noted that there are a number of public policies that are aimed at vegetable producers. For example, since 2017, support programs have been approved for vegetable producers who grow tomatoes in protected areas, in order to obtain off-season crops. Another program is dedicated to garlic production, as this vegetable accounts for a large share of the trade deficit due to its high marketing price per unit volume. In addition to these national measures, there are also European subsidies for the vegetable sector. However, the beneficial effects, i.e. an increase in the area under cultivation, the development of vegetable growing in protected areas, and, consequently, a reduction in imports, are slow to materialize. The primary aim must be to maintain the quality

of food, taking into account people's health, and taking measures to maintain and improve the sustainability of soil and energy resources.

Furthermore, in order to correct and improve the trade deficit in the vegetable sector and beyond, measures should also be taken to inventory agricultural areas, to consolidate land and holdings, and to provide vocational training and education for the existing workforce, with a view to ensuring that agricultural activities are carried out properly, thereby helping to increase the competitiveness of agricultural sectors. Another factor influencing the trade balance deficit in the vegetable sector is an indirect one, i.e. the market share held by the large agro-food retail chains, which in 2021 exceeded the 70% threshold, with the trend continuing upward. The lack of organization in the production area leads vegetable buyers to ensure the continuity of the flow of fresh vegetables with the help of imports. The evolution of the vegetable trade balance shows that in Romania there is a need to develop associative forms of cooperation on product supply chains, leading to the concentration of vegetable supply, the establishment of warehouses with modern technologies to ensure the conditioning and preservation of products for periods that allow constant deliveries regardless of the season. At the same time, since the supply of vegetables is seasonal and the demand for vegetables is continuous, it is recommended that they be produced throughout the year.

The perishability of vegetables also plays a very important role in their valorization, as the supply on the market must meet certain standards and meet existing requirements, with the introduction of commercially valuable varieties playing an important role. Often the vegetable varieties grown in Romania have very good organoleptic properties but are deficient in terms of commercial quality.

In terms of geographical location and climate, Romania is at a great disadvantage in terms of winter vegetable production compared to southern countries such as Spain, Greece, and Italy. Due to the lack of modern technologies and, more recently, to the increase in the price of energy and fuels, the cultivation of vegetables in protected areas, whether in solariums or greenhouses, is carried out in small areas, which leads to the import of significant quantities of vegetables.

Figure 7. Forecasting the vegetable trade balance, horizon 2030 (tons)
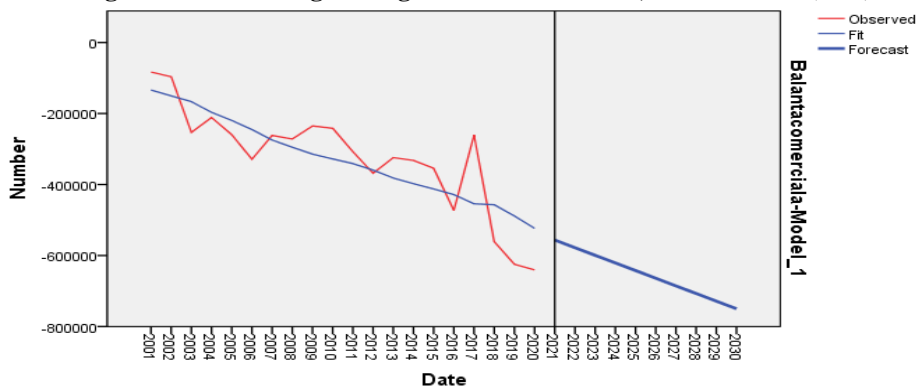
Source: Processing based on ITC data.

Observing the downward trend of the trade balance of vegetables, a model was created to forecast its evolution in the following period, until 2030. According to the model, in 2030 Romania would have a deficit of 750 thousand tons, which means that the trade deficit increases 9 times compared to 2001. The value of meat exports to Romania showed an oscillating trend in the period 2010-2020; therefore, in 2020 the export value reached 195 million euros, an increase of more than 55% compared to 2010, when a value of 125 million euros was recorded. Romania exports mainly poultry meat, and in 2020 it exported to countries such as England and Hungary (29182 tons and 27585 tons, respectively) and pork to Belgium, Italy, Sweden, etc.

Meat imports show an overall upward trend registering a slight decrease in 2020, when the value of imports was €912 million, 2.96% less than in 2019. It can be seen that the value of meat imports in 2020 is about 2 times higher than in 2010. The total quantity of meat that Romania imported in 2020 was 468.5 thousand tons, 30.12% more than 2010 (Figure 8). Romania imports mostly pork, the main countries of origin being Spain (272630 tons) and Germany (60371 tons). In addition to pork, significant quantities of poultry meat (Poland and Hungary), beef (Germany and Poland), and sheep and goat meat are also imported.

Figure 8. Evolution of meat exports and imports, 2010-2020

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Import Val (thousand euros)	496584	440069	464728	469183	522513	547186	614139	740278	817589	940316	912400
Import Cant(Tons)	360062	294258	316912	297353	344138	377708	389754	419304	494117	475596	468527
Export Val (thousand euros)	125823	129185	152692	210662	202972	237892	227552	270362	264012	240553	195356
Export Cant(Tons)	77191	99282	114753	101559	94357	110255	121784	131849	128711	145193	93617

Source: www.intracen.org.

It should be noted that meat imports were also influenced by other factors such as the embargo imposed on Russia after the annexation of Crimea in 2014, but especially by the spread of African Swine Fever (ASF) since the same year, which decimated the pig farming sector in Romania. Under these conditions, the level of pork imports has reached a very high level of more than 70% of the Romanian market's consumption needs.

Figure 9. Meat trade balance forecast, horizon 2030 (tons)
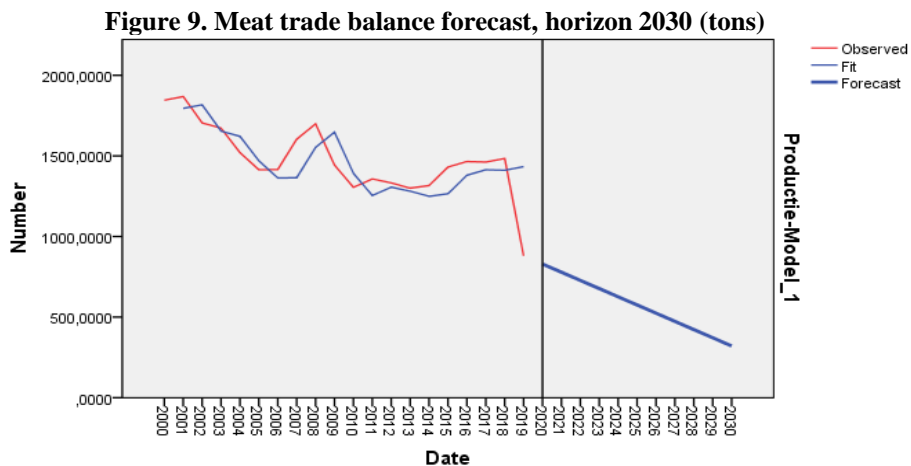
Source: processing based on ITC data.

Observing the downward trend of the trade balance for meat, the model developed in SPSS shows its evolution in the next period, until 2030. According to the model, in 2030 Romania would have a deficit of 785 thousand tons, which means that the trade deficit increases by about 3 times compared to 2001. The ageing population and demographic decline will limit the development of the domestic agro-food market. With a similar trend expected for the whole European continent, it is expected that Romania will have to increasingly expand its influence on markets outside the EU. The growth in food consumption currently exceeds production, leading to massive food imports. Pork and poultry consumption is growing the most while beef and dairy production hold the majority of agricultural resources (Kolleen et al., 2011).

Now, Romania needs to effectively manage the existing constraints and how best to address them. In Romania's Development Strategy for the next 20 years, a document drawn up in 2015, it was mentioned that by 2020 Romania should have ensured its food security, but according to the current data it can be seen that the forecasts mentioned in the Strategy will not be confirmed, which leads to the need for the authorities to intervene in order to correct the existing deficiencies. The intervention of the authorities, together with the associations of the sector, is focused on the development and implementation of strategies for the agro-food sector. This strategy considers it necessary to develop a development policy focused on the production sector, the main aim being to recover domestic markets and increase external markets based on competitiveness.

Following the high degree of fragmentation of holdings, the proposed measures relate to amending and improving the legislation on land consolidation and completing the land registration process. Other measures proposed to alleviate the shortcomings that have accumulated in recent years concern the theoretical training and education of agricultural workers and research institutions. According to an NBR report, Romania ranks last in Europe in terms of the graduation of specialized

schools by employees working in the field (CNSM, 2021). In addition, a set of recommendations is proposed on: stimulating exports of products, increasing added value (for cereals and large crops, vegetables, fruit, and for the livestock sector), proposals on innovation, quality, and financing. The recommendations for stimulating and increasing exports provide measures to finance the program to enhance the value of organic food products, including for export, financing of trade fairs and foreign economic missions for the agro-food sector, as well as measures to increase the number of exporting agro-food SMEs, the development of clusters and regional agro-food export networks to manage geographical indications, development of the e-commerce system, etc. (Dăianu, 2001).

To increase added value, the aim is to implement measures, in particular, to encourage associations within agricultural cooperatives in order to benefit from high-performance and intelligent technologies that can ensure a high level of competitiveness for agricultural products. In addition, measures have been proposed to define the value chain for all agro-food products.

6. Conclusions

Romania has an overall trade deficit for all sectors except cereals, where there is a trade surplus of 7.8 million tons, equivalent to €1.4 billion, in 2020. The development of the processing sector for raw materials obtained from the processing of cereals such as flour, corn flour and vegetable fats could, through their export, reduce the trade deficit. The processing of raw materials from primary crop production into higher value-added products such as bakery products, pasta, biscuits, frozen doughs, puff pastries, confectionery, and pastry products could be other solutions to make better use of Romania's cereal production.

Regarding foreign trade, the balance of trade in vegetables shows a deficit of 625 thousand tons, equivalent to €423 million, one of the most affected sectors. One way of correcting the trade balance may be to improve yields per hectare, which could help to solve problems related to the availability of vegetables, such as the current problems of low access to food. The trade balance in animal products is in deficit. In the context of ensuring animal production that meets current consumption requirements and availability for export, livestock farming in Romania also requires the existence of adequate livestock numbers and a breed structure with high genetic value. This situation of continually shrinking livestock numbers and the excessive fragmentation of livestock farms is having an impact on farmers' investment capacity and therefore on the yields obtained, with sectoral production also being affected by insufficient collection, storage, and transport facilities. Thus, the inability to deliver goods to the upper links of the production chain in accordance with their quantitative and qualitative requirements characterizes not only the plant sector but also the livestock sector. Following on from the previous statements on exports of cereals, especially wheat, maize, and sunflowers, a link should be made with the development of the livestock sector, especially pig farming, but also poultry farming, which could influence the level of imports of high value-added products such as meat, meat products, dairy products, and eggs.

According to forecasts, using the SPSS software, Romania is expected to have a surplus of 181 million tons of cereals by 2030, while the trade deficit for vegetables and meat could reach 750 thousand tons and 785 thousand tons, respectively. The continuation and deepening of current trends is undesirable for the agro-food sector in Romania, as the economic consequences could be negative, jeopardizing the existence of crops in the case of the vegetable sector, generating excessive specialization of large cereal farms, which could have social consequences, but especially on the environment and biodiversity.

Acknowledgment

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Theoretical Perspective on the Impact of Globalization and the Development of the World Economy System

Mohamad ABOU EL HASSAN[1]

Abstract

Globalization is a complex process determined by multiple causes, given the diversity of the contemporary world and the international relations developed between modern societies, the spatial or temporal distance no longer being an obstacle to the expansion of transnational relations. Globalization can be approached both conceptually and phenomenologically. This is a challenge for modern society, which must assimilate and control the information and content circulated by establishing links between various economies and societies, but we will see that this also depends on the degree of initial development and the mentality of that society. Globalization, by its dimensions, acts not coercively and perhaps not fully consciously on the contemporary world, becoming an immanent factor of any relations between states. Freedom of movement of capital, labour, technology is a channel for action of globalization. This paper analyses the phenomenon of globalization from a theoretical perspective, investigating various theories on its impact on the development of the world economic system.

Keywords: economic system, financial globalization, world economy.

1. Introduction

Globalization is a complex phenomenon, outlined as a fairly recent concept, but manifested in the history of states since individuals began to interact in order to obtain the necessary resources, when their own ones were not enough. These simple exchange relations have expanded through the migration of people; thus, globalization nowadays aims at integrating national economies on various levels, economic, social, cultural, political, a phenomenon that can diminish the autonomy of governments, but the reconfiguration of social relations has as final goal the increase of the development potential of a country and, implicitly, of the living standards of the population.

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The economic facet of globalization highlights the fact that the advantage arising from the global manifestation of this phenomenon related to the more efficient allocation of resources also affects the perpetuation of these resources. The scarcity of resources thus becomes the result of the struggle to maximize profits, to expand power, and to seize markets. The aspects that shape the identity of a nation, such as local culture, traditions, mentality, cultural values, are annihilated under the auspices of globalization. Beyond the benefits of the phenomenon, globalization can actually lead to the suppression of borders and the sovereignty of the preferences and interests of developed states, which leads to the unfair allocation of resources, the unfair redistribution of the national product, to the deepening of the differences and differences between the social strata, thus to the domination of the few and the big over the small and many.

Politically, however, globalisation poses a threat to emerging economies, which the major economies are exploiting. The intensification of global economic exchanges is increasing the dependence of countries on the periphery of the pyramid of economic development on developed economies such as the US, in which a large part of the capital and expertise is found in many areas. There is also a transfer of power from the state to multinational corporations, which concentrates financial power at present. This has led to the strengthening of the 'brand' and its globalisation, as the production and marketing of a multitude of products is carried out on a large scale today.

2. Research Questions and Methods

This theoretical research aims to investigate the impact of globalization on the development of the world economy system. The main research questions proposed in this paper are the following:
- What are the economic implications of the phenomenon of globalization, from a theoretical perspective?
- What concepts underlie financial globalization?
- What is the relationship of the globalization phenomenon with the system of the world economy?

The methodology of the paper consists in the theoretical analysis of the main books and articles that approach the phenomenon of globalization on the development of the world economy system and the comparative presentation of the main issues underlined.

3. The Phenomenon of Globalization and its Economic Implications

Globalization has become a known term since the 1990s and is appreciated due to the contribution of economic growth potential it offers to interconnected states, leading to higher living standards. Economic integration leads to a better division of labour between integrated states, a mechanism that allows economies that pay labour at a low level to specialise in diverse and competitive areas, while developed countries with a wage policy geared towards high pay to increase labour

productivity, allowing companies to exploit economies of scale. Globalisation also allows capital flows to be migrated to the highest-return investment opportunities, without being constrained to be placed in the country of origin at lower returns.

Although globalization is a multifaceted concept with numerous dimensions, some specialists approach it as an eminently economic phenomenon, determined by the unprecedented increase in the volume of international commercial transactions, by the liberalization of the movement of capital and labour, having as purpose the maximization of the gain at the expense of these facilities, respectively, the increase of investments in order to consolidate the development in the already developed countries and to stimulate the economic growth in developing or emerging ones. Against the background of increasing capital and investment flows, certain capital markets will develop even more strongly, thus favouring the domination of large corporations over national economies.

At the same time, globalization involves the conveyance of ideas, national practices, and technologies and constitutes something more than internationalization or modernization, universalization. This involves the intensification of social relationships spread globally, which connect places at almost immeasurable distances, but which are influenced by events that take place at great physical distance, which would otherwise be impossible to annihilate. Eliminating geographical distances and barriers is one of the undeniable advantages of this phenomenon. They are produced as follows:
- relocation and over territoriality;
- the transmission of technological innovations is done at a speed that also affects a certain risk;
- the domination of multinational corporations;
- liberalisation and the development of financial markets lead to a corresponding increase in the risk exposures of national economies.

Friedman complains that globalization is not a trend, but a legitimate manifestation of global interdependence, which has its own rules, its own logic, and exerts specific pressures on all states, companies, people, to a greater or lesser extent. In his vision, globalization refers to the integration of markets, technologies, information systems, telecommunications systems in a manner that exceeds national borders, decreases distances, and increases the speed and scope of accessibility of all to products and services that originate at a greater or lesser distance. Globalization is also perceived as a process or set of processes that include the transformation into a spatial organization of social relationships and transactions, expressed through transcontinental flows and networks of activities, interactions, and power (Friedman, 2000).

Waters points out that globalization is also a paradox, due to the fact that it reduces the world to a compressed whole, due to the compression of temporal and spatial barriers, but also an intensification of the awareness that the world is also becoming a much more complex set of forces, due to the interdependencies that are formed. Although the definitions given to globalization highlight its dialectical nature, Waters counts on the advantages brought by globalization to the national

economies integrated into this undefined superstructure, which allows for the diversity but also the homogeneity of local practices and cultures. He believes that there will be only one culture on the planet, but which will not, of course, be harmoniously integrated, due to diversity and local specificity. Space barriers will disappear, with territoriality no longer being an organizing principle of social and cultural life. Also, in a globalized world, we will be unable to predict the preferences of society through the prism of the geographical location of a state (Waters, 1995).

We believe that the elimination of geographical barriers will not eliminate unquenchable customs, especially in the case of peoples with a solid and ancient history of traditions, but also the fact that underdeveloped third-world countries will not reduce the gap between degrees of development in order to integrate into a globalised world.

The relocation is also manifested in the banking system, where financial innovations and financial infrastructure have led to the carrying out of part of the banking activity without physical interaction between the bank and the customer. However, not everything is globalized. Employment is largely local or regional, but it is certainly affected by strategic activities and economic factors carried out in a globalized system of inputs and outputs.

In the view of many specialists, but also in the collective consciousness, globalization is an ideologically suspected premise, since it is meant to justify the spread of Western culture and capitalist society, which is largely real (Goodhart, 2003; Alami, Dixon, 2020; Pizzolo, 2020). However, this does not imply that every state must submit to this ideology, but must relativise this ideology in order to adapt to its needs. The relocation or deterritorialization of social and political arrangements occurred mainly in Western Europe.

4. Financial Globalization

Financial globalization is the most important dimension of globalisation, especially in the context of a fragile global financial system, but also exposed to external vulnerabilities. Globalisation must be seen as a process rather than as a condition of a system. This implies the quantitative and qualitative intensification of exchange relations (transactions) outside national borders, i.e., on international financial and banking markets. Financial globalisation also makes a significant contribution to increasing consumption and investment in space-distant financial markets, but also contributes to the diversification of risks through the decompartmentalization of markets.

The dynamics of financial globalisation should also be analysed in the light of the risk component of interbank exposures in a market or of international exposures generating systemic risk. Many theorists, but also practitioners in the economic field, appreciate the fact that the most recent global financial crisis was determined only on the surface by the fall of the real estate market, due to the moral hazard of the clients, who took risks without hedging, because they did not have enough information (asymmetry of information) on the market and could not predict the evolution of real estate prices amid excessive demand for mortgage

loans (Alqaisi, 2018; Gennaioli, Shleifer, 2018; Kvalnes, Nordal, 2019). In essence, however, the bursting of speculative bubbles was due to a longer process of accumulation of imbalances, which were "decompensated", affecting the entire economy. The causes of the onset of this crisis were such micro and macroeconomic order.

Financial globalization, regarded as one of the other dimensions of the phenomenon, designates the interdependence relationships that are formed between banking systems and financial markets at a global level. An important role in the process of globalization is played by financial deregulation, which involves the relaxation of regulations in the financial and banking field, which does not imply their elimination, but the allowing of banking institutions to pursue the maximization of profit with greater leeway, especially in terms of interest rates on deposits and loans granted. With regard to deregulation, two main issues are significant:

- the amplitude of the intervention on the financial and banking market;
- the intervention instruments permitted or chosen.

The first aspect related to the discretionary character of public action reveals that in certain states, such as Romania, the central bank has a higher degree of freedom of action than other public policies, which is a benefit, given the success of monetary policy in recent years, the credibility enjoyed by monetary authority, and the transparency of its policy.

Currently, as we note from the history of systemic economic and financial crises, the central bank also performs an interventionist function, the regulations being necessary both to diminish the post-factum effects and to increase the ex-ante predictive capacity. The stages of financial regulation capture two important historical moments: the period of the Great Moderation, characterized by a strict regulation on financial and banking activity; this moderation proved to be artificial, not imposing major interventions on the part of the central bank, whose duties were executive (it established the overnight interest rate). The second landmark historical moment concerns the 1970s, with the abandonment of the Bretton Woods system and the transition to the floating of the exchange rate. In this context, the convertibility of the dollar into gold was abandoned, gold ceasing to be a means of exchange, and that period was that of the Great Deregulation.

After the global financial crisis that broke out in 2008, international financial bodies and supervisory committees have strengthened the regulations of banking prudence, so that now the banking activity is regulated by the provisions of the Basel III Agreement, considered the best means of prudential intervention in the banking market and with the best results in anticipating an episode of turbulence that would generate systemic risk.

In the specialized literature we find three ideological trends specific to the 1990s: the hyperglobalist perspective, the sceptical perspective and the transformative perspective (Held et al., 2000). The hyperglobalist perspective amplifies, as expected, the role of globalization in building a new age of mankind, dominated by the lack of borders between national economies, all of which are part of a global market. The national authority is repealed, and economies are 'denationalised'. The

sceptical perspective classifies the current phenomenon of globalization as being more of a process of regionalization and fragmentation, exemplifying this ideology with the third world, which is marginalized rather than integrated into a global market. The authors also point out that the development of multinational corporations brings benefits to their host countries by not being outsourced as a committed workforce. The transformative perspective does not identify any real reasoning underlying globalization, nor any outcome, being at the opposite pole of the other two currents of thought.

Scholte also tried to define globalization, which he approaches as a transformation of social geography, driven by the expansion of supraterritoriality (Scholte, 2004). The author notes the inconsistency of the definitions related to liberalization, universalization, westernization, etc. and emphasizes a sociological factor, that of cross-border communication between people. Scholte's perspective approaches the transformative one in that he argues that globalization is transforming the nature of social space.

Lomborg addresses the impact of globalization on the world, and his work on the actions we can take both as individuals and as a nation can increase the return on investments made, especially to improve the situation of human capital. Lomborg analyses the costs and benefits of the best solutions to twelve global problems, with the financial resources to spend $ 75 billion, over a time horizon of 4 years. His analysis shows that the best solution, the one generating the most benefits in relation to the effort made, is the allocation of 3 billion dollars in the health and education system, with the purpose of reducing malnutrition in children and improving education in pre-schoolers. The cost-benefit analysis reveals that a dollar spent to reduce malnutrition in children will generate a benefit of $30 (Lomborg, 2014).

Addressing pressing issues that affect both present and future generations shows that public policies should reconsider their priorities in terms of objectives. The operations intensified by the process of financial globalization refer to the integration of both the public and private sectors within a developed, complex global financial market, thus to the involvement of public and private institutions in cross-border financial transactions. State loans and foreign direct investment are becoming international financial flows, along with acquisitions and mergers between certain financial institutions. Looser regulations or financial deregulation have favoured an increase in the processes of capital inflows and outflows between the countries of the world.

At the global level, banking activity has had an evolution marked by three factors or vectors: deregulation, disintermediation, and opening or decompartment of markets. As deregulation has been the subject of previous detail, it is also necessary to point out certain aspects about disintermediation and the opening up of markets.

Disintermediation is a phenomenon derived from deregulation. Although increasing financial intermediation is currently an intermediate monetary policy objective, as this process increases the role of financial intermediary of the banking sector, disintermediation implies the freedom of economic agents to act directly on

the financial market, without resorting to banking institutions to place their resources or attract resources.

The opening of the markets can be carried out towards the foreign market, by eliminating the borders between the national and foreign market, but also inward, by decomparting the external market. The most striking example of the opening process is the introduction of the euro, with all the implications arising from it, implications of competitiveness, regulation, and pressure. The globalisation of banking activity also refers to technological progress and financial innovations, which have fostered the emergence of new, marketable financial assets, increasing the volume of transactions on the financial markets.

The fundamental objective of central banks is to ensure price stability, a necessary but not sufficient condition for maintaining financial stability. In a globalised economy, financial stability is becoming an even more delicate desideratum because national banking systems must rigorously comply with the bank prudence provisions in their commitments and exposures, especially in those that create interdependencies within the financial system. Bernanke considers the objective of stability not only an objective, but also an instrument of monetary policy, as its effective 'use' contributes to sustainable economic growth, to increasing employment with an impact on social welfare (Bernanke, 2007). The implications of achieving such an objective for the real economy are related to the transparency of monetary policy, which supports confidence in the central bank and practically controls inflation expectations, the fall in interest rates, the preservation of the value of incomes, and, therefore, of the purchasing power of households, which has access to changes in relative prices, the orientation of resources towards the productive sphere, and the avoidance of an increase in the money supply in circulation, accompanied by a similar increase in prices and not in output, according to the quantitative equation. Thus, achieving the objective of financial stability becomes difficult in the context of globalization and liberalisation of financial and banking markets.

5. The Relationship of the Globalization Phenomenon with the System of the World Economy

The belief that poor countries feel the benefits of globalisation more strongly than developed countries is based primarily on increasing the economic openness of third countries, so that they can make use of their resources more easily and investors can look for investment opportunities in underdeveloped economies. We believe that the benefit of opening up to the global economy is a double-edged knife, because the resources available in poor countries and the labour force are paid much less than the same resources would be in industrialised countries. Thus, just because living is much cheaper in these countries, and living standards much lower, investors get higher earnings than they would get in other regions. The exploitation of human capital thus becomes a delicate issue today. It should be noted that a pro-global argument would be to increase the competitiveness of local producers (Dima, 2018), who can thus develop their business (Trifu et al., 2014); globalisation also allows for the free movement of labour (Girneata, 2015), and employment opportunities are

more numerous. From the point of view of large corporations, globalization contributes to the reduction of bureaucracy and leaves them with a certain flexibility to expand into new markets and to search for new commercial fords that will increase the value of their business. Arestis and Basu believe that it must be moderated by a global institution that has a role of coordinating the process due to the acceleration of the globalization process (Arestis, Basu, 2003).

On the other hand, antiglobalists have a different perspective for two reasons. Countries with a rich history, such as the US and some European countries, blame the rise in unemployment, especially among the workforce specialising in competitive fields; on the other hand, developing countries, most of the time with emerging economies, demanding the loss of national identity, autonomy, and local culture. Also, antiglobalists regard the phenomenon of globalization as a premise of the concentration of power also in the hands of the powerful, society being divided into no more than three social strata, of which the poor blanket will be dominant in density, but the dominance of the rich will be felt at the structural level. In a globalized society, the reversal of values in the collective consciousness has almost become a cliché, a peculiarity of the "new modernity", in which the binder between places and peoples also determines their dependence on all other. Thus, if during the first modernity sovereignty still had intrinsic value, nowadays the national identity struggles not to be annihilated by the composite, aggregated identity of all other nations, characterized rather by elements common to all societies and less by their specificity.

The arguments in favour of globalisation are, of course, manifold. First of all, the evolution of technology constitutes a major gain accessible to a wide range of individuals, companies, and societies. Technological progress, thanks to globalization, brings together a workforce from all over the world to work on the same innovative product, without barriers, benefiting at the highest levels from everyone's specialization, and the transfer of know-how being indispensable for evolution. Globalization also allows the standardization of certain technical parameters that can be widely used for the same purpose by everyone, and this uniformization of the means of work eliminates the disadvantages that would arise from the situation in which each company had its own means of storing data or transferring it.

Another advantage stems from the globalisation of politics, which allows international to decide on events of systemic importance, such as EU sanctions on Russia during the war in Ukraine.

At the same time, globalization contributes to the reduction of bureaucracy, due to the elimination of barriers, so that all beneficiaries relate to global standards that they must achieve. The decrease in the prices of goods and services against the background of production and marketing opportunities in different countries of the world in different regions with varying degrees of development and, implicitly, against the background of lower production costs.

Among the advantages of globalization, we also mention international security (large corporations are involved in social responsibility actions, in the fight against

terrorism), increasing employment opportunities, using resources more efficiently in order to reduce their waste (however, the intense consumption of resources leads to their rarity).

The increase in foreign direct investment is a consequence of globalization that produces its effects with a bigger or smaller gap, also taking into account the external competitiveness of a national market, which can be increased only by leading credible public policies, with results and connected to the real needs of society. The increase in foreign capital materialized in the increase in the quality of management at the level of the companies in which it is invested determines, in essence, the productivity momentum. However, it should be remembered that globalization also means relocation, which implies that foreign investors, depending on economic and political stability, fiscal policy that must encourage investment and production (Girneata, Dobrin, 2015), but also depending on new investment opportunities on other markets, can lead to capital outflows, with negative effects on the economy, by increasing the unemployment rate, damaging the country's image externally, etc.

Financial globalization, regarded as one of the other dimensions of the phenomenon, designates the interdependence relationships that are formed between banking systems and financial markets at a global level. An important role in the process of globalization is played by financial deregulation, which involves the relaxation of regulations in the financial and banking field, which does not imply their elimination, but the allowing of banking institutions to pursue the maximization of profit with greater leeway, especially in terms of interest rates on deposits and loans granted. As far as deregulation is concerned, two main aspects are significant: the magnitude of the intervention in the financial and banking market and the intervention instruments allowed or chosen. Currently, as we note from the history of systemic economic and financial crises, the central bank also performs an interventionist function, the regulations being necessary both to diminish the post-factum effects and to increase the ex-ante predictive capacity.

Due to the increasing interdependencies between the world's economies, the phenomenon of financial globalization also favours the risk of contagion, which triggers the propagation of shocks at a rate that annihilates time and space barriers. That is why the prudential regulations currently in place are precisely aimed at limiting the effects of contagion risk, which remains inherent in cross-border financial activities. Mitigating this risk would highlight the benefits that globalisation brings to the parties involved. Other researchers emphasize the conditions that interdependent nations must meet in order to feel the advantages of globalization more strongly than its costs (Witt, 2019; Drezner, Farrell, Newman, 2021; Luo, 2021). Among these conditions, we mention the observance of market discipline, the increase of the depth of the financial systems, thus their development, the diversification of risks, the efficient allocation of financial resources by placing them at the best yields or their redistribution to the demand for money, efforts to increase the quality of management. Compliance with these conditions is possible in the case of states with a developed economy, developed financial markets, and governed by effective macrostabilisation policies.

The liberalisation of capital movements generates risks for states that carry out a massive volume of international trade, in which foreign capital flows are numerous or those of capital outflows, if exports are stimulated, so that the attention paid to certain intermediate or operational monetary policy objectives must be increased.

The complete liberalization of the capital account is conditioned by: inflation targeting, so the failure of the inflation target threatens financial stability; the floating of the exchange rate is to a certain extent controlled, in order for the monetary authority to intervene in the event of a steep appreciation or depreciation of the national currency, with an impact on capital movements; external competitiveness to be supported by credibility in the public policies of the state; the budget deficit is kept within prudent limits; the degree of external indebtedness does not endanger public solvency; stimulating competition through fiscal, monetary incentives, in order to produce results in domestic production and, implicitly, in GDP; the existence of developed, up-to-date information systems that meet the present needs to assess the state of the economy in general and to monitor and establish correlations between certain problems in the economy, in order to provide technical support for the substantiation of solutions.

6. Conclusions

Globalization in general, and financialization in particular, makes the economies of the states of the world become interdependent through numerous channels of transmission of globalization. In these circumstances, international financial institutions have a special role to play in strengthening the prudential supervision framework and in correcting financial imbalances. The concept of financial stability is also very broad, making it difficult to identify a widely accepted definition.

Globalisation can be approached both conceptually and phenomenologically. This is a challenge for modern society, which must assimilate and control the information and content circulated by establishing links between various economies and societies, but we will see that this also depends on the degree of initial development and the mentality of that society. Globalization, by its dimensions, acts not coercively and perhaps not fully consciously on the contemporary world, becoming an immanent factor of any relations between states. Freedom of movement of capital, labour, technology is a channel for action of globalisation. financial globalisation is the 'binder' between economies affected by the crisis, given that globalisation is by definition interdependence, system and contagion, when relations between states deteriorate due to the difficulties of one or more 'partners' of these relations. Thus, there is a polarization between proglobalists and antiglobalists regarding the potential benefits of globalization: proglobalists believe that globalization has eminently positive effects on the living standards of the population, on their incomes through diversification, but also through the liberalization of the movement of labour, capital, and technology. While proglobalists argue that the main beneficiaries of globalization are poor countries, antiglobalists have antagonistic beliefs that globalization has devastating effects on poor countries because it affects local culture, the environment, and quality of life.

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Does the Profitability Have an Influence
on the Financing Decision?

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Abstract

This paper investigates the relationship between profitability, cost of debt, liquidity, cash conversion cycle, and leverage over time, for companies that mainly operate in wholesale trade of motor vehicle parts and accessories. The bigger a company is, the higher the proportion of bank loans into the total liabilities, and this might be due to banks assessing the larger firms as being more eligible for a loan. Due to the large volumes, they purchase, the bigger companies have also bargain power and can negotiate better payment terms and prices with the trade creditors, which enables them to better manage their cash.

Keywords: capital structure, cost of debt, debt ratio, financing decision, ROA, ROE.

JEL Classification: G31.

1. Introduction

As long as the cost of debt is one of the multiple factors that have an impact both on the finance structure of the enterprises and the investment decisions (if there are more competing investment project, which one should be undertaken, and the way the potential mix of the funds is used to purchase of various types of assets leading to new asset structure and size), while different investment projects carry different risks thus having an impact on the cost of debt, it is expected that not only these indicators are inter-related, but they also have a direct relationship with the return of equity which shows the efficiency in using the company's own funds.

The literature in this area explains how the cost of debt can impact the financing decision; for example, if, due to factors that do not directly depend on the financial situation of the company, but are rather general economic environment related, the

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cost of debt increases, the company might decide to issue equity if available or even to postpone the investment plans.

At the same time, a company with an already high gearing ratio might not be assessed as eligible for additional loans by the banks, thus having to turn to its shareholders to get its investment projects funded, even if potentially at an increased expected return (as dividends required by the owners); alternatively, the bank might take the risk of lending money to the company but at an increased interest rate and under certain restrictions on using the funds.

Also, the quality and quantity of the company's assets directly impact the revenues that can be generated by them, the inflows that will result in increases in equity and, as such, in the available funds that can be re-invested.

Therefore, the return on equity, the return on assets, and current ratios will be used as control variables to see how they relate to the debt ratio.

2. Problem Statement

During the last few decades, a lot of literature has been produced to address the relationship between the capital structure and firm performance, both theoretically and empirically. Initially, it was F. Modigliani and M. Miller (1958), whose theory demonstrated the irrelevance of capital structure in a company's value. A few years later, in 1963, they revised their own theory and factored the deductibility of interest expense in, leading to the conclusion that the higher the debt ratio is, the higher the company value, too. They were followed by other researchers who found many other variables that influence both the making of decision on the mix of financing resources and the financial performance, which make it very difficult if not impossible to formulate a general theory of optimal capital structure.

Chang (2015), contradicts, through three arguments, the Modigliani and Miller's theory.

Later on, Baker and Wurgler (2002), suggest that companies issue new shares when they perceive that they are overvalued and that firms redeem their own shares when they consider that they are undervalued; this behavior impacts the capital structure, and also the authors Dragotă and Semenescu (2008) sustain that the capital structure depend of the sector of activity of the companies.

Jensen and Meckling (1976), introduced the agent theory, based on different interest of shareholders, managers, and creditors of the company, they identify two types of conflicts: conflict between managers and shareholders, and the conflict between shareholders and creditors. The agent theory proposes the way to reduce the cost by accessing the credit, in this case the creditors are the unpaid and strict monitoring agent. Borrowed capital has a constraint and motivating effect upon managers of the company, they have to be very carefully that company to produce results to can pay the interest and the capital rates, otherwise the company will face the risk of bankruptcy, and the managers lose their jobs (Vernimmen, 2017).

Connelly, Certo, Duane, and Reutzel (2011) declare, that signal theory is based on the different behavior between two parties that have access to the different information, in our case the shareholders and creditors.

In a study based on data from 1.380 European companies for the period 1993-2013, Rauramo (2016) identified that median value of the industry represents an determinant to estimate the capital structure of the companies.

An recent article published in The Journal of Finance (2019) signed from the President of American Finance Association, Peter De Marzo, - Presidential Address: Collateral and Commitment – sustain that choosing the optimum capital structure is a problem of engagement. In the context with the agency conflicts between the shareholders and creditors, the complete engagement means that the company will be almost exclusively on borrowed capital.

The Authors Charness and Neugebauer (2019) after a study that test the invariance of the theorem in the market, during the Modigliani and Miller demonstrated mathematically that market value of a company is independent of return on assets economic and the or the equity and debt ratio, if prices are not arbitrage, but the theorem was not sufficient tested on the real markets.

Shemetov (2020) shows that the propositions of Modigliani and Miller are available only short time periods, discrepant with the predication of Modigliani and Miller, structure of assets affects the value of the company.

A more recent study performed by Stanica, Ilie and Taga (2018) on a sample of Romanian listed companies and published identified a positive relationship between the cost of debt of the non-financial companies and the capital structure, while a negative one exists between the cost of debt and the growth opportunities, size, and age of the company; the industry effect was also confirmed as being a factor of influence on the cost of debt.

A study by Botoc and Anton (2017) used the financial information available for the period 2006-2015 for a sample of 937 companies in Central and South Eastern Europe, having a fast economic growth. It showed a U-shaped relationship between the working capital management and the profitability. The optimum of working capital at which the profitability is maximized was calculated at 79% of the turnover. The profitability ratios used in this study were the following: ROA, EBIT, ROIC and WKRC (Working capital ratio = Net current assets / Sales). Working capital ratio carries the contrast between the managers' interest in aggressive commercial policies regarding early payment discounts, and the shareholders' concerns regarding the increase in profitability.

The results of the 2017 study were in contrast to the conclusions of previous research that showed a negative relationship between working capital management and profitability. Ebben and Johnson's findings (2011) are that the US small firms with shorter cash conversion cycles need lower levels of invested capital (long-term debt plus shareholders' equity) and have a positive impact on the financial performance assessed by the asset turnover and return on invested capital and on the levels of liquidity. The study published by Aregbeyen (2013) contributes to the view that the efficiency of working capital should be improved and the cash conversion cycle shortened in order to increase the profitability of the manufacturing firms. Aktas, Croci and Petmezas (2015) argued that there is an optimal level of working capital and that by converging to it, the companies improve their performance.

Another study was conducted in Romania for the manufacturing companies listed on the Bucharest Stock Exchange in 2003-2010. It used a cross-sectional regression that highlighted the relation between the capital structure and the financial performance. The analysis on the capital structure considered: short-term debts vs. long-term debts, total liabilities vs. equity, while the assets performance (ROA) and the equity performance (ROE) are the profitability ratios. The results suggest that for the sample companies, the financial performance is enhanced when they avoid the debts and only use their own financial resources.

Setiyono, and Ernawati (2017) published a study conducted in Indonesia, which included 14 listed companies in Food & Beverage sector and their financial data available for 2013-2015. It outlined that the internal audit and the current ratio do not have any significant impact on the financial performance, while the working capital turnover (Turnover / Net current assets) does.

Going a little farther, in Asia, we find another empirical study that used the Panel data model for IT companies in Bangladesh, listed at the Dhaka Stock Exchange in 2013-2017; the dependent variables selected were ROE, ROA and EPS and the independent variables were debt ratio, equity ratio, long term debt ratio and short-term ratio. Its results show that the capital structure has a significant positive effect on ROA, but ROE and EPS are not influenced much by the capital structure; it also suggests that shareholders' wealth maximization can be done by the perfect mix of equity and debts (Alamgir et al., 2019).

3. Research Questions / Aims of the Research

The aim of this paper is to determine the relationship between the debt ratio and the return on equity, the return on assets, current ratios, for the companies that operate in wholesale trade of motor vehicle parts and accessories (NACE Code 4531) and which, at the end of 2020 were still operating in the market.

4. Research Methods

The sample analyzed includes the Romanian companies that between 2008 and 2020 had a total annual turnover higher than EUR 100 thousand and operate in wholesale trade of motor vehicle parts and accessories (NACE Code 4531) and which, at the end of 2020 were still operating in the market. They were grouped by the turnover in six categories; in the below table we show the number of companies within each category for every year in our range, as in the Table 1:

Table 1. Number of companies with > 100 k EUR turnover in 2009-2020

Turnover	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
1. 100 - 500 k	65	164	156	163	183	202	223	232	250	269	300	314	361	2,882
2. 500 - 1,000	43	84	80	85	82	77	89	105	114	111	101	118	135	1,224
3. 1 - 5 m EUR	97	91	104	111	117	124	119	122	131	141	152	152	137	1,598
4. 5 - 10 m EUR	16	13	17	18	16	16	21	26	31	27	19	23	22	265
5. 10 - 50 m EU	15	12	12	13	14	11	14	14	14	17	24	22	24	206
6. Over 50 m E	1	3	3	3	2	2	2	3	5	6	8	9	11	58
Total	237	367	372	393	414	432	468	502	545	571	604	638	690	6,233

Source: Trade Register Office, data processed by the authors.

When further analyzing the financial data for the companies included in the above categories, we tested the structure of the financing sources where these sources are: suppliers, bank loans, equity, and other debts (shareholders' loans, taxes, salaries, leasing companies). Given that a company cannot afford to accumulate unpaid liabilities to the employees, government, and leasing companies, we can assume that most of the 'Other debts' are actually the money lent by the shareholders of the companies in our sample. The vast majority of these companies are family businesses, and it is not uncommon that the owners provide temporary funds to the firms.

The following four tables (Tables 2-5) show how, depending on their size, the companies in this trading area (NACE Code 4531) make their financing mix up. The financial data processed to get the respective numbers had been extracted out of the annual financial statements filed by the companies with Trade Register Office.

Table 2. Suppliers share in total financing sources

Turnover	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
1. 100 - 500 k EUR	0.00%	0.60%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%	0.10%
2. 500 - 1,000 k EUR	0.00%	1.40%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3. 1 - 5 m EUR	0.00%	1.50%	0.40%	0.30%	0.70%	0.50%	0.30%	0.20%	0.20%	0.20%	0.30%	0.10%	0.10%	0.30%
4. 5 - 10 m EUR	7.90%	10.00%	9.80%	12.20%	10.70%	10.10%	9.50%	8.00%	8.00%	9.50%	5.60%	7.10%	7.40%	8.70%
5. 10 - 50 m EUR	26.90%	26.30%	31.10%	31.80%	26.40%	23.60%	20.20%	17.60%	17.30%	21.10%	21.00%	21.40%	17.70%	22.70%
6. Over 50 m EUR	47.20%	43.60%	35.20%	27.20%	25.50%	38.60%	36.70%	49.90%	38.30%	20.60%	21.00%	25.70%	22.90%	29.00%
Total	2.40%	2.50%	1.80%	1.90%	1.60%	1.30%	1.30%	1.30%	1.30%	1.30%	1.40%	1.40%	1.30%	1.50%

Source: Trade Register Office, data processed by the authors.

Table 3. Bank loan share in total financing sources

Turnover	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
1. 100 - 500 k EUR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2. 500 - 1,000 k EUR	0.00%	0.40%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3. 1 - 5 m EUR	0.00%	0.30%	0.00%	0.00%	0.10%	0.10%	0.00%	0.30%	0.30%	0.30%	0.20%	0.20%	0.20%	0.20%
4. 5 - 10 m EUR	2.20%	3.30%	2.40%	2.60%	3.10%	3.10%	2.70%	1.90%	2.80%	3.40%	4.90%	6.00%	4.60%	3.30%
5. 10 - 50 m EUR	18.80%	18.70%	13.60%	18.20%	19.20%	18.40%	15.50%	14.40%	13.30%	13.60%	12.20%	15.50%	16.40%	15.70%
6. Over 50 m EUR	0.00%	19.30%	18.90%	21.50%	12.90%	29.10%	29.40%	26.30%	21.80%	23.00%	21.60%	16.70%	14.30%	19.50%
Total	1.30%	1.10%	0.70%	0.90%	0.80%	0.70%	0.70%	0.70%	0.80%	0.90%	1.00%	1.00%	1.00%	0.90%

Source: Trade Register Office, data processed by the authors.

Table 4. Other debts share in total financing sources

Turnover	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
1. 100 - 500 k EUR	67.30%	60.50%	60.40%	59.70%	59.10%	53.20%	53.60%	50.20%	54.50%	53.40%	48.20%	48.60%	45.70%	53.70%
2. 500 - 1,000 k EUR	66.50%	63.90%	63.00%	61.70%	62.20%	61.30%	59.20%	56.90%	60.50%	58.00%	54.90%	53.40%	51.90%	58.10%
3. 1 - 5 m EUR	60.60%	55.70%	56.20%	55.10%	54.80%	53.20%	53.20%	53.70%	57.10%	55.50%	54.50%	53.50%	49.80%	54.60%
4. 5 - 10 m EUR	45.70%	35.70%	46.10%	36.80%	40.80%	38.20%	42.50%	46.30%	52.20%	46.80%	47.50%	44.10%	42.70%	44.30%
5. 10 - 50 m EUR	17.60%	20.40%	20.90%	13.70%	14.30%	12.90%	19.80%	19.20%	21.00%	21.00%	25.70%	24.40%	21.50%	20.10%
6. Over 50 m EUR	13.70%	9.70%	19.70%	29.00%	48.70%	3.60%	5.00%	6.60%	24.20%	29.70%	27.10%	27.60%	30.30%	24.50%
Total	59.50%	58.20%	58.10%	56.40%	57.00%	55.20%	54.40%	52.80%	56.60%	54.60%	51.90%	50.80%	48.60%	54.20%

Source: Trade Register Office, data processed by the authors.

Table 5. Equity's share in total financing sources

Turnover	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
1. 100 - 500 k EUR	32.70%	38.20%	39.60%	40.30%	40.90%	46.80%	46.40%	49.80%	45.50%	46.60%	51.80%	51.40%	54.30%	46.20%
2. 500 - 1,000 k EUR	33.50%	35.20%	37.00%	38.30%	37.80%	38.70%	40.80%	43.10%	39.50%	42.00%	45.10%	46.60%	48.00%	41.80%
3. 1 - 5 m EUR	39.40%	42.40%	43.50%	44.50%	44.50%	46.20%	46.60%	45.80%	42.30%	44.10%	45.10%	46.30%	49.90%	44.90%
4. 5 - 10 m EUR	44.20%	51.00%	41.80%	48.40%	45.50%	48.60%	45.20%	43.80%	37.00%	40.30%	42.00%	42.90%	45.40%	43.60%
5. 10 - 50 m EUR	36.70%	34.60%	34.30%	36.40%	40.10%	45.10%	44.50%	48.90%	48.40%	44.20%	41.10%	38.70%	44.30%	41.50%
6. Over 50 m EUR	39.10%	27.50%	26.30%	22.30%	12.90%	28.70%	28.80%	17.10%	15.70%	26.60%	30.30%	30.00%	32.50%	27.00%
Total	**36.70%**	**38.10%**	**39.40%**	**40.80%**	**40.50%**	**42.80%**	**43.60%**	**45.20%**	**41.30%**	**43.20%**	**45.80%**	**46.80%**	**49.20%**	**43.40%**

Source: Trade Register Office, data processed by the authors.

In conclusion, the smaller companies are financed by their owners, either by equity (share capital and retained earnings) or by direct loans (mainly non-interest bearing and generally on an undetermined term), while the bigger a company is, the more balanced the mix between these four sources is, as summarized in the table below:

Table 6. Summary of the financing mix by categories

Turnover	Average of Suppliers %	Average of Bank loans %	Average of Other debts %	Average of Equity %	Total liabilities
1. 100 - 500 k EUR	0.10%	0.00%	53.70%	46.20%	**53.80%**
2. 500 - 1,000 k EUR	0.00%	0.00%	58.10%	41.80%	**58.20%**
3. 1 - 5 m EUR	0.30%	0.20%	54.60%	44.90%	**55.10%**
4. 5 - 10 m EUR	8.70%	3.30%	44.30%	43.60%	**56.40%**
5. 10 - 50 m EUR	22.70%	15.70%	20.10%	41.50%	**58.50%**
6. Over 50 m EUR	29.00%	19.50%	24.50%	27.00%	**73.00%**
Total	**1.50%**	**0.90%**	**54.20%**	**43.40%**	**56.60%**

Source: Trade Register Office, data processed by the authors.

Because the financial decision seemed to depend on the company size, the relationship between the debt ratio and the financial ratios used for this study (ROA, ROE, and cost of debt) was analyzed for each category. The financial data used to compute the indicators selected as variables were gathered from the annual financial statements filed with the Trade Register Office.

Upon our first attempt to determine how much influence the performance and cost of debt have on the leverage, we noticed that for most of the turnover categories, the influence is rather low, as Table 7 shows, thus leading us to introduce liquidity-related indicators into the model. This influence was measured by the value of R-squared for each data panel:

Table 7. Influence of ROA, ROE, and cost of debt over debt ratio

Turnover	R-squared without liquidity ratios
1. 100 - 500 k EUR	9.16%
2. 500 - 1,000 k EUR	13.21%
3. 1 - 5 m EUR	7.04%
4. 5 - 10 m EUR	37.74%
5. 10 - 50 m EUR	23.75%
6. Over 50 m EUR	16.08%
Total sample	**8.58%**

Source: Trade Register Office, data processed by the authors.

Although we are aware that not always a higher R-squared value means that the selected model fits the data, due to this statistical measure cannot indicate whether the regression model is accurate and that a low R-square value can be determined for a good model (for example, in the case of the models that attempt to predict human behavior; as some previous studies showed, the quality of human resources involved in the business operations and in the financial decision and their level of financial education and sophistication have a direct impact on the performance), we decided to test and see whether adding more financial ratios as independent variables would make any change in the model. These ones are: current and quick ratios, and cash conversion cycle.

The debt ratio was chosen as the dependent variable. It expresses the proportion of company assets that are financed by debt and is used to assess the solvency of a business; lenders and creditors use this indicator to estimate the risk they will incur by extending credit to a company: the higher the ratio, the less likely it is to lend money to it. The formula is as follows:

Total liabilities (short- and long-term) ÷ Total assets

The liabilities contain bank loans, trade creditors, taxes, salaries, shareholders loans, and debts to leasing companies.

Return on equity (ROE) is one of the independent variables. It was calculated as the ratio of net income to shareholders' equity and shows the company's capability to effectively manage the equity investors' funds. A high level of ROE means that a relatively small investment was turned into a big profit, and this is what the shareholders want: maximization of the result of their investment.

Return on assets (ROA) is the second independent variable, which shows the company's efficiency in using its assets to generate revenues. It was calculated by dividing the net income by the total assets in the balance sheet. The higher the ROA is, the more productive and efficient the management is in utilization of the resources the company has available; however, this ratio must be considered in comparison against its competitors in the same industry and sector.

Cost of debt (Kd) is the third independent variable. It is the return that a company provides to its debtholders to compensate them for any risk exposure associated with lending to it. The ratio was calculated by the formula

$$Kd = \frac{\text{Total interest cost incurred}}{\text{Average debt}} * (1 - t)$$

The debt considered here is the total of short and long-term bank loans as disclosed in the financial statements. "t" is the tax rate; for all the years taken into our analysis the applicable corporate tax rate in Romania was 16%. The analysis does not include the structure of the debt by maturities.

Because of the obvious preference for a certain financing mix depending on the company size, the relationship between the variables selected was analyzed separately for each category.

Current ratio (or the working capital ratio) estimates whether a company is able to meet its short-term obligations, thus indicating its financial health; it is calculated by dividing the current assets by the current liabilities.

5. Findings

The econometric technique used for this analyst is Panel data regression. In statistics and econometrics, panel data or longitudinal data are multi-dimensional data involving measurements over time (Baltagi, 1995). By combining data in two dimensions, panel data gives more data variation, less collinearity, and more degrees of freedom. Applying the regression equation described below on the data panel in E-Views, we get the following result on which interpretations will be made:

Table 8. Regression results

Dependent Variable: DEBT_RATIO
Method: Panel Least Squares
Date: 10/23/21   Time: 19:58
Sample: 2008 2020
Periods included: 13
Cross-sections included: 757
Total panel (unbalanced) observations: 6233

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROA	-0.525859	0.021871	-24.04329	0.0000
ROE	0.000107	4.19E-05	2.567710	0.0103
KD	1.13E-05	8.92E-06	1.271703	0.2035
C	0.619593	0.003860	160.4965	0.0000

R-squared	0.085777	Mean dependent var		0.566295
Adjusted R-squared	0.085337	S.D. dependent var		0.260426
S.E. of regression	0.249066	Akaike info criterion		0.058443
Sum squared resid	386.4086	Schwarz criterion		0.062767
Log likelihood	-178.1371	Hannan-Quinn criter.		0.059941
F-statistic	194.8124	Durbin-Watson stat		0.211212
Prob(F-statistic)	0.000000			

Source: Trade Register Office, data processed by the authors in E-views.

Estimation model:

$$DEBT_{RATIO} = \alpha + \beta 1 * ROA + \beta 2 * ROE + \beta 3 * KD$$

DEBT_RATIO = -0.52585934755*ROA + 0.00010749435227*ROE + 1.13474166056e-05*KD + 0.619592549227

For example, if ROA increases by 100 bp (basic points), namely 1%, debt ratio decreases by 52 bp (0.52%) and if KD increases by 1%, debt ratio in turn increases by 1.13%. This shows a direct and positive link between debt ratio and ROE and cost of debt, respectively, a negative link between ROA and debt.

Prob: This probability is also known as the p-value or the marginal significance level (Beers, 2022). Given a p-value, you can tell at a glance if you reject or accept the hypothesis that the true coefficient is zero against a two-sided alternative that differs

from zero. For example, if you are performing the test at the 5% significance level, a *p*-value lower than 0.05 is taken as evidence to reject the null hypothesis of a zero coefficient. To assess the validity of the model, its prob value is analyzed for each of the variables that make up the model.

R-squared: R-Squared (R^2 or the coefficient of determination) is a statistical measure in a regression model that determines the proportion of variance in the dependent variable that can be explained by the independent variable. Thus, sometimes, a high r-squared can indicate the problems with the regression model. In our case, the value of R2 (0.08) indicates that only 8% of the variation of debt ratio is explained by the variation of ROA, ROE, and cost of debt.

Prob(F-Statistic): As per the above results, the probability is zero. This implies that, overall, the regression is meaningful.

6. Conclusions

For a company to exist and operate, both its daily business activities and the new investments need to be provided with funds, the two available sources being the company's own money (retained earnings, share capital) and the funds borrowed from third parties, such as banks and other financial institutions, trade creditors, etc. The financing decision, i.e., on maintaining an optimum capital structure to meet the company's financing needs, must consider the risks and the costs associated with raising funds, the cashflows generated by the operations of the business, the level of control (the lenders might impose some restrictions on the operations or on how the available cash is directed toward investment projects, dividend distributions, etc.).

Our study outlines that there is a direct and negative relationship between debt ratio and the return on assets, and this does not depend on the size of the company. Although this might be seen as intuitive, this relationship exists even in the case of the small business whose financing resources are not interest-bearing, suggesting that it is the changes in ROA that lead to the ones in the debt level: a higher profitability of the assets means more self-generated funds and lower needs for extra credit.

A direct relationship between ROE and debt ratio cannot be observed since the coefficients calculated were not consistent across the turnover ranges. Moreover, no link between the cost of debt and leverage could be observed, suggesting that the lenders do not take the level of debt into consideration when assessing the risk of providing funds to the companies in this trade area. Also, it could be that even when interest rates decrease, the demand for borrowing funds to invest in the business remains about the same.

For the small and micro-enterprises (with a turnover lower than 5 million euros), no significant correlation could be observed between the liquidity, cash conversion cycle, and the debt ratio levels. They are funded almost exclusively by the owners and even when the level of liquid assets increases and there is potentially more cash available, it is kept in the accounts instead of being reinvested; the managers in such companies (most of the time they are the owners, too) are less financially educated

and sophisticated, therefore they are less concerned with purchasing and implementing systems to assist in planning and process designing for better managing the components of company's liquidity.

The goal of any business is to maximize assets and minimize costs. In this regard, it is necessary to analyze the weight of each financing option (own funds or debts) in the share of total financing. Debt ratio is an important indicator in corporate financing, being seen as a measure of the degree to which a company finances its operations, this financing assuming debts to fully owned funds. In other words, the indicator measures the level of a company's debts in relation to the value of its net assets. In this paper, we analyzed how cost of debt, return on assets, the financial performance (return on equity), liquidity ratios, and cash conversion cycle relate or not to debt ratio for a sample of 758 Romanian companies in total over a thirteen-year period (some of them active on the market only for a short while), operating in wholesale trade of motor vehicle parts and accessories. None of them is publicly listed.

The overall conclusion is that more financial education is needed both for the potential investors in this sector and the existing ones so that they can make better use of the resources they have at hand and also know where to look up for more sophisticated instruments for funding their businesses. The graphic below (Figure 1) shows the evolution of capital structure for the total sample selected:

Figure 1. Capital structure (% in total assets) for NACE 4531
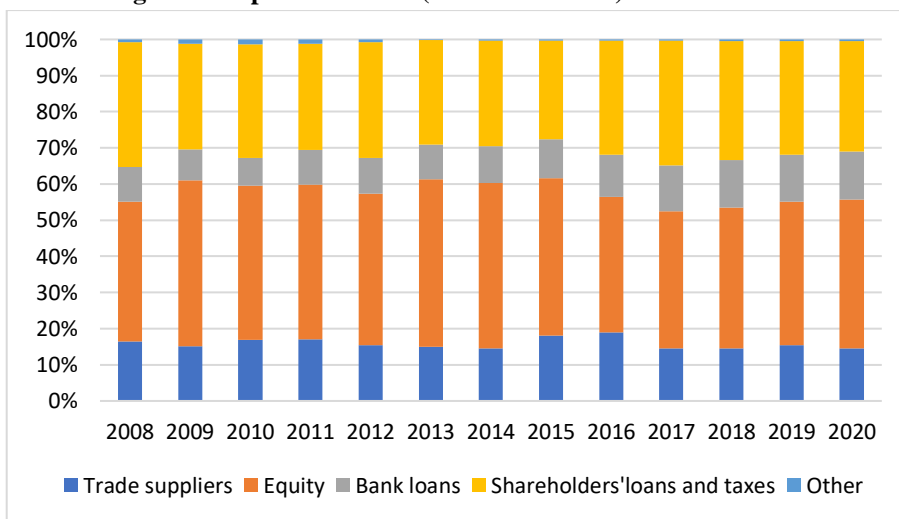
Source: Trade Register Office, data processed by the authors.

It demonstrates that there is a strong preference for the commercial credit over the bank debt, even in the years when the inflation is on a downward slope and interest rates decrease, too, as in this graphic, that discloses the evolution of these values in Romania over the period we studied.

By studying the validity of the model and the connection between the variables, a panel structure was used as an economic technique in the EViews software. Student

and Fisher tests indicate that the model used is valid because the probability of F-statistic analysed for the entire model, respectively, the probability of each t-statistic related to the variables that make up the model, are below the maximum accepted level of 5%, with a confidence level of 95%. An important indicator for the model is R2, also called the coefficient of determination. Its value indicates that 55% of the variation of the debt ratio is explained by the variation of ROA, ROE, and cost of debt. The value of the coefficients that make up the model indicates a direct and positive relationship between ROE, cost of debt, and debt ratio, respectively, a direct and negative one between ROA and debt ratio. In conclusion, the initial hypothesis is kept, the chosen model being a valid one, and the dependent variable debt ratio being influenced by the indirect variables that make up the model.

Future analysis should be considering stress scenarios when interest rate should increase, or dividend payment could increase also, because government policy that can approve very low tax on dividend payments.

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The Decision-Making an Approach Oriented on Financing the System of Pre-university Education

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Abstract

  Like all other public sectors, the financial investment in education must be well accounted for. Within the OECD countries, decentralizing education financing is becoming very common. As part of the decentralized system, the central government mandates sub-central governments and local schools to run an autonomous system that gives them the power to decide how to expend their budgetary allocation. This study looked at accountability for education financing in decentralized systems in the OECD and compared the results to what takes place in Romania by investigating the allocative efficiency of local authorities at the primary and secondary school levels. In order to determine the impact of this fiscal decentralization system, the researcher collected data from secondary sources to look at the effect of the practice on several educational outcomes, including policy effectiveness, efficiency, equity, and academic performance. Results are consistent with the fact that local authorities have shown competence in allocative efficiency in both the OECD countries and Romania, where fiscal decentralization is practiced, resulting in improved educational outcomes. The improved educational outcomes are similar in countries that focus the decentralized system on sub-central governments and those that focus on local schools.

Keywords: decentralized system, fiscal decentralization, education financing, sub-central government, allocative efficiency.

JEL Classification: H52, P44, P43, H61, I22, M48, H75.

1. Introduction

  The International Institute for Educational Planning under UNESCO and the International Commission on Financing Global Education Opportunity, also known as the Education Commission, are both committed to finding the most effective and efficient modalities of education financing that result in desirable outcomes,

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including improved student performance and equity in education access (Guerra, Lastra-Anadón, 2019). Among the modalities that these two bodies recommend is fiscal decentralization at the pre-tertiary levels. The fiscal decentralization system simply refers to education financing where the central government gives autonomy to sub-central governments (local authorities) and local schools to spend their education budgets (Purwanto, Pramusinto, 2018). It also includes mandates given to local authorities and schools to raise their funds.

The fiscal decentralization system is now globally acclaimed and has become a common practice among the Organization for Economic Cooperation and Development (OECD) countries. The fiscal decentralization system is also prevalent in the European Union, of which Romania is a member. With the continuing popularity of the system, it is essential to understand its holistic impact on educational outcomes. The need for such assessment is further highlighted by (Cordeiro Guerra, Lastra-Anadón, 2019), who expressed the view that there are several points of authority in every decentralized system. The different authority points make it difficult to ensure accountability in decentralized systems compared to centralized systems. This situation justifies why the researcher conducted this study to find evidence of the effects of fiscal decentralization on educational outcomes.

2. Problem Statement

In 2005, the Local Government and Public Service Reform Initiative (LGI) organized a forum in South-Eastern European on education financing as part of its Fiscal Decentralization Initiative (FDI) (Bischoff, 2009). The forum aimed to encourage member countries to adopt fiscal decentralization systems for education. Bischoff (2009) notes, however, that each country has decided its path of interest in terms of the "extent and how to decentralize management and financing of public education" (p. 2). As far as Romania is concerned (Camelia et al., 2014), admit that the country's educational policies point to decentralization. However, some feel that the nature of fiscal decentralization of pre-tertiary schools in Romania only constitutes a legacy of incomplete reforms (Bischoff, 2009; Camelia et al., 2014). One of the most effective ways to determine the validity of such a notion is to conduct comparative research that uses educational outcomes among the OECD countries practicing decentralized systems as a benchmark for outcomes of Romania.

3. Aim of the Research

The research aims to assess educational outcomes in countries that practice the fiscal decentralization system for primary and secondary schools. In doing this, the following research questions will be answered:
1. *What are the main decentralization options for funding preuniversity education?*
2. *What data do we have about the effects of decentralizing education financing on overall education spending in the preuniversity education?*

3. *What data do we have about the effects of decentralizing education financing on student learning outcomes? Is there a link between different types of financial decentralization in education and different educational outcomes?*
4. *What data is there on the implications of decentralized education financing on educational equity? What mechanisms exist to address inequality on a subnational level? What are the terms and conditions of the transfers?*
5. *What evidence do we have about the effects of decentralization of education financing on the technical efficiency of education spending?*
6. *What evidence is there of the consequences of education finance decentralization on the efficient distribution of resources at the subnational level? What subnational procedures are in place to boost budget allocation to education?*

4. Literature Review

Some existing studies relate to the phenomenon of study, which is education financing in decentralized systems. This section has reviewed some of the existing literature relating to research questions 2 to 6. These include literature on the effects of decentralizing education financing on educational outcomes such as expenditure, students' learning outcomes, policy effectiveness, equity, and efficiency. The literature review is based on the allocative efficiency theory.

4.1 Effects of Education Financing Decentralization on Education Expenditure

There are two leading schools of thought regarding the effect of education financing decentralization on the education expenditure of primary and secondary schools. The first school of thought holds that decentralization increases the expenditure on education financing (Purwanto, Pramusinto, 2018). (Arends, 2020) noted that, as much as decentralization might have its benefits, the core system of having different heads of schools managing their budgets means allocating more funds to schools within the same jurisdiction. This situation tends to increase the overall expenditure. (Cahyaningsih, Fitrady, 2019) found that in a centralized system, many expenses, including administrative costs, are not repetitive, as is the case with a decentralized system. This is because educational financiers, most of whom are the government, require a higher financial resource to implement the decentralized system effectively. Based on this assertion, more evidence will be collected to determine whether decentralization in education financing is less successful in lower-income economies.

The second school of thought argues that education financing decentralization forces the educational managers towards a path of efficiency, which automatically positively impacts expenditure planning (Androniceanu, Ristea, 2014). For example, quite (year) asserted that increasing efficiency is a core requirement in improving the decentralization outcomes. Meanwhile, the system's efficiency is not only limited to material resources but also to financial resources. Based on this, education managers are forced to be more efficient with their expenditure, especially when they

know there is competition for national budgetary allocation from other sectors. (Grigoli, 2014) used the case of lower-income economies to make a case for the positive impact of decentralization of education financing on expenditure efficiency. In his study, he found evidence of efficient spending in secondary schools in those lower-income economies, resulting in 36% in the overall enrollment of students.

4.2 Effects of Education Financing Decentralization on Students' Learning Outcomes

The allocative efficiency theory is commonly used to analyze the impact of education financing decentralization on primary and secondary schools. According to the theory, resources should be distributed by taking into account the preferences and needs of consumers (Vidoli, Fusco, 2018). Based on the allocative efficiency theory, most researchers have argued that education financing decentralization improves students' learning outcomes, since it becomes a modality for allocating resources to the most critical areas of academic needs (Letelier, Ormeño 2018). Already, it has been established that the decentralized system could mean education managers having to increase their efficiency in order to be able to maximize the use of their allocated funds. In doing so (Todea et al., 2011) indicated that they became mandated to focus on areas of the local population's needs representing the preferred outcomes of educational learning.

(Salinas, Solé-Ollé, 2018) also supported the claim that decentralization of education financing positively impacts students' learning outcomes. On the other hand, (Heredia-Ortiz, 2007) cautioned that decentralization of financing is not an automatic guarantee for improved outcomes. To maximize the concept of allocative efficiency for its profits, primary and secondary school heads should have the ability to predict cultural and learning needs based on changing trends. When the allocation is done only concerning the current learning needs of students, it will not be possible to make competition for the future (Letelier, Ormeño, 2018). The justification of this claim is that if the future learning needs of students are not met today, it will take more resources than could be available to do so in the future since the complexity of learning increases by the day.

4.3 Impact of Education Financing Decentralization on Policy Effectiveness

Based on the allocative efficiency theory, there are two leading positions in the literature on the impact of education financing decentralization on policy effectiveness. The first school of thought is the most dominant in the literature and argues for a positive effect on policy effectiveness. According to (Salinas, Solé-Ollé, 2018), fiscal decentralization means that educational managers always have fewer mandates under their authority. Based on this, they can give their authoritative allocation as much attention and focus as will ensure quality outcomes with educational policies. Meanwhile, (Dincă et al., 2021) elucidated that the core measure of policy effectiveness is the quality of its outcomes. Diaz-Serrano and

Rogriguez-Pose (2014) noted that decentralization gives citizens and local communities more excellent representation and voice to contribute meaningfully to decision-making and ask for accountability. By inference, fiscal decentralization positively impacts policy effectiveness through more substantial stakeholder involvement in policy implementation.

However, the second school of thought holds that adverse outcomes could be related to policy effectiveness. (Simão et al., n.d.) worried that education financing decentralization could mean different local authorities would have different curricular and quality standards. This situation can result in inconsistent educational outcomes and thus negatively impact the quality of outcomes. On their part, (Arends, 2020) cautioned that the tendency of local authorities not complying with national policy initiatives and standards is very high when they are financed locally. Given that the national policy initiatives are developed based on years of expert research, one would agree that non-compliance can have a negative impact on policy outcomes. Diaz-Serrano and Rogriguez-Pose (2014) also saw that it is common to experience elite capture, where better-developed parts of the countries will have better policy effectiveness than lesser-developed parts.

4.4 Impact of Decentralized Pre-tertiary Education Financing on Equity

There is strong evidence supporting the notion that education financing decentralization positively impacts equity. As used in this context, equity refers to allocating resources based on an area's unique circumstances and conditions (Felix, Trinidad, 2020). In this regard, the call for fiscal decentralization in education does not necessarily mean advocating the same amount of resources for every area. It instead means giving an area what is due based on its ability to harness those results. The idea of education can thus be seen to relate very closely to the allocative efficiency theory (Dincă et al., 2021). (Felix, Trinidad, 2020) held that the idea of fiscal decentralization is an automatic requirement for equity. The basis for this is that financial managers plan to allocate resources based on availability for each area. This way, allocation ensures that places that need fewer funds do not get more than they can efficiently use.

Based on evidence from Mexico, a member of the OECD, (Simão et al., n.d.) found that fiscal decentralization resulted in inequity in educational opportunities, especially for students from less developed communities. (Cahyaningsih, Fitrady, 2019) asserted that it is common for less developed communities to be marginally neglected in funding education in a centralized system. This is due to the problem of elite capture. However, this decentralized system based on allocative efficiency theory defeats this tendency. It promotes scenarios where less developed communities can get higher financial allocation based on their unique educational needs. By inference, decentralization of education financing can promote equity by bridging the gap between developed and less developed areas, as already developed communities will not continue to receive more funding than they require.

4.5 Impact of Education Financing Decentralization on Efficiency

Regarding education financing, efficiency is discussed in terms of using fewer resources to achieve more significant outcomes (Kovalainen, 2021). In this sense, the impact of decentralization on efficiency is widely divided in the literature. (Todea et al., 2011) believed that decentralization leads to efficiency based on the core principle of allocating just how much an area needs. By inference, there is a closer link between efficiency and equity. That is, the fact that resources are allocated based on the unique needs of an area means that there is an assurance that they will be used to achieve those needs efficiently. This particular line of argument is justified by noting that some local governments have had more financial resources than needed in some centralized systems, leading to waste (Păunică et al., 2021).

(Simão et al., n.d.), on the other hand, asserted that education financing decentralization could harm efficiency by reducing the economies of scale. That is, decentralization means more individual or isolated units of localities to fund. Under such circumstances, achieving economies of scale by producing more units of service on a larger scale with fewer inputs becomes a defeat. This is because individual units would mean the possibility of producing on a larger scale will become nonexistent (Kovalainen, 2021). (Bîtcă et al., 2020) supported this claim by emphasizing that educational management involves much outsourcing of materials, most of which save the central government much money for the mere fact that they will be purchased on a larger scale. This situation cannot be effectively achieved in a decentralized system.

5. Research Methods

The study was conducted as a comparative analysis that used both quantitative and qualitative methods to compare the effect and impact of fiscal decentralization of pre-tertiary education on educational outcomes. The study was set in the OECD countries and Romania. This means that all data collected were from those countries. However, it must be emphasized that the researcher used a secondary data collection method. The researcher did not collect first-hand data from respondents as primary data. The need to use secondary data was justified by the amount of data required from the OECD countries and Romania. Conducting primary research would have involved participants from all those countries, which would have been difficult to achieve. The secondary data ensured that the researcher could use credible sources from different geographic locations without the need to be physically present in those places (Vaismoradi et al., 2016).

(Braun, Clarke, 2014) cautioned that secondary research could have limitations with the quality of results if the sources used are not credible, reliable, and current. Since the credibility of the sources used in the study was necessary, the researcher conducted a search strategy that helped in selecting the best available sources for the study. To achieve this, the researcher used the national educational databases of the selected countries. Most of the databases were available online and presented in the

form of Education Acts. The national constitutions of the countries were also considered appropriate.

The researcher searched online from the Education Resources Information Center (ERIC) database for academic articles with sufficient information to answer the research questions. It is essential to mention that it was not all OECD countries that the researcher found robust data on education financing at the pre-tertiary level. For this reason, the results of the study are limited only to countries with enough data to ensure a comparison. The results of the selected sources were extracted using the content analysis method. These results have been presented and analyzed as findings of the study.

6. Findings

6.1 Quantitative Results on Modalities of Decentralization in Financing Pre-tertiary Schools

The variable of modalities of decentralization in financing pre-tertiary schools simply focuses on the approaches that individual countries use in fiscal decentralization implementation. Available quantitative results on the modalities for the OECD and Romania can be categorized into the distribution of authoritative competencies (actors making decisions on expenditure) and financial sources. The table below shows four levels of government and four competencies and responsibilities to describe the distribution of authoritative competencies in the selected countries.

Table 1. Distribution of authoritative competences

Level of government	Setting quality standards	Building of schools	Purchasing school equipment	School facility inspection
Central government	15	0	0	10
Sub-central government	4	16	11	8
Schools	0	2	8	0
Shared responsibility	3	6	5	5
Missing information	2	0	0	1

Source: Simão, Millenaar and Iñigo (2019) and authors.

In Table 1, the shaded parts show where Romania belongs. From the table, it would be noted that the modality for decentralization in most countries is to have the sub-central government take responsibility for spending. However, the responsibility of setting quality standards is done by the central government in most countries. This shows that the modality of decentralization is that the central government is the initiator, while the sub-central governments are the implementers.

In terms of funding sources, the focus of the data analysis was on the distribution of expenditures at the primary and secondary school levels by the central government, sub-central, and schools. Table 2 contains data on the percentage of expenditure financed by various levels of government.

Table 2. Percentages of expenditure financing

Country	Central government	School resources	Transfer to sub-central
Chile	57%	38%	5%
Columbia	85%	0%	15%
Norway	8%	1%	91%
Mexico	29%	50%	22%
Spain	14%	0%	85%
Belgium	24%	-1%	77%
Brazil	10%	7%	82%
Denmark	12%	-7%	94%
Japan	2%	15%	84%
Switzerland	NA	3%	96%
United States	1%	11%	89%
Poland	4%	1%	95%
Finland	11%	31%	59%
France	70%	0%	30%
Hungary	30%	34%	36%
Ireland	84%	15%	1%
Italy	82%	1%	18%
Luxemburg	84%	5%	11%
Austria	40%	37%	23%
Romania	35%	5%	60%

Source: https://stats.oecd.org/.

Table 2 shows that even though decentralization is widespread in selected countries, the central government still plays a significant role in financing the expenditure of primary and secondary schools. This notwithstanding, half of the countries, including Romania, have sub-central governments funding more significant parts of school expenditure.

6.2 Qualitative Results on the Impact of Fiscal Decentralization on Policy Effectiveness

Data was selected from the OECD countries (only those with fiscal decentralization) and Romania relating to specific measures of policy effectiveness. Based on the study by (Simão et al., n.d.), the measures of policy effectiveness are students' performance and teacher management. In terms of students' performance, the measure for policy effectiveness is the program for international student assessment (PISA). The results from (Simão et al., n.d.) "show a positive association with PISA country average results significant at 0.6%" (p. 130). This result implies that the use of a decentralized financing system helps schools effectively implement

educational policies to improve student performance (Letelier, Ormeño, 2018). Regarding teacher management, the measures used were autonomy to recruit teachers, selection of textbooks, and in-service teacher training programs.

Teacher management results showed a "positive association obtained for decentralization of teacher management" (Simão et al., n.d., 2019, p. 134). Among the three measures of teacher management, it was found that the highest level of effectiveness was on the design of in-service training for teachers, while the least was in terms of the selection of textbooks. This result confirms that decentralization gives local authorities the opportunity to prioritize teacher development to align with their unique needs (Leider et al., 2021). Specific to Romania, (Androniceanu, Ristea, 2014) found that decentralization of financing for primary and secondary schools accounts for high teacher motivation, which translates into their output of work as measured by students' performance. By inference, the results for the OECD in terms of the impact of decentralization on educational policy effectiveness are consistent with what exists in Romania.

6.3 Impact of Different Patterns of Fiscal Decentralization on Educational Outcomes

Earlier, results had been gathered on the modalities of decentralization used in the selected countries. This resulted in different patterns of fiscal decentralization among the selected countries. As far as countries with decentralized systems are concerned, the two patterns identified are those whose financing is dominated by sub-central government and those dominated by the schools. (Simão et al., n.d, 2019) developed a decentralization index for educational outcomes whereby a score of 0 meant no decentralization and 3.6 meant maximum decentralization.

Data from the studied articles shows that the mean score for decentralization dominated by the sub-government and those dominated by the schools are the same. This infers that the average outcomes for different educational attainments are identical as some form of decentralization is practiced. However, there are some differences in terms of the minimum scores. Those whose decentralization practices are dominated by schools have lower minimum scores than those dominated by sub-government. This could suggest that, as much as overall educational outcomes could be the same, those dominated by schools may have lower scores in specific assessment areas. This claim is supported by results from (Păunică et al., 2021), who found that schools that use their resources in financing primary and secondary education have infrastructural challenges in Romania. These infrastructural challenges sometimes have a negative impact on schools in terms of maximizing enrollment and attracting experienced teachers.

6.4 Qualitative Results on the Impact of Education Financing Decentralization on Efficiency

The final section of the chapter was used to analyze the impact of education financing decentralization on efficiency. The literature review found that the

allocative efficiency theory was the main principle, justifying decentralization's positive impact on efficiency. Based on this, (Simão et al., n.d.) (2019) measured how local education managers can make superior allocative decisions and exercise allocative autonomy within the OECD countries. These results have been used to interpret the measure of decentralization on efficiency based on the theoretical relationship between allocative decisions and efficiency. Two main patterns of results were obtained. The first confirms that countries with higher scores on allocative decisions and allocative autonomy had higher efficiency with budgetary allocation.

The second line of the result was that in "both models that look at the allocative autonomy of sub-central governments and that of schools, the inclusion of the allocative autonomy variable alone (does not affect the results of regressions considerably without them" (p. 137). This infers that, while decentralization is an essential determinant of efficiency, the type of decentralization that is practiced does not influence outcomes with efficiency. Based on this result (Simão et al., n.d.) (2019) found that "some decisions in different spheres tend to be decentralized together, possibly as a strategy to promote more efficient workflows" (p. 135). These results from the OECD are not different from what (Bîtcă et al., 2020) found in Romania. It was evident that all schools in which decentralization exhibited competence with resource allocation to meet the needs of individual localities efficiently.

7. Conclusions

The research aimed to assess educational outcomes from countries that practice the fiscal decentralization system for primary and secondary schools. OECD countries and Romania were used as settings for the study, whereby secondary sources from those countries were analyzed. The study was guided by six major research questions that focused on various dimensions of quality education policies. Both the literature reviews and secondary sources addressed the six research questions. Based on results relating to the research questions, it can generally be concluded that fiscal decentralization at the pre-tertiary level positively impacts educational outcomes. In different countries, different modalities of education financing decentralization systems are used. The two commons are decentralized systems dominated by sub-central governments and those dominated by local schools. The conclusion is supportive for all these types of modalities, as no significant difference was found in terms of the outcomes of educational effectiveness and efficiency. Romania has openly adopted the decentralized system of financing its primary and secondary schools as a country. The results obtained for the OECD countries are closely related to those of Romania. Based on this, it would be concluded that decentralized financing of pre-tertiary education in Romania does not fit the description of a legacy of incomplete reform. While the system may have shortcomings, it has earned good outcomes that make it fit into a description of successful reform.

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Stock Prices, Attention, and Google Searches

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Abstract

With the increasing availability of data and the expanded use of digital trading platforms, the behaviour of individual investors actively involved in trading has a greater impact on stock returns on capital markets. Traditional models assume that investors are perfectly rational economic agents, but, as prior research has shown, this constraint is not fully honoured in the actual world most of the time. Our paper investigates the dynamics of the relationship of investors' attention and its impact on the stock market for an institutional investor-dominated stock exchange. The research was centred on the FTSE 100 Index of London Stock Exchange (LSE), and we constructed an investor's attention indicator based on the Google Search Index, which measures in real-time the information with whom individuals come into contact daily. We introduced the indicator in the Fama and French 3-factor model. To explore the association between investors' cognitive limitations and stock prices, we used weekly data for five years, from the beginning of 2015 to the end of 2019. We then used multiple and panel regression to categorise quintile portfolios according to market capitalization levels. Despite the minimal presence of private investors on the LSE, our findings show that there is a positive correlation between the volume of Google searches and stock prices. Furthermore, there is a positive effect of attention on the portfolio of companies with the smallest market capitalization. Our findings have implications for investment approaches and, specifically, for active portfolio management strategies.

Keywords: Google Searches, Investor's attention, Panel regression, Stock returns, FTSE 100.

JEL Classification: G12, G41.

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1. Introduction

Especially in an environment where the use of digital trading platforms has become a widely employed method of trading, and the European average of the population with Internet access is 90 percent (Eurostat, 2020), individual investors enjoy searching online for information about the companies they are interested in investing. As a result, the frequency with which a specific asset is searched may be a direct reflection of the amount of attention that investors pay to that asset, in general. Given the availability of Google Trends (GT), a free public online service provided by Google that offers data on the number of searches for a specific topic, it is possible to use it to gauge investor interest in a particular topic.

Da et al. (2011) were the first to propose using the volume of Google searches as a proxy for investor attention. Following this, Joseph et al. (2011), Bank et al. (2011), Vlastakis, Markellos (2012), Takeda, Wakao (2014), and Ekinci, Bulut (2021) demonstrated that search volume is positively correlated with returns.

Our paper addresses the Barber and Oden's theory of attention, but for companies in the FTSE 100 index for which no research has been conducted thus far using Google searches volume as a direct measurement of investor's attention. The choice of this index was motivated by the fact that its constituents account for 80% of the capitalization of the London Stock Exchange. Furthermore, according to Barton (2021), 33 percent of the English population owns shares, and more than 21 percent want to invest in the future, making the FTSE 100 the recommended subjects for this research. Our research conducted on 125 companies during a period of five years shows that the volume of Google searches is significant and can be associated with a positive change in returns, which confirms the hypothesis on which it was built and confirms the results of the other works mentioned above. Three variables based on data downloaded from Google Trends were used to measure investor attention and introduced in both multivariate regression as well as in panel data regression.

Regarding the structure of the paper, it consists of four sections and a conclusion. Firstly, we reviewed the most significant research in the field, we propose our research questions considering the literature gap identified. In addition, we stated the premise on which we have constructed our study. The fourth part introduces the methodology used, and the next chapter presents our result and discussions.

2. Problem Statement

Merton (1987) develops an equilibrium model for a market with inattentive investors and introduces the theory of asset recognition. He notes that familiarity with the issuing company is a pre-requisite for acquiring or collecting additional information about a particular asset. As a result, the theory of asset recognition or visibility is developed. An entire branch of literature has developed around Merton's (1987) model and theories of constrained rationality. Thus, we can distinguish, according to the variable used to measure investor attention, two categories: (i) indirect / proxy which can be expressed by extreme values of returns / trading volume (Gervais et al., 2001; Hou et al., 2008), media coverage (Huberman, Regev,

2001; Fehle et al., 2005; Barber, Odean, 2008; Fang, Peress, 2009; Kim, Meschke, 2011), advertising spending (Grullon et al., 2004; Lou, 2014), upper price limit events (Seasholes, Wu, 2007), other types of online searches (Antweriler, Frank, 2004; Moat et al., 2013) and (ii) directly through the volume of Internet searches (Da et al., 2011; Bank et al., 2011; Vlastakis, Markellos, 2012; Takeda, Wakao, 2014; Tang, Zhu, 2017; Ying et al., 2015; Bijl et al., 2016; Tang, Zhu, 2017; Weng et al., 2018; Hu et al., 2018; Nguyen, Schinckus, Nguyen, 2019; Salisu et al., 2019; Ekinci, Bulut, 2021). We noticed that most of the revised papers were studies conducted for the American or Asian capital markets, where the presence of individual investors is higher. As a result, we found a gap in the literature regarding the UK capital market, which is addressed in this paper. This research examines the importance of the attention factor in asset valuation in developed markets with a high presence of investors, confirming the theory of attention of Braber and Odean's (2008).

3. Research Questions / Aims of the Research

In conjunction with previous research, the purpose of this study is to examine and reconfirm the existence of a relationship between investor attention and capital market asset returns. The primary factor investigated is the effect of individual investors' attention on price movements. This element derives from the following research questions: is there any relationship to be confirmed between attention and returns even in a capital market with multiple institutional investors, are there any differences in the relationship between attention and returns when companies are sorted by market capitalization, and what is the correlation a low or high volume of searches and returns? Our research aim is obtained by quantifying investor's attention using three variables derived from data downloaded from Google Trends.

4. Research Methods

4.1 Data Selection

We constructed the attention index using Google Search Volume data from the Google Trends site. This open source is a Google Inc.-operated website that was launched in 2006 and provides access to the Google Search Volume (GSV/SVI) for a particular term. This data is available across multiple regions / countries, categories, and the type of search / category of object you are looking for (images, news, YouTube), and its frequency varies depending on the time period selected (weekly data for long periods, hourly data for short periods). The critical aspect of this data is that the values are not provided in their absolute form, but rather in a relative, normalized form. Each keyword produces a time series containing an entry for a particular frequency. The data used in our research are at the national level (i.e., Great Britain), as Da et al. (2011) argue that country-level data are more significant than global data. We have considered in our GSV data retrieval process the following premise: In 2016, Google Trends has made improvements to its database, as well as

the way in which keyword information is made available. Consequently, when you enter a term in the search field, its feature appears, which may be one of the following: "search term" - which includes all searches for that topic, "topic" – which includes searches related to that topic, and "company" – which includes searches for the keyword as a company.

For the market data, the sample included the closing prices and trading volume of the companies that comprise the FTSE 100 Index for a five-year period, from 2015 to 2020, as obtained from the Bloomberg platform. This sample encompasses all 125 companies that have been included in the FTSE 100 Index during the review period. We chose this method to avoid survivorship bias and the potential impact of adding or removing companies, given the index's composition is adjusted quarterly (as opposed to the S&P 500, Dow Jones, or Nikkei 250).

4.2 Variables

We define the independent variable, Google search volume, in three ways, following Takeda and Wakao's methodology (2014) (Table 1). We use the methodology proposed by Da et al. (2011), Tang and Zhu (2017) to construct the index of abnormal investor attention, as the relationship between the value of SVI and returns may not accurately reflect the true effect of investor attention on market returns, as the level of SVI is relative. In this sense, an abnormal search index, called ASVI has been developed.

Table 1. Google Searches Index Variables

Name of variable	Equation
Simple Search Volume Index	$SVI_{t-j} = lnSVI_{t-j}$
Delta Search Volume Index	$\Delta SVI_{t-j} = lnSVI_{t-j} - lnSVI_{t-j-1}$
Abnormal Search Volume Index	$ASVI_{i,t-j} = lnSVI_{i,t-1} - ln[Med(SVI_{i,t-1}, \ldots, SVI_{i,t-7})]$

Source: Authors' work.

We sorted the portfolios into quantiles based on their market capitalization level. Thus, portfolio 1 (P1) will contain the companies with the smallest market capitalization, while portfolio 4 (P4) will contain the largest. Portfolios are composed of equally weighted. Then, we integrated our variables in the Fama and French (Fama, French, 1993) three-factor model (Equation 1).

$$R_{Pk,t} - R_{f,t} = \alpha_k + \beta_{1k}X_t + \beta_{2k}(R_{M,t} - R_{f,t}) + \beta_{3k}SMBt + \beta_{3k}HML_t + \varepsilon_{k,t} \qquad (1)$$

The second part of the analysis rebuilds four portfolios in which the assets are sorted into four quantiles according to the search volume defined in Table 1, with portfolio k = 1 having the fewest searches and portfolio k = 4 having the most. Each portfolio's assets are equally weighted. If β_{1k} is significant for portfolios with a higher search volume (i.e., the Fama and French 3 factors do not fully explain the change in returns), this leads to the conclusion that returns and search volume are correlated. Further, we regressed a simple FF3 model upon the above-mentioned portfolios, in

which α_k will be the abnormal search volume return as proposed by Joseph et al. (2011), Bank et al. (2011), Takeda, Wakao (2014), and Ekinci, Bulut (2021).

Due to the multidimensionality of the data (companies, years), we proposed to use a multifactorial panel data regression integrating only theabnornal volume of searches, which is similar to the methodology used by Bank et al. (2011), Takeda and Wakao (2014), Vlastakis, Markellos (2012), Ekinci, Bulut (2013), among others (2021) (Equation 2).

$$R_{Qk,t} - R_{f,t} = \alpha_k + \beta_{1k}ASVI_t + \beta_{2k}(R_{M,t} - R_{f,t}) + \beta_{3k}SMB_t + \beta_{4k}HML_t + \varepsilon_{k,t} \qquad (2)$$

5. Findings

5.1 Portfolios by Market Capitalization

The results for portfolios based on market capitalization show a positive and significant relationship between the volume of Google searches a week in advance (i.e., with lag j equal to 1) for portfolios that include small market capitalization companies (P1, P2) (Da et al., 2011; Takeda, Wakao, 2014; Ekinci, Bulut, 2021). The link between search volume and portfolio 3 returns is weak. This may be related to the search results. In particular, negative news can cause investors to sell their shares. Thus, the volume of searches has a significant effect on companies with low market capitalization, confirming Barber and Odean's price pressure hypothesis (2008). When the weekly search volume is compared to the weekly returns, it is observed that the relationship is positive for portfolios with low market capitalization (P1, P2) as well as portfolios with the highest capitalization. On the other hand, the relationship between Google searches and portfolio 3 (P3) returns is insignificant in this case as well, which may be due to the low level of recognition of its member companies. Additionally, for time t+1, three of the four portfolios' dynamics of the relationship between search volume and returns is positive. Thus, it is demonstrated that there is a positive correlation between the increase in yields and the subsequent week's searches.

The results varied depending on the form of the independent variable used. The results for the logarithmic search volume (SVI) and the abnormal search volume index (ASVI) are similar. Contrarily, the search volume delta shows no correlation with the excess returns on portfolios sorted by market cap at time t-j. Overall, the results for each type of search volume show a positive correlation with returns for portfolios with small market capitalization companies.

5.2 Portfolios by Search Volume

When portfolios were grouped according to search volume, the results confirmed that an increase in search volume is associated with an increase in the returns on those investments (Table 2). Increased volume would result in lower returns for all time periods (t-j, t, and t + j) for the first portfolio (P1), which contains the companies with the lowest level of searches; however, the p-value indicates that

the variable SVI is not statistically significant for this portfolio. The second portfolio (P2) exhibits an increase in coefficients as the temporal characteristic of the previous portfolio's search volume increases (P1).

Table 2. Abnormal Returns

		t-j	t	t+j
SVI				
P1	αk	-0.0001	-0.0011	0.0023
	p-value	0.0865***	0.1461	0.9821
P2	αk	0.0006	-0.0005	0.0008
	p-value	0.0571***	0.5075	0.4571
P3	αk	0.0041	-0.000	0.0084
	p-value	0.0967***	0.0266**	0.0933***
P4	αk	0.0008	0.0001	0.0010
	p-value	0.0436**	0.0870***	0.0348**
ΔSVI				
P1	αk	0.0003	-0.0005	0.0005
	p-value	0.7284	0.533	0.5385
P2	αk	-0.0003	-0.0011	0.0087
	p-value	0.7245	0.2012	0.9372
P3	αk	0.0001	0.0009	0.0002
	p-value	0.0305**	0.0248**	0.0407**
P4	αk	0.0012	0.0032	0.0011
	p-value	0.0216**	0.0296**	0.0240**
ASVI				
P1	αk	-0.0001	-0.0011	0.0023
	p-value	0.0865***	0.1461	0.9821
P2	αk	0.0006	-0.0005	0.0008
	p-value	0.0571***	0.5075	0.4571
P3	αk	0.0041	-0.000	0.0084
	p-value	0.0967***	0.0266**	0.0933***
P4	αk	0.0008	0.0001	0.0010
	p-value	0.0436**	0.0870***	0.0348**

Note: * The null hypothesis is rejected at 1%; ** The null hypothesis is rejected at 5%.

Source: Authors' work.

The results indicate that increasing the number of searches a week in advance has a significant effect on the returns for that week, as predicted. Therefore, an increase in returns is positively correlated with an increase in search volume. Similar situations are identified and analysed for portfolios with the highest search volume. For time t, the results indicate that the assets in portfolio two will experience the highest abnormal returns associated with searches. The value of the coefficient increases from portfolio two to three, but this increase is not sustained, as the portfolio with the highest search volume has the lowest level of abnormal returns. Additionally, a decreasing trend in abnormal returns associated with search volume can be observed for time t + j. It is critical to note that the results indicate that the portfolio comprised of companies with the highest search volume has the lowest returns, which contradicts Takeda and Wakao's findings (2014). According to Ekinci and Bulut (2021), because the relationship between returns and search volume is contemporaneous, we cannot conclusively determine whether the abnormal results reflect a high level of public interest visible in Google searches or whether the high returns attract attention, causing people to search.

The final section of the analysis, which involved applying a regression to panel data, confirmed the previous findings in large part (Appendix 1). Specifically, the regression coefficient of the search volume is positive and significant for time t, indicating that a change in Google searches during the current week is associated with an increase in returns during the same period. For time t-j, the search volume is also a significant predictor of returns, with a positive relationship between them (similar results were obtained by Takeda and Wakao, 2014). On the other hand, it is observed that the search volume is associated with a decrease in returns at time t + j, but this relationship is not statistically significant. It is worth noting that in regression on panel data at time t + 1, the search volume coefficient is negative and statistically insignificant, whereas the remaining variables are positive and significant. This result is comparable to that of Bijl et al. (2016). This finding may imply that an increase in returns is associated with a decline in search volume in the coming week.

6. Conclusions

The results confirm that the impact of individual investors' attention on capital market prices must not be neglected, even if more than 50% of the market is occupied by institutional investors. First, despite the low presence of individual investors in the English stock market, the results show a significant positive relationship between investor attention and returns. According to the findings in the literature, small-cap companies will benefit from investor attention more than large-cap companies. Second, the finding of a positive relationship between prices and searches in the absence of individual investors calls into question the theory of attention's applicability. Barber and Odean (2008) hypothesize that institutional investors are rational agents who select assets differently than individual investors. Specifically, retail investors will buy assets that catch their eye, whereas institutional investors will buy assets based on fundamental value. Individual investors' anomalies, reflected in my research by abnormal returns, should be offset by institutional

investors' actions. The FTSE 100's assets' visibility may be an answer to this situation. It is possible that many of the included companies are well-known, resulting in large returns. This can be considered for future studies that analyse all companies listed on the London Stock Exchange to confirm or deny the results. If this is not the case, the subject opens the door for further research into the asset's ownership structure. However, the frequency of the data depends on the time period selected. For periods longer than five years, only monthly data are available. This limited the length of the data used and its frequency. Thus, the present study's limitations allow for future research, improvement of data processing methods, and revision of model variables. However, data availability constraints are unavoidable.

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Appendix

Appendix 1. Panel data regression results

Variable	Coef.	Std. Error	t-Statistic	p-value
At time t-j				
ASVI	0.0295	0.0159	1.8542	0.0237**
MKT_RF	0.0055	0.0003	15.6322	0*
SMB	0.0022	0.0002	8.2312	0*
HML	0.0009	0.0002	3.8064	0.0001*
C	0.0001	0.0003	0.4097	0.682
At time t-j				
ASVI	0.0769	0.0151	5.0772	0*
MKT_RF	0.0014	0.0003	3.9337	0.0001*
SMB	0.0025	0.0006	4.0194	0.0001*
HML	0.0008	0.0005	1.5096	0.1312
C	0.0007	0.0007	1.0180	0.3087
At time t-j				
ASVI	-0.0120	0.0159	-0.7544	0.4506
MKT_RF	0.0055	0.0003	15.7199	0*
SMB	0.0022	0.0002	8.2222	0*
HML	0.0000	0.0002	3.6556	0.0003*
C	1.28E-05	0.0003	0.0407	0.9675

Source: Authors' work.

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The Paradox of Taxation: Capital or Labor Force?
Empirical Evidence for the European Union Countries

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Abstract

The COVID-19 crisis that started as a healthcare system crisis, rapidly emerged as a financial crisis. In the European economy, classified as an open economy where production factors can freely move, the mix of fiscal, budgetary, and monetary policies faces even more challenging times in response to the new status quo. Fiscal policy is one of the first mechanisms that a state will use to intervene in the economy to correct for a possible disequilibrium. Nevertheless, the fiscal policies of the member states are not entirely harmonized: thus, different countries will use different approaches in similar situations, creating even more significant disparities between countries. Our paper investigates whether there is a shift between taxing capital and taxing labor force – both seen as production factors – in the European Union member states' fiscal policies, particularly in difficult periods. The data was collected from the Eurostat database and referred to all European member states for 2007-2021, covering the latest crises: financial (2007-2008) and pandemic (2020-2021). By employing a cluster analysis accompanied by a paradox of rationality, the investigation will accentuate that nowadays, more than ever, fiscal policies at the European level are imbalanced and uncoordinated, encouraging the development gap among economies. Our research emphasizes the need for closer coordination of direct taxation at the European level to stimulate the convergence of fiscal policies. Both academics and policymakers may use our results in their future analytical studies or decision-making processes related to the blending of taxing capital and labor force.

Keywords: European fiscal policies, capital taxation, labor taxes, COVID-19 crisis, financial crisis.

JEL Classification: E62, H21, H87.

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1. Introduction

In a borderless world governed by the mobility of factors of production, especially capital and labor force, and characterized by the existence of common markets, fiscal policy is emerging as a critical component of economic reform with a profound impact on future developments of the economy.

Fiscal competition is not a new concept, but the tax competition issue is a noteworthy topic because, in worldwide economies, there is a tendency to understand, as accurately as possible, the positive or negative effects of this phenomenon. For the European Union (EU-27), seen as a conglomerate of states and an exponent of economic globalization, the fiscal policy strongly influences the multiple economic processes that occur within each member state. The coordination processes in the taxation field at the European level (which is intended to be a "federal type of state") are complex actions with multiple ramifications, and it is practically difficult, if not impossible, to harmonize and coordinate 27 different fiscal policies, coming from as many countries with different degrees of development, more or less willing to give up national practices. Furthermore, the EU-27 is known as a high-tax burden economic environment compared with other advanced economies. Thus, taxes and compulsory actual social contributions in the 27 Member States of the EU-27 accounted for 40.1% of the gross domestic product (GDP) in 2019 (European Commission, 2021). Hence, the tax burden (measured as total tax revenues and social security contributions received as a percentage of GDP) was in EU-27 6.3 percentage points (pp) above the OECD average and more than 15 pp above the US tax burden.

An efficient taxation system should adapt to the different stages of the economic cycle, such as expansion, peak, contraction, and trough. That is why taxation systems are complex mechanisms, and their implementation requires an outstanding knowledge of their composing elements and network interconnections. When discussing the complexity of the fiscal policy, we need to focus on tax rates and tax bases, and thus on the tax burden. Furthermore, we must assess the tax burden distribution on different tax bases – i.e., labor, capital, and consumption.

2. Problem Statement

According to the Maastricht Treaty (1993), the free movement of labor and capital are two of the EU single market's four fundamental freedoms (free movement of goods, persons, services, and capital). While divergences are innevitable, fiscal differences among the Member States can alter the free movement of the above mentioned (Delgado and Presno, 2011). In any given scenario, the foundation of the fiscal policy is the tax rate, and this "seemingly insignificat" element holds in its power the world wide web of taxation and has been analyzed over the years on numerous occasions and contexts. Therefore, the tax rate is employed as a variable in macroeconomic analysis using different approaches: as a statutory tax rate, whether as a flat or marginal tax rate (Popescu et al., 2019; European Commission,

2021; Ernst & Young, 2022); as an implicit tax rate (European Commission, 2021) or as effective tax rates (European Commission, 2021; Lazăr, Filip, 2011).

The statutory tax rate is the rate imposed by legislation on a taxable basis. On the contrary, the implicit tax rate measures the actual or effective average burden directly or indirectly levied on different tax bases or activities that could potentially be taxed (European Commission, 2021). While some authors suggest employing in the analysis an aggregated tax rate (Devereux et al., 2002; De Mooij, Nicodème, 2008), others argue in favor of tax rates specific to tax basis, whether incomes/profits or activities (Mendoza et al., 1994).

Labor force mobility in the EU-27 has been affected by the financial crisis due to the contraction of businesses and by the COVID-19 crisis due to mobility restrictions. After a peak in 2007, during 2009 -2010, mobility flows fell by 41% compared to 2007 and 2008 (Barslund, Busse, 2014) and came to a halt during the pandemic (European Commission, 2022). Capital mobility has been increasing since the Maastricht Treaty was signed, and the flows are running from advanced economies toward emerging economies (Camarero et al., 2021). Furthermore, the financial crisis has affected the latter, where capital mobility has decreased. The COVID-19 crisis has triggered major disruptions in capital flows with a rapid shock that spread to the global economy (OECD, 2020). As it is more mobile than labor, a question has often arisen for capital taxation: is there a race to the bottom related to tax rates applied in determining the tax burden? According to Plümper et al. (2009), tax competition tends to cause a decrease in taxes on capital and increase tax rates relative to labor. The scholars explained that there is no race to the bottom in capital taxation, since governments will not abolish taxes levied upon them. Recent research (Sokolovskyi, 2021; Razin, Sadka, 2011) shows that a country might apply higher tax rates under tax competition than tax coordination when faced with an upward flux of labor and capital. Thus, economies might find themselves in a seesaw situation rather than in a tax-competitive one.

The cluster analysis is a statistical method that organizes a set of objects so that objects in the same group are more similar to each other than those in other groups. This type of analysis is similar in concept to discriminant analysis (Sinharay, 2010). By employing a cluster analysis at the European level, Mihokova et al. (2016) have shown that, despite ongoing integration within the EU, differences between member countries persist and are visible in the statutory and effective tax rates, especially between older and newer EU members.

The difference in taxation policy, in the limit set by the European framework, was investigated over the time. As examples, Kočenda et al. (2008) found that a significant level of heterogeneity exists in fiscal convergence, while Esteve et al. (2000) reported convergence in fiscal pressure during the 1979-1994 period, while important divergence was found for the years 1967-1979.

In this context, we conducted our analysis by scrutinizing the member states' taxation systems using the following variables:
  i.   statutory tax rates for labor force (%L) and capital (%K);
  ii. implicit tax rates for labor force (ITR L) and capital (ITR K);

iii. the connected tax burden (%L/GDP and %K/GDP) as tax revenues collected to GDP.

Our research looks at the shift between taxing labor and capital, seen as production factors, by employing a cluster analysis in the European Union, and focuses on the similarities and differences between member states when facing challenging times.

3. Research Questions

As mentioned above, fiscal policy is likely to be the first intervention tool used to regulate the economy. Therefore, policymakers will use taxation and its elements to boost investments, production, and employment. This leads to tax competition among counties, even if the EU has established that fiscal convergence is its long-term objective. In our analysis, we will focus on direct taxes settled for labor and capital because when it comes to indirect taxation, the European legislation is already coordinated for most of the related taxes.

We will conduct our research by employing a cluster analysis, approaches used to classify the member states into emerging and advanced economies, and our research questions support this procedure.

The research hypotheses are as follows.

H_1: Is there a shift between taxing the labor force and capital in emerging economies from the EU-27?

H_2: Is there a shift between taxing the labor force and capital in advanced economies from the EU-27?

We expect to find conclusive evidence to support that capital, seen as a production factor, is the "golden item" of the European taxation systems regardless of the cluster. Furthermore, we aim to highlight the switch in fiscal policies during both the financial crisis (2007-2008) and the COVID-19 crisis (2020-2021).

4. Research Methods

To test our hypothesis, we collected the data for 2007-2021 from Eurostat regarding the variables included in the analysis. We have chosen this period because, over the 15 years included in the research worldwide, economies have undergone two crucial turning points in their evolution - first, the financial crisis (2007-2008) - and then, the COVID-19 crisis (2020-2021). Thus, the statutory tax rates for labor and capital, the implicit tax rates for labor and capital, and the tax revenues collected to GDP from taxing labor and capital were used in our quantitative analysis. The cluster analysis approach is the method of choice for the empirical grouping of EU countries, as it is most widely accepted for groping counties according to various indicators (Velichkov, Stefanova, 2017). Hence, we decided to organize the EU countries into two clusters using the International Monetary fund country classification (IMF, 2022). By employing the IMF country classification, the EU-27 member states were divided into – emerging economies –

Bulgaria, Croatia, Hungary, Poland, and Romania – and advanced economies – the remaining 22 countries.

We embarked on a complex macro back-looking analysis to find empirical evidence that, in a long-term trend, there is a shift between taxing labor and capital in EU-27 economies. Our analysis compares statutory and implicit tax rates for the variables employed and then continues with the parallel between tax rates and tax burden. The research will emphasize the similarities and differences in taxing production factors throughout the financial and the COVID-19 crises. The following section presents our findings for each cluster for the analyzed period.

5. Findings

The emerging economies represent the first cluster in our analysis. These states are geographically situated in Eastern Europe and are similar in macro-economic development.

Figure 1a. Statutory versus implicit tax rates in emerging economies
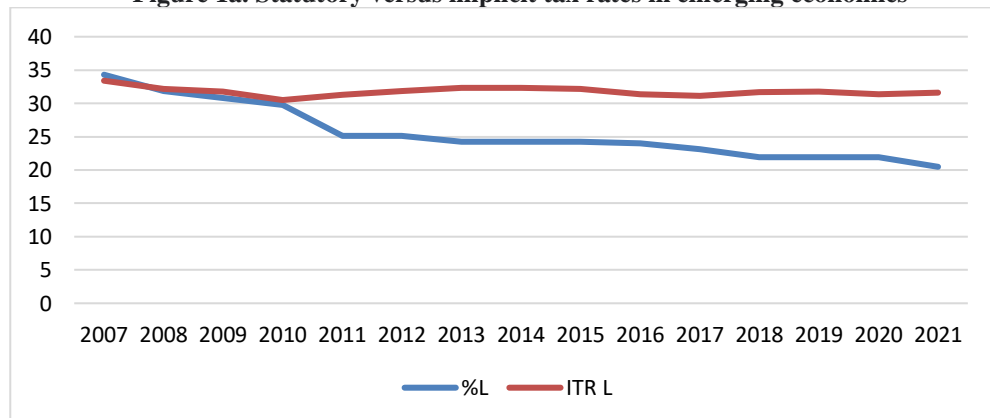
Source: Authors own computations.

Figure 1b. Statutory versus implicit tax rates in emerging economies
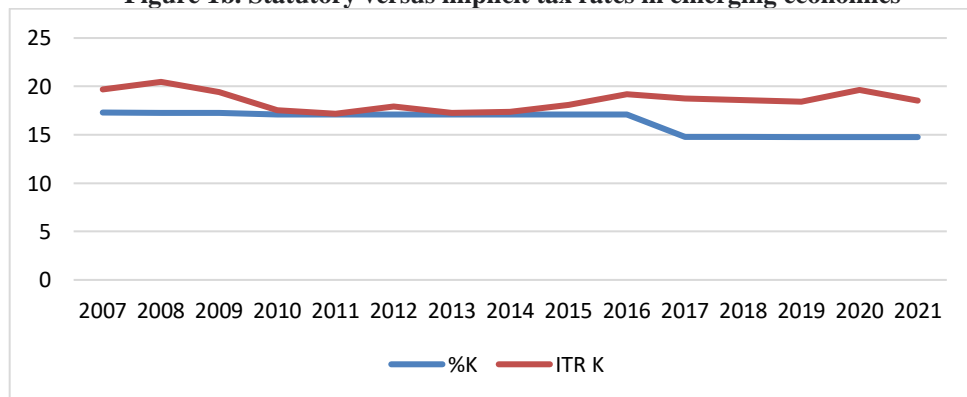
Source: Authors own computations.

The average statutory tax rates for the labor force and capital are lower than the average implicit tax rates over the analyzed period. For the labor force, the implicit tax rates are, on average, 6.2 percentage points (pp) higher than the statutory tax rates. For capital, the average difference between implicit and statutory tax rates is 2.2 pp. Furthermore, we can acknowledge that the labor force is overtaxed face to capital because both statutory and implicit tax rates are higher for labor than for capital.

We noticed that, during the financial crisis (2007-2008), the emerging economies in the EU-27 have put pressure on capital because while the statutory tax is unchanged, the implicit tax rates, as a measure of the effective tax burden, have increased. However, during the COVID-19 crisis, the situation is in reverse – the tax burden is levied upon labor force with a slight increase in the implicit tax rates. It is to be noted that the gap between tax rates related to labor force is steeper than the one for tax rates related to capital due to tax "privileges" given to the latter, such as tax exemption, incentives, annulments, and others.

Figure 2. Tax revenues to GDP in emerging economies

Source: Authors own computations.

As expected, tax revenues to GDP collected from taxing labor force exceed the tax revenues collected from the capital. On average, the gap between the variables is 7.6 pp, showing a clear preference, in emerging economies, toward taxing labor force. However, during the financial crisis (2007-2008), emerging countries have registered a slight constriction of the tax revenues collected due to the decrease of the tax rates for both production factors. However, for the COVID-19 crisis, paradoxically, tax revenues' collection has increased for capital even if the average statutory tax rate has remained unchanged (see Appendix, Table 1).

One might argue that the statutory tax rate is not the correct variable to describe taxation trends, and therefore we move forward and compare implicit tax rates with the tax revenues collected to GDP. As stated above, implicit tax rates quantify the real tax burden perceived by the production factor. We can notice that the analyzed variables follow the same trend, but the paradox mentioned above is even more apparent. Thus, during the financial crisis, the collected tax revenues to GDP decreased for both labor and capital as an immediate effect of tax rate contraction. Nevertheless, during COVID-19, even if the average implicit tax rate for labor has increased, the tax revenues collected have slightly subsided, while for capital, the situation is reversed. So, for capital, the average implicit tax rate was cut back by 1.1 pp, but the tax revenues to GDP have moderately increased. This goes to show that the EU-27 emerging economies are encouraged to have a "race to the bottom".

The advanced economies of the EU-27 represent the second cluster in our analysis.

Figure 3a. Statutory versus implicit tax rates in advanced economies
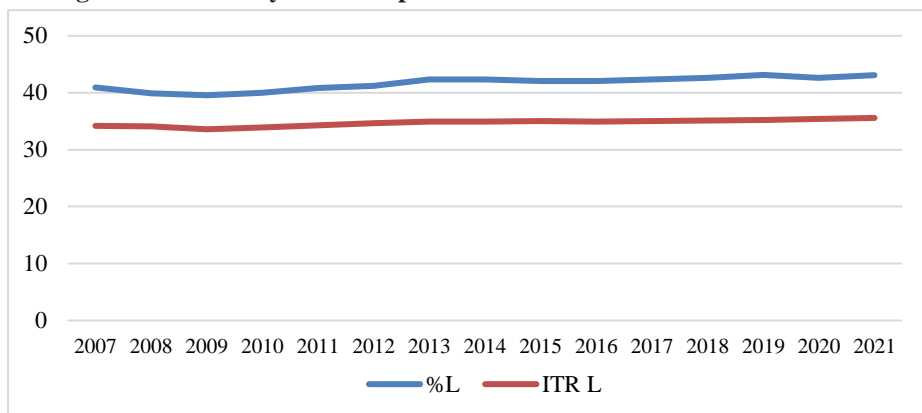
Source: Authors own computations.

Figure 3b. Statutory versus implicit tax rates in advanced economies
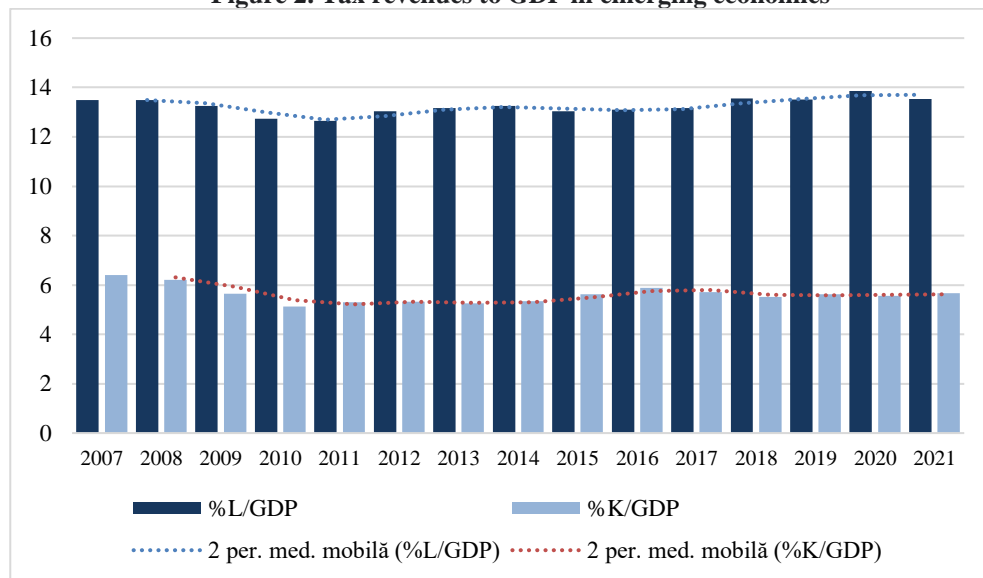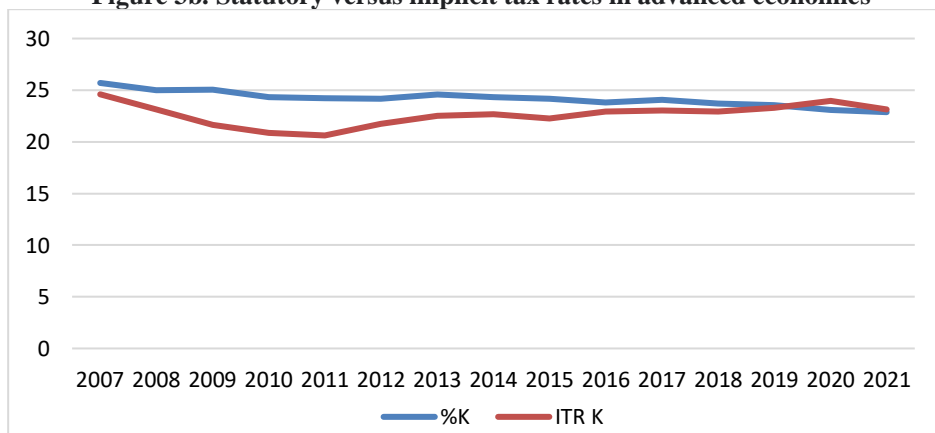

Source: Authors own computations.

When it comes to taxing labor force and capital in advanced economies, we notice that average statutory tax rates are higher than the average implicit tax rates, meaning that the actual tax burden is lower than what the legislation is establishing as a tax rate. This is a positive effect of tax incentives, tax deductions, or tax exemptions and should stimulate tax revenue collection. If for the labor force, the average statutory tax rates are 6.9 pp over the average implicit tax rates for the analyzed period, for capital, the gap is just 1.6 pp. We can also notice that for capital, during both the financial crisis and the COVID-19 crisis, the average statutory tax rates and the average implicit tax rates have decreased, but for labor force, the COVID-19 crisis was a period in which both types of tax rates have increased (see Appendix, Table 2).

Figure 4. Tax revenues to GDP in advanced economies
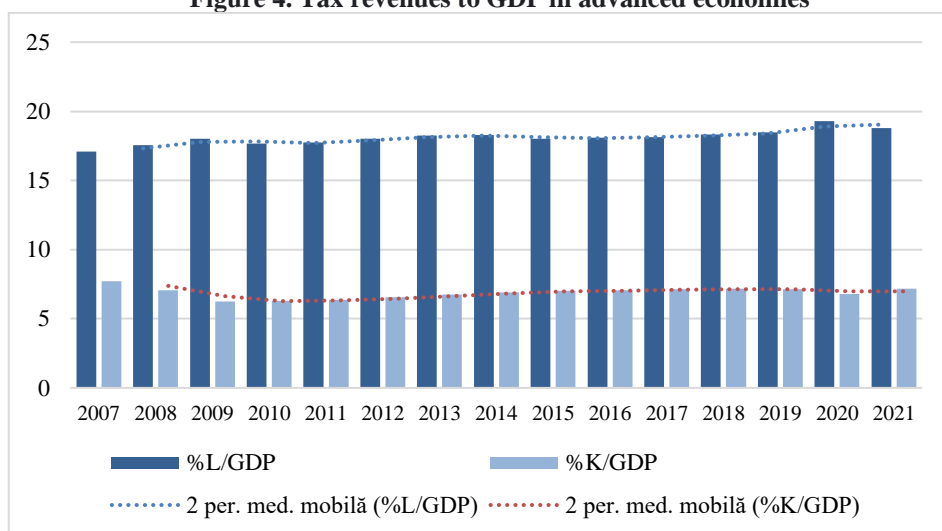
Source: Authors own computations.

As in emerging economies, advanced economies collect more tax revenues from GDP from taxing the labor force. Natural, we can say, if, on average, the implicit tax rates for the labor force are 12.1 pp higher than the ones for the capital. During the financial crisis, we can notice, again, a paradox, this time when it comes to taxing the labor force – a tiny decrease in tax burden has the opposite effect on tax revenues collection. Furthermore, for capital, even if the tax burden decreased in the same period, the response in the economy is the expected one – a decrease in tax revenues collection. For the period related to the COVID-19 crisis, advanced economies reacted differently. For the labor force, the tax burden slowly increases, which leads to a lower level of tax revenues collection, whereas for capital, the tax burden decreases, and ,as an effect, the tax revenues' collection registers the same value as in the pre-pandemic period. (see Appendix, Table 2).

Advanced economies in the EU-27 have a different approach to the tax burden related to production factors than emerging economies. Thus, taxation systems in

advanced economies rely substantially on tax incentives, even if they incline toward taxing the labor force. Moreover, although, on average, the tax burden in advanced economies is higher for both production factors (see Appendix Table 1 in corroboration with Table 2) than in emerging economies, the capital is more likely to be the protégée of the fiscal system.

However, our research is subject to some limitations related to the relatively short period under analysis and the fact that the present analysis focuses on tax structure by type of tax base. Nevertheless, we succeeded in covering two major macroeconomic events that took place in the last 20 years – the financial crisis and the COVID-19 pandemic and by working with the available data on Eurostat, which is curated, the study has certifiable outcomes.

6. Conclusions

The study pivots around taxation policies in the European Union, focusing mainly on taxing production factors, i.e., labor force and capital. By employing a cluster analysis, the research showed that at the European Union level, seen as a unified space, where production factors can move freely, the labor force and capital are among the most wanted tax basis, and tax policies will engage in a "fight" over who is taxing what and how.

In all five European emerging economies, capital – seen as a production factor – is less taxed than the labor force. We expected this, since the capital is more likely to"run" from tax burden more easily than labor. During the financial crisis, emerging economies have decreased the statutory tax rates for labor and maintained the ones for capital. Nevertheless, looking at the implicit tax rates, we will notice that for labor, they decreased, and for capital, they increased – the aftermath was a steady tax revenues collection from labor but a slight decrease from capital tax collection. During the Pandemic, the statutory taxes for labor have decreased, but the implicit tax rates have actually increased – the result was a moderate decrease in tax collection. The paradox is met when it comes to taxing capital because, during the Pandemic, the statutory tax rates have remained the same, but the implicit tax rates have decreased, yet the tax revenues collected have increased.

In advanced European economies, the tax burden related to capital – seen as a production factor – is lower than that of the labor force. During the financial crisis, advanced economies decreased both statutory and implicit tax rates, but, paradoxically, the tax revenues collected from labor increased in 2008 compared to 2007. During the Pandemic, the statutory and implicit tax rates for labor increased, and the immediate result was a moderate decrease in tax collection. Again, a paradox is met when it comes to taxing capital. During the Pandemic, the statutory and implicit tax rates have slightly subsided, yet the tax revenue collection has increased. One can infer that advanced economies are inclined to have a "race to the bottom" when taxing capital.

The significant difference between clusters is that implicit tax rates for both labor force and capital are lower than the statutory tax rates in advanced economies. The multitude of tax reliefs explains these exemptions and other tax deductions applied.

On the opposite side, in emerging economies, this situation is reversed. Implicit tax rates are much higher than the statutory tax rates for both production factors. This shows that the tax legislation in emerging economies is "hiding" around the tax basis and the procedure to increase the tax burden.

Without a doubt, we can state that capital – seen as a production factor - is the taxation system protégée at the European level. Capital is the "freest" type of tax base because it can "vote with its feet" and so has the potential to move unhinged from one taxation system to the next. Therefore, as a trend, at the European level, during both crises, the tax rates (statutory and implicit) related to capital have decreased, and paradoxically tax-related revenues have increased. Thus, the member states will have no interest in harmonizing capital.

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Appendix

Table 1. Descriptive statistics for emerging countries

	%L	**ITR L**	**%L/GDP**	**%K**	**ITR K**	**%K/GDP**
2007	34,3	33,4	13,5	17,3	19,7	6,4
2008	31,8	32,1	13,5	17,3	20,5	6,2
2009	30,8	31,7	13,2	17,3	19,4	5,6
2010	29,8	30,5	12,7	17,1	17,5	5,1
2011	25,1	31,3	12,6	17,1	17,2	5,3
2012	25,1	31,9	13,0	17,1	17,9	5,3
2013	24,2	32,3	13,2	17,1	17,3	5,3
2014	24,2	32,3	13,3	17,1	17,4	5,3
2015	24,2	32,2	13,0	17,1	18,1	5,6
2016	24,0	31,3	13,1	17,1	19,2	5,9
2017	23,1	31,1	13,2	14,8	18,7	5,7
2018	21,9	31,7	13,6	14,8	18,6	5,5
2019	21,9	31,7	13,5	14,8	18,4	5,6
2020	21,9	31,3	13,9	14,8	19,6	5,6
2021	20,5	31,6	13,5	14,8	18,5	5,7

Source: Data: Taxation trends in the European Union series; authors own computations.

Table 2. Descriptive statistics in advanced economies

	%L	ITR L	%LGDP	%K	ITR K	%K/GDP
2007	40,9	34,2	17,1	25,7	24,6	7,7
2008	39,9	34,1	17,5	25,0	23,1	7,1
2009	39,6	33,6	18,0	25,0	21,6	6,3
2010	40,0	33,9	17,7	24,3	20,9	6,3
2011	40,8	34,2	17,7	24,2	20,6	6,4
2012	41,2	34,7	18,0	24,2	21,8	6,5
2013	42,3	34,9	18,2	24,6	22,5	6,7
2014	42,3	35,0	18,3	24,3	22,7	6,9
2015	42,1	35,0	18,0	24,2	22,2	7,0
2016	42,1	35,0	18,1	23,8	23,0	7,0
2017	42,3	35,1	18,1	24,1	23,0	7,1
2018	42,6	35,2	18,3	23,7	22,9	7,2
2019	43,1	35,3	18,5	23,6	23,3	7,1
2020	42,6	35,4	19,3	23,1	24,0	6,8
2021	43,1	35,6	18,8	22,9	23,1	7,2

Source: Data: Taxation trends in the European Union series; authors own computations.

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Climate-aligned Tokens as Instruments of Climate Change Financing and Investment – the Case of Energy Tokens

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Abstract

The growing role of Tokenomics in the world of finance has stirred much interest in different areas of the economy. Digital tokens as financial innovations, also known as cryptoassets, emerged alongside the blockchain technology (or the more broadly applied concept of the 'distributed ledger technology' – DLT). At present, numerous analyses are being carried out on the ever emerging new types of digital tokens and the process of tokenization. In recent years, tokenization has also found application in the field of organising and financing climate change and energy policies.

The aim of the article is to identify climate-aligned tokens, with particular regard to energy tokens. In the second part of the paper, the authors evaluate the investment attractiveness of 12 selected energy tokens from the point of view of the effectiveness measures applied to ordinary financial instruments. In this way, it was possible to compare energy tokens with traditional financial instruments. Furthermore, the authors attempted to investigate the relationship between the formation of rates of return of the researched energy tokens and the rates of return on stock and commodity markets. The aim of this study was to point to the possibility of diversifying an investment portfolio using the tokens in question.

The results of the study indicate the low investment attractiveness of energy tokens compared to investments in stock markets, commodity markets, and investments in major cryptocurrencies such as Bitcoin and Ethereum. The research therefore indicates that buyers of energy tokens today should not be driven by investment or speculative motives, but rather by a desire to obtain a means of clearing energy trading, or other utility.

Keywords: digital tokens, tokenization, climate-aligned tokens, energy tokens, investment efficiency.

JEL Classification: G11, G12, O13, Q54.

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1. Introduction

The ever-advancing climate change requires taking immediate action if we want to halt environmental degradation and ensure the ecological security of our planet. This issue has become so important and pressing that in 2015 the UN passed the Resolution on Sustainable Development Goals, among which – in addition to tackling poverty, hunger, exclusion, inequality, armed conflict – climate and environmental issues were prioritised. In particular, the promotion of water resources management, access to affordable and clean energy, protection of life on land and in water were mentioned (United Nations, 2015). On 7 March 2018, the European Commission launched the Action Plan for Financing Sustainable Growth, with the aim of encouraging and promoting sustainable investment. This act is in line with the European policy for a new sustainable world and continues the work carried out by European authorities following the Paris Agreement and the UN Agenda (European Commission, 2018).

However, the latest report of the Intergovernmental Panel on Climate Change (IPCC, 2021) leaves no illusions that climate change can be stopped now. The authors predict that over the next 20 years, global temperatures will on average reach or exceed a 1.5°C increase. Hence, there are numerous calls for governments and international associations (such as the European Union) to accelerate action to reduce carbon emissions. It is therefore becoming a priority for the EU to implement the Green Deal strategy, including, in particular, the energy sector, which is responsible for 75% of the EU's greenhouse gas emissions (EC, 2019). It should also be noted that the European Union is increasingly promoting further legislative initiatives related to financing and investing in sustainable and green assets (investments), such as the Sustainable Finance Disclosure Regulation (European Parliament and the Council, 2019), among others, which is a set of new regulations that help to better classify the sustainable specification of investment funds and the new EU Taxonomy, which offers a classification for economic activities that are green and sustainable.

The renewable energy market is therefore becoming an increasingly attractive market from the point of view of financing and investment, including financial investment. Furthermore, the use of the decentralised ledger technology (DLT) and the tokenization process is increasingly being considered in the energy sector. According to the Union of the Electricity Industry, which represents 3500 energy sector companies across Europe, a blockchain enables secure data storage and executing smart contracts in peer-to-peer networks. Owing to its unique attributes, this technology has the potential to play a significant role in the energy sector. The possible solutions that could be implemented across the electricity supply chain, with regard to process optimization, include networks and trading platforms as the traditional wholesale trading as well as peer-to-peer (Eurelectric, 2017).

The first aim of the article is to identify climate-aligned tokens, including energy tokens, based on the practice of their use to date. Another objective is to answer the question about the attractiveness of energy tokens as an instrument for investment and diversification of the investment portfolio of market investors.

To the best of our knowledge, this is the first analysis ever to include energy tokens in a portfolio analysis as financial instruments. This is because so far the main focus has been on researching this digital token in its payment and utility function only.

Thus, the article is organised into four main sections. The first section presents an analysis of the research to date on providing public access to environmental resources, including clean and affordable energy as public goods, and traditional ways of financing this process. This is followed by a description of the issues of using new blockchain technology and climate-aligned tokens to achieve climate goals. In the next section, the essence and significance of energy tokens as a way of using blockchain technology in the energy sector is discussed in more detail using the classification criteria of digital tokens and the existing issuing practice. In the last section, the authors present the results of empirical studies conducted on the investment efficiency of energy tokens and their portfolio attractiveness.

2. Climate-aligned Traditional Financing

The implementation of sustainable development goals is automatically connected with the tasks of the state. It is so because ensuring citizens' access to environmental resources, including clean water, clean air, energy sources, etc., is perceived in terms of a public good, construed as a good that, once produced for specific consumers, can be consumed by other entities as well, without incurring additional costs (Samuelson, 1954). This feature can be described as "non-rivalry" in consumption (McNutt, 1998), "jointness" in consumption, or "non-excludability" from consumption (Holcombe, 1997). Moreover, the globalisation processes taking place in recent decades have resulted in a change in the perception of public goods. In 1999, the concept of global public goods emerged. Its authors defined global public goods as "outcomes (or intermediate products) that tend toward universality in the sense that they benefit all countries, population groups, and generations. At a minimum, a global public good would meet the following criteria: its benefits extend to more than one group of countries and do not discriminate against any population group or any set of generations, present or future" (Kaul et al., 1999, p. 16). Such goods are the emanation of national public goods beyond the borders of specific states, and the fundamental difference in their provision is that they do not result from coercion but from international agreements (Kleer 2014, p. 45). In considering the nature of goods whose provision should be handled by the state, a true milestone is the definition of the so-called merit goods by Richard A. Musgrave (1957, pp. 33-43; 1959, pp. 13-15), who argues that these goods include public goods and selected private goods that have positive and measurable spillover effects (or "externalities") on other people and society as a whole. Education and healthcare, among others, are also included in this group of goods. Such a broad approach to the definition of goods, the provision of which is the responsibility of the state, strongly implies the need for the government to also engage in environmental protection issues. It is precisely providing people with fair

and sustainable access to environmental resources, including diversified energy sources, that is now becoming the key merit good.

Bearing in mind the above considerations concerning the essence of the public good, it should be stated that, in principle, the burden of financing the implementation of measures related to climate change lies with the state (public funds). The actions of public authorities supporting environmental protection under the conditions of climate change have, therefore, consequences both on the side of public expenditures (financing or co-financing of pro-environmental and energy projects) and public revenues (e.g., lower budget revenues caused by the application of reliefs in public levies, rewarding pro-environmental activity of taxpayers). The accumulation of public funds for the described objectives may consist in obtaining new public revenues, including taxes and fees imposed, e.g., on entities whose activities harm the environment and increase carbon emissions. Appropriate construction of the tax system (including green tax) and budget revenues obtained from the auction sale of emission allowances, including EU ETS, is yet another issue (Marchewka-Bartkowiak, Jarno, 2020).

In addition to budgetary resources, climate finance can also be repayable and result from public commitments in the financial market. The last decade has seen a sharp increase in the volume and value of green bonds and climate-aligned bonds, including those issued by governments, both central and local governments (Wiśniewski, Zieliński, 2019, pp. 83-96). According to the Climate Bond Initiative (2021), in 2020, the global green bond market was worth USD 1.1 tn – dominated by bonds issued by sovereigns, government-back entities, local governments and development banks. Additionally, sustainability bonds, which finance the implementation of both green and social goals, appeared in the statistics. In 2020, the value of the market for these bonds amounted to USD 317 bn, and their issuers included mainly development banks, however, not excluding sovereigns, government-back entities, and local governments.

This path is also being followed by private entities, which increasingly use repayable financing (loans, bonds) of green nature. The commitments entered into finance green activities specified by the issuer, which constitutes an incentive for socially and environmentally responsible investors to purchase these instruments. In order for an investor to be confident in the greenness of their investment, certification by institutions such as the Climate Bond Initiative, CICERO, Moody's Green Bond Assessments and Standard & Poor's Green Evaluation is required (Ehlers, Packer 2017, p. 93). It is emphasised that such certification makes it easier for a green debt issuer (both public and private issuer) to place a bond issue and reduces the investor's margin, thus reducing the cost of debt, due to the additional bonus investors receive in the form of the belief that they are doing something valuable for the environment (Wiśniewski, Zieliński, 2019, pp. 83-96).

However, modern technologies are increasingly becoming an alternative to the so-called traditional methods of financing climate policy. In this article, the authors will focus on the latest trend in financing and investing in the field of climate and

energy policy based on the distributed ledger technology (DLT, or more narrowly: blockchain), namely tokenization.

3. Climate-aligned Digital Tokens

The increasing interest in the new DLT technology has resulted in the growing popularity of digital tokens and the process of their creation (issuance) called tokenization. Accordingly, tokenization may revolutionise and fundamentally diversify sources of funding and investment in the so-called climate and energy market in the future. As mentioned in the introduction, blockchain and digital tokens are already seen by potential issuers and investors as a future-oriented asset for practical application in the field of energy and climate change financing. Therefore, it should be assumed that climate-aligned tokens will increasingly be taken into account in financial decisions by both the private and public sector (Table 1).

**Table 1. Financial instruments in financing tasks
and activities regarding climate change**

Economy sector	Financial instruments	
	Traditional	**Modern (digital)**
Public	**Budgetary sources** (incl. budgetary spending on green investments, green tax credits, public taxes and charges on entities acting to the detriment of the environment, public revenues from green debt, especially green bonds)	**Climate-aligned tokens** (e.g., green bond tokens)
Private	**ESG-linked loans and securities** (incl. green bonds and loans)	**Climate-aligned tokens** (e.g., energy, climate, green tokens)

Source: Authors' own elaboration.

Generally, digital tokens or cryptoassets are defined as a digital representation of value or rights which may be transferred and stored electronically, using the distributed ledger technology or a similar technology (definition adopted by the European Commission in COM(2020)593). Digital tokens are currently used in many business models (Diedrich, 2016; Adhami et al., 2018). Their diversity in terms of functionality has also given rise to the recognition of a new area of analysis called the Token Economy, or Tokenomics for short (Mougayar, 2017). The most important division of digital tokens is mainly based on three aspects: the purpose of their creation, the function they are supposed to perform, and their technical aspects.

Based on these three criteria, the authors separated climate-aligned tokens as a type of digital asset used in the field of climate-energy policy. The characteristics of climate-aligned tokens within the framework of digital tokens classification accepted in the literature (BIS, 2018; FSB, 2018; ESMA, 2018; ECB, 2019; OECD, 2019; FCA, 2018; Oliveira et al., 2018) are presented in Table 2.

Table 2. Climate-aligned token features

Criteria	Climate-aligned tokens features
Aim of the creation (issuance)	**Energy tokens** Green (climate) tokens
The value or rights represented	Exchange type (payment tokens) Utility type (utility tokens) Investment type (asset or security tokens)
Type of the issuance	Public or private sector Institutional or individual entities
Method of technological link	Native or non-native tokens
Price/value stability standard	Stable or non-stable tokens
Digital contract	Fungible or non-fungible tokens

Source: Authors' own elaboration.

Climate-aligned tokens can be used in a wide variety of ways for direct financing of climate and energy policy (on digital platforms); they can also be used as an investment instrument (e.g., for trading on digital stock exchanges); they can also be used for clearing purposes (e.g., in energy trading) or for utility purposes, entitling their holder to certain services. It is also worth noting that although digital tokens are most often issued by institutional entities, personal tokens are becoming increasingly popular (Marchewka-Bartkowiak, Nowak, 2020). In the future, it should therefore be possible to use tokens by households or individuals in the climate-energy area not only as beneficiaries, but also as issuers of tokens (e.g., of energy surpluses). From a technical point of view, the construction of climate-aligned tokens can be based on existing functionalities of digital tokens, such as technological link with platforms, price stability standard, or smart contract. However, these issues will largely depend on the further development of DLT technology in the near future.

Today, one of the most popular climate-aligned tokens is energy tokens, to which a more in-depth analysis is devoted.

4. Energy Tokens as the Climate-aligned Tokens

Nowadays, many different applications of the DLT technology can be found as far as energy is concerned. First of all, the blockchain is used in energy trading – buying and selling individually generated energy – by individual users. With the help of this technology, electricity trading platforms are created, services enabling payment for charging electric vehicles at stations, or giving users the opportunity to quickly change energy service providers (Basden, Cottrell, 2017). The literature highlights that the use of new technological solutions can increase the security of energy trading, as the technology perfectly allows for confirmation of ownership, it is a reliable and inexpensive way to conduct and control transactions without a central generation unit of power, and promote the development of the renewable energy microgrid. In addition, it introduces intelligent solutions and energy management systems to ensure universal and safe access to energy. Blockchain, through liquidation of intermediaries and introduction of P2P transactions, also allows reducing energy prices, under the conditions of high competition

(Varnavskiy et al., 2018, pp. 46-49). Researchers dealing with the possible applications of the technology described also point to its use for: crowdfunding of assets and distribution of revenue, facilitating green energy investments and assets co-ownership, bringing together sustainable energy projects and prospective investors, rewarding low-carbon and green energy production (Andoni et al., 2019, pp. 158-159).

Generally speaking, energy tokens issuers are entities involved in providing clean energy, mediating its settlement, as well as implementing new solutions in the renewable energy market.

Energy tokens can thus be considered as a means of payment in a clearing or utility function (Varnavskiy et al., 2018; Andoni et al., 2019), but also as a commodity (Guseva, 2021, pp. 175-176) or decentralised means of investments (Lin, Tjio, 2020, p. 1). Thus, these tokens can also represent an alternative form of investment compared to classical financial instruments, such as stocks, bonds, or mutual fund units. Even if they are not "equity" tokens, which are a digitalised form of financial instruments, they can be regarded as an alternative investment, such as investments in commodities (oil, metals, and grain).

The study conducted below is based on a group of 12 energy tokens. Table 3 presents their characteristics, specifying the type of issuer, services offered, availability, etc., as well as their market capitalisation value, and describing their essence. Data for the analysis was obtained from the CoinMarketCap and CoinGecko portals, while detailed information on the tokens was collected from the websites of their issuers. Detailed descriptions of the energy tokens and the technical solutions used are also described in detail in: Andoni et al., 2019; Varnavskiy et al., 2018; SolarPlaza, 2018; PWC, 2018.

Table 3. The energy tokens under study

Acronym	Name	Market capitalisation (USD)*	Date of "issuance"	Characteristics
EWT	Energy Web Tokens	206 787 847	31/03/2020	native token behind the Energy Web Chain, a blockchain-based virtual machine designed to support and further application development for the energy sector; used to create DApps
WPP	WPP Token	138 884 888	14/04/2019	native token which allows market participants to trade Energy and biofuel production (Switzerland)
POWR	Power Ledger	120 547 246	08/11/2017	native token which uses public ETH blockchain, designed to enable local areas to sell and distribute solar power without the help of middlemen, used to facilitate energy and environmental commodity trading

Acronym	Name	Market capitalisation (USD)*	Date of "issuance"	Characteristics
WOZX	EFFORCE	76 678 254	07/12/2020	native cryptocurrency token of energy efficiency platform Efforce, used as the medium through which energy savings created on the Efforce platform are tokenized for use by any participant
MWAT	Restart Energy	17 608 389	02/03/2018	cryptocurrency operating on the ETH platform, which enables energy producers to tokenize their energy
GRID+	GRIDplus	8 392 318	02/03/2018	cryptocurrency operating on the ETH platform, that gives consumers direct access to wholesale energy markets (USA)
CHG	Charg Coin	4 149 307	14/06/2018	native coin which binds energy to money using the power of electric vehicle charging as a basis of value; time of charging vehicle (in Charge Coin network) is transformed into the price of the coin
SNC	SunContract	4 021 650	19/11//2017	native cryptocurrency which empower individuals to freely buy, sell or trade electricity by providing an open energy marketplace (Slovenia)
WPR	WePower	3 909 418	11/02/2018	a platform which allows green energy producers to raise capital by issuing these tokens
ELEC	Electrify.Asia	527 240	21/03/2018	cryptocurrency operating on the ETH platform, that allows for the trading of energy among individual producers of energy (Singapore)
PYLNT	Pylon Network	358 687	21/03/2018	Native cryptocurrency, which enable digital energy trading, and foster market transparency by tracking and certifying source of energy (Spain)
TSL	Energo / Tesla	203 381	28/12/2017	native cryptocurrency, which supports peer to peer power trading system by applying a blockchain to the microgrid for decentralized energy autonomy

* data as of 1 August 2021

Source: Own elaboration based on energy tokens issuers' websites.

The list of energy tokens presented in Table 3 allows several observations to be made:

- in most cases, energy tokens have the nature of payment tokens - with their help individual energy producers and energy buyers can make settlements without an intermediary, which can reduce the cost of electricity; others allow, for example, the self-creation of tokens by entities interested in using the created blockchain or decentralised applications (DApps), or even the creation of coins thanks to charging electric vehicles from a specific network;
- the first tokens of this type appeared in 2017 and the dominant part of them was implemented a year later; two of them were launched only in 2020;
- the majority (8 out of 12) of the surveyed energy tokens are native tokens, meaning that their issuers have created their own blockchain - the others were based on Ethereum (non-native tokens);
- market capitalisation of the researched tokens is very diverse and very variable, too - from a few hundred thousand USD to over 200 million. In August 2021, the average value of the market capitalisation of all energy tokens, as reported on the aforementioned portals, amounted to approximately USD 700 million, with the daily turnover exceeding USD 20 million.

It is therefore clear that most of the instruments described are of payment or use character, which definitely defines the nature of their users (buyers). In such an approach, the valuation of these instruments is highly difficult, as it is subjective in nature to value access to some service, or the possibility of relatively cheaper acquisition or disposal of energy, or to value the "utility" of owning a token that has created capital for the creation of renewable energy sources, or to value the possibility of creating one's own DApp.

5. Energy Tokens as the Investment Instrument

In the era of progressive changes related primarily to the greater digitalisation of modern life, the change in investor behaviour, including a greater interest in acquiring digital and at the same time alternative instruments, with their greater availability and lower transaction costs compared to classical financial instruments, the acquisition of energy tokens may represent an alternative for the investor. Of course, valuing his satisfaction resulting from the fact that he allocates his resources to finance environmentally friendly actions is highly difficult due to its subjective nature. However, evaluation, from the point of view of financial investment, is also most possible and objective, too

The fundamental research on energy tokens undertaken by the authors concerns in particular the following:

- analysis of profitability, risk, and investment efficiency of tokens in the light of classical measures used by investors;
- correlation between the rates of return of the tokens under study (intra-group), as well as between the rates of return of these tokens and selected stock indices.

The authors have attempted to apply classical investment measures, including in particular profitability, risk, and efficiency, to the verification of the tokens under

analysis. Such an analysis of energy tokens leads to an assessment of their investment attractiveness from the perspective of portfolio analysis. By investment attractiveness of a particular instrument, the authors understand its high expected rate of return and low risk (low volatility of return rates) - according to the portfolio theory of Markowitz (1952). Investment efficiency, on the other hand, will be considered in terms of reward-to-variability, as the relationship between the above categories, according to the commonly used concept, formulated by Sharpe (1952, 1994).

Although in the literature it is possible to find a study of the risk of investing in tokens (initial coin offerings – ICOs) using the Value-at-Risk methodology (Kuryłek, 2020, pp. 512-530), in this study, the authors focused on classical risk measures such as standard deviation of returns, which to the best of the authors' knowledge no one has done before.

The study conducted concerns the energy tokens characterised above for the period from 12 November 2017 to the end of June 2021 (i.e., from when they were listed on the indicated information platforms).

To measure their investment attractiveness in a comparative manner, the study was also conducted for:

- the major cryptocurrencies (Bitcoin (BTC) and Ethereum (ETH));
- indices of the largest world stock exchanges (American: SPX, DJI, Brazilian: BVP, British: FTM, German: DAX, French: CAC and Japanese: NKX);
- and for alternative commodity investments (gold price (XAU) and WTI-NYMEX crude oil price (CL.F)).

Weekly logarithmic returns were determined for the investment evaluation of the tokens. The choice of such an interval was dictated, among others, by the need to standardise the frequency of data – in the case of stock market indices, a week is, in principle, five days long, while in the case of tokens, data are available on each day of the week.

In addition to examining the investment attractiveness of energy tokens, the authors also looked at the relationship between their rates of return and those of stocks and commodities, because for investors who want to diversify their portfolio and make it resilient to changes in the economic situation, it is also important whether the prices of the assets held are correlated with each other – how strongly and in what direction. Therefore, the next study undertaken is an analysis of the correlation of the returns of tokens, stock indices, and commodities.

For each token, stock index, and commodity price, the following measures of investment attractiveness were determined (Table 4):

- profitability, determined as the arithmetic mean rate of return;
- risk, described by the standard deviation of the return rates;
- effectiveness, calculated with the Sharpe ratio (quotient of mean rate of return and standard deviation – the value of risk-free rate was omitted in the Sharpe ratio calculation due to the effectively zero interest rates occurring in the analysed period).

Table 4. Investment measures of energy tokens against selected cryptocurrencies, stock market indices, and commodity prices

Energy tokens	EWT	WPP	POWR	WOZX	MWAT	GRID	CHG	SNC	WPR	ELEC	PYLNT	TSL
Number of weeks under study	65	116	190	29	174	190	159	189	177	171	182	183
Profitability	0.0330	0.0049	0.0020	-0.0415	-0.0017	-0.0077	0.0086	-0.0036	-0.0137	-0.0241	-0.0219	-0.0307
Risk	0.2261	0.3801	0.2042	0.1948	0.2310	0.2997	0.6287	0.1929	0.1936	0.2398	0.2769	0.2643
Effectiveness	0.1462	0.0129	0.0096	-0.2132	-0.0072	-0.0257	0.0138	-0.0185	-0.0706	-0.1006	-0.0791	-0.1161
Cryptocurrencies / stock indices / commodities	**BTC**	**ETH**	*SPX*	*DJI*	*BVP*	*FTM*	*DAX*	*CAC*	*NKX*	XAU	CL.F	
Number of weeks under study	190	190	190	190	190	190	190	190	190	190	190	
Profitability	0.0094	0.0103	0.0027	0.0021	0.0030	0.0007	0.0009	0.0010	0.0013	0.0018	0.0015	
Risk	0.1194	0.1531	0.0288	0.0314	0.0360	0.0305	0.0326	0.0313	0.0306	0.0195	0.0671	
Effectiveness	0.0784	0.0673	0.0955	0.0664	0.0833	0.0221	0.0284	0.0331	0.0410	0.0909	0.0221	

Source: Authors' own calculations.

For easier reading, tokens are marked in bold and shaded, cryptocurrencies in bold, stock indices in italics, and commodity prices without distinction (this also applies to the next table). The measures presented in the table indicate significant variation in profitability, risk, and efficiency of the instruments studied. In addition, unlike indices, commodities and BTC and ETH, some tokens are new instruments and therefore have not been traded in the entire period since November 2017. To highlight this fact, the table notes the number of weeks from June 2021 backwards for which data was available.

Table 4, despite providing detailed information on the measures described, does not facilitate the drawing of synthetic conclusions. Therefore, on the basis of this data, an investment ranking was made in the indicated three criteria, and its results are presented in Table 5. The places in the ranking mean respectively the highest profitability, the lowest risk and the highest efficiency of a given token, stock index or commodity.

The results of the study clearly show that – in light of the investment measures used – most energy tokens perform worse than investments in stocks or commodities. The only exception to the list is the Energy Web Token, which is characterised by above-average profitability and efficiency, but its case should be analysed with great caution due to its shortest period on the market. Charg Coin and WPP Token were also characterised by high profitability; however, they both occupy the last places in the risk ranking. The study showed that even during such a turbulent time – the COVID-19 pandemic period – the stock and commodity markets were characterised by lower risk than investments in cryptocurrencies and the energy tokens under study.

In addition to examining the investment attractiveness of energy tokens, another study examined the relationship between their return rates and the return rates of stocks and commodities. This issue is crucial for investors who want to diversify

their portfolio and make it resilient to economic fluctuations. It is therefore important whether the prices of the assets held are correlated with each other – how strongly and in what direction.

Table 5. Investment ranking of energy tokens and selected cryptocurrencies, stock indices, and commodity prices

Rank	Profitability	Risk	Effectiveness
1	**EWT**	XAU	**EWT**
2	**ETH**	*SPX*	*SPX*
3	**BTC**	*FTM*	XAU
4	**CHG**	*NKX*	BVP
5	**WPP**	*CAC*	**BTC**
6	*BVP*	*DJI*	**ETH**
7	*SPX*	*DAX*	*DJI*
8	*DJI*	*BVP*	*NKX*
9	**POWR**	CL.F	*CAC*
10	XAU	**BTC**	*DAX*
11	CL.F	**ETH**	CL.F
12	*NKX*	**SNC**	*FTM*
13	*CAC*	**WPR**	**CHG**
14	*DAX*	**WOZX**	**WPP**
15	*FTM*	**POWR**	**POWR**
16	**MWAT**	**EWT**	**MWAT**
17	**SNC**	**MWAT**	**SNC**
18	**GRID**	**ELEC**	**GRID**
19	**WPR**	**TSL**	**WPR**
20	**PYLNT**	**PYLNT**	**PYLNT**
21	**ELEC**	**GRID**	**ELEC**
22	**TSL**	**WPP**	**TSL**
23	**WOZX**	**CHG**	**WOZX**

Source: Authors' own elaboration.

The values of the Pearson correlation coefficient between the return rates of tokens, stock indices, and commodities were determined for the available data (respectively, the number of weeks of trading of a given token indicated in Table 4). The matrix of the correlation coefficient value is presented in Table 6, with bold highlighting those values where there is statistical significance of the relationship for a significance level of 0.05; while grey highlighting those values where the p-value is below one per mille, indicating a strong correlation.

Table 6. Values of the correlation coefficient between the rates of return of energy tokens, cryptocurrencies, stock indices, and commodity prices

	EWT	WPP	POWR	WOZX	MWAT	GRID	CHG	SNC	WPR	ELEC	PYLNT	TSL	BTC	ETH	SPX	DJI	BVP	FTM	DAX	CAC	NKX	XAU	CLF
EWT	1																						
WPP	0.0260	1																					
POWR	0.4574	0.0997	1																				
WOZX	0.4949	-0.0102	0.4859	1																			
MWAT	0.1300	0.0843	0.3371	0.4600	1																		
GRID	0.2392	0.1143	0.4246	0.2193	0.1964	1																	
CHG	0.0570	-0.0097	-0.0046	0.1802	0.0076	-0.0418	1																
SNC	0.4263	0.1693	0.5999	0.1805	0.3352	0.2934	0.0824	1															
WPR	0.4195	0.1689	0.6839	0.3854	0.3689	0.3437	-0.0458	0.5607	1														
ELEC	0.2931	0.1005	0.4538	0.0105	0.2425	0.2853	-0.0390	0.4391	0.5129	1													
PYLNT	0.3284	0.0002	0.2661	0.1723	0.0888	0.2261	0.0107	0.1399	0.2890	0.1367	1												
TSL	0.2706	0.0529	0.4145	0.0991	0.2242	0.2268	-0.0238	0.3359	0.4446	0.3396	0.2591	1											
BTC	0.4457	0.0891	0.6050	0.1499	0.3844	0.3721	-0.0197	0.6249	0.6317	0.4388	0.2735	0.4041	1										
ETH	0.4723	0.0965	0.6655	0.2517	0.3424	0.4663	-0.0605	0.6132	0.6558	0.4572	0.2505	0.4092	0.7595	1									
SPX	0.1719	0.0544	0.1490	0.0873	0.1205	0.2337	-0.0368	0.1339	0.1779	0.0849	0.0583	0.1263	0.1581	0.2588	1								
DJI	0.1751	0.0619	0.1568	0.1810	0.1517	0.2415	-0.0253	0.1245	0.1825	0.0739	0.0822	0.1193	0.1569	0.2528	0.9765	1							
BVP	0.3673	0.1615	0.2141	0.0722	0.1683	0.2549	-0.0683	0.1389	0.1820	0.1020	0.0831	0.1447	0.2050	0.2702	0.7022	0.7133	1						
FTM	0.2868	0.1154	0.2073	-0.0867	0.2274	0.2718	-0.0645	0.1743	0.2030	0.0710	0.0542	0.1587	0.2211	0.3009	0.8147	0.8315	0.7128	1					
DAX	0.2463	0.1851	0.2394	-0.0708	0.2507	0.3279	-0.1942	0.1652	0.2920	0.1005	0.1280	0.1538	0.2725	0.3467	0.7620	0.7746	0.6504	0.8607	1				
CAC	0.2371	0.2085	0.2141	0.0939	0.3158	0.3043	-0.1576	0.1788	0.2933	0.0644	0.0863	0.1438	0.2738	0.3441	0.7379	0.7561	0.6457	0.8588	0.9555	1			
NKX	0.2279	0.1507	0.1697	0.0001	0.1912	0.2206	-0.0727	0.1766	0.2736	0.0944	0.0794	0.1317	0.1912	0.2459	0.7399	0.7576	0.5906	0.7794	0.7929	0.8084	1		
XAU	0.1535	-0.1334	0.0879	-0.2384	-0.0034	0.1471	-0.0577	0.1782	0.0777	0.0815	0.0626	0.1244	0.1893	0.2516	0.2819	0.2884	0.2776	0.2888	0.2260	0.1900	0.2053	1	
CLF	0.1587	0.1193	0.1723	0.1761	0.2029	0.1615	-0.1686	0.1098	0.1859	0.0901	0.0202	0.0696	0.1928	0.2253	0.3980	0.3981	0.4228	0.3999	0.3675	0.3761	0.2697	0.0767	1

Source: Authors' own calculations.

Generally, the results indicate a weak correlation between the return rates of energy tokens and stock market indices, gold and oil prices. This means that the markets for these instruments are not strongly correlated, which is an advantage for an investor wishing to diversify his or her portfolio and make it resilient to economic changes. Additionally, the energy tokens analysed do not show strong intra-group linkages - the exceptions being EWT and POWR tokens, where linkages with some other tokens are noticeable. Importantly, some of the tokens also do not show links to the key cryptocurrencies, Bitcoin and Ethereum, which may be due to the fact that many of them are based on separate blockchains.

6. Conclusions

The herein presented considerations on tokenization in the field of climate and energy policy have allowed the authors to formulate a number of conclusions of theoretical and practical nature.

Taking into account the ongoing climate changes, the authors point to the key role of the state and international organisations in this process. The considerations made at the beginning clearly indicate that common resources, including water, air, solar energy, and land, should be the subject of state interest, and providing society with access to these resources in the modern economy has become a public good. Therefore, the provision of such a good should be financed similarly to other public goods.

This does not mean that private entities do not have the opportunity to care for the environment. On the contrary, in addition to taking action to reduce the burden

of our daily lives on the environment, it is also possible to use modern technologies, including blockchain technology, to solve environmental problems.

One possible action is to use tokenization to solve energy problems. Energy tokens on the market allow for energy settlements, in particular between private buyers and providers (prosumers), financing the creation of own renewable energy sources, or creating own DApps (Decentralised Applications).

The valuation of the environmental benefits of acquiring energy tokens remains a subjective issue. These benefits may have a financial dimension, in the form of lower costs of electricity generation, or a more attractive form of their sale by individual small producers, bypassing the intermediary. It may be possible to calculate these benefits for an individual user, but the benefits depend on many individual characteristics - how much energy the user buys/sells, in what cycles, and finally on whether he or she can derive any tax benefits from it. It is even more difficult to assess the value of non-financial benefits, such as the satisfaction of doing something good for the environment.

Despite this, the authors have attempted to evaluate energy tokens from the point of view of their investment attractiveness. Obviously, apart from their clearing and utility values, the buyer of such a token may treat it as an alternative investment instrument. However, the results of the conducted research indicate a low investment attractiveness of the tokens in question. Compared to investments in stock or commodity markets, or even to investments in major cryptocurrencies such as bitcoin and Ethereum, investments in energy tokens are characterised by relatively lower profitability and higher risk, which from the point of view of investment efficiency, measured using the Sharpe ratio, places them lowest in the herein prepared ranking. This research may therefore indicate that purchasers of energy tokens should not be driven by investment and speculative motives, but rather by the desire to obtain a means of clearing energy trading, or other utility.

Acknowledgment

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The Impact of Corporate Social Responsibility
on Organizational Performance:
Evidence from Romanian SMEs

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Abstract

The purpose of this study is to analyze the impact of the dimensions of corporate social responsibility (environmental, community services, and human resources) on the performance of Romanian SMEs. A questionnaire has been designed and distributed randomly, questionnaires were distributed among non-financial SMEs in Romania by sending one questionnaire for each firm. Questionnaires were sent via Google Forms to respondents among stakeholders, managers, and directors of financial departments. The number of questionnaire sheets given to customers and used in this survey (540). The results suggest a positive and direct significant impact of the dimensions of corporate social responsibility (environmental, community services, and human resources) on SMEs performance in Romania, collectively and individually.

Keywords: Corporate social responsibility, SMEs performance.

JEL Classification: A10, M14.

1. Introduction

Dealing with SMEs and considering their role in the economy of a certain country is essential. Where it was stated by Haque et al. (2017) that SMEs play a vital role from different aspects, such as: developing the economy, leading to social welfare & innovation, and also providing better job opportunities. On the other hand, SMEs are essential in the field of employment within developed countries. In addition, Morina and Gashi (2016) added that SMEs are considered important in relation to both social stability and economic development, such as: SMEs are involved in solving and addressing problems related to employment, SMEs are considered useful in the development of large enterprises, SMEs contribute to a country's GDP, and, finally, SMEs are involved in issues related to export-import activities in a country .

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Nowadays, there is a competition among SMEs in the related market, which led to the application of novel systems, such as corporate social responsibility. Keeping in mind that SMEs have become part of the society. Therefore, customers now have a great awareness of social responsibility, so they prefer corporates that apply corporate social responsibility. Generally, when discussing corporate social responsibility, it reflects the corporate social concern within the business process.

Moving to organizational performance, it is useful to mention that basically the performance is related to what and how people are achieving their goals and objectives. Furthermore, Contu (2020) mentioned that in relation to an organization, the organizational performance relies on the adaptation of a certain corporate to the changes within the external atmosphere and environment. Contu (2020) added that when dealing with a performance of a certain company, it is useful to consider financial indicators that present the achieved economic goals and reflect investors' view. However, Chen and Zhao (2020) indicated that non-financial indicators are not being described or analysed from corporate's financial data. Therefore, the need to consider organizational performance in this study came from the inclusion of both financial indicators and non-financial indicators.

In conclusion, it is essential to consider the current situation of the COVID-19 pandemic and its influence. Therefore, the researcher in this current study is going to find the impact of corporate social responsibility on organizational performance. Moreover, since there is an interest in the SMEs expansion within the economy, so that the study will take a place among Romanian SMEs.

2. Literature Review

About Corporate Social Responsibility

As mentioned by Patil et al. (2021), there are different names of corporate social responsibility such as: corporate citizenship, corporate social opportunity, corporate responsibility, and responsible business. It was added that corporate social responsibility is the outcome of business ethics. Where business ethics concern about moral values. However, corporate social responsibility deals with sustainability, environmental, and social issues. Furthermore, Tiep et al. (2021) indicated that corporate social responsibility may include: charity events, creative activities, sponsorships, and voluntary employees. Also, it was mentioned that corporate social responsibility as a serious strategy for a business within its marketing planning and it is vital in marketing of a particular business. Moreover, Zdonek et al. (2021) added that the concept of corporate social responsibility refers to the firm's ability to incorporate voluntarily both environmental and social interests within the related market, besides the firm's relationship with different groups of stakeholders.

In the end, Tiep et al. (2021) concluded that there are several benefits in contributing to corporate social responsibility. For example, brand development, reputation formation, image promotion, increasing sales, and changing customer attitudes.

Dimensions of Corporate Social Responsibility

In this study, the researcher considered three dimensions that are: environmental, community services, and human resources. Where each of these dimensions will be discussed below:

- Environmental dimension

It was mentioned by Chwilkowska-Kubala et al. (2021) that environmental practices are being defined as the activities that are considered by a certain business for the purpose of lowering the effect of these practices on the environment. Based on the study conducted by Seles et al. (2019) where the researchers stated some examples of environmental activities by applying corporate social responsibility that are: evaluating the effect of environmental activities, introducing of activities related to water-saving and energy, encouraging customers to concern about natural environment, and the implementation of control systems regarding pollution and waste.

- Community services

Based on the study conducted by Sudana et al. (2019), it was stated that community reflects a firm's participation into the community in different forms including: arts and education, scholarships and supporting education locally, community services, involvement in public health, and developing performance. In addition, Deigh et al. (2016) added that community concept differs depending on certain disciplines, for example, psychology, anthropology, town planning, philosophy, sociology, and political sciences.

Back to Sudana et al. (2019), the researchers added that following community practices led to enhance relations within a community, gain competitive advantage and operational efficiency, and increase in market performance.

- Human resources

In accordance to Jang Ardichvili (2020), it was mentioned that the participation of human resources in corporate social responsibility is vital through the importance of considering issues related to human and social sustainability. Here that can be attained by connecting human practices with the three major objectives of a certain firm. Furthermore, it was stated by Al Qaisi (2019) that human resources within corporate social responsibility reflect how a certain business decision has an impact on public, suppliers, and employees.

Based on the study conducted by Jang and Ardichvili (2020), the researchers concluded that the development of human resource is involved with both organizational performance and long-term human development based on training and organization development.

Organizational Performance

As was mentioned by Ion and Criveanu (2016), performance referred to the sum of work effects since they presented the strongest relation among strategic goals of an organization, economic involvement, and the satisfaction of customers. Richter et al. (2017) stated that when dealing with the performance of a firm, it is essential to consider the use of financial indicators that present the achievement of the economic

goals by a multinational enterprise in the terms of finance. Richter et al. also added that organizational performance is being affected by the financial performance.

At the end, Chen and Zhao (2020) stated that financial indicators and non-financial indicators are related to each other. Where the non-financial indicators are being used to compensate efficiently the financial indicators defects when assessing firms' performance and the indicators s are vital to the business system in order to evaluate performance.

3. The Study Problem and Its Questions

The concept of corporate social responsibility is being widely applied, where corporate governance has required corporates in different fields to follow and apply corporate social responsibility. However, there are several challenges that SMEs are facing. For example, funding issues where some SMEs do not have sufficient fund to follow entirely what corporate governance has asked them. So that those SMEs tend to follow corporate social responsibility partially. Keeping in mind that any paid expense without gaining any return will end up having a loss that will lead them to exist from the market. Therefore, that might cause several problems to SMEs especially in the current situation of COVID-19 pandemic. Moreover, the crisis has led to a reduction in SMEs profitability based on the increment in row materials since supply chains were disrupted across countries. However, such disruption affected importing and exporting activities which cause obstacles for SMEs, so they did not tend to follow corporate social responsibility for the purpose to avoid experiencing any losses. In conclusion, there were several studies that recommended further studies of corporate social responsibility in different areas and its implementations within SMES, such as the studies conducted by: Tiep et al. (2021), and Maldonado-Erazo et al. (2020).

Therefore, the study has one major question that this:

Q: "Is there any significant impact of corporate social responsibility through its dimensions (environmental, community services, and human resources) on the performance of Romanian SMEs and which dimension has the most impact among the dimensions?"

4. Hypotheses

H1. A: There is a positive impact of environmental dimension on SMEs performance in Romania.

H1. B: There is a positive impact of community dimension on SMEs performance in Romania.

H1. C: There is a positive impact of human resource dimension on SMEs performance in Romania.

5. Study Methodology

The Used Method and Tool

In this current study, the researcher used a quantitative approach. As mentioned by Daniel (2016), the quantitative approach is useful, since it saves time and allows for generalization. Moreover, the researcher collected data by the use of questionnaire. Where it was indicated by Cleave (2021) that this tool is beneficial since it helps in reaching respondents on a wide base and saves costs in comparison to other tools.

Population and Sample

As mentioned before, there are (480,791) SMEs in Romania, where the researcher used an equation by the following link (https://www.calculator.net/ sample-size-calculator.html) in order to get the number of the selected sample, it was found that the appropriate sample size is represented by (384) questionnaires in order for the researcher to be able to generalize the results of this study to the study population. Furthermore, through a specialized agency; questionnaires were distributed among non-financial SMEs in Romania by sending one questionnaire for each firm. Questionnaires were sent by Google Forms to respondents including stakeholders, managers, and directors of financial departments.

6. Statistical Analysis and Hypothesis Testing

Descriptive Examination

Table 1. The results of the descriptive test for the distribution of the study sample

Item		Choice	Frequency	Percentage
Company's Information	**Capital**	Total assets of up to 2 million euros	55	10.2%
		Above 2 million euros to less than 43 million euros	485	89.8%
		All	**540**	**100.0%**
	Number of employees	Above 9 to less than 49	48	8.9%
		50 to less than 249	492	91.1%
		All	**540**	**100.0%**
	Job position	Stakeholder	40	7.4%
		Manager	459	85.0%
		Director of the department	41	7.6%
		All	**540**	**100.0%**
	Type of Sector	Service sector	57	10.6%
		Industrial sector	338	62.6%
		Financial sector	108	20.0%
		Insurance sector	37	6.9%
		All	**540**	**100.0%**

Item		Choice	Frequency	Percentage
Personal Information	**Gender**	Male	480	88.9%
		Female	60	11.1%
		All	**540**	**100.0%**
	Age	Under 25	22	4.1%
		25-30	39	7.2%
		31-36	105	19.4%
		37-42	265	49.1%
		43 and Above	109	20.2%
		All	**540**	**100.0%**
	Level of Education	Diploma	26	4.8%
		Bachelor's Degree	361	66.9%
		Master's Degree	141	26.1%
		PhD	12	2.2%
		All	**540**	**100.0%**
	Level of Experience	Less than 5 Years	33	6.1%
		(5- less than 10) Years	38	7.0%
		(10- Less than 15) years	346	64.1%
		15 years and Above	123	22.8%
		All	**540**	**100.0%**

Source: Author's own research.

Table 1 presents the results of the demographic data for the study sample, and it is noted that the majority of the respondents were males, with a ratio of (88.9%), and most of them work in medium-sized companies based on the size of their capital: Above 2 million euros to less than 43 million euros, at a rate of (89.8%), with 50 to less than 249 employees in a ratio of (91.1%), and the majority of respondents are found to be managers of these companies at a rate of (85%), and most of them work in the industrial sector, at a rate of (62.6%), and most of the respondents were between 37 and 42 years old, with a percentage of (49.1%) of the study sample. Also, most of the study sample are holders of a bachelor's degree, with a percentage of (66.9%). It was also found that the study sample had good experience, where the majority had 10 to less than 15 years of experience with a percentage of (64.1%). These results represent good indicators of the study sample on their having long practical experiences, as well as good academic qualifications that enable the researcher to complete the research and reach results and conclusions that are generalized to the study community. In order to show the rates of answers to the study questions, the researcher relied on the fifth Likert Scale, and the weighted average was therefore calculated to determine the level of importance of the study sample observations for each variable, first by calculating the length of the period (4 divided by 5), where 4 represents the number of distances, 5 represents the number of choices, and the result is 0.80, and accordingly, the results of the descriptive analysis of variables are presented as follows:

Table 2. Results of the descriptive analysis of the study variables

No.	Variable	Mean	Std. Deviation	Degree of Approval
1	Environmental	3.131	0.867	High
2	Community services	4.361	0.305	High Very
3	Human resources	4.126	0.335	High
4	SMEs Performance	4.203	0.297	High
Arithmetical mean has a value between (1 to 1.79), the result of degree of approval is "Very low"; (1.80 to 2.59) the result of degree of approval is "Low"; (2.60 to 3.39) the result of degree of approval is "Medium"; (3.40 to 4.20) the result of degree of approval is "High"; (4.21 to 5.00) the result of degree of approval is "Very High."				

Source: Author's own research.

The previous results of the descriptive analysis of the study variables presented in the above table that the Community services dimension has the highest degree of significance among the Corporate Social Responsibility dimensions, with an arithmetic mean of (4.361), and a Very High degree of importance, Human resources dimension was in second place in terms of importance with an arithmetic mean of (4.126) and a high degree of importance, and Environmental dimension was in the last place in terms of importance with an arithmetic mean of (3.131) and a high degree of importance, while the arithmetic mean of the SMEs Performance variable was (4.203) and a high importance.

Study Hypotheses Test

It was verified that there is no problem with the linear interference in the study models by using the (Variance Inflationary Factor) (VIF) and the Tolerance factor, where all VIF variables are less than (5), and the results of the analysis presented in the table below showed that the Tolerance coefficient for all variables had values greater than (0.20), and according to the study of (Ekiz, 2021; Salmerón et al., 2018), it is clear that all the independent study variables have passed these two indicators, which means that there is no problem of linear interference in the study model, and therefore the multiple regression test was used to test the study hypotheses, as follows:

Table 3. The results of the multiple regression test for the study model

F-statistic:	367.305	Adjusted R-Square:	0.671
Sig (F-statistic):	0.000	R-squared:	0.673
S.E. of regression:	0.170	R:	0.820

Variable	Coefficient	T-Statistic	Sig.T	VIF	Tolerance
Constant	--------------	7.234	0.000	-------	-------
Environmental	0.160	5.393	0.000	1.442	0.694
Community services	0.325	10.826	0.000	1.476	0.677
Human resources	0.490	15.234	0.000	1.695	0.590

Source: Author's own research.

The table indicates that the calculated F value reached (367.305), which is significant at a level of (0.05), which indicates that the first proposed study model is appropriate, and the results of the regression analysis showed that the (Sig. F-statistic) value reached (0.000), and it is less than the significance level of the test, which is (5%), and based on the correlation value of (R = 0.820), it is found that the main hypothesis is accepted, which indicates that there is a positive impact of corporate social responsibility on SMEs performance in Romania. The results of the regression analysis also showed that the adjusted R-square value reached (0.671), which means that only about 67.1% of the fluctuations that occur in SMEs performance can be explained by the changes that occur by applying Corporate Social Responsibility. According to the study of (Purwanto, Sudargini, 2021), which classified the explanatory power, it was found that the explanatory power of this model is high and reliable in the process of predicting and interpreting SMEs performance in Romania.

Also, the results of the regression analysis showed that the level of significance for all dimensions of corporate social responsibility decreased at the significant level of (Sig.T < 0.05), which indicates that there is an effect of all dimensions of corporate social responsibility represented by (Environmental, Community services, and Human resources) on SMEs performance, and all of these dimensions were found to influence positively based on the value of impact coefficients, and therefore all sub-hypotheses of the study are accepted. The Coefficient value of Environmental dimension, which reached (0.160), indicates that Environmental ranks last in terms of impact on SMEs performance in Romania among the dimensions examined by the study within the application of Corporate Social Responsibility, as well as the Coefficient value reached (0.325), which belongs to the Community services dimension, which indicates that this dimension is ranked second in terms of order, and the Coefficient value related to the human resources dimension reached (0.490), which indicates that this dimension ranks first in terms of impact on SMEs performance in Romania among the dimensions examined by the study within the application of Corporate Social Responsibility.

Conclusion

This study aimed to find the impact of corporate social responsibility by its dimensions that are (environmental, community services, and human resources) on SMEs performance in Romania. It is a quantitative research approach by which the researcher collected the data by using questionnaires. Where only (540) questionnaires were applicable to analysis among stakeholders, managers, and directors of financial departments who work within non-financial SMEs in Romania. Furthermore, the study resulted in a group of findings, as what will be discussed below:

First, there is a positive and direct impact of corporate social responsibility on SMEs performance. That can be justified because, in general, corporate social responsibility has an effect on society and building a better community. It also reflects the SMEs success strategy where it helps in creating a critical ethical attitude

among employees by making them responsible to accomplish their public tasks. The result is consistent with the studies conducted by Singh (2021) and Ullah et al. (2020), where their studies resulted in having a positive relation between corporate social responsibility and business performance.

Second, there is a positive and direct impact of environmental dimension on SMEs performance and it is found to have the least impact among other dimensions. That might be justified since environmental dimension of corporate social responsibility plays a vital role among several environmental issues, such as: using water and changes in climate. Where taking environmental issues into consideration will be useful in saving costs and generating revenue that will be reflected by the enhancement of a SMEs performance. The result is consistent with the studies conducted by Al Qaisi (2019) and Naseem et al., (2018), where they found that there is a positive impact of environmental dimension and business performance.

Third, there is a positive and direct impact of the community service dimension on SMEs performance and it is found to have the second most impact among other dimensions. That can be justified where corporate social responsibility can have an opportunity to be involved and participated by communities within different levels in a certain society. Therefore, there is a benefit within a community itself and SMEs by seizing diversified benefits that will lead to enhance SMEs performance. This result is consistent with the study conducted by El Moslemany and Etab (2017) where the study resulted in having a positive impact of the community dimension on business performance.

Fourth, there is a positive and direct impact of the human resource dimension on SMEs performance and it is found to have the greatest impact among other dimensions. That might be justified due to the essential role of human resource in developing corporate social responsibility. Where developing corporate social responsibility at SMEs, is important in dealing with societal issues within its workers. That will ultimately lead to an enhancement in performance. This result is consistent with the studies conducted by Gimeno-Arias et al. (2021) and Franzoni et al. (2021) where there is a positive relation between human resource dimension and business performance.

The researcher faced a set of limitations while conducting the study such as: difficulty in reaching SMEs, lack of studies related to the topic of the study in Romania, where the researcher was unable to perform comparisons, and the researcher was unable to use content analysis for the selected SMEs annual reports so that the use of a questionnaire was required.

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Smooth Transition Approach for Monetary Policy Shocks over the Business Cycle

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Abstract

The empirical assessment of the monetary policy shocks represents an area of interest widely studied among macroeconomic research papers due to the implications for both central bank and economic agents, respectively. Given the fact that the economies are characterized by asymmetries over the business cycles, it becomes challenging for the monetary policy authorities to ensure price and financial stability. The method proposed in this paper is a Bayesian Smooth Transition Vector Autoregressive model (STVAR) that allows for nonlinearity via a two regime-dependent model. This dependence is defined by a logistic function to switch between cyclical positions when the economy is "overheated" (i.e., positive output gap) and periods when the actual output is below potential output (i.e., negative output gap). To assess the effects of a contractionary monetary policy shock on the economic activity, we use the real economic growth and inflation, all variables at a quarterly basis. The transmission mechanism is presented in this paper into a comparative analysis between three Central and Eastern European countries classified as emerging markets (Czech Republic, Poland, and Romania). Results suggest that a contractionary monetary policy shock that, according to the literature, is expected to decrease the gross domestic product and lower inflation produces different effects over the business cycle and across distinct states. Subsequently, the estimated effects of the shock are gradually dissipated in the medium term.

Keywords: monetary policy, smooth transition, regime switching.

JEL Classification: E52, E30, E32, E42.

1. Introduction

The monetary policy transmission mechanism represents an area of interest widely studied among economic research papers. To the extent that monetary policy shocks are essential for policy analysis, especially in times marked by uncertainty and data revisions, the key empirical question of this paper is how the effects of these shocks vary over the business cycles. The answer to this research problem is

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important not only for policymakers to maintain price stability and sustainable economic growth, but also for economic agents to form their decisions. The objective of monetary policy is to stabilize the domestic economy by reducing the variability of prices and output growth. Changes in interest rates affect consumers directly through the cost of borrowing, while stable prices and steady real economic growth ease the economic and financial planning (Cecchetti, 2000).

Most empirical research papers assess the interaction between monetary policy and macroeconomic variables in a linear setup. According to economic theory, a contractionary monetary policy shock depresses economic activity and increases inflation, producing effects in the same direction, similar to a supply shock. The vector autoregressive multivariate models, estimated via classical econometric techniques or Bayesian inference are widely used to investigate the interactions between macroeconomic variables and the effects of shocks using impulse response functions. However, nonlinear models, such as regime-switching ones, highlight the existence of asymmetries in the transmission mechanism of shocks. This class of models permits the assessment of this mechanism that depends on the regime, on the subject to structural changes. These shifts could be abrupt (e.g. Markov-Switching, Threshold models) or gradual which are referred to as smooth regime switches or transition models. In this paper, we implement a Smooth Transition Vector Autoregressive model (STVAR) using the Markov Chain Monte Carlo method, more specifically the Metropolis Hasting algorithm, following a method similar to Auerbach & Gorodnichenko (2010) and Gefang & Strachan (2010).

The rest of the paper is structured as follows: the next section presents a survey of the literature, followed by the aim of the paper. Then, we present the methodology of the STVAR model implemented in this study and the framework of data introduced. Section 5 presents the results, and the last section concludes.

2. Problem Statement

The data-driven economic mechanisms are often time-varying such that a specific model could perform better in some periods and worse in others, resulting in a non-linear (e.g., state-dependent) evaluating and forecasting performance. Our focus on nonlinearities related to the monetary policy transmission mechanism is justified by two important stylized facts. First, macroeconomic time series display asymmetric behaviour over the business cycles (see, among others, Lo, Piger, 2005). Second, monetary policy features non-identical dynamics in boom and bust periods. The literature presents different exhibitions of asymmetry, in the direction and the size of monetary policy action; or asymmetry related to the business cycles phases (Weisse, 1999; Lo, Piger, 2005).

In the first instance, Taylor (1993) specified a monetary policy rule where the short-term interest rate increases if the inflation is above the target and the actual output is above the potential output. The effects usually appear with a delay, because policymakers tend to smooth adjustments according to expected future movements in inflation and output gaps. The original version of the Taylor rule has been modified in many ways, to incorporate nonlinearities and to indicate asymmetric

preferences of the central bank. However, studying a Taylor rule could also require expert judgment and rational forward-looking behaviour. Thus, a straightforward framework to study the interaction between monetary policy and economic data series is represented by vector autoregressive models. Additionally, Bayesian methods improved upon frequentist ones because this approach allows incorporating prior information about the parameters into posterior probability statements (Miranda-Agrippino, Rico, 2018).

Regime–switching models have received attention over the last years aimed at measuring, testing, and forecasting the economic variables. Among others, the seminal work for these is related to Chan and Tong's (1986) for threshold autoregressive models (TAR), Hamilton's (1989) for Markov-switching regime, and Teräsvirta's (1994) in the case of smooth transition models. For the last class of models, which is the one implemented in this research study, there are two different perspectives for state indicator. This could be defined either as logistic function (LSTAR) or exponential function (ESTAR). But, given the fact that there are findings for identification and estimation issues that make ESTAR models unsuitable for econometric modelling (Buncic, 2019), we prefer the logistic approach to control for the smoothness of the transition function. Among others, the LSTAR approach is implemented by Teräsvirta (1994), Lopes & Salazar (2006), and Dijk et al. (2002).

Within the literature that employs a regime-switching type of nonlinearity of effects of monetary policy during recessions and expansion, Peersman & Smets (2002) use multivariate extensions of Markov-Switching regressions allowing one to endogenously determine the phase of the economy and test the existence of different effects in the two states. The results estimated suggest that, on average, the short-term interest rate movements have significantly larger effects on output growth in recession than in boom periods. Bruns & Piffer (2021) prove similar conclusions by extending the smooth transition vector autoregression model to allow for identification under external instruments and sign restriction.

After years of empirical research and methodological advances, there is still uncertainty around the effects of monetary policy. The magnitude and the sign of the responses depend on the dataset, identification strategy, model specification, and also on the sample period. Hence, imperfect and asymmetric information or price rigidities are some of the reasons that increases in short-term interest rates could lead to countercyclical responses entitled „puzzles". This is equivalent to a short-term increase in output or prices in response to monetary contraction during recessions.

Bolboacă & Fisher (2019) investigate via a recursive identification the state-dependent effects on news shocks about technological information indicating that the probability of a regime switch is highly influenced by the news shocks. Moreover, the response to a news shock is larger in an expansion than in a recession, the intuition for those differences is related to increased uncertainty of the economic agents about what to expect when the economy is in recession.

A different strand of the research field investigates the relationship between monetary policy and uncertainty, arguing that the uncertainty shocks have been recently identified as one of the drivers of the business cycles. Therefore, some

counterfactual simulations suggest that the effectiveness of monetary policy actions is more pronounced in expansions than in recessions (see Caggiano et al., 2017).

3. Research Questions / Aims of the Research

We contribute to the state of the art by studying whether the monetary policy of shocks produces effects conditioned by the state of the economy (expansion vs. recession). The analysis is conducted on three Central - Eastern European emerging markets that point out similar economic characteristics (Czech Republic, Romania, and Poland).   To distinguish between periods that the economy is situated on expansionary or recessionary phases, we estimate the cyclical component of the economy via a classical Hodrick-Prescot filter. The regime-dependence is represented by a logistic function for switching between cyclical positions when the economy is "overheated" and periods when the actual output is below the potential output.

The results presented in this paper validate the hypothesis of the existence of asymmetric behaviour of the central bank over the business cycle. We also find some counterintuitive responses, defined by the literature as "economic puzzles", that could be potentially explained for example by the price rigidity. Moreover, these results could potentially indicate the need for another way of identification of shocks, such as sign restrictions (Uhlig, 2005) rather than the Cholesky decompositions. Also, we demonstrate that for the Czech Republic data, the hypothesis of nonnormality is rejected, therefore we did not perform impulse response functions.

The quarterly dataset used in this paper is based on macroeconomic variables that are useful to be chosen when studying the possibility of nonlinearity of the business cycles. In this context, we use the short-term (3-months) interbank interest rates as a proxy for the monetary policy rate, introduced in absolute differences in the VAR model. Also, we include the economic growth calculated as a percentage change of real gross domestic product and a measure of core consumer prices inflation calculated from a harmonized index of consumer prices excluding food, energy, alcohol, and tobacco. All series are provided by the Eurostat database for the period 2003Q1-2021Q3. The evolutions are illustrated in Figure 1 to Figure 3.

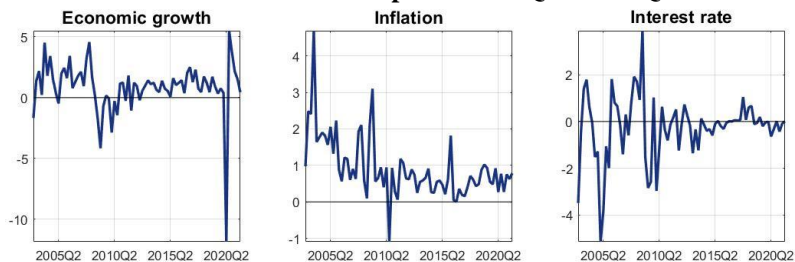**Figure 1. The evolution of data series in period 2003Q1 – 2021Q3 for Czech-Republic**
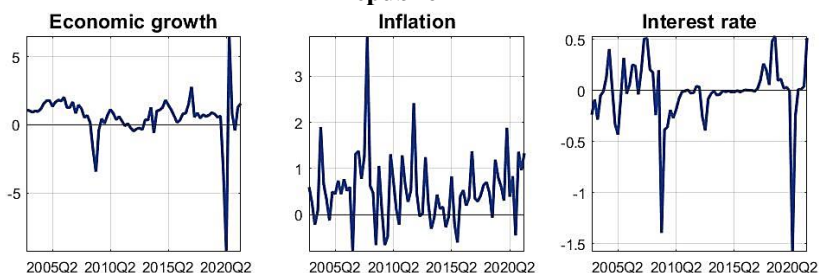
Source: Authors'calculations, data available on Eurostat.

Figure 2. The evolution of data series in period 2003Q1 – 2021Q3 for Poland
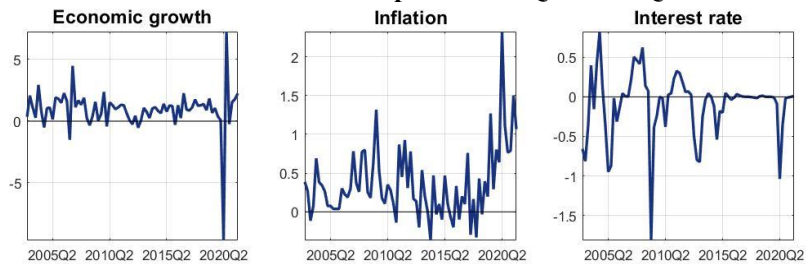
Source: Authors'calculations, data available on Eurostat

Figure 3. The evolution of data series in period 2003Q1 – 2021Q3 for Romania

Source: Authors'calculations, data available on Eurostat.

We test linearity versus nonlinearity by applying Akaike Information Criteria (AIC) and Bayesian Information Criteria (BIC). According to Table 1, for the Czech Republic, it has been rejected the nonlinearity hypothesis in the vector autoregressive model. If we apply the methodology presented in the section above, the results are not conclusive. In the case of Poland, the values for linear and non-linear models are very close, even if the non-linear model is not recommended. Therefore, we will estimate the Smooth Transition Autoregressive model only for Poland and Romania.

Table 1. Lag length criteria (AIC and BIC) for non-linear model vs. linear model

Country	Non-linear model		Linear model	
	AIC	BIC	AIC	BIC
Czech - Republic	-3.4215	-3.2035	-2.7089	-2.6155
Poland	-3.2642	-3.0463	-3.0842	-2.9908
Romania	0.96747	1.1854	1.2458	1.3392

Source: Authors' contribution.

4. Research Methods

The methodology introduced in the following is closely related to the smooth transition vector autoregression model (STVAR) using Bayesian estimation techniques as in Auerbach & Gorodnichenko (2010) and Gefang & Strachan (2010). In this paper, the smooth regime-switching model allows for differentiated responses to monetary policy shocks across recession and expansion. We define these two

regimes by the deviations of actual GDP from its potential, assessed by a logistic function $F(s_t)$. This can be interpreted as the probability of the underlying regime 2 (recession). The model specification for the vector of data Y_t is represented as

$$Y_t = \left(1 - F(s_{t-1})\right)\sum_{j=1}^{p} A_{1,j}Y_{t-j} + F(s_{t-1})\sum_{j=1}^{p} A_{2,j}Y_{t-j} + \varepsilon_t \tag{1}$$

$$u_t \sim N(0, \Omega_t)$$

$$\Omega_t = \left(1 - F(s_{t-1})\right)\Omega_1 + F(s_{t-1})\Omega_2 \tag{2}$$

$$F(s_t) = \frac{e^{-\gamma \hat{s}_t}}{1 + e^{-\gamma \hat{s}_t}}, \quad \gamma > 0, \quad \hat{s}_t = \frac{s_t - \mu}{\sigma_s} \tag{3}$$

The nonlinear vector autoregressive process of order p allows for two types of difference in the propagation of structural shocks as in Auerbach and Gorodnichenko (2010): i) dynamic via differences in lag polynomials and ii) contemporaneous via differences in the matrix of covariances of disturbances. In other words, this basic specification of the nonlinear model could be set up as a weighted sum of two linear models with the estimated coefficients for the lagged variables (A_1, A_2) and the matrix of covariances of the residuals (Ω_1, Ω_2).

The regime-switching is assumed to be captured by the first order logistic smooth transition function $F(s_t)$, defined by the transition variable s_t, which is normalized so that γ is scale-invariant. Parameter $\gamma > 0$ determines the speed of the smooth transition. In this paper, for a smooth curvature, we calibrated it to 10 due to the Auerbach & Gorodnichenko (2010) findings suggesting that point estimates for γ to be above 5 and 10, so that the model to be best described by switching regimes at certain thresholds. When $\gamma \to \infty$, the transition logistic function becomes a Dirac function and the model converges to a two-regime threshold VAR. When $\gamma = 0$, $F(s_t)$ is constant, equal to 0.5 the model collapses to a linear VAR. This convention of non-negative γ, permits that the behavior of the system described the coefficients matrix A and covariance matrix of residuals Ω to be in a (sufficiently) deep recession (i.e. $F(s_t) \approx 1$) or being in a (sufficiently) deep expansion (i.e. $1 - F(s_t) \approx 1$).

The parameter estimates and their standard errors are computed using Monte Carlo Markov chain methods. Following Bayes' theorem, the prior is combined with the information contained in the data, as captured by the likelihood function to obtain the posterior probability distribution for the estimates.

The log-likelihood function that has to be maximized is:

$$\log L(\theta) = constant - \frac{T}{2}\log|\Omega_t| - \frac{1}{2}\sum_{t=1}^{T} \varepsilon_t' \, \Omega_t^{-1}\varepsilon_t \tag{4}$$

Where the vector of

$$\varepsilon_t = Y_t - \left(1 - F(s_{t-1})\right)\sum_{j=1}^{p} A_{1,j}Y_{t-j} - F(s_{t-1})\sum_{j=1}^{p} A_{2,j}Y_{t-j}. \tag{5}$$

Conditional on γ, Ω_1, Ω_2, the coefficients can be estimated by minimizing $\frac{1}{2}\sum_{t=1}^{T} \varepsilon_t' \, \Omega_t^{-1}\varepsilon_t$. If we note

$$W_t = \left[\left(1 - F(s_{t-1})\right)Y_{t-1} \quad F(s_{t-1}) \, Y_{t-1} \, \ldots \left(1 - F(s_{t-1})\right)Y_{t-p} \quad F(s_{t-1}) \, Y_{t-p}\right]$$

It can be proved that the first-order condition with respect to A is given by the representation

$$vecA' = (\sum_{t=1}^{T}[\Omega_t^{-1} \otimes W_t' W_t])^{-1} vec (\sum_{t=1}^{T} W_t' Y_t \Omega_t^{-1}) \qquad (6)$$

To ensure positive definiteness of the variance-covariance matrix, we estimate the alternative vector $\Psi = [chol(\Omega_1), chol(\Omega_2), A_{1,j}, A_{2,j}]$. To compute the posterior estimates we implement the Markov Chain Monte Carlo (MCMC) simulation via Metropolis- Hasting algorithm using MATLAB R2018a software.

5. Findings

As we mentioned before, we identify the transition between the two distinct phases of the business cycle, recession, and the expansion using a state variable given by the output gap, calculated by a simple Hodrick - Prescott filter. The transition between these two distinct economic regimes is smooth, as a result of logistic indicator function $F(s_t)$. In the last representation of Figure 4 and Figure 5 it is drawn the regime indicator, meaning that for a level of 1, there is a 100% probability for the economy to be situated in periods with negative output gap (as we can see the outbreak of COVID-19 pandemic crises in 2020, that generated significant drops in output, both for Poland and Romania).

Figure 4. The state variable and the transition function for Poland
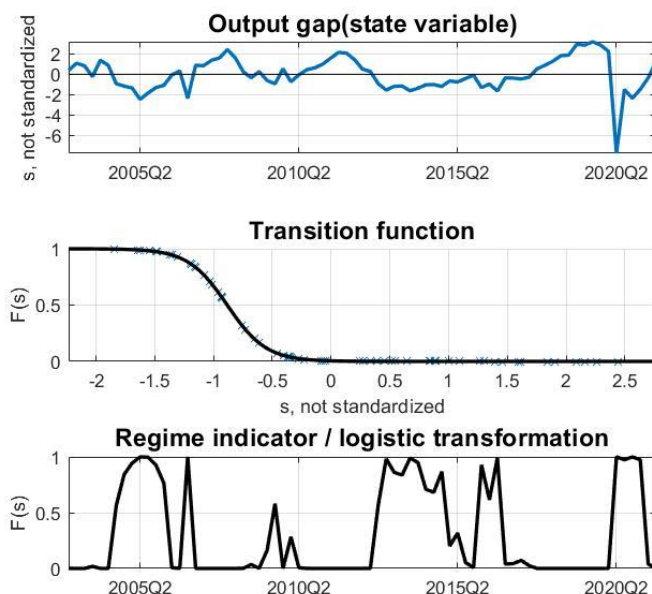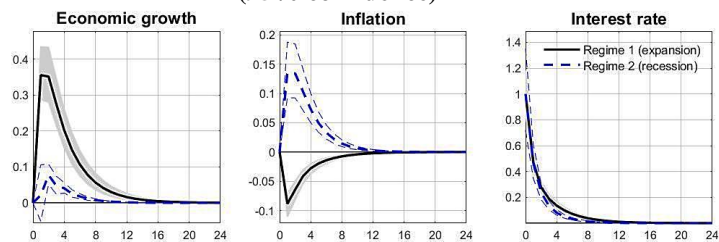

Source: Authors' contribution.

Figure 5. The state variable and the transition function for Romania
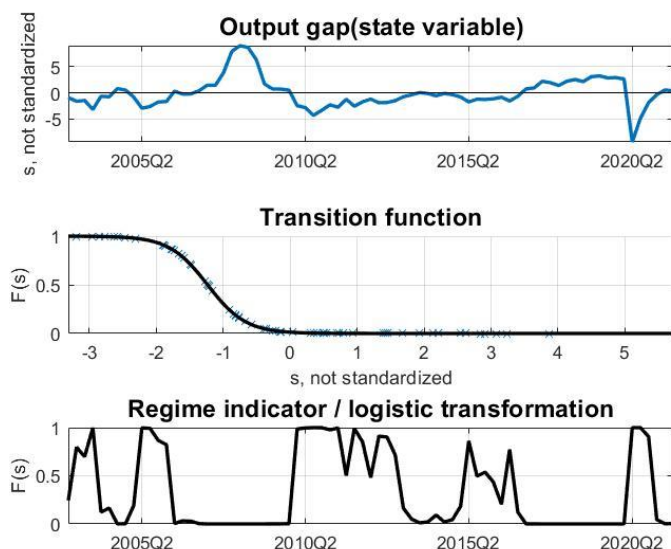
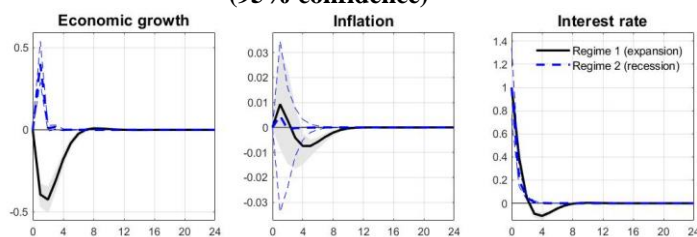*Source:* Authors' contribution.

Following an increase of one standard deviation in the short-term interest rate, the responses of the shock in output and inflation are represented in Figure 6 and Figure 7. In the case of Poland, we can see results that are in line with economic theory only regarding inflation in Regime 1 (expansion). Most exactly, an increase in interest rate, decreases inflation with about 0.05 percentage points when economy is above its potential. For the recession case, we can observe a "price puzzle" that is potentially explained by the nominal price rigidities or other factors that are not quantified in this research study. The economic growth seems to be positively driven by a monetary policy shock in expansion, while for the second regime, the results are not significant at 95% confidence level.

Figure 6. Impulse responses functions of monetary policy shock for Poland (95% confidence)

Source: Authors' contribution.

**Figure 7. Impulse responses functions of monetary policy shock for Romania
(95% confidence)**

Source: Authors' contribution.

As for Romania, an increase in the interest rate depresses economic activity in expansion by almost 0.5 percentage points, while for prices, the results don't put forward economic interpretation due to the fact that there are outside of confidence interval. Also, the estimated effects of the shock are gradually dissipated in the medium-term. A better way to address these issues is a different calibration of parameters or the identification of business cycles phases by a multivariate, much complex filter.

6. Conclusions

This paper attempts to assess the monetary policy mechanism from the perspective of a smooth transmission of shocks at the macroeconomic level. This analysis is developed for the CEE countries that have similar characteristics in terms of the business cycle. The method introduced in this study is widely used among research papers and it is based on the Bayesian Smooth Transition Vector Autoregressive model (STVAR) that allows for nonlinearity via a two regime-dependent model.

The preliminary results reject the hypothesis on nonlinearity for the Czech Republic economy, therefore, this specification of the model is not appropriate to be applied in this case. Consequently, we estimate the impulse responses of the monetary policy shock for Romania and Poland. We obtain results that are in line with economic theory (i.e., an increase in interest rate depress economic activity and diminish inflation) only in expansion regime for inflation in Poland. Similarly, in an expansion regime, the economic growth is decreased in Romania's case. Also, there are shreds of evidence of "price puzzles", possibly explained by the factors that are not incorporated in this study. These findings could be a starting point for further developments in the area by including other variables and recalibrating the model.

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The Contagion Effect on the Romanian Capital Market in the Context of the COVID-19 Pandemic

Ela-Andrada PUȘCAȘU[1]

Abstract

The capital markets' activity is often disturbed by turbulences that quickly extend worldwide due to complex links existing between countries. Even though the COVID-19 crisis first broke out in the healthcare sector, the negative effects extended rapidly to the financial sector, capital markets being one of the major affected activities due to lockdowns, shutdown of non-essential activities, decrease in capital flows, and changes in investors' behavior. The scientific literature in the field proposes different methodologies in order to study volatility and the contagion effects, in recent times focusing on GARCH models' application to study the contagion during the global financial crisis (2007-2009), at the same time developing research papers for the coronavirus pandemic period. This paper investigates the contagion effect between the Romanian stock market and the stock markets of other twelve countries worldwide during the COVID-19 pandemic crisis. The study applies the Dynamic Conditional Correlation GARCH model to daily stock returns of market indexes from selected countries for the period January 2016 - April 2021. The breakpoint due to crisis is identified using the Chow test for structural breaks by testing possible dates that mark changes in the Romanian capital market. The results show a significant increase in the mean of dynamic conditional correlation coefficients between Romania and most of the other selected stock markets in the crisis period compared to the pre-crisis period, especially in relation with Italy, Hungary and United Kingdom. The findings prove the existence of contagion between Romania and most of the selected stock markets. The paper contributes to the field of study by investigating the effects of the recent global health crisis on stock markets' movements and by studying the contagion effects on the emerging Romanian capital market in these turbulent times.

Keywords: Financial crisis; contagion; COVID-19; Romania; GARCH-DCC model.

JEL Classification: E44, G15, N2.

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1. Introduction

Prolonged periods of economic development are often disturbed by economic, political, or other types of turbulence that expand at a rapid pace across countries due to the complex links existing between them. The COVID-19 pandemic crisis broke out at the regional level in China's health sector and escalated rapidly, leading to the infection and death of millions of people. To contain the negative effects of the virus, it was necessary to impose generalized protection measures, but the adverse effects of the pandemic were not limited to the health sector alone, affecting also the commercial and financial sectors, global supply chains, and stock markets.

The financial systems have adopted measures to counter the pandemic negative effects and to encourage consumption and investment, measures such as: decreasing the monetary policy interest rate and the minimum reserves and supporting access to financing sources for households, SMEs, and corporations. Capital markets are one of the main activities affected due to lockdowns, the shutdown of non-essential activities, and the decrease in capital flows and changes in investors' behaviour.

Figure 1 shows the evolution of the economic growth rate from the end of 2015 to mid-2021 in the selected countries. Historically, a similar trend has been observed up to the emergence of the COVID-19 pandemic.

The economic growth rate's evolution for the period between the first and the third quarter of 2020 is correlated with the COVID-19 cases expansion worldwide. China is the first to experience an economic decline in the first quarter of 2020, while the other selected countries are lagging in terms of economic response, with GDP decreasing in the second quarter of 2020 as the COVID-19 infection spread across Asia and other continents. After the first pandemic wave, the economies are slightly increasing, their recovery depending on the epidemiological situation of each country, its ability to manage the crisis and to respond to shocks.

Figure 1. Evolution of quarterly economic growth in selected countries (%)
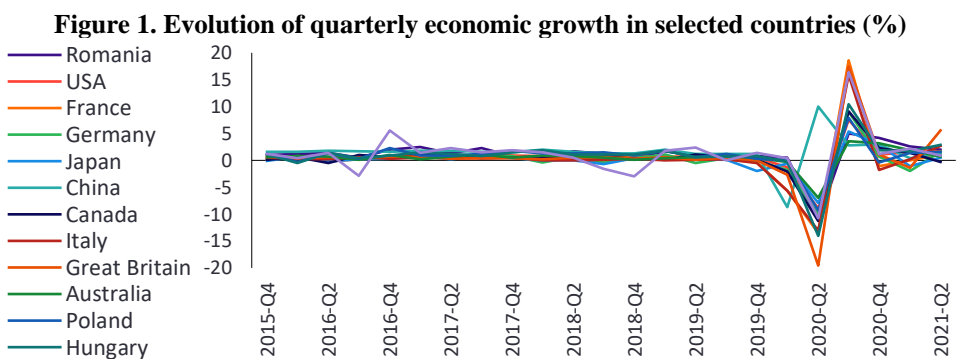
Source: OECD database.

Further on, the paper details in chapter 2 the current state of the scientific literature regarding the contagion in international financial markets, followed by the research statement (chapter 3), the study's research methods (chapter 4) and the empirical results (chapter 5).

2. Problem Statement

Capital markets influence economic growth and are considered a barometer of the health of the economy (Kazi, 2011). The relationship between capital markets was analysed in the early period by Granger and Morgenstern (1970), their study focusing on the interdependence between markets. Further on, research papers studying stock markets correlations were developed, such as Ripley (1973) and Panton et al. (1976), where simultaneous movements in the share price were the result of factors such as geographical proximity, currency relations, and trade partnerships, cultural and economic elements.

Bekaert, Garcia and Harvey (1995) indicate that capital markets have a crucial role in the economic development of emerging markets because properly functioning markets ensure that the right prices are obtained for securities. The links established between financial markets and economic growth relate mainly to the diversification of risks' exposure, companies being able to choose riskier projects with higher returns, and households being able to invest at a higher level than their economies.

The concept of contagion was introduced around the 1990s to distinguish between the classic transmission of a crisis that occurs through links to the real sector and the one transmitted through the financial markets. Contagion is defined as a significant increase in the links between financial markets after a shock has been applied to a particular country, as measured by the extent to which asset prices or financial flows move simultaneously across financial markets relative to the same simultaneous dynamics in calm periods (without crisis). (Dornbusch, Park, Claessens; 2000). A crisis can be identified by a sudden and acute fall in stock prices that persists for a relatively long period of time, with stock index values providing the most concise information on the capital market (Burzala, 2016).

Moreover, the need to achieve results on the transmission of financial market disturbances in order to identify and implement public policy measures to increase market resilience is imperative in recent years as the financial sector is developing and crises are more frequent (The Great Economic Crisis of 1929-1933, Black Monday in 1987, Dot-Com crisis of 2000-2002, Financial crisis of 2007-2010, Sovereign debt crisis in Europe in 2009-2019, COVID-19 pandemic crisis).

Alper and Yilmaz (2004) analyse the contagion of share returns' volatility from emerging markets and financial centres to the Turkish capital market since 1992. The methodology involves simple rolling regressions that identify periods of persistent volatility on the Istanbul Stock Exchange and the contagion of volatility to this capital market, while also applying a GARCH model to obtain solid estimates. The results show an increase in volatility and its persistence in the Turkish capital market around prominent economic events such as the economic crisis of 1994, the Russian crisis of 1998, the Marmara earthquake of 1999, and the crisis of 2001.

Kazi et al. (2011) investigate the spillover effect between the US stock market and 16 OECD member countries in the context of the global financial crisis of 2007-2009. The methodology is based on the GARCH model of dynamic conditional correlation developed by Engle (2002), applied to daily share price data for the period 2002-2009. An upward trend of the DCC coefficients between the US capital

market and those in the OECD countries is identified from October 2007 onward. Finally, the simultaneous movement of major capital markets in times of crisis highlights the contagion between the US capital market and those of the selected OECD member countries, a relationship confirmed by several previous studies.

Burzala (2016) tested whether the approach developed by Orlov (2009) is relevant to capital markets and whether high-frequency fluctuations are the result of lagged reactions or are caused by simultaneous reactions. The research carried out indicates that the return rates on the European markets studied react simultaneously to a much greater extent as a result of interdependencies between them or as a response to the situation observed on third-country markets, than as a result of mutual contagion.

Da Silva et al. (2016) investigate the impact of the 2008 financial crisis and the contagion effect by studying the cross-correlations between the closing price of indexes in G7 countries. The methodology involves computation of the DCCA cross-correlation coefficient and construction of an index, defined as the share between the post and pre-crisis coefficient value. The results show a positive cross-correlation of the index, the financial crisis of 2008 leading to a greater grouping of capital markets in G7 countries, and the effects of the crisis spreading to most countries. Thus, a movement in a particular stock market leads to similar changes in other markets.

The scientific literature on the economic effects of the COVID-19 pandemic crisis recently began to develop as Baker et al. (2020) and Zhang et al. (2020) explore the effects of the pandemic on aggregated markets, and McKibbin and Fernando, (2021) show the effect of COVID-19 outbreak on the global economy.

In this context, Akhtaruzzaman et al. (2021) are investigating the effects of the COVID-19 pandemic on firms' profitability, the financial contagion generated by them and the implications for portfolio composition. The results show that dynamic conditional correlations between the securities' return in China and those in the G7 countries have increased significantly in the pandemic period. The results also show that China and Japan are net transmitters of spillover effects during the outbreak, the financial contagion effect following a similar pattern to that of virus contagion.

The scientific literature regarding the effects of the coronavirus pandemic on financial markets, and, more specifically, on stock exchange movements and contagion, is still scarce even after two years of the global health crisis. The difficulty in studying this topic arises from the ongoing pandemic situation, the data being limited and uncertain, while the crisis consequences, both short and long-term, and are not fully revealed. At the same time, the emerging capital market of Romania attracts investors rather on a regional level, not having the power to influence more developed markets. The research papers studying its connection with other capital markets have expanded in recent years, but are still limited and slow to incorporate recent changes in international stock exchanges.

Thus, the present paper contributes to the field of study by investigating the effects of the recent global health crisis on stock markets' movements and by studying the contagion effects on the emerging Romanian capital market in these turbulent times.

3. Aims of the Research

The research aims to study the effects of the contagion on the Romanian stock market of other twelve international capital markets in the context of the COVID-19 pandemic by using a DCC-GARCH model.

4. Research Methods

The database includes information on the daily closing prices for thirteen stock indexes, for the period from 1st of January 2016 to 30th of April 2021:

Table 1. The countries and stock indexes selected

Country	Stock exchange index
Romania	BET
United States of America	Nasdaq 100
France	CAC 40
Germany	DAX 30
Japan	Nikkei
China	Shanghai Composite Index
Canada	TSX 60
Italy	MIB
Australia	AII Australian 50
United Kingdom	FTSE 100
Poland	MSCI Poland
Hungary	MSCI Hungary
Turkey	BIST 100

Source: Author's analysis.

The stock index return $R_{i,t}$ is computed as the logarithmic difference of the closing price of each stock index $P_{i,t}$ using the formula: $R_{i,t} = \log\left(P_{i,t}/P_{i,t-1}\right) \times 100$ and subtracting the mean of each series' values. The data sources mainly consist of the financial platform Investing.com and the stock exchanges' websites.

The methodology applied refers to a Dynamic Conditional Correlation GARCH (DCC-GARCH) model applied to the daily price return of the stock indexes from the thirteen countries selected. For this, the structural break within the data series has to be identified. The applied model is based on the research conducted by Kazi et al. (2011), where the empirical study refers to the methodology of Engle (2002).

To identify the structural breaks, a Bai-Perron test is performed on the BET index data series, this approach allowing for the estimation of several structural breaks of a linear model estimated using the least-squares method.

Following the application of the Bai-Perron test on the BET index closing price series between January 2016 and April 2021, three structural breaks were identified, as can be seen in the table below. Analysing the SARS-CoV-2 infection cases, as well as authorities' announcements and the news, there is no link between the evolution of the financial market and the epidemiological situation, the identified structural breaks being caused by other factors. At the same time, applying the Bai-Perron test on the BET index return data series, no structural breaks were identified.

Table 2. Bai-Perron test results

	BET closing price	BET return
Break test	0 vs 1 * *(1373.907)* 1 vs 2 * *(1030.438)* 2 vs 3 * *(115.4271)* 3 vs 4 *(10.86373)*	0 vs 1 *(5.691192)*
Break dates	17.02.2017 28.06.2019 17.07.2020	-

Note: The numbers in parentheses show the Bai-Perron F-statistic for each hypothesis testing. *Significant at 0.05 level

Source: EViews output, Author's analysis.

Further on, the date from the pandemic period that could be a structural break in the BET index data series was identified based on news, press releases, and regulations passed by the authorities. The selected dates were checked using the Chow test to identify if they prove to be a structural break or not.

Thus, the Romanian capital market experienced a structural break for both the BET closing price and the BET return on 17th of March 2020, the day following the establishment of the state of emergency in Romania due to the global pandemic situation. Therefore, because of the global spread of the coronavirus, an immediate reaction of investors is observed based on the increased uncertainty of macroeconomic conditions and global markets. The table below shows the Chow test F-statistic when the date of 17th of March 2020 is tested as a structural break:

Table 3. Chow test F-statistic when testing 17th of March 2020

	BET closing price	BET return
F-statistic	347.1240***	5.1958**

*Significant at 0.10 level; **Significant at 0.05 level; ***Significant at 0.01 level.

Source: EViews output, Author's analysis.

Therefore, the data series was divided into two periods, the pre-pandemic time (respectively the period 04.01.2016 – 16.03.2020), and the period during the COVID-19 crisis (respectively the period 17.03.2020 – 30.04.2021).

To measure the degree of simultaneous movement between time-varying correlation coefficients, a DCC-GARCH model is applied on pairs of capital markets indexes, each being considered together with the BET index, following the steps:

First, the return series y_{1t} and y_{2t} are defined:

$$\sigma_t^2 = Var(y_t/y_{t-1}) = c + \alpha u_{t-1} + \beta \sigma_{t-1}^2 \qquad (1)$$

Furthermore, the GARCH(1,1) model is fitted to each of the return series. The standardized residual series is extracted from the GARCH fit. Let $z_{i,t}$ be the standardized $u_{i,t}$, where $i \in (1; 2)$, indicating each pair of stock indexes analysed.

For every $z_{i,t}$, the sample variance and covariance are calculated, as well as the conditional correlation coefficient is computed for each pair of stock indexes, respectively between $z_{1,t}$ and $z_{2,t}$.

The log-likelihood method is used to estimate the parameters, allowing for the conditional variance and covariance to be estimated for each variable. The log likelihood function is defined by the following formula:

$$Logl = -\frac{1}{2}(2\log(2\pi) + log|R_t| + (z_1^2 + z_2^2 - 2\rho_{12}z_1z_2)/|R_t| \tag{2}$$

Where $|R_t|$ is the determinant of the correlation matrix, computed as follows:

$$|R_t| = (1 - \rho_{1,2}^2) \tag{3}$$

The contagion effect is identified if there is a positive change between the co-movements of stock indexes returns, meaning if the mean of DCC coefficients in the crisis period is higher than their mean for the pre-pandemic period.

5. Findings

The GARCH(1,1) coefficients, estimated for each stock exchange index for the period between January 2016 and April 2021, are significant and positive, indicating that the volatility of the capital market indexes is captured by the estimated GARCH model. The table below shows the estimated coefficients of the GARCH(1,1) model of each stock index return series:

Table 4. GARCH(1,1) coefficients and standard errors

Stock index	C	Resid(-1)^2	GARCH(-1)
BET	0.000001*	0.352332*	0.654324*
	(0.000000)	*(0.012128)*	*(0.015500)*
CAC 40	0.000001*	0.192705*	0.776889*
	(0.000000)	*(0.017583)*	*(0.019573)*
Nasdaq-100	0.000001*	0.182315*	0.783815*
	(0.000000)	*(0.01795)*	*(0.019191)*
DAX 30	0.000000*	0.096176*	0.880105*
	(0.000000)	*(0.009846)*	*(0.012768)*
Nikkei	0.000000*	0.111903*	0.861736*
	(0.000000)	*(0.010315)*	*(0.012974)*
SSE Composite Index	0.000000*	0.074979*	0.915600*
	(0.000000)	*(0.006071)*	*(0.005773)*
TSX Canada	0.000000*	0.252961*	0.698035*
	(0.000000)	*(0.023404)*	*(0.03077)*
MIB Italy	0.000001*	0.156714*	0.812531*
	(0.000000)	*(0.012722)*	*(0.016896)*
FTSE 100 UK	0.000000*	0.144946*	0.813103*
	(0.000000)	*(0.016611)*	*(0.020767)*
AII Australia	0.000000*	0.131462*	0.834187*
	(0.000000)	*(0.013103)*	*(0.018174)*
MSCI Poland	0.000000*	0.059368*	0.909745*
	(0.000000)	*(0.006360)*	*(0.013237)*

Stock index	C	Resid(-1)^2	GARCH(-1)
MSCI Hungary	0.000001*	0.097603*	0.86519*
	(0.000000)	*(0.010356)*	*(0.014725)*
BIST Turkey	0.000003*	0.071970*	0.836539*
	(0.000000)	*(0.013231)*	*(0.037527)*

Note: The numbers in parentheses represent the associated standard errors. *Indicates that the coefficients are significant at the level of 5%.
Source: EViews output, Author's analysis.

The GARCH error parameter measures the reaction of conditional volatility to market shocks, a relatively high value (e.g., above 0.1) meaning that the volatility is very sensitive to market events (Alexander, 2008). Based on the empirical results, the error parameter is greater than 0.1 for most countries except Germany, China, Poland, Hungary, and Turkey. Therefore, the capital markets in most of the selected countries show immediate movements due to changing macroeconomic and financial circumstances, as was the case of the COVID-19 pandemic crisis, when health issues affected the commercial and financial sectors, increasing, in turn, the volatility in the capital markets of selected countries.

The GARCH lag parameter measures the persistence of conditional volatility, and when its value is relatively high (for example, over 0.9), it takes a long time for the volatility to disappear after a financial crisis (Alexander, 2008). Based on the above results, the lag parameter is well below 0.9 for stock indexes in Romania, France, the US, Canada, Italy, Great Britain, Australia, and Turkey, while being over 0.9 or close to it in specific cases, including Germany, Japan, China, Poland, and Hungary. Based on the results, for most of the selected countries, the pandemic's negative effects will not impact the stock markets in the long term. As the global epidemiologic situation improves and countries' economies fall back on track, the stock markets are expected to no longer be affected by the previous pandemic condition.

Based on the bivariate GARCH-DCC model estimated for the period between January 2016 and April 2021, the mean of the DCC coefficients between Romanian capital market and each of the other selected capital markets is shown below:

Table 5. Mean of DCC coefficients

	Before crisis	In time of crisis	% Difference
CAC 40	0.306	0.483	58.0%
Nasdaq-100	0.206	0.153	-25.6%
DAX 30	0.313	0.496	58.5%
Nikkei	0.230	0.374	62.5%
SSE Composite Index	0.160	0.147	-7.6%
TSX Canada	0.215	0.261	21.5%
MIB Italy	0.263	0.480	82.5%
FTSE 100 UK	0.248	0.483	94.6%
AII Australia	0.219	0.256	16.9%
MSCI Poland	0.255	0.339	33.2%
MSCI Hungary	0.237	0.439	84.9%
BIST Turkey	0.131	0.251	91.3%

Source: EViews output, Author's analysis.

The results indicate, for almost all the stock indexes selected in pair with the BET index, that the dynamic conditional correlation coefficients have higher values during the pandemic crisis compared to the pre-pandemic period. Therefore, the phenomenon of contagion in the context of the global pandemic crisis is present in most of the selected capital markets to the Romanian stock index.

The largest conditional correlation for the pre-crisis period is observed between the BET index in Romania and DAX 30 index in Germany (0.313), followed by the correlation between the BET index and the CAC 40 index in France (0.306). The overall economic activity of Romania is strongly linked with the German and French markets through capital flows, related especially to trade and investments, therefore their capital markets are also greatly connected.

For the pandemic period, the strongest correlation is with the DAX 30 index and the CAC 40 index, after the correlation coefficient increases by approx. 58%. The stock market relation between Romania and Germany or France grows stronger in pandemic times, showing that financial disturbances are transmitted faster in crisis periods than the movements in calm periods.

At the same time, the lowest conditional correlation before the pandemic crisis is registered between the Romanian stock market and the Turkish stock market, which increases by approx. 91% during the pandemic. For the crisis time, the lowest correlation coefficient is noticed between the BET and SSE composite index, the Romanian and Chinese markets not being directly linked in the financial sector.

6. Conclusions

The GARCH(1,1) model estimated for each of the thirteen stock indexes significantly captures the real movements of the stock markets analyzed. For most of the selected countries, their capital market is sensitive to market events and shocks, while the expected volatility persistence is rather low for the global pandemic period.

An upward trend is identified in the dynamic conditional correlations starting with March 2020 for most of the sample markets, from the moment when the coronavirus pandemic outbroke worldwide onward. Thus, the mean of the DCC coefficients is higher in the pandemic period than the mean of the DCC coefficient for the pre-pandemic period in most of the selected markets. The results of the empirical analysis indicating the existence of simultaneous movements between the Romanian stock index and the other twelve selected indexes prove the contagion on the Bucharest Stock Exchange from the other capital markets in the context of the COVID-19 pandemic.

Following on, the policy implications of the study refer to the urgency to increase stock markets' resilience in times of generalized crises, the authorities needing to ensure mechanisms that make markets able to cope with increased volatility. As it can be seen from the results, in crisis periods, the correlation between stock markets is increasing, which makes them more vulnerable to shocks transmitted across countries.

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Tracking Firms' Adaptation to COVID-19 in Albania

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Abstract

With the country being closed for a relatively long time, followed by the declining demand for many product categories after the opening, many businesses in Albania faced many difficulties because of COVID-19. The reduction of income to the minimum limits, on the one hand, and the inability to reduce the level of expenses, on the other hand, brought great difficulties to businesses. If we had to emphasize three key and immediate issues arising during COVID-19, they would be debt management, lack of liquidity, and fear for the future of their businesses. During the research carried out for our paper, we observed that other authors have studied these issues, but our paper brings novelty in terms of drawing comparisons of these issues over the two time spans 2019-2020 and 2019-2021. Our paper aims to study the statistical relationships between factors and their comparison for the "pre-pandemic" period and the post "pandemic lockdown" period, a period that continues with restrictions on life and social activity to manage the spread and fatalities of COVID-19. The bivariate correlation relationships for these two periods are compared by using the Pearson correlation coefficients (PCC).

Keywords: Liquidity, COVID-19, Firm size, Bivariate Correlation Relationships.

JEL Classification: M10, L25, G01.

1. Introduction

Albania experienced two devastating shocks within a very short time: the November 2019 earthquake and the COVID-19 pandemic in the spring of 2020 that forced large parts of the economy to "freeze" (ReSPA, 2020). These shocks have dominated the economic developments and the short-term perspective of the country's economy. Although the earthquake in Albania was soon followed by the initiation of the reconstruction process, the global COVID-19 pandemic was

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beginning to show its first effects in the country, effects that are obscure and entirely different from other shocks or crises that our country may have gone through. COVID-19 was expected to have a strong impact on all economic and financial indicators of the country. Like many other countries, Albania took various measures to prevent the spread of the pandemic, inflicting on the other hand serious problems on businesses. As anywhere else in the world, in Albania, the impact that the pandemic had on this category was inevitable and quite visible. Albania undertook two instruments of measures to cope with the current situation, the focus of which was debt financing by changing loan terms and employment support. Various countries, including Albania, in order to prevent the spread of the virus, took the measure of closing state borders for a certain time span. Obstacles to the movement of goods across borders affected both importers and exporters during this period.

During 2020, the lending standards for businesses, both for investment loans and liquidity, were considerably tightened. According to the Bank of Albania (2021), the tightening of these standards emerged as commercial banks perceived an increased risk due to the pandemic conditions for reduced solvency and the lack of liquidity that was observed throughout 2020. Thus, one of the main challenges of the Albanian market today, after harshly facing the consequences of COVID-19, has been the survival of entrepreneurs from the pressures of global manufacturers/suppliers who supply the Albanian market with quality and competitive prices. Our paper aims to study the correlation relationships of several factors for the "*pre-pandemic*" period and the post "*pandemic closure*" period during COVID-19. In order to have continuity and a good coordination of what has happened to businesses in our country during these two periods, the authors have come up with important results.

2. Literature Review

The COVID-19 pandemic has significantly affected businesses worldwide by reducing demand, hampering operations, tightening supply chains, and restricting access to financing (Krammer, 2021). In Hadiwardoyo's study (2020), the most affected sectors were crowd-based sectors, such as tourism and tourism-supporting businesses, including mass transportation, hotels, and tertiary products businesses, whose sales depend on public savings funds, properties, and lending institutions. The decline in commercial activities and lack of income made many firms dependent on their cash reserves to meet their obligations (Dörr et al., 2021). While temporary liquidity shocks may be overcome after economic activity resumes, an extended period of low income may eventually cause solvency problems (Guerini et al., 2020).

In their study, Wieczorek-Kosmala et al. (2021) found that firm size is a factor influencing firms' perceptions of the aggravating effect of outages that COVID-19 causes on costs, sales, financial liquidity, and access to credit, as well as business survival. Higher borrowing and higher levels of debt between firms and households

during this time make short-term shocks stronger compared to previous pandemics (Boissay, Rungcharoenkitkul, 2020).

Firms are part of the real economy that supply and are supplied with money through a series of channels (Sokol, Pataccin, 2020). Nevertheless, this pandemic might have catastrophic consequences resulting from the sudden severance of mutual relations between firms and others (Gourinchas, 2020). According to Carsslon et al., (2020), to understand the negative shocks that COVID-19 has brought to the economies of each country, it is important to understand the economic transmission channels, such as the *direct impact* (by immediately reducing the consumption of goods and services); *indirect impact* (through financial market shocks); *supply interruptions* (supply chains).

3. Methodology

The data collected for conducting this study are divided into secondary and primary data. Secondary data are collected mainly from articles in scientific journals or official websites and books, which are related to the literature review, carried out in order to establish the theoretical model used, and investigate the preliminary studies and approaches followed by them. Secondary research serves as a good starting point for any research process. Secondary research also allows researchers to collect data in a shorter period and at a lower cost. Whereas, the primary data were collected from the questionnaires addressed to a sample of selected businesses that are included in our study. Primary research is ideal if a researcher is seeking for new findings or wants to explore new aspects of their field of study. Primary research is also used to provide individual, reliable results related to a topic being researched. In order to study the correlations between economic factors for the "*pre-pandemic*" period and the relationships between economic factors for the period following the "pandemic closure", the data processing and analysis in this article were performed using SPSS software. Pursuant to the purpose of this paper, as well as with the aim of coming up with novelties and conclusions in this study, the correlation relationships (evaluated by PCC) between the factors have been considered comparatively. These relationships are compared from the following perspectives:

(i) *Qualitative*: The change in the direction of the correlative interaction between factors for the two periods. So, sign (PCC before the pandemic) ≠ sign (PCC during the pandemic);

(ii) *Quantitative*: For the relationships that maintain the direction of statistical interaction, we have compared their level of strength for significant changes (greater than 0.05);

(iii) *Statistical significance*: Qualitative change of the significance level by turning the correlation relationship into statistically insignificant and vice versa.

4. Results and Discussions

'Liquidity' Analysis According to Bivariate Correlation Relationships

In times of crisis, the management of activity and working capital, in particular, takes on a special importance, as even a small mistake may cause a loss of liquidity for firms (Chang et al., 2019). Liquidity was one of the most severe consequences of COVID-19 for individuals, firms and countries. The lack of liquidity due to the closure and restrictions burdened firms with obligations, which they continue to carry even today. This crisis knew no age, stratum, or power. In the sample analysis considered in the study:

(i) it is clearly noted that the age of Albanian firms, which bears *per se* their maturity and financial stability in the market, did not affect their response to the crisis.

(ii) the increase in the size of firms is in a positive relationship with exports, and this relationship is stable even in times of pandemics, although it has no impact on the firm's income. This suggests that firms concentrate their revenue mainly in the domestic market.

(iii) in 2019, the changing rate of income has no statistically significant relationship with any of the other factors taken into consideration, such as loan financing, or collection and payment policies. The private sector was in a status quo in terms of economic and financial activity.

4.1 TheCOVID-19Pandemic Year: The Response of Firms under the Unexpected Regime of Restrictions

The following analyses will consist of comparing the 2019-2020 bivariate correlational relationships to the relationships that changed arising from the need to survive.

Table 1. Comparison of bivariate correlation replationships 2019-2020

		Firm Size	Firm Age	Loan Financing	Average Collection Period	Average Repayment Period	Export Sales	Revenues Growth Rate
Firm Size	PCC	1	.336*	**.376***	.350*	.267	.552**	.103
	Sig. (2-t)		.027	**.013**	.022	.084	.000	.512
Firm Age	PCC	.336*	1	.021	-.103	-.122	.049	-.174
	Sig. (2-t)	.027		.893	.509	.435	.753	.266
Loan Financing	PCC	**.290**	-.020	1	.279	**.537****	.075	.023
	Sig. (2-t)	**.059**	.900		.070	**.000**	.633	.884
Average Collection Period	PCC	.347*	.015	.225	1	.695**	.439**	.120
	Sig. (2-t)	.023	.926	.146		.000	.003	.444
Average	PCC	.243	-.151	**.250**	.678**	1	**.129**	.090

		Firm Size	Firm Age	Loan Financing	Average Collection Period	Average Repayment Period	Export Sales	Revenues Growth Rate
Repayment Period	Sig. (2-t)	.117	.335	**.105**	.000		**.411**	.566
Export Sales	PCC	.582**	.131	.130	.475**	**.307***	1	.247
	Sig. (2-t)	.000	.403	.406	.001	**.045**		.111
Revenues Growth Rate	PCC	.177	-.207	.131	.208	.202	.223	1
	Sig. (2-t)	.256	.184	.404	.180	.194	.151	
*. Correlation is significant at the 0.05 level (2-tailed).								
**. Correlation is significant at the 0.01 level (2-tailed).								

Source: Authors's calculations.

a) The statistical relationship between *'Firm Size'* and *'Loan Financing'* in 2019, was a non-significant, positive and weak relationship ($PPC_{2019} = 0.290$). During the pandemic shock year (2020), it becomes significant, positive and moderate in terms of strength ($PCC_{2020} = 0.376*$). This result reinforces the role that business size plays in credit access and financial situation (Wieczorek-Kosmala et al., 2021). In the study conducted by the Bank of Albania (2021), taking out loans to cover current expenses has marked a significant increase for all sizes of enterprises, thus reflecting the situation brought about by SARS-Cov-2 pandemic. However, small businesses have felt that financing costs and access to credit during this period have been a hindrance for them.

b) The statistical relationship between *'Average Repayment Period'* and *'Loan Financing'* changed in terms of statistical significance and quantity. From an insignificant relationship for businesses, it turned into not only a significant relationship, but also a very strong one. (PCC greater than 0.05). The average repayment period in the first year of the pandemic experienced an extension due to the very restrictions imposed by governments on reducing the transmission of virulence and tolerant policies regarding the payment of taxes and bank loans (Mano et al., 2021). However, the limited activity led businesses from banks to 'fill' their cash-boxes under reduced revenue stagnation.

c) The statistical relationship between *'Average Repayment Period'* and '*Export Sales'* changed qualitatively, losing its statistical significance during the 2020 pandemic year. Prior to the pandemic, the phenomenon of business expansion to foreign markets (exports) was accompanied by a prolongation in the timeframe of settlement of obligations to third parties. During the "pandemic closure" period, these two phenomena did not statistically interact with each other.

4.2 A Year Later, in the Presence of the COVID-19 Pandemic: Adapted Behaviour of Firms

The year 2021 is known as the year that firms began to actively adapt to the pandemic and, in a certain way, to reconfirm the manner of doing business under the new conditions. In this paper, we endeavoured to interpret this through

statistical relationships between factors and their comparison for the pre-pandemic period and the post "pandemic closure" period, a period that continues with restrictions to life and social activity to manage the spread and fatalities of COVID-19.

Table 2. Comparison of bivariate correlation relationships 2019-2021

		Firm Size	Firm Age	Loan Financing	Average Collection Period	Average Repayment Period	Export Sales	Revenues Growth Rate
Firm Size	PCC	1	.336*	.295	.373*	.187	.627**	-.069
	Sig. (2-t)		.027	.055	.014	.230	.000	.660
Firm Age	PCC	.336*	1	-.009	.009	-.158	.091	-.040
	Sig. (2-t)	.027		.955	.957	.310	.561	.801
Loan Financing	PCC	.290	-.020	1	.313*	.593**	.111	-.292
	Sig. (2-t)	.059	.900		.041	.000	.479	.057
Average Collection Period	PCC	.347*	.015	.225	1	.764**	.525**	-.367*
	Sig. (2-t)	.023	.926	.146		.000	.000	.016
Average Repayment Period	PCC	.243	-.151	.250	.678**	1	.251	-.540**
	Sig. (2-t)	.117	.335	.105	.000		.104	.000
Export Sales	PCC	.582**	.131	.130	.475**	.307*	1	-.051
	Sig. (2-t)	.000	.403	.406	.001	.045		.747
Revenues Growth Rate	PCC	.177	-.207	.131	.208	.202	.223	1
	Sig. (2-t)	.256	.184	.404	.180	.194	.151	
*. Correlation is significant at the 0.05 level (2-tailed).								
**. Correlation is significant at the 0.01 level (2-tailed).								

Source: Authors's calculations.

d) The statistical relationship between *'Loan Financing'* and *'Average Collection Period'* changed significantly. From an insignificant relationship, it changed into a significant relationship in business activity. This relationship turning into important positive links shows that, despite the fact that cash collection is an important source, the lack of liquidity in the market causes firms to finance themselves with alternative sources in the financial system. This may also be a competitive strategy that firms apply, so as to maintain their market and preserve their reputation in the sector where they operate, in such times of crisis.

e) Likewise, the statistical relationship between *'Loan Financing'* and *'Average Repayment Period'* changed in two directions, both significantly and qualitatively. This relationship becomes stronger and more significant ($PCC_{2021}=0.593**>0.5$).The prolongation of deadlines and at the same time loan financing, indicates the need for firms to maintain their business cashboxes supplied.

f) The relationship between *'Average Repayment Period'* and '*Export Sales'* loses its statistical significance in (PCC$_{2021}$=0.251, p=0.104>0.05), compared to the same relationship in 2019 (PCC$_{2019}$=0.301*). A similarly insignificant relationship has returned in 2020. This indicates that the strength of the money supply chain of domestic firms through exports has weakened, and they have a negligible impact in relation to their use as an important source for the settlement of liabilities.

g) Significant changes, both qualitative and quantitative, have occurred in the relationships between *'Revenues Growth Rate'* and '*Average Collection Period'* (PCC$_{2019}$=0.208 andPCC$_{2021}$= -0.367*)as well as *'Revenues Growth Rate'* and *'Average Collection Period'* (PCC$_{2019}$=0.202 and PCC$_{2021}$=-0.540**). From statistically and insignificantly positive relationships, they have turned into statistically moderate and strong relations, but in both cases they are significant and in the opposite direction (negative). This proves that in 2021,forAlbanian businesses, the increase in turnover was accompanied by the resilience to collect cash in in the shortest possible time. It was also accompanied by an increased correctness of the payment of obligations in the shortest possible time.

5. Conclusions

The restriction measures taken by the government in 2020 caused problems in the settlement of liabilities for the businesses under consideration. The decline in revenues due to the global pandemic was not accompanied by a reduction in liabilities. Hence, businesses still had to pay their liabilities to third parties, creditors, suppliers, while they also had to cover operating costs. While measures eased and business activity returned to normal, during 2021, businesses had to pay part of their obligations, slowly returning to the norms of the year before the pandemic.

Referring to the results and analysis of the correlations in our paper, we conclude that the average period of revenue receipts from customers has increased somewhat. This may have been caused by problems that the clients themselves may have had with their liquidity, leading consequently also to the liquidity problem of the sample businesses covered by the questionnaire to provide us with the data. The reason for these changes may have been the reduction of income, the fact that some consumers might have lost their jobs during the lockdown/closure period, etc. However, during 2021, as the situation alleviated, the average collection period has come to a decrease, approaching what it was in the year prior to the pandemic.

The closure of a large part of businesses, the reduction of revenues due to the impact of the pandemic, the increase of the average collection period, has caused businesses to have problems with liquidity. This, coupled with the fact that liabilities have remained almost unchanged, mainly rents, bank loan instalments, taxes, etc., have reduced the ability of businesses to repay liabilities quickly. As previously stated, although the lockdown measures and the pandemic itself

in 2020 had a significant impact, in 2021 the situation started to improve. Nevertheless, such a situation has not yet returned to normal, to be the same as the period before the pandemic.

In 2021, we notice that the situation has started going back to normal, and we expect to have an increase in turnover compared to the previous year 2020. This shows that in 2021, the increase in turnover for Albanian businesses was accompanied by their persistence to collect revenues as soon as possible. In addition, Albanian businesses showed an added correctness in settling their obligations in the shortest possible time.

In completion of our work through the analysis of results and findings, we come to a final conclusion for business managers, accentuating the great importance of establishing a serious balance between collection, settlement of debts, and debt financing for their businesses.

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Consequences of Exits from Political Unions on Corporate Financial Policies: Brexit Case

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Abstract

The paper addresses the impacts of political exits on the capital budgeting policies, taking the impact of the Brexit deal on the UK's companies as a practical case. The paper linked the political risk and uncertainty of Brexit and linked it directly to the capital budgeting policy of UK companies over the last years. The paper divided into two periods, the first period before the Brexit deal (2010-2015), and the second period is after the Brexit deal (2016-2021). The aim of dividing the period is to show how the UK companies were developing their capital budgeting policies before Brexit, and in presence of Brexit. The data of the study were collected through a survey which was sent to the UK companies and the answers of respondents were analyzed through statistical techniques and empirical tests to reach the final results. Therefore, the results show that there is a direct relation between political exits and corporate financial policies such as capital budgeting. In addition, the results show that (NPV, IRR, PB, MIRR, Prof. Index) are the most used techniques at UK where financial managers are preferring NPV over IRR. Moreover, the results show that the use of net present value (NPV) method decreases with the political risk, where the use of the Payback method increases with the political risk. This means that during uncertainty periods managers seek to use different methods in order to understand all the surrounded atmosphere while developing their capital budgeting policy.

Keywords: Capital Budgeting, Political Exits, Brexit.

JEL Classification: C83, D81, F51, G31.

1. Introduction

Politics is linked to some extent to economic and financial policy, where there is a significant correlation between politics and the economy of any country. As it is not possible to hide the impact of political decisions, including elections, joining, exit, or even split on the economic situation, especially on the corporate financial policies. Kinder and Mebane (1983) confirms that politics interfere in economics in

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different ways, where the political activities and decisions draw the general track of the economic policies and effect on the pattern of the economic.

Political decisions such as joining or exiting political unions have a great impact on the economic and financial level, especially with regard to the future of companies operating in those countries, and the impact of these decisions and regulations on the corporate financial policy and the performance of these companies. Thissen et al. (2020) mention that the political exits such as Brexit have a lot of implications on the UK and EU economy, trade scenarios, and the performance of the companies. In such cases, the political exits may have an effect to a large extent on the performance of companies operating in that region, especially as they may face this scenario for the first time.

Exits from the political union happened when one of the participating members wants for various reasons and considerations to leave the union, and it is often discussed between the two parties to reach a final formula that satisfies the interests of both, knowing that any political member of the union must have regulations and laws protecting entry and exit operations. According to Huysmans and Crombez (2020), historically we witness a lot of political exits from political unions and the split of some countries from each other. Often these unions were subjected to external and/or internal pressures in exercising their role, which push their members to leave it, or for any worse situation leading to the termination of the union as the case of the League of Nations and the Soviet Union.

In recent years, we have witnessed the split of many countries around the world, the most important example of which was the split of South Sudan from Sudan 2011, and Eritrea's split from Ethiopia 1993 and recently the UK's exit from the European Union 2020, which is known as Brexit. According to Acemoglu & Robinson (2012), states do not fail overnight. The seeds of their destruction are sown deep within their political institutions. Usually, most of the separated states and countries, face many challenges such as their inability to fully take advantage of the potential of their society to grow, which makes citizens suffer from social and economic problems.

As for Brexit, there were many reasons that push the UK to leave the EU. Mauldin (2016) mentions that there are three reasons that lead UK to leave the EU back to economics, sovereignty, and political elitism. First, for economics, the UK believes that the EU brings negative influences for on its economy because it is an unbalanced economic organization includes some economically troubled countries. Second, for sovereignty, Brexit is a symbol that a nationalism is rising. Lastly, for political elitism, it is beneficial for government to make policies and decisions by themselves without returning back to the EU in order to secure its interests and achieve its priorities.

Certainly, the Brexit deal will leave its impact on the performance of UK companies, but the question remains to what extent? According to Bloom et al. (2019), Brexit created uncertainty in June 2016. This uncertainty persisted with more time without agreement on the terms of the UK's withdrawal, as companies became more skeptical about the fate and terms of the deal, and whether there would be a second referendum. The UK's exit from the EU was a political and economic shock.

They studied how companies were being affected by Brexit depending on variables such as sales, prices, investment, and employment. The study contributed to tracking the views of companies throughout this period to assess the impact of Brexit and the associated uncertainty on corporate performance.

So, to which extent will the UK's exit from the EU affect the capital budgeting of UK companies where these companies have not been faced a similar situation? Also, the economic relations that will be agreed upon between the two parties and the impact of this decision on the performance of UK companies and their trading movement.

In this paper, we address the impacts of political exits on the capital budgeting policies, taking the impact of the Brexit on UK's companies as a practical case. The paper shed light on the political uncertainty of Brexit and linked it directly to the capital budgeting policies at the UK over 10 years. It also addresses the topic in a scientific manner to reach the final results. Therefore, this study shows the impact of political exit on the capital budgeting policies.

According to the nature of the topic, this paper could be useful for academics and researchers specializing in finance and economic field, as the study shows the impacts of political exits on the capital budgeting policies, taking the Brexit deal as an example. In addition, this study could be helpful for EU & UK in order to reach a suitable agreement between them, considering that any future procedure effect on the financial sector of the two parties.

The remainder of the paper is structured as follows. Section 2 addresses the theoretical background and tested hypothesis of the study. Section 3 describes the data and methodology that include the empirical tests. Section 4 shows the results and discussion of the study. Section 5 includes the conclusions and limitations.

2. Problem Statement

It is known that politics are linked in one way or another to the economic and financial policy of any country where the impact of political decisions is often reflected in economic and financial trends. O'Leary (1985) mention that it can be said that the political concept in societies is directly related to how the government carries out its political activities and applies them on the ground. However, no matter how good these practices are, they may sometimes be used incorrectly when applied to theories and practices. Therefore, the urgent need to link the political system and the financial policies of companies must be recognized as a fundamental factor in ensuring the development of companies and maintaining their continuity in light of global political and economic conditions.

It is certain that the political atmosphere has many impacts on the economic and financial policies. Political decisions such as the split of countries and the exit from political union have many impacts on corporate financial policies. According to Graham and Harvey (2001), a corporate financial policy denotes to the company's overall approach to manage its financial decisions; it also refers to how corporations deal with funding sources, capital structuring, and investment decisions. Corporate finance policy is linked to the decisions and regulations related to the financial

system within the organization and the implementation of various strategies within the corporation.

Political decisions such as the exit from the political union have an impact on the corporate financial policies, especially on the capital budgeting. For DeBenedetti (2014), changing global policy practices can cause changes in economic and financial policies continuously; sometimes it leads to a change in economic policy, and the conversion of so-called strong investments into financial disasters. As a result, companies of all types must define and mitigate political risks to avoid losses from these practices. However, capital budgeting is more than just accounts, as political climates can play a huge role in where the money is invested.

In addition, DeBenedetti (2014) mentions that the capital budget differs from the regular costs that companies cost during the operating cycle. The differences include the amount of money spent and the expected duration of the investment to generate returns. The capital budget often uses time periods greater than a year. Funds invested in income-generating facilities or equipment require capital budget accounts. International companies may have capital assets in politically unstable countries, which makes decisions to allocate critical assets critical. Countries' political performance directly affects borrowing costs and taxes, regardless of corporate regulation and policy. Erroneous political practices such as bribery and corruption have dangerous effects on most companies.

Furthermore, Holmen and Pramborg (2009) analyze the impact of the political risks and instability on the capital budgeting by applying of regression models; they found that in the presence of capital market deficient and unsystematic conditions, political risks can affect the capital budgeting. These risks are difficult to estimate, especially since they lead to higher deliberation costs, managers tend to use simple rules to make decisions about the capital budget decisions. Political risks may help to explain why firms depend on alternative methods such as the Payback method, despite their theoretical flaws. Holmen and Pramborg (2009) added that the political risks may greatly effect on the capital budgeting policy, where the prevailing political climates greatly affect the size of investment and projects. Therefore, it requires politicians to take into account the impact of any decision or agreement which may have repercussions on corporate finance policy, especially the capital budgeting.

So what capital budgeting means exactly? According to Kenton (2020), capital budgeting can be defined as the process of evaluating a potential projects or investments. Companies aim to enter into such investments in order to yield the best return over an applicable period, which enhance shareholder value and profit. Also, Peterson and Fabozzi (2002) define capital budgeting as the process of identifying and selecting investments in long-lives assets or assets expected to produce benefits over more than one year. Capital budgeting is an ongoing process, because firms must first determine their corporate strategy, which is centered on the future investments.

Many studies have been reported on the capital budgeting decision, practices, and policies. For example, Kengatharan, L. (2016) discusses about the capital budgeting

theory and practices, especially in developed countries. Also, Dayananda et al., (2002) mention that the capital budgeting practices are the investment decision taken for increasing shareholders value. Moreover, several studies have been conducted about capital budgeting practices in the US and Europe, such as (Pike, 1996; Block, 2007). Furthermore, Arnold and Hatzopoulos (2000) shed light in their study on the gap between theory and practice in capital budgeting by studying about 300 UK companies of different sizes. The results indicate that UK companies have increasingly relied on the analysis of prescribed financial books to reach the stage where the majority will use only discounted cash flows, formal risk analysis, adjustment corresponding inflation, and post-audit in their study.

Moreover, Drury et al. (1993) studied 300 manufacturing companies in the UK and analyzed their capital budgeting practices. The results showed that PB (86%) and IRR (80%) were the preferred methods. The widely used risk analysis was the sensitivity analysis. In another study for Brounen et al. (2004), four European countries such as the UK, France, Germany, and the Netherlands consisting of 313 companies during the period 2002 and 2003 were examined. The result showed that the UK companies were used 47% of NPV and 67% of PB respectively as a primary method for evaluating capital budgeting decision, whereas companies in Netherlands were used 70% of NPV and 65% of PB methods. However, companies in France and Germany reported lower usages of both methods, where in France they use 42% for NPV and 50 % for PB, and in Germany they use 44% for NPV and 51 % for PB. Also, there are many previous studies that were conducted in the US and the UK and some available studies for the Netherlands such as (Herst et al., 1997; Brounen et al., 2004).

3. Research Questions

Researchers are divided on the impact of political practices and decisions on corporate financial policies. Some researchers believe that political decisions have a weak impact on the financial policy of companies, where they believe that these issues are internal issues decided by the board of directors of each company, as they cannot determine whether or not the politics has a direct impact on the company's financial policy.

Faccio (2006) addressed that the impact of political ties mostly depends on the level of the institutional and economic development of the country, as the impact varies from one country to another. In other words, it can be said that the impacts of practicing politics can vary between one country and another, and in some cases it is not possible to say that there is no impact on a corporate financial policy. In addition, Feltri, S. et al. (2017) addressed that until the past two decades, finance researchers did not pay much attention to political economy until the impact of politics on the economy began to emerge. At that time, analysts did not study the impact of politics on the economy and on the companies' performance, thinking that there was no close relationship between them. The hypothesis below [H0] is adopted by some researchers who believe that politics charts the general framework of economic and financial policy, but it does not interfere in the corporate financial policy. These

issues are an internal matter usually decided by the BOD, managers, and stakeholders, who draw the company orientation and policies.

H0: The exits from political unions have no impact on the capital budgeting policies.

On the other hand, there are many authors that investigate about the impacts of the political decisions on the corporate financial policies such as capital budgeting. For example, Holmen and Pramborg (2009) investigates about the impact of the political risks and instability on the capital budgeting, where they found that in the presence of capital market deficient, unsystematic country specifications, political risks can affect the capital budgeting. These risks are difficult to estimate, so it is important to analyze the impacts of the political instability on the capital budgeting policies. In addition, Frederikslust, R. et al. (2008) mention that the perceived excess of the 1980s produced a major regulation of the US financial markets that affects the control market, credit markets, and the market structure. These changes have shed light on the importance of the political environment and its impact on financial and governance policies. The hypothesis below [H1] is adopted by many authors in the political and economic field, since political decisions have an effect on the corporate finance policy, especially the capital budgeting policy.

H1: The exits from political unions change the capital budgeting policies.

Political risks are often associated with high deliberation costs, where they are significant for spending resources in order to make estimates of cash flows and the risk profiles for FDIs in countries where it faces a high political risk. So, it is logic that the political decisions such as exit from the political union could have many consequences on the firm's capital budgeting policies.

4. Research Methods

This paper analyzes the impact of political exits on the capital budgeting policies during the period [2010-2021] taking the impacts of Brexit on the capital budgeting policy of UK companies. Brexit negotiations begin in 2016, and in order to study and analyze the impact of Brexit deal on the UK companies, we select a period of 10 years (2010-2021). The studied sample was applied to the UK companies, especially the listed companies of FTSE 100 and other 50 company from the UK. Data were collected from a survey sent to the selected firms and from their annual reports and FTSE 100, using both a qualitative and quantitative approach. In addition, some companies' disclosures, managerial reports, and companies' financial reports were used.

It was necessary to study the period before and after the split, to notice the impact of Brexit (2016) on the capital budgeting policy of UK companies over 10 years, dividing the studied period into two periods (before & after). The first period was between 2010 &2015, while the second one was from 2016 to 2021. Moreover, Capital budgeting policies will be evaluated through studying the techniques and methods of capital budgeting such as net present value (NPV), internal rate of return (IRR), payback period (PB), modified internal rate of return (MIRR), and profitability index (PI) that the UK companies were adopted.

Decision-makers such as managers at UK companies were identifying different types of investment projects that had been implemented by their companies in the last decade. The investment strategy was represented in future projects and long-term investments especially acquisitions and mergers. There are main factors that affect capital budgeting such as the availability of funds, capital structure, management decisions, working capital, government policy, earnings, and political stability. Several techniques could be used to reach the final decision, such as NPV, IRR, and PB. According to Schall et al. (1978), most firms use payback, accounting rate of return, internal rate of return, and net present value as a capital budgeting techniques. In addition, Oblack and Helm (1980) mention that most multinational firms adopt accounting rate of return, internal rate of return, net present value, payback period, and profitability index as reliable methods for capital budgeting decision.

The sample comprised of 150 UK companies (listed companies of FTSE 100 & other 50 company from UK), who are active companies, having a registered office address in different regions of the UK (England, Scotland, Wales, Northern Ireland). The sample was selected from different sectors of different firm sizes. Table 1 below show the industry of the firms, number of selected companies, responding companies, and their percentage.

Table 1. Industry, companies' number & percentage, responding companies & percentage

Industry	No. of Co.	Companies' %	No. of Responding Co.	Responding Co. %
Agriculture	1	1%	1	100%
Chemical industry	3	2%	1	33.3%
Clothing	3	2%	2	66.7%
Construction	4	3%	1	25%
Financial Services & Insurance	30	20%	7	23.3%
Food Industry	26	17%	5	19.2%
Machinery and Equipment	6	4%	2	33.3%
Media	8	5%	1	12.5%
Medical Industry	7	5%	1	14.3%
Mining	8	5%	0	0%
Petroleum & Gas Industry	8	5%	1	12.5%
Software & Computer Services	10	7%	2	20%
Support Services	16	11%	8	50%
Telecommunications	2	1%	1	50%
Travel & Leisure	10	7%	3	30%
Other	8	5%	0	0%
Total	150	100%	36	

Source: Own work, 2022.

On March 15, 2022, the questionnaire was sent to the selected companies and their financial managers. The responsibilities of financial managers include collecting and using available funds in effective ways to achieve targeted financial goals. Those managers are responsible for setting and implementing the company's financial policies, and they also participate in the implementation of the company's overall objectives, through the development of strategies, plans, and conducting of control activities. Therefore, it can be said that they are familiar with the activity and performance of the company as a whole. The participation of these executives and financial managers in this study provides the required information and contributes to conveying an objective picture of the impact of Brexit on the performance of companies in order to give the research reliable scientific evidence. A cover letter was written at the top of the page of survey to the respondents that outlines the study's objectives and assures for participants about the study's safeguarding of confidentiality.

A follow-up reminder was sent out to non-respondents through emails on March 30, 2022. On April 15, 2022, 36 out of the 150 questionnaires were received. Consequently, 36 completed questionnaires were returned. The respondent's analysis gives a net response rate of 24% (36 completed questionnaires out of 150). The response rate is acceptable compared with more recent UK-based surveys (e.g. 19.09% was achieved by Alkaraan, 2020; 19.60% was achieved by Abdel-Kader & Luther, 2008). 62% of the respondents are financial managers, 14% are financial controllers and working in the financial department, and the remaining 24% are chief executive officers. Most of the respondents have a finance and accounting background and a years of experience in that domain.

The data and methodology are aligned with previous studies such as (Alkaraan, 2020; Northcott & Alkaraan 2007; Abdel-Kader & Luther, 2008; Harris, Emmanuel, and Komakech, 2009), where previous studies collect their data through a survey and depending on the annual reports of the studied firms. Previous studies included in their surveys many questions about the capital budgeting practices and decisions. Indeed, we follow the same strategy in our study, by sending a survey to the selected companies and through access the annual reports of these companies.

However, the important factor in this methodology was the study of the impact of the political factor such as Brexit on capital budgeting policy for UK firms, where the managers were asked about the impact of Brexit on their capital budgeting policy. It was important to show the impact of the political factor, since political stability and government policy are a main determinants of the capital budgeting policy.

5. Findings

After receiving the questionnaire of the UK companies who were filled by the financial managers and executives, we convert the results into charts and tables for analyzing and processing. Then we use the collected data to start the regression analysis in order to understand the consequences of the political factors such as Brexit on the capital budgeting policy, through analyzing the responses of UK companies during the period (2010-2021).

The results show that the applicants' age was between 32 & 52 years, where the average age was 42, which means they have a lot of experience in their domain and position. Also, 53% of the respondents were males, while 47% of the respondents were females. In addition, the last academic degree for the respondents were divided as follows: 25% holding a Bachelor's degree; 58% holding a Master's degree, and the remaining 17% holding a PhD Degree. These statistics indicate that all of them have an academic degree and have a finance and accounting background with many years of experience. Furthermore, the respondents' companies were divided into four countries as follows: 50% from England, 19.4% from Scotland, 16.7% from Wales, and the remaining 13.9% from Northern Ireland. It seems that the large number of respondents were from England, while the smallest portion from Northern Ireland.

In addition, the results show that a combination of capital budgeting techniques is implemented by most companies in evaluating their financial performance, as shown in the table below. Table 2 shows the number of the UK companies that were adopting the capital budgeting techniques over the studied period in order to analyze their future projects and investment where most firms adopt these five techniques (NPV, IRR, PB, MIRR, Prof. Index). It was necessary to mention the impact of the Brexit Deal on the UK companies in order to know its consequences on the Firms' decisions regarding capital budgeting policy especially when entering any new project or investment where some questions have been added in the survey to detect the firms' response to Brexit impacts.

Table 2. Descriptive statistics

Before Brexit [2010-2015]				After Brexit [2016-2021]			
Techniques	No.	Mean	St. dev.	Techniques	No.	Mean	St. dev.
NPV	34	4.77	0.93	NPV	30	4.33	1.5
IRR	31	4.43	1.41	IRR	28	4.12	1.68
PB	16	2.67	2.03	PB	21	3.32	2.01
MIRR	5	1.56	1.40	MIRR	7	1.76	1.60
Prof. Index	4	1.43	1.27	Prof. Index	6	1.67	1.51

Source: Own work, 2022.

Prior research findings such as (Pike, 1996; Abdel-Kader & Dugdale, 1998) indicate that financial managers prefer IRR over NPV. In contrast, the current study ensures that the NPV technique has enjoyed greater loyalty from the managers of different UK companies compared to IRR, confirming with the findings of the survey (Alkaraan, F. 2020). Moreover, we can notice that the other techniques such as Payback period, MIRR, and Profitability Index were used as a secondary technique before Brexit. But after 2016, when the UK started its referendum to leave the EU and in the next years reaching to 2021, it seems that UK companies start depending more on those methods especially payback period believing that Brexit will bring additional uncertainty and risks in the coming years, where they should consider the impacts of the Brexit related laws on their capital budgeting policy.

Figure 1. Disrtibution of capital bidgeting techniques used by UK companies before and after Brexit
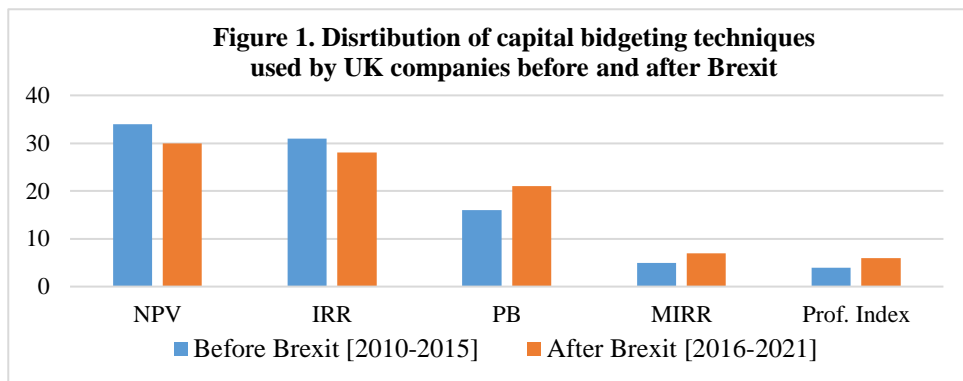
Source: Own work, 2022.

The results of Figure 1 aligns with the findings of Holman and Pramborg (2009) when they investigate the Swedish firms' use of capital budgeting techniques for Foreign Direct Investments through a survey. The results show that the use of net present value (NPV) method decreases with the political risk where the use of the Payback method increases with the political risk. This type of behavior might partly explain why respondents find that alternative methods such as the payback method, modified internal rate of return, or profitability index are frequently used despite their theoretical drawbacks. This means that during uncertainty periods managers seek to use different methods in order to understand all the surrounded atmosphere while developing their capital budgeting policy.

Moreover, we have included direct questions about Brexit in the survey sent to the UK companies in order to discover the impact of Brexit on capital budgeting policies. The results show that 63.9% of respondents were taken partially into consideration the impacts of Brexit, where 22.2% were considering totally the impacts of Brexit on their capital budgeting policy from all its aspects, where the remaining companies 13.9% were not considered the impacts of Brexit during developing their capital budgeting policies. Figure 2 below shows the distribution of the consideration of the impact of Brexit deal during the development of capital budgeting policies for UK companies.

Figure 2. Consideration of the impact of the Brexit during developing capital budgeting policy of UK Companies
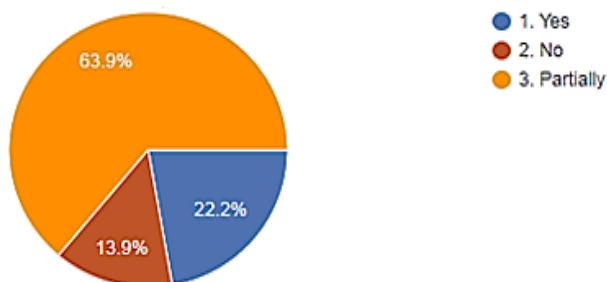
Source: Own work, 2022.

Moreover, the survey takes into consideration the risks and opportunities of Brexit during developing their capital budgeting policies. The results seem similar to the previous question in Figure 2, which is logical, since when developing your capital budgeting policy, you should be alert for the risks and opportunities of the surrounding factors especially, if it is a political factor. For example, Holmen and Pramborg (2009) consider that the political factor is one of the important factors during developing the capital budgeting policy.

Moreover, the results show how brexit had changed the capital budgeting policy for UK companies. Figure 3 below shows the results' distribution, where 72.2% mention that political factors such as Brexit require more time and effort to develop the capital budgeting policy taking into consideration the Brexit-related laws. Also, 22.2% mention that while developing their capital budgeting policy, they take into account the impact of Brexit while engaging in new investment projects. Others 8.3% mention that Brexit imposed new conditions and criteria for mergers and acquisitions. The remaining 5.6% believe that Brexit has not changed their capital budgeting policy.

Figure 3. How Brexit had changed the capital budgeting policy for UK companies
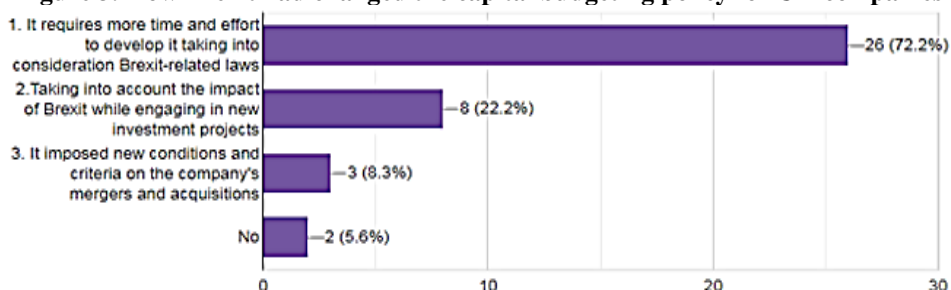
Source: Own work, 2022.

Also, managers were asked about how brexit affected their capital budgeting policy, whether positively or negatively. The results show that 44.4% cannot determine the imapct of Brexit on their policy specifically, while 36.1% mention that Brexit has a positive impact on their position and performance, while 19.4% mention that Brexit will leave a negative impact on their performance. Figure 4 below shows the distribution of Brexit's impact on the capital budgeting policy for the UK companies.

Figure 4. How Brexit affected capital budgeting policy for UK companies
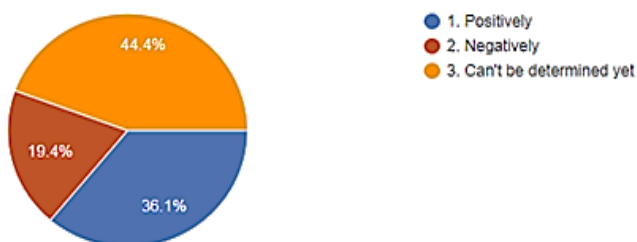
Source: Own work, 2022.

For those who consider that Brexit will have a positive impact on their companies, they believe that Brexit will bring a lot of privileges and advantages when it is applied. For ecample, 53.8% of them believe that Brexit will bring less EU restriction and more freely trade with the non-EU markets, where they will be allowed to trade freely with other markets all over the world. Moreover, 46.2% believe that Brexit will help them and give them the chance and opportunity for growth and involving them in new projects outside the EU. Figure 5 below shows the the positive impacts of the Brexit on the UK companies.

Figure 5. Positive impacts of Brexit on capital budgeting policy of UK companies

Source: Own work, 2022.

On the other side, some managers consider Brexit to have a negative impact on their companies for many reasons. For example, 57.1% believe that Brexit will increase the level of unpredictable and volatile for UK business, while 42.9 % believe that Brexit will create a tariffs in face of the UK exports and products. Figure 6 below shows the negative impacts of Brexit on the UK companies.

Figure 6. Negative impacts of Brexit on capital budgeting policy of UK companies
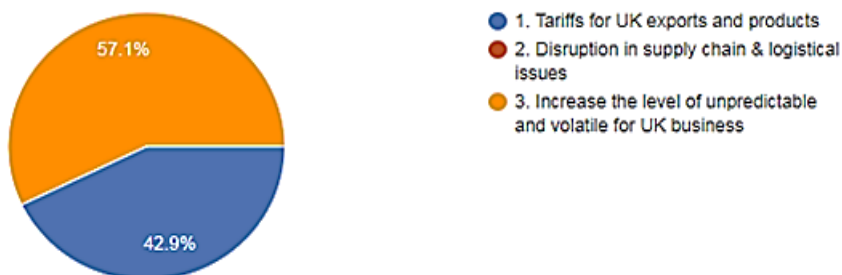
Source: Own work, 2022.

As a result of all I have mentioned before in the tables and figures, it appears that Brexit will cast its shadow over the UK companies, as it will have its repercussions and impacts on UK businesses. Many managers have stated that Brexit will have an impact on where UK companies should take into account the impact of Brexit on their companies' performance.

6. Conclusions

The paper sheds light on the impacts of political exits on the capital budgeting policies, taking Brexit as a practical case. The paper linked the political uncertainty of Brexit and linked it directly to the capital budgeting policy of UK companies. The studied period divided into two stages, before (2010-2015) and after Brexit (2016-2021).

The study data was collected through a survey which was sent to the UK. The apllicant's respondent age was between 32 & 52 years, where the average age was about 42. Furthermore, 53% of the respondents were males and 47% of the respondents were females. Also, the academic degrees were divided as follows: 25% holding a Bachelor's degree; 58% holding a Master's degree and its equivalent, with the remaining 17% holding the PhD Degree.

In addition, the results show that a combination of capital budgeting techniques is used by most companies, but the financial managers prefer NPV over IRR in the normal situation while they rely more on additional techniques mainly payback period during uncertainity period. The results show small decreases in the use of NPV and IRR method with the political uncertainty, where the use of the Payback method increases with the political uncertainty.

Also, the results show that 63.9% of respondents were taken partially into consideration the impacts of Brexit while developing their capital budget policy, while 22.2% were considering totally the impacts of Brexit on their capital budgeting policy, where the remaining companies 13.9% were not considered the impacts of Brexit at all.

Moreover, managers were asked about how brexit affected their capital budgeting policy, whether positevly or negatively. The results show that 44.4% can't determine its impact, while 36.1% mention that Brexit has a positive impact, and the remaining 19.4% mention that Brexit will leave a negative impact on their performance.

So, it is obvious that Brexit will leave its impact whether (positive or negative) on the UK companies, as it will have its consequences on UK businesses and trade movement. These indicators support the H1 Hypothesis, which ensures that the Brexit deal has a direct impact and changes the capital budgeting policies.

Finally, there are two main limitations to this study. First, the time constraints, which prevent us from giving the respondents more time, because the deadline was (one month from sending the survey). Second, many companies did not respond to the survey, which prevented us from providing a comprehensive picture of the topic.

Acknowledgment

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Economic Liberalization, Privatization and Globalization Hodge-Podges: Ethiopian Manufacturing Firms Retort from Marketing Perspectives

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Abstract

This study has been focused on examining examine the dynamics of liberalization, privatization, and globalization in relation to export performance for Ethiopian privatized manufacturing firms since 1991. To achieve these objectives, cross-sectional data was collected from 114 fully privatized manufacturing firms through key informant approaches and structural equation modelling (SEM) was used. This model identified liberalization, privatization, and globalization as independent variable under competitive priority mediating role for export performance. The model tells that all the predicting variables (LPG) in the hypothesized model were significant at P< 0.05 and this shows that economic liberalization, privatization, and economic globalization affect export performance under all competitive priority. The finding shows that LPG stimulates export performance under firm's competitive priority an intervening role. The competitive priority of firms comprises cost, flexibility, and quality priority. Those measures confine arouses export performance in terms of both quantitative (market share, profit) and subjective measures (export satisfaction) indicators. The extent of law-and-order commitment towards financial and non-financial incentives) and the overall trade openness use as liberalization indicator.

Keywords: Economic Liberalization, Privatization, Globalization, Manufacturing Retorts, Export.

JEL Classification: M10, M31, M40, M50.

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1. Introduction

In today's corporate environment, marketing theories have been in state of flux and have been influenced by a variety of factors. The global market is currently equivocated due to irregularities in a variety of business contexts. From a marketing point of view, among other things, government political ideology in this case, the commitment and willingness toward economic liberalization, intention towards privatization of state-owned enterprises from unescapable influence of globalization considered as a business shifter (Donahue, 1989). Those variables are prominent, which govern the business in both developing and developed nations Boycko et al. (1993). Liberalization, privatization and globalization (LPG) are powerful forces that expressively change structural and/or operational marketing strategies (Fuerst, 2010). Regardless of its effect, experts in different countries have varied levels of comprehension and sympathy for those principles. Because the concepts are muscularly aligned with the government's ideological and political inclination (right or left-wing orientation), the government's political and ideological orientation, commitment to liberalize the economy, privatization commitment, and understanding of globalization differ.

Because of the change in advancement of technology, we are living within, which is the so-called economic globalization, international marketing has endured a metamorphic change. International marketing desires economic integration more than ever before. The overall marketing system in a global market scenario, the firm's strategy, competition among nations, and even competition among firms become volatile. In the Ethiopian context, the easiest and somewhat less risky international marketing entry strategy is exporting. Exporting is one of the market entry strategies and the internationalization approach. Exporting continued the most popular marketing entry strategy adopted by the firm especially in the developing economy. It provides a high degree of flexibility and cost effectiveness through quickly penetrating new international markets (Samiee, Chirapanda, 2019).

Government intervention in the economy has endured substantial change since the beginning of the 1980s (Fuerst, 2010). The Keynesian welfare state has been evacuation in the developed democracies of the Organization for Economic Cooperation and Development (OECD) to other parts of the world (Potrafke, 2020). In the international competitive stage, ownership structure and measures both in the home and host nation expressively stimuli its export performance. Private and public owned firms have different success factors in the international market stage. Public owned firms encounter continuous performances problem. The performance problems are due to deprived motivations unenthusiastic managerial behavior, leaving managers considerable discretion to pursue their personal agendas rather than focus to the assigned responsibility. State-owned enterprises progressively privatized to the private sector to eliminate the existing problem of public firms and strengthen competitiveness in a competitive environment (Leykun, 2020).

The principal characteristic of public owned firms in Ethiopia dominated by inefficient and mostly managed by politically affiliated individuals rather than well-oriented professionals. The political economy was apt for the monopoly position,

while others depended on excessive government subsidiary Boycko et al. (1993). Instead, private owned enterprises have upright management commitment, follow-up, and better business performance profiles due to egoistic nature of individual for your private business. Furthermore, study by (Rodríguez, 2007) evidence that organizational as well as national economic policy is closely tied to organizational growth, international marketing competitiveness and performance of privatized firms.

Regarding the political economy, between 1974 and 1991, Ethiopia was governed by a socialist political ideology under a stern centralized political system. This ideology strongly contended that government policies and strategies are high degree of rigidity and stringency. The system creates economic distortion and market inefficiency in all sectors of the economy, including the manufacturing sector. After two decays, strategically and ideologically different opponents ruling partly came to power, Ethiopian People Revolutionary Front (EPRDF) presumed different policy adjustment and macro-economic reforms including privatization of inefficient state owned enterprises (SoEs). Even the nation starts to privatize those state-owned enterprises, still as compared other African countries, with regard to adoption of privatization policies, Ethiopia is considered as a late starter in market reforms (Carter, 2013).

The other paradox with regard to reform is that the motive behind economic reform and privatization which was implemented mainly not by own initiatives, but rather due to international pressure like donors and debtors (Ismail, 2018; Carter, 2013). On the other hand, large accommodated public debt leads to national budget deficit (Ismail, 2018) poor performance of state-owned firms in terms of production efficiency, marketing, and poor growth prospects of SoEs (Jesiah, 2014). For instance, the then government, EPRDF (currently changed to prosperity party PP since 2019) which took power in 1991, the government support with policy and strategy for the implementation of structural economic policy adjustment program. The program was led by the World Bank and the International Monitory Fund (IMF). The principal objectives of the program were predominantly center on privatization intended to improve the use of scares public recourses, enhance firms operating and dynamic (Verick, 2006).

Decays after 1991, in 2004, state-owned enterprises in Ethiopia account for 72% of the total manufacturing value added, 62% of the gross value production, 57% of the manufacturing labor forces, and 64% of wage and salaries (Winters et al., 2004). After a Capel of years' Privatization policy adjustment expedition, the process was problematic in its implementation. For example, most of the privatized firms were sold to the single-family owned enterprises (W/yohannes, 2015). In the early stage of the privatization process, there is a problem of selection, which public enterprises were first privatized for whom it transferred. The government simply focus merely on transfer ownership from public to the private owners irrespective of the structural and operational wellbeing of the private firms. Because of this, most of the public owned firms privatized in 1990s were to one or two dominant private owners, and it creates private monopoly. Furthermore, the privatization process is riddled with

corruption and malpractices. This circumstance forces the government to reconsider the privatization procedure and modalities, and forced to renationalization of some privatized companies before.

Changing an organizational structure as well as government orientation is vital due to the change in dynamic business environment due to globalization. Globalization crafts an opportunity on one hand and threats in the other pole, but it is up to the firms capability to adapt their organizational structure and strategy accordingly (Rodríguez, 2007). Globalization helps to the firm to improve productivity and uses its unique competence through gasping global market (Asongu, Nwachukwu, 2017, Items et al., 2016).

2. Problem Statement

As export is the easiest and the most popular marketing entry strategy in the internationalization process, the Ethiopian export sector, however, lacks dynamism relative to other countries even in the same continents. The structure of Ethiopian export in terms of firm, product, and destination countries has remained stable and relatively unbending as compared to countries with similar stage of economic development Brülhart & Schmidheiny, (2018).

Firstly, Ethiopia, characterized by law rate of firm's entry in to exporting, and secondly, the average life span of a given firm product - destination connection is significantly below the international average. Because of lack of vitality and dynamisms in the past Capel of decays since 1991.

Brülhart & Schmidheiny, (2018) suggest that the Ethiopian exports lack dynamism because of an excessive foreign exchange and certain government intervention through forcing firms to maintain export link even at an operational loss due to political advantage. However, between 2009 and 2016, the average production in manufacturing sector reached to fivefold and average sales rises by 600 percent. Still, the average value of manufacturing export per firm, while increasing between 2009 and 2013 has subsequently declined. These rises enquiry about the potential reasons why manufacturing exports growth are insignificant and lack of determination.

From the world economic experiences, the business environment is rapidly changing due to the advancement of technology. Advancement of technology has also expressively affected the world international trade pattern. Globalization improves the free trade condition and the limitless transaction alters the dynamics of international spare of competition. It is also supported by the international trade theories adopted to the fast-changing nature of production process led to enhancement of technological capability (Fischer, 2012).

The exporting firms which have superior technological capability, in the global market can sheltered a better resources utilization by enhancing process innovation and can achieve higher differentiation to the user in diverse market environment (Yu, Richardson, 2015).

The firm's export performance was the most widely studied and researched but least understood and argumentative area in international marketing. The problem

among researchers was a different degree of conceptualization, operationalization, and measurement of export performance constructs. Thus mostly, the conclusion leads to inconsistency and conflicting results (Chitauro, 2021). In addition to this, most of the studies focus on the internal/ organizational factors that affect export rather than macro environmental factors. Therefore, in this research, liberalization, privatization and globalization as a macro business environment which affect the export performance of the Ethiopian manufacturing sector. Subsequently, the influence of LPG on the export performance of the firm's still unexploited area of research.

Then, the way how to manage the dynamics of marketing environment, national economic policy with respect to ownership structure of firm matters the success of the business irrespective of the level of development. In this research, therefore, investigate the effects of LPG as a multiple effect on international market competitiveness and firm's export performance with a particular interest in privatized manufacturing firms in Ethiopia.

3. Hypothesis of the Study

Hence, national policy and international business environment make organizational resources control and overall structural changes and make up of firms, it's necessary for firm's international market competitiveness and export performance. Given that, these opportunities are more likely to enhance firms export performance. Then, the hypotheses of the study can be stated as:

H1: Firms Liberalization measures (Law and order, Incentive schemes, and trade Openness) do not have a positive and significant effect on firm's competitive priority.

H2: Privatization measures (operational, organizational and structural measures) do not have a positive and significant effect on the firm's competitiveness priority.

H3: Globalization (Global market opportunity, global market threat and global market uncertainty) does not have a positive and significant effect on firm's international competitiveness priority.

H4: Liberalization measures (Law and order, incentive schemes, and trade openness) do not have a positive and significant effect on firm's export performance.

H5: Privatization measures (operational, organizational and structural) do not have positive and significant influences on firm's export performance.

H6: Globalization (global market opportunity, global market threat, and global market uncertainty) does not have a positive and significant effect on firm's export performance.

4. Research Methods

The researcher used a mixed research approach and data collected from 114 fully privatized manufacturing enterprises with random proportional sampling techniques. Those firms diverse in terms of their degree of production and marketing capacity, level of economic strength, and competitiveness Foreign Policy, (2001, 2003),

(Sciences, 2014). The key informant technique Campbell et al., (2017) was used to collect data. The total sample size was determined by using the sample size determination formula developed by (Cochran, 1963). The total sample size for the total number of firms included under investigation was calculated at 95% degree of significance as, 114 firms proportionally. The unit of analysis in this research is the manufacturing firms and primary data collected at the firm level.

4.1 Variables

Firm-level export performance studies, (Samiee, Chirapanda, 2019) use three way categorization, that is economic (sales related, profit related, market share related), non-economic (market related, product related and miscellaneous), and generic measures (degree of satisfaction, perceived export success and degree to which export objectives have been fulfilled). Other options are to divide (export) performance in to the three dimension of effectiveness, efficiency, and adaptability (Weinberg et al., 2001). The other sales-related measures, profit-related measures (Chitauro, 2021). All these measures can be dignified either objectively or subjectively, however, measuring export performance both objectively and subjectively is preferable. The multidimensionality of the concept and the choices for objective and subjective proxies clearly recur in this study. This entire factor taken in to account the researcher identify the research variables as shown in Table 1 below.

Table 1. Research Variables

Research variables		Indicators	No items	Label	Expected sign
Independent variables	Liberalization	Law and order		LaO	(-)
		Incentive schemes		InsS	(+)
		Trade openness		TrdO	(+)
	Privatization	Ownership measure		Om	(-)
		Structural measures		Sm	(-)
		Operational measures		Om	(+)
	Globalization	Global market opportunity		GmO	(+)
		Global market threat		GmT	(-)
		Global market uncertainty		GmU	(-)
Predicted variables	Export Performance	Subjective Measures	Export satisfaction	Esat	
			Perceived export success	PexpP	
		Objective Measures	Market share	MakS	
			Financial performance	FinPerf	
Mediating variables	Competitive Priority	Cost		CotP	(-)
		Flexibility		FlxP	(+)
		Quality		Quatp	(+)
Control variables		Firm age		Fage	(+)
		Management commitment		MgtC	(+)

Source: Author's own calculations.

To establish the relationship between variables, structural equation modeling (SEM) was used based on the assumption supported by the theory. Structural equation modeling is a combination of factor analysis and linear regression (Monroe, 2020). It helps to justify the acceptance and rejection of proposed hypothesis by analyzing Structure Equation modeling tries to justifying the acceptance or rejection of proposed hypothesis by analyzing the direct effects and indirect effects of mediators on the relationship of independent variable and dependent variable. The unobserved factors were correlated with the explanatory variables in the model. To achieve the structural equation modeling, this study applies a methodology used in the previous research (Paiva et al., 2008). They recommended four-step data analysis, which were (a) Testing the assumption of multivariate analysis, (b) Carrying out an explanatory factor analysis (EFA) with Varmax rotation to examine the underlining dimension of the liberalization, privatization and globalization construct, (c) Appling confirmatory factor analysis (CFA) to test the measurement model extracted, (d) measuring the relationship between variable.

To perform multivariate analysis, first expected to test the major assumption related to sample size requirement, scale of measurement to the variables, normality, multi-collinearity of data (Hair et al., 2012). Regarding the sample size, as suggested by (Hair et al., 2012), adequate observation between 100 and 200, then in this research the sample size taken was 114 which is in the acceptable range and fairly adequate. The normality of the data measure based on the skewness and kurtosis of the study variables that is within the acceptable range (± 1), suggested by the distribution symmetry (Paiva et al., 2008), (Egger, Walker, 2019). The correlation among the variables were checked and found less than 0.9 which indicate there is no multi-collinearity problem (Hair et al., 2012). Those basic assumptions of the multivariate model were tested and ensured that there is no statistical violation to perform the analysis.

5. Findings

As explained, privatized export-oriented firms taken for this study. The descriptive study displays a summary statistic on the variables used, and the manufacturing categories are as presented (Table 2).

Table 2. Descriptive Statistics

Types of manufacturing firms with respective categories				
	Frequency	Percent	Valid Percent	Cumulative Percent
Food and Beverage Industries	50	43.9	43.9	43.9
Textile and wearing appeals	17	14.9	14.9	58.8
Chemical and chemical products	9	7.9	7.9	66.7
Nonmetal minerals manufacturing	11	9.6	9.6	76.3
Furniture and home Appliances	9	7.9	7.9	84.2

Types of manufacturing firms with respective categories					
		Frequency	Percent	Valid Percent	Cumulative Percent
	Tanning and dressing skins, leather manufacturing	8	7.0	7.0	91.2
	other, like batteries motor vehicles bodies and rubber, plastic products	10	8.8	8.8	100.0
	Total	114	100.0	100.0	

Source: Author's own calculations.

From the table most of the cases, 50 from the food and beverage industries and the textile and wearing appeals represent 17 out of the overall samples respondents. These two types of manufacturing firms account for around 58.8% of the respondents in the study.

5.1 Exploratory factor analysis

To identify the dominant indicators as a requirement of the study, exploratory factor analysis (EFA) was used. Exploratory factor analysis with Varmax rotation was used because it helps to assess the unidiamintionality of the construct (Psomas et al., 2013). Exploratory factor analysis analyzed interrelationship among items on the measurement scale, and during the validation process, items with a factor loading of less than 0.5 were deleted (Talib et al., 2013). The reliability of the instruments was measured using the Cronbach's alpha coefficient (Posner, 2006). It is the most commonly used technique to measure internal consistency or homogeneity of scale (Talib et al., 2013). The alpha value of each factor were identified as Lib =0.890, Priv =0.882, Glob =0.863, ComPrio =0.889 and ExpPerf =0.819. These alpha value exceeded the minimum acceptable level of standard set, which is 0.7 (Posner, 2006). The result is summarized in the table below.

Table 3. Instrument Reliability

	Cronbach's Alpha	Rho. A	Composite Reliability	Average Variance Extracted (AVE)
CompPrio	0.889	0.905	0.928	0.722
ExpPerf	0.819	0.921	0.939	0.755
Glob	0.863	0.912	0.944	0.850
Lib	0.890	0.915	0.931	0.772
Priv	0.882	0.947	0.958	0.852

Source: Author's own calculations.

In this study, the slow parsimonious normed fit index for evaluation of the measurement model, during the estimation of the measurement model, an examination of the modification indices and standardized residuals exposed an opportunity for a better model fit. The convergent validity and discriminate validity were establishing by using confirmatory factor analysis. Convergent validity evaluated for the confirmatory factor analysis based on (1) factor loading (k), which is factor loading of all indicators should be more than 0.5 to be acceptable, (2) with regard to the composite reliability (CR), should exceed 0.70 and then (3) the average variance extracted (AVE) by every construct should be greater than 0.50 (Hair et al., 2012). The factor loading (k) for all value are were above 0.5, the composite reliability (CR) of every factor greater than 0.7 and the average variance extracted by every constructs is more than 0.5, which indicate a sound convergent validity of model as shown table (3). CR is a favorable indicator of convergent validity, considering the actual factor loading (k) instead of assuming that every item is fairly weighted during composite load determination. Composite reliability of all latent constructs is not within the acceptable limits but also exceed the benchmark of 0.7, it indicates measure of latent constructs is internally consistent. Discriminate validity of constructed measured based on the method designed by Fornell and Larcker (1981), as proposes, the squared correlation between any two construct should be less than the variance extracted by either of the individual constructs.

The KMO measures the sampling adequacy, which should be greater than 0.5 for a satisfactory factor analysis to further process. A very close to 1 indicates that, patterns of correlation are relatively compact, and so factor analysis yields distinct and reliable. The acceptable value is greater than 0.5as acceptable, but value below 0.5 lead to more data collection or think about the variables, which will be included in the model Kaiser (1974). However, values between 0.5 and 0.7 are good, but values above 0.9 are excellent. For this data, the value of 0.882 indicate that, the data is good, and then the factor analysis is appropriate. With respect to Bartlett Test of sphericity, which measure the strength of relationship between variables, from the data, it is significant associated with probability is less than 0.05 at a standard level of significances. The test for these data is 0.000 less than 0.05; it shows the significance of factor analysis.

Table 4. Correlation Matrix

	CompPrio	ExpPerf	Glob	Lib	Priv
CompPrio	0.850				
ExpPerf	0.168	0.869			
Glob	0.077	0.717	0.922		
Lib	0.653	0.097	0.038	0.879	
Priv	0.923	0.923	0.923	0.923	0.923

Source: Author's own calculations.

5.2 Confirmatory factor analysis (CFA)

The structural model shows the relationship between constructs, and this relationship helps to construct theoretical and logical reasoning. Logical reasoning helps to for judging the structural model in which endogenous variables determination coefficient (R2). Like multiple regression coefficient, the model quality should be based on the path coefficient's direction and significance level (Chin, 1998).

The indigenous determination coefficient (R2) shows the level of latent construct's explained variances and measure the regression coefficient's goodness of fit against the empirically obtained manifest items (Backhouse et al., 2003). The coefficient of determination is a normalized term that can have an assumed value between 0 and 1. Structural analysis and the picture depicted in fig (1) was present and helps to test hypotheses of the study and show the influence of liberalization, privatization, globalization on competitive priority and export performance. The figure laydown the projected standardized path coefficient and the variance explained by the model. With regard to model fit, statistical measures test the measurement model presented in table (5) similar to the hypothesized model.

Table 5. Path Coefficient

	Original sample (O)	Sample Mean	Standard deviation	T Statistics (|O/STDEV|)	P Values
CompPrio -> expPerf	0.456	0.462	0.126	3.630	0.000
Glob -> CompPrio	0.198	0.198	0.072	2.733	0.007
Lib -> CompPrio	0.418	0.420	0.062	6.777	0.000
Lib -> expPerf	0.121	0.120	0.063	1.909	0.057
Priv -> CompPrio	0.446	0.447	0.077	5.804	0.000
Priv -> expPerf	0.402	0.401	0.116	3.473	0.001

Source: Author's own calculations.

The overall structural model depicted that, an acceptable fit for the data and the model explained that 77.1% of the variances in the dependent variable, export performance of manufacturing firms explained by the detailed explanatory factors (LPG). The summery results of structural model analysis are show the standard regression coefficient of structural parameters that enable us to adopt on the validity of the hypothesis.

Figure 1. SEM
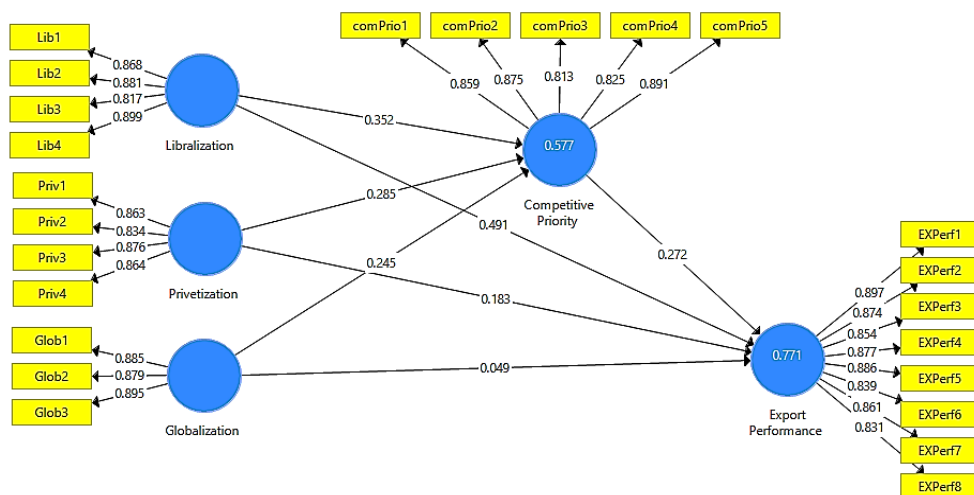
Source: Author's own elaboration.

The individual path coefficients represent the standardized Beta coefficients ensuring from the least-square method of estimation. In partial least square, goodness of fit for path coefficient can tested by asymptotic t-statistics. Paths, which are insignificant and contrary to the hypothesized direction, do not support rather paths that show hypothesis direction, which is empirically support, the proposed relationship between variables.

Table 6. Total effect

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision
CompPrio -> expPerf	0.456	0.462	0.126	3.630	0.000	Rejected
Glob -> CompPrio	0.198	0.198	0.072	2.733	0.007	Rejected
Glob -> expPerf	0.090	0.089	0.037	2.410	0.016	Rejected
Lib -> CompPrio	0.418	0.420	0.062	6.777	0.000	Rejected
Lib -> expPerf	0.311	0.313	0.067	4.656	0.000	Rejected
Priv -> CompPrio	0.446	0.447	0.077	5.804	0.000	Rejected
Priv -> expPerf	0.606	0.610	0.068	8.879	0.000	Rejected

Source: Author's own calculations.

From the relationship shown in table (6) besides examining the coefficient of determination (R^2) indicators of all endogenous variables, the change in R^2 also indicates whether an independent latent variable has considerable influence on the dependent variables. Similarly, the outmoded partial F-Test, Cohen (1988), settled the effect size f^2. Contrarily to the F-test, the effect size f^2 do not refer the sample at all, rather, to the basic population of analysis, so that, no degree of freedom needs to be considered.

6. Conclusions

The goal of this study is to look at the effects of dynamic macroeconomic variables (liberalization, privatization, and globalization) on competitiveness and export performance. Economic liberalization, the privatization of state-owned firms, and globalization all have a positive and significant impact on a company's export priority and performance. Economic liberalization, privatization, and globalization have a favorable and considerable impact on competitive priorities (cost, flexibility, and quality). International shoppers, on the other hand, are quality-conscious and adaptable in their purchasing habits. Our findings suggest that in the current globalization period, privatized exporting enterprises and countries with more liberalized economies are significantly more likely to be satisfied in terms of export satisfaction, market share, and profit.

Law and order, government incentive schemes, and general market openness all play a role in the overall market performance in the international market. In comparison to other incentive schemes, incentive schemes have the highest loading. In the Ethiopian context, the global market opportunity, the global market threat, and the global market uncertainty as indicators for global marketing, an opportunity cannot be exploited due to fear of challenges, and data shows that manufacturing firms in export are more affected by challenges than the benefit received from the opportunity.

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Growth of Developing Countries in Global Value Chains, Focusing on Apparel Industry – A Literature Review

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Abstract

Trade liberalization and the economic openness of developing countries around the globe have placed value chains at the centre of discussions on the international dimension. This occurs in almost all value chains and their activities, from ancillary activities to the core activities of firms. The forms of entering a destination country are conditioned by the firm's internal motivations, the socio-economic picture of the host country, the nature of the industry, etc. The apparel manufacturing industry is one of the typical industries where products are produced in international networks within GVCs. The main purpose of this paper is to assess the level of integration of apparel manufacturing firms into global value chains and their growth within them. Offshore outsourcing for Textile and Apparel Industry (TAI) firms has as its main reasons the reduction of costs and the increase of efficiency. This study provides a theoretical overview of the factors that promote (hinder) the improvement of subcontractors within the global value chains in the clothing industry. The method used in this paper focuses on a systematic review of existing literature and also excludes the subjectivity of researchers while we have been pursuing the keyword literature.

Keywords: Offshore outsourcing, global value chains (GVCs), apparel industry, and value chain improvement.

JEL Classification: D12, F63, L16.

1. Introduction

The global organization of chains is the construction of a system of successive economic ties with other countries in the form of direct investments, joint ventures, licensing for the production of products, outsourcing, etc. GVCs for the textile and apparel manufacturing are *costumer-led supply chains*. The leading firms are clients, such as retailers, manufacturers of well-known brands, and popular trademarks (Gereffi, 2002). These clients coordinate global apparel manufacturing between

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end-consumer markets and the industries of developing countries. These chains are typically labour-intensive industries and are very important to developing countries (for example, agro-food industry, footwear, furniture, and the like) (UNIDO, 2005). The barriers that a country encounters to get involved in any GVC are based on unique knowledge and skills that not everyone can acquire. This isolates competing firms based solely on the price of the activity. In the apparel manufacturing GVCs, the activities with the highest added value are design, branding, and marketing. All of these activities are largely based on the knowledge that large clients have (Kaplinsky, 2005). The conditions for the integration of a developing country in the apparel GVCs are meeting the requirements of foreign customers in terms of quality, production capacity, delivery time, compliance with various social and environmental standards, distance, and tastes between developing countries and major export markets. Many developing countries are hyping themselves as destinations in certain industries based on their advantages, such as low-cost, skilled labour force, or information technology infrastructure (Farrel, 2006; Popescu, 2010). Small developing countries find it difficult to integrate into all GVCs. There are several arguments related to this issue, such as: moment of inclusion, nature of global demand, competitiveness, geographical proximity, priority sectors of the country's economy, cultural differences, capacities, etc.

These last years have shown that globalization, seemingly an ideal integration strategy for developed countries and especially those developing ones, turns out to be a challenge. This is due to the problems that the young 10-year-old is manifesting strongly. The COVID-19 pandemic and the stalemate that plagued global value chains empowered the adaptation of communication and information technology to the transformation of production processes, distribution systems, and sales (Rodríguez-Sánchez et al., 2020). In addition, many articles are questioning the phenomenon of globalization and the return of activities to their countries of origin or near shoring. This is especially true for the manufacturing industry, as in the case of the apparel industry. In the beginnings of this globally embraced strategy, toward the integration of firms and countries into global value chains, it seemed as if the benefits would be reciprocal for both developing and developed countries. The truth is different. The World Development Report (WB, 2020), although promoting such GVC participation as a development strategy for the latter, acknowledges that purchasing firms in developed countries reap higher profits while supply firms in developing countries are squeezed as a consequence of participation in GVC, (WB, 2020).

Research Question

The apparel industry is one of the industries which have had a great expansion under the trend of globalization. This is for a number of reasons which have been elaborated on throughout the paper. At the same time, various studies show the challenges that developing countries face in staying within the chain. The paper, therefore, conducts an extensive review of the literature to answer a question that

arises today more than ever: "What makes developing countries successful within the global value chains in the apparel industry?"

2. Methodology

The purpose of a research paper is to review or synthesize existing knowledge, analyze existing circumstances or problems, provide a solution to problems, explore and analyze more general issues, build or create procedures or systems, explain new phenomena, and offer new knowledge or a combination of them (Collis, Hussey, 2003). The research methodology in this article consists of and has as a reference source the literature review, related to the Apparel Industry as one of the typical industries where the products are produced in international networks within the GVCs. Studying the varied literature related to this industry has helped to build a very clear summary of all the authors and the key issues that have been addressed in our study. To achieve the main goal of this paper, the following objectives have been set:

*(i)*theoretical overviews of the factors that drive (hinder) the improvement of subcontractors within the global value chains in the apparel industry

*(ii)*forms of improvement within global value chains

*(iii)*potential links between domestic producers and foreign customers in production networks

To provide a rigorous, transparent, and reproducible synthesis of the literature, in this article, we have used the method called systematic review (Gomezelj, 2016). The most appropriate and similar items to the purpose and objectives of our paper were selected according to a process that allows the identification of existing research to examine the value and relevance of the research topic (Becheikh et al., 2006).

3. Growth within GVCs: transition to higher value-added activity

Growth within GVCs is a matter of importance for developing countries. The growth of firms within them implies an increase in added value by domestic production and economic growth for the country. According to (UNIDO, 2004; Kaplinsky et al., 2002), improvement within the GVCs may occur in the following ways:

- process improvement (addition of new product lines, reduction of faults, shortening of delivery time, etc.);
- product improvement (quality improvement, introducing a new product on time, etc.);
- functional improvement (increasing added value through a new combination of activities within the firm or carrying out activities that require greater skills and knowledge);
- cross-sectorimprovement (transition to market segments where products are more technically sophisticated and have a higher added value).

Figure 1. Improvement forms within global value chains

| Improvement Forms within GVCs | Integration within GVC | Process Improvement (1) | Product Improvement (2) | Functional Improvement (3) | Cross-sectoral Improv. (1+2+3) |

Meets standards, expands the market, increases competitive advantages, ..., Growth in the long run
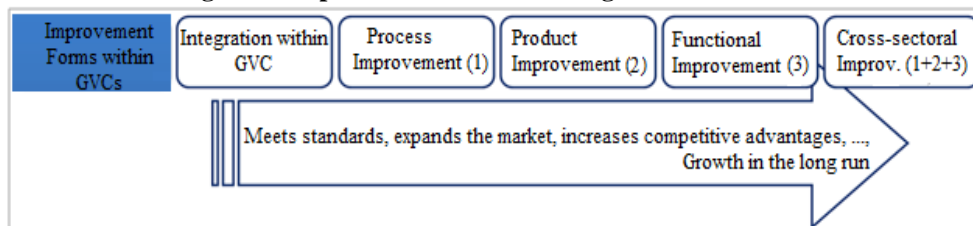
Source: Adapted by Authors from the Fernandez-Stark, Bamber & Gereffi scheme (2011).

Textile and Apparel Industry (TAI) includes three basic operations: pre-packaging (design, categorization, marking (brand marking) and cutting), packaging (sewing), and post-packaging (advertising, distribution, and sales). All of these processes have different ratios in terms of capital and labour. Pre-packaging represents the stage requiring the highest capital intensity in the apparel sector, where quality and precision are key elements of production (Abenarthy, Volpe, Weil, 2004). The packaging phase in the apparel sector, no matter how modern the production process, continues to be performed by hand work; thus this production phase is more likely to be outsourced to low-cost countries.

Firms in the TAIs of developing countries are integrated within the GVCs thanks to intensive work with a low level of knowledge. The activities with the lowest value in the apparel GVCs are their production (CMT- cut, make, trim). In these types of contracts, the customer is the supplier of raw materials and indirect materials. The contract of outsourcers following their agreement signed with clients defines: the production and distribution according to the client's request and the fee on the performed service. The outsourcer is not responsible for any activity other than those contracted. Upgrading outsourcers to CMT activities can take place in three modes: process, product, or function.

Process improvement in apparel GVCs is achieved through the application of new technologies or the reorganization of existing production systems. Technology improvement occurs in most cases at the modelling or cutting stage. The sewing process still remains a labour-intensive activity, although there are studies that recognize process and product improvement thanks to technology transfer (Humphrey, Schmitz, 2002).

Product improvement involves switching to higher value-added product lines, which are more difficult to produce due to differences in technical characteristics and materials used. The ability of the outsourcer to produce products with a higher added value is strongly related to the level of improvement of the production processes.

Improvement is functional when a business moves toward more complex tasks within a GVC. Functional improvement refers to the transition to functions such as product design, self-supply of raw materials, introduction to the market with its own brand, and product marketing. Functional improvements come in several forms:

- Apart from production (CMT-cut, make, trim), performing direct procurement of raw material or distribution of the produced product;
- ODM- original design manufacturing;
- OBM- original brand-name manufacturing.

Process or product improvement does not imply improvement within the GVC, toward higher value-added activities. Process or product improvement is the improvement that occurs within the same functional node (e.g., improvement of cutting activities) and efficiency gains within that particular function (process improvement), and/or the production of products with a higher value added within the same product category (product improvement).

Firms in developing countries involved in global manufacturing networks and GVCs (where TAI is often the number one industry) are expected to improve the skills, knowledge, and technology used. All of the above factors are important to improve productivity and business growth (UNIDO, 2004).

Functional improvement requires organizational changes, product distribution, raw material procurement, etc. Functional improvement is directly related to the capacity of the outsourcer (supply firm) to carry out more complex activities. The role of the client in this regard is decisive, as it determines to what extent functions are delegated to the outsourcer. Accomplishing functional improvement is also related to the size of the domestic market.

An important factor in the improvement within the GVC is the nature of the demand. If the outsourcing firm produces for low-income markets, the product is standard, and the need for process/product improvement is low. Demand from high-income countries is increasingly sophisticated, with a special emphasis on product differentiation, quality standards, etc. The forms of development that emerge from these different requirements (criteria) have a significant impact. The sophisticated demand in high-income countries has increased entry barriers and favoured the consolidation of GVCs.

In addition to the client, manufacturing firms play an important role within the industry through the creation of clusters for the distribution of orders, technology, knowledge, etc. Building sustainable inter-firm relationships within TAIs in developing countries helps improve processes within firms. Moving further towards a comprehensive approach that constitutes a comprehensive analysis (financial, quality, profitability, competitiveness, etc.) of the activities carried out within the GVCs enhances the information, awareness, and cooperation between them.

**Figure 2. Link between domestic producers and foreign clients
in production networks**
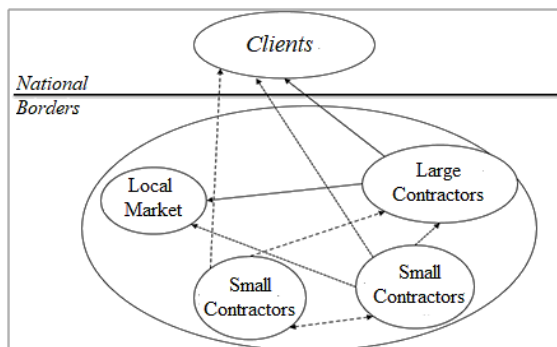
Source: Adapted and simplified by authors, according
to the Kaplinsky & Readman scheme (2000).

Both approaches, clustering of firms and integration within the chain, underline the importance of *improvement* within the GVC. Improvement is a necessity in staying competitive and growing in the market (Humphrey, Schmitz, 2002). The pursuit of cluster-level strategies for improvement varies considerably by circumstances and industry (Xiaofen, Renyong, 2006).

An important factor for a sustainable growth of firms in the toll manufacturing industry is the environment where firms operate divided into two dimensions: the general environment and the environment within the industry. The general environment encompasses the political, legal, socio-cultural, technological, demographic, global factors that can affect the activity of the firm. While the competitive environment consists of other factors that affect the profitability of the organization, such as customers, local market, business associations, other firms in the industry, etc. (Miller, Dess, 1996).

Local and national initiatives (sometimes in collaboration with international agencies) aim to improve skills in specific sectors and industries so that they can meet the demands of international markets. Firm improvement comprises both technology upgrades and free market access. Complementary efforts at the local and national levels are needed to stimulate these two conditions (Humphrey, 2004). Government incentives play a central role, including regulations on export processing zone (EPZ)[2], reduced profit tax rates, and subsidizing land rents, buildings, and fees for other services (WB, 2011). Market distance (geographical position) can serve the benefit of firms, delayed in integrating into global supply chains, when they are closer than early-involved competitors.

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[2] EPZs are special zones that are isolated from the domestic economy. In these zones, investors are not allowed, or only in a limited quantity, to supply domestic consumers as production is export-oriented. EPZs are a legal framework for export production where governments typically offer a package of incentives such as tax breaks, duty free imports, infrastructure provision, lower tariffs for public utilities such as water and electricity, and land and factory subsidies (WB, 2011).

Lack of regional transport networks, poor quality, high costs, and common delays hinder regional integration and impose significant additional costs that constrain regional and international trade. Ideally, investments through a regional fund and changes in regulations to improve intra-regional transport infrastructure and logistics processes will be central preconditions for increasing regional trade in textiles and apparel (WB, 2011).

Education remains a priority, both in terms of basic education for workers employed in manufacturing firms, but also in improving firms throughout the value chain. Education in vocational high schools and branches demanded by industry increases the capacity of firms to move towards other activities.

Regional integration is important not only in relation to end markets, but also in relation to regional production networks. This can increase added value within the region and the competitiveness of the apparel sector. Timeliness and flexibility have become central criteria in clients' decisions. Customers are increasingly hiring vertically integrated suppliers or located in regions that have a competitive textile sector. Greater access to low-cost financing is crucial in increasing the capacity of re-exporting firms (WB, 2011).

4. Results and Discussions

The main reason for offshore outsourcing for firms in western TAIs is the reduction of costs and the increase in efficiency. In summary, studies rank the main factors of offshore outsourcing as follows (EMCC, 2008; CBI, 2014):

Costs in the destination country: Outsourcing to a specific destination starts with estimating the level of costs such as labour costs, raw material costs, energy costs; etc. The main item is labour costs due to the fact that the apparel industry is labour-intensive.

Access to production factors in the destination country: The selection of a destination is not only based on the level of costs, but also on the capabilities of the supplying firms in the country in carrying out certain activities within the GVC. The decision in most cases constitutes a competitive strategy for foreign clients (ordering parties).

Timeliness and flexibility: Timely delivery and production flexibility have become indispensable conditions for western firms in the apparel industry. Almost all apparel market segments are increasingly shortening the product life cycle and reducing the volume of quantity launched in the market. The ability to quickly change the product confection process is critical to adapt to customer requirements.

Short distances: Countries near major markets are increasingly coming to the forefront for western apparel companies. The main reasons are the launch of the product as soon as possible, the reduction of transport costs, and the management of GVCs with strategic providers in geographical proximity to western markets. In the latest CBI study (2014), moving towards key market segments is a particularly important element related to the decision on the company's allocation. Timely delivery (according to the just-in-time basis) favours business models

oriented towards a faster delivery where production is close to the main markets in these segments.

The reconfiguration towards new styles and models has been accompanied by the establishment of a reward for shorter distribution cycles, improved production capabilities, and supply chain management, including apparel production and the material supply and finishing process.

At a global level, buyers and intermediaries around the world are increasingly turning to larger suppliers that can easily provide materials, coordinate distribution (logistics), and foster creative development in countries that can allow faster (shorter) cycles in distribution (Staritz, 2012). This has resulted in the consolidation of the supply chain. Leading buyers have moved from the supply of many small, old-fashioned firms - cutting, manufacturing and sewing structures to close relationships with a small number of strategic providers, thus managing production between multiple factories and international countries, sharing together financial liabilities, providing greater value-added services and ultimately ensuring greater benefits from the apparel and textile trade. These international networks also serve as an important source of employment and manifest a variety of effects in the domestic labour markets. This industry usually serves as a springboard for the industrialization of developing countries with limited capital that are export-oriented, mainly due to intensive work in production structures. As such, this industry, in particular the apparel sector, is contributing to generating the necessary employment. Large clients have moved from supplying very small, old-fashioned firms with traditional activities (cutting and sewing), to close relationships with a small number of strategic providers. The success or failure of offshore outsourcing is the timely response of large customers, thus managing production between multiple factories and international countries, sharing financial liability, providing greater value-added services, and ultimately providing greater benefits from the apparel and textile trade.

5. Conclusions

Global value chains have expanded thanks to trade liberalization and advances in communication and information technology. Foreign companies are choosing to grow by doing less and outsourcing more. Researchers consider both services and custom manufacturing activities within the GVCs, embodied in the value of net exports of some industries in developing countries (textile and apparel manufacturing industry, mineral extraction and fuel processing industry, production of communication and information technology equipment, ICT services industry, etc.).

The international services market today represents the fastest-growing segment in the international market. It is also one of the few promising sectors in the global economy, where a number of developing countries currently have a competitive advantage (Suri, 2005). The revolution of trading services has brought about a dramatic expansion of offshore outsourcing of services, allowing firms to take advantage of lower production costs in foreign countries (Liu et al., 2011).

The improvement of companies in the apparel industry is limited due to the improvement of production technology and the increase in produced quantity. Despite the fact that companies have a relatively long experience in the apparel industry, they still continue to carry out activities with low added value.

Not all developing countries have similar developmental characteristics. Small countries under cost pressure can no longer continue to follow old strategies in terms of low value-added activities, so they need to resize their industrial development strategies.

States need to look at the new global conditions (post-COVID-19), as firms are increasingly accepting near shoring as a potential strategy for carrying out production chain activities. This is due to new restrictions and rising costs.

Today, ICT and process automation are at the heart of global value chains. The tailoring industry, although characterized as a labour-intensive industry, does not rule out the possibility (especially in small developing countries) of seeking improvement within the chains through the improvement of the technological infrastructure.

Limitations of the Study

The objective indicators are the financial data of the firms, which are missing in this study. Analysis of financial data, combined with other factors, can yield new and more consistent results.

Another important constraint or outcome would be to assess the degree of integration of apparel firms into global value chains and the growth within them during the COVID-19 period. Analysis and results during the pandemic years may be part of further research.

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Digital Strategies' Use
in Lebanese Pharmaceutical Companies

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Abstract

Digitalization is inclining as a communication tool between various parties. However, its use by pharmaceutical companies is limited and a restricted number of countries apply digital strategies in pharmaceuticals. The objective of this research is to study the Lebanese pharmaceutical companies' perception of the use of digital strategies, and the impact on margins and relationship with clients. To achieve the study purpose, a qualitative study is conducted by interviewing 14 respondents from 14 pharmaceutical companies, local and multinational. The results showed that pharmaceuticals mainly use email marketing, WhatsApp, web conferences, and social media marketing. However, pitfalls exist, including employee's and client's resistance and legal restrictions. Additionally, the results revealed that pharmaceuticals support the use of digital tools as they can improve the relationship with physicians and enhance their sales margins.

Keywords: Pharmaceutical, digital, marketing, physicians, communication.

JEL Classification: M31.

1. Introduction

The expression "digital marketing" has recently advanced from a particular term portraying the marketing of items, through the use of digital tools, to a broader word illustrating the process towards utilizing digital innovations. It is used to attract clients through accessing customers' needs, market products and services, maintaining long-lasting relationship with customers, and enhancing sales (Kannan, Li, 2017).

The use of digital communication channels in drugs has been restricted because of healthcare professionals' and staffs' refusal to accept change and the limitations forced by regulation particularly in Lebanon (Parekh, Kapapura, 2016). The adjustment of the marketing position itself is mandatory due to the constraints and crises that affected it like cost expansion, financial slumps, expanded joblessness,

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and organizations' cutting back. These reasons shed light on the importance of exploiting digitalization to ease and coordinate pharmaceutical work, upgrade their communication with their clients, decline their costs, and accomplishing patient fulfilment with the serious rivalry the Lebanese market is confronting (Bala, Verma, 2018).

Although extensive data is available supporting the use of digitalization in pharmaceuticals; however, limited data and research is available in Lebanon. The purpose of this study is to investigate the opinion of Lebanese pharmaceuticals about the use of digital tools and its impact on sales margins and the relationship with clients. This research will highlight the importance of digitalization for pharmaceuticals to differentiate themselves and maintain their growth.

2. Problem Statement

e-Detailing
e-Detailing Definition and Characterization
The expanded use of the web among individuals making it easier for healthcare communication and interaction by various touch points between doctors, pharmaceutical representatives, hospitals, and pharmaceutical organizations is called e-Detailing (Vijayabanu et al., 2018). Another definition, according to Banerjee and Dash (2011), e-detailing is characterized as the utilization of the online channel and data innovation to promote pharmaceutical items. It is the use of the Web as the way of communicating pharmaceutical products to doctors.

Most pharmaceutical officials see e-detailing as a key way to improve pharmaceutical representatives' traditional way of marketing; however, there is solid understanding among doctors that e-detailing will never displace conventional detailing (Alkhateeb, Doucette, 2009).

Types of e-Detailing
Virtual/Interactive e-detailing: Virtual e-detailing is an online system used for detailing products that doctors can access anytime. It is composed of product data regarding side effects, symptoms, diagnostic analysis, and case studies. The aim is to assist doctors with going through the data whenever it may suit them. In the end, physicians can emphasize their needs as far as free product samples, pharmaceutical representative visit, most recent publications, test reports, and so on (Banerjee, Dash, 2011). Regarding the duration of virtual e-detailing, it is set to be four to eight minutes by Alkhateeb and Doucette (2009), 10 minutes by Montoya (2008), 5-15 minutes by Trucco and Amirkhanova (2006).

Video e-detailing is characterized as face-to-face computer-based video conferencing between a doctor and a pharmaceutical representative. Physicians conduct video conferencing using a preconfigured and preloaded PC and web cam (Banerjee, Dash, 2011). This permits the representation and introduction of the required data in a fast and helpful manner. Moreover, specialists can plan the gathering whenever the timing is ideal and be in charge of span. A visit of this sort, as a rule, goes on for around 10 minutes (Balkanski, Getov, 2019). This framework

encourages doctors to pose inquiries and may explain questions with the assistance of the Web interaction (Banerjee, Dash, 2011). According to AlKhateeb and Doucette (2009), this type of e-detailing is shown to be most effective with physicians who live in rural areas or physicians who cannot see pharmaceutical representatives at their clinics.

E-detailing by portal for physicians: These are entrances which are accessible to specialists and can be utilized to indicate the product details to the specialists and, furthermore, provide sponsorship promotion of the item. Instances of such entries are Doctors.net.uk, detaildirect.com, and ommedica.net (Vijayabanu et al., 2018). This gateway gives information with respect to the time spent by doctors, their Web propensities, and areas of interests (Nalini et al., 2017).

Scripted e-detailing: Doctors can see an arrangement of intelligent sessions through the Web and intranet. They cannot have an immediate collaboration, yet they can contact through email or phone (Nalini et al., 2017). The specialist and pharmaceutical representative converse with one another on the telephone or through Internet-based phone lines (IP phones) and peruse web-based data at the same time. The visual association is missing, which renders the strategy to some degree less customized than the past one (Balkanski, Getov, 2019).

Advantages of e-Detailing

According to IMS Health (2015), 3.2% of the absolute pharmaceutical industry investments in 2014 were in the digital promotional tools, while 59% of it was in e-detailing. In spite of the solid development rate (+37,2% from 2013 to 2014), e-detailing is as yet a negligible advancement instrument. In information distributed as to year 2015, IMS Health (2016) reveals that digital channels weight expanded to 3,8%, expanding 15% from 2014.

The main reasons behind the adoption of e-detailing are its convenience and ease of use, its time saving benefit, its synergism with traditional detailing tool, and its compatible quality and quantity of information (AlKhateeb, Doucette, 2009). In addition, Gonul and Carter (2010) stated that the use of e-detailing by physicians and pharmaceuticals allows them to connect at a convenient time and time span for both parties. On the other hand, Trucco and Amirkhanova (2006) state that e-detailing, a cost-effective communication tool, assists pharmaceuticals in product launching. It has the ability to communicate with hard-to-reach physicians and has a synergistic effect with traditional detailing. This assists in filling physicians' free time at their convenience and in post-launching stages through re-positioning products, especially for physicians who work in distinct areas. In addition, Montoya (2008) proposes that e-detailing enhances the time efficiency of pharmaceutical representatives, decreases the cost of using traditional detailing tool, and positively impacts the prescribing behaviour of physicians.

QuintilesIMS (2016) addresses the several benefits of e-detailing stated by UK and Spanish physicians. Their study shows that these benefits include the ease to organize appointments, its suitability and convenience to fit in physicians' daily schedule, its time-saving characteristic, and the advantage of downloading

information necessary to keep physicians updated. Balkanski and Getov (2019) state that e-detailing provides the advantages of low cost per visit, greater customer reach especially for physicians with limited access, extensive organized data available for specialists, synergist effect with detailing strategy, higher acceptance by physicians due to its flexibility and customization, and faster access to data.

e-Sampling

By definition, e-sampling is an online strategy used by specialists to order samples online through filling a form using their laptops, computers, or mobiles (Kumar, Panigrahi, 2014). The change to e-sampling has transformed the process of sampling delivery to physicians, where physicians embed their sample demand through contacting the manufacturer (Puschmann, Alt, 2001). Moreover, they can contact drug organizations' sites and pharmaceutical representatives, which in return will have the chance to check the physicians' product preferences and customize their messages when detailing with physicians to understand the need behind the drug sample (Kumar, Panigrahi, 2014).

e-Mail Marketing

When you send a business message by email to a rundown of potential clients, the procedure is called Email Marketing. Email marketing incorporates conveying mass messages with promoted materials, distributing and circulating electronic newsletters, distance education, and other promotional messages by means of email. Mass messages are the most prevalent type of email marketing. The issue with this type of advertising is the potential to have your messages seen as spam. This is probably going to happen on the off chance that you send your messages to beneficiaries who have no enthusiasm for your items or benefits and have not communicated enthusiasm for getting messages from you (Venugopal et al., 2012).

E-newsletters are created to attract and maintain loyal customers by sending them updated information once a month about the company products, events, and offers (Schwarzl, Grabowska, 2015). E-newsletters can be a basic or as complex as you normally like and might incorporate content, designs, commercials, links, or any blend of these components (Wright, Bolfing, 2001).

Distance courses offered by email is the last email marketing tool to talk about. These courses might be either offered for an expense and transform into an earning source, or they might be made accessible for nothing. The hypothesis behind offering these courses for nothing is that they frequently contain unobtrusive promotion asking guests to put resources into the items and services offered by your business. Regardless of whether you charge for your email correspondence courses or offer them for nothing, care should be taken to guarantee that the data contained in these courses is totally precise (Venugopal et al., 2012).

Moreover, E-mail marketing is a promotional tool used by pharmaceuticals to send medical and promotional information to doctors through using physicians' email list that pharmaceuticals have collected and available in their database or through referring to third parties as healthcare portals (ZS, 2014). According to

Jawaid and Ahmed (2018), a study done on 718 physicians shows that when they seek to update their medical information, only 4.59% of the participants use marketing emails. Furthermore, marketing emails are the least to affect the clinical practice and prescription behaviour of physicians with only 8% considering emails as influential.

e-Continuing Medical Education (e-CME)

Likewise, another marketing communication tool available to pharmaceutical companies to promote their products is electronic continuing medical education, or e-CME. Webinars that are live and interactive chat tools such as presentations, talks, classes, and workshops sent over the Internet are considered one of the types to provide e-CME to physicians (Buxton et al., 2012). According to Wutoh et al. (2004), web-based CME has been shown to be as effective as traditional CME in providing physicians with the necessary information to maintain their knowledge level and professionalism.

3. Research Questions / Aims of the Research

As pharmaceuticals are facing the new trend of digitalization and as digital strategies are not applied in most countries including Lebanon, the aim of this research is identifying what digital tools are used by pharmaceuticals and its effect on their clients. Research questions to be investigated:

- What is the perception of Lebanese pharmaceuticals regarding the use of digital tools to communicate with clients?
- Do digital strategies affect the pharmaceutical companies' margins/sales performance?
- Does the use of digital marketing tools affect the building and maintaining of a relationship with physicians?

4. Research Methods

Qualitative research through in-depth, face-to-face, semi-structured interviews with pharmaceutical marketing managers were conducted between February 2021 and April 2021. The sampling method was non-probability sampling that included 14 companies divided equally between local (SADCO, Benta Pharma Industries (BPI), Codipha, Omnipharma, UPO, Arwan Pharmaceuticals, and Pharmamed) and multinational companies (Sandoz, Pfizer, AstraZeneca, Novartis, Eli Lilly, Sanofi, and Procter & Gamble). 14 respondents, one from each company, answered open-ended questions, and each interview took 20-30 minutes. Content analysis was the method used to analyse data collected.

5. Findings

RQ1: What is the perception of Lebanese pharmaceuticals regarding the use of digital tools to communicate with clients?

In Lebanon, pharmaceuticals are not adopting e-detailing, e-sampling, and e-DTCA (Table 1). E-DTC is used by Lebanese nutraceutical products only, and social media marketing is adopted to build awareness about the company in general and stay engaged with customers rather than marketing pharmaceutical products, as law regulation forbids such acts. On the other hand, pharmaceuticals focus mainly on their sales personnel to communicate with physicians and pharmacists.

Table 1. Type of Digital Channel Used by Lebanese Pharmaceuticals

Type of digital channel	Number of Respondents
E-detailing	0
Email marketing	14
Web conferencing	14
WhatsApp	14
E-sampling	0
E-DTCA	0
Social media marketing	14

Source: Generated by Author.

The use of digital channels to communicate with healthcare practitioners has some advantages and disadvantages. According to respondents, the main advantages of digital tools are that it fits better the schedule, saves time, and can be used as a complement to face-to-face discussion. On the other hand, the main disadvantages include healthcare practitioners and employees' resistance to adopt new technology (Table 2).

Table 2. The Advantages and Disadvantages of Digital Channels

Digital Channel Advantages	Number of Respondents
Better fits in the schedule	13
Saves time	12
Discussion at ease at home	5
More educational	3
Easier to ask questions	7
Freedom to speak what's in mind	8
Complements face-to-face discussion	14
Digital Channel Disadvantages	
Mistrust information	2
Employees resistance to use	9
Clients resistance to use	11
Legal restrictions	14
Increase in marketing cost	7

Source: Generated by Author.

Lebanese pharmaceuticals use digital tools for several reasons. Although they do not adopt e-detailing and e-sampling; however, most of them believe that such strategies will help them communicate with clients in rural area, record data, and promote their products (Table 3).

Table 3. Use of Digital Tools

	Email	**WhatsApp**	**e-Detailing**	**e-Sampling**	**Web Conferences**
Send announcements	12	-	-	-	-
Taking appointments	10	14	-	-	-
CME credits	-	-	-	-	14
Alternative to traditional conferences	-	-	-	-	14
Send reminders	12	14	-	-	-
Check availability	-	14	-	-	-
Send promotional messages	-	-	14	-	-
Communicate with clients in rural areas	-	-	14	11	-
Recording	-	-	12	14	-

Source: Generated by Author.

RQ2: Do digital strategies affect the pharmaceutical companies' margins/sales performance?

Lebanese pharmaceuticals use IMS (Innovative Medical solutions) to access their products' sales data versus competitors. Additionally, IMS provides pharmaceuticals with sales per Lebanese region. To access the impact of digital tools, pharmaceuticals check their sales and market share before and after the adoption of any innovative or new way of marketing communication. Table 4 represents the pharmaceutical opinion on the effect of digitalization on sales margins.

Table 4. Digital Tool Impact on Margins/Sales Performance

Respondent	Impact on margins/sales performance
12	Positive impact
0	Negative impact
2	No change

Source: Generated by Author.

RQ3: Does the use of digital marketing tools affect building and maintaining relationship with physicians?

Table 5. Digital Tool Impact on Clients' Relationship

Respondents	Impact on Clients' Relationship
14	Positive impact
0	Negative impact
0	No chance

Source: Generated by Author.

The more the contact points with clients are enhanced, the better the end result. Compared to the implementation of traditional tools, digital marketing improved the relationship with physicians (Table 5). The continuous contact with them improved the profit margin due to the long-term relationship with various clients. E-detailing can be a promising tool to engage with clients on a continuous basis and to prolong the relationship with pharmacists and physicians. Thus, overcoming any barrier, whether economic, social, or environmental.

6. Conclusion

The main communication strategy used by Lebanese pharmaceuticals to communicate with physicians is personal selling. Adding to this traditional way of marketing, email marketing, WhatsApp, web conferences, and social media are adopted. However, as online marketing for medications is prohibited in Lebanon (Haddad, Salem, 2013), social media is only used to build awareness about the company. Despite that a lot advantages go along with digital use; from fitting work schedules to its synergistic effect with pharmaceutical representatives' visits; however, barriers exist that limit the use of digitalization. The main barrier is clients' and employees' resistance to adopt a new way of communication.

Lebanese pharmaceuticals expressed their opinion that e-detailing and e-sampling can assist in communicating their promotional messages to their clients, especially those in rural areas. Moreover, the attempt to use digitization helps in building a long-term relationship with physicians due to contacting them through several tools according to their convenience and thus improving pharmaceuticals' margins. Thus, adoption of digital tools to communicate with healthcare practitioners can increase sales and build and maintain relationships with clients.

Limitations for this research exist. More pharmaceutical companies should be interviewed, and to complement this qualitative approach, a survey targeting healthcare practitioners should be analysed quantitatively to access their opinion in adopting digitalization. Furthermore, the COVID-19 and the Lebanese economic and social situation can affect research results and raise the question whether companies and staff are willing to keep on using digitalization when face-to-face interaction becomes easier to apply.

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Triggering Factors for Engaging Consumers as Key Players in the Economic System in the Zero-carbon Global Economy

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Abstract

The fact that the world has become aware of climate change and that once temperatures rise above a certain level there is no way back to normal has not been a success for politicians, academics, or scientists. The current article explores the triggering factors which enable the involvement of final consumers as main actors of the economic system to the zero-carbon global economy. This study is intended to capture, analyze and present results on the perceptions of ordinary citizens on what they know and can do about climate change. Today, scientific literature exists, plenty of business studies or high education programs related to zero-carbon economy. Mainly, the companies are guided about the steps to follow to measure the Corporate Carbon Footprint, the Product Carbon Footprint, climate reporting, and the path to become climate neutral, reduce or avoid their emissions. The method foreseen is based on questionnaire. The main research question is how we should address each citizen as a final consumer to concentrate on the energy saving measures, energy efficiency, self-supply of green energy, own carbon footprint, advantages, disadvantages, and financing possibilities in the region/area where he lives. The results show that incorporating the carbon neutral principle in formal and adult education, presenting the regional specifics and the local strategy, providing easy-to-use carbon emission tools, communicating on transparent platforms, the technologies, financing facilities are factors which may have a higher impact on consumers, encourage and motivate people to participate in climate protection. The findings of the study contribute to the understanding of main factors that influence the consumers to reduce their impact on climate change and contribute to a zero-carbon global economy.

Keywords: carbon footprint, climate change, final customer, global warming, green energy, net-zero carbon economy, sustainable products and services.

JEL Classification: D12, E91, Q01, Q42.

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1. Introduction

Our society's biggest challenge to stop the global warming caused mainly by the increase of the carbon dioxide levels is amplified these days by the war in Europe having the consequence of increased prices of the energy, food limitations in poor countries, and redirecting funds for military expenses. If focusing on sustainable energy consumption used to be an abstract fancy requirement, the actual crisis in Ukraine shows us that it is even economically a must to go for green energy, with all its positive consequences.

Considering the "Habit 2: Begin With The End In Mind" (Covey, 1989), which says "to determine the projection in the future on what is considered to be the final expectation", it is in our perspective that the final-customer will mainly choose to use and invest with priority in sustainable energy and in any kind of products and services produced sustainable if we want to stop the global warming.

This is the reason to choose as the main objective for this article to identify if the final customer has the knowledge (education) and the instruments to be able to become one of the main actors in our ambitious net-zero carbon global economy.

2. Problem Statement

The idea for this research came from a practical situation: the challenge of installing a new heating system for a renovated house in Romania. Being confronted with a variety of offers for different products or installation services, the questions arose: where to start, what really suits the house in this region, where to get this information, who can advise which is the best option from an economic and sustainable point of view? The problem is whether it is an individual question or much more general and usually concerns the end customers.

Looking at the existing regulation, checking the literature, and a plenty of studies, they conducted to the conclusion that the companies and countries are the ones addressed to measure the Corporate Carbon Footprint, the Product Carbon Footprint, provide climate reporting and the path to become climate neutral, reduce or avoid their emissions. The main regulations and protocols are referring to the companies and countries: the Kyoto Protocol (1997) which encourage both countries and private companies to reduce emissions; the Paris Agreement (United Nations Climate Change, 2015) which aims to limit the rise in global temperatures below 1.5°C and defines how countries submit their plans for climate action known as nationally determined contributions (NDCs) and the long-term low greenhouse gas emission development strategies (LT-LEDS)).

The end customer, the ordinary citizen, is not directly involved in defining this process or deciding which path to take.

Certainly, politicians are supposed to represent him, and they in turn work to enact regulations and control their application; companies are the ones that offer sustainable products and services, banks and financial organisations that ensure funding, and so on. But citizens are nowhere directly involved. Do citizens feel that

they are well educated/informed/prepared to choose sustainable products and services? Such a dilemma is what the current paper will try to bring to light.

There are complex studies and the analysis of some related to the final consumer revealed technical concepts such as "Consumer Behaviour in the Electricity Field", which analyses behavioural on energy consumption (Tantau et al., 2021), sociological ones like "relation between the cultural dimensions of Hofstede's model and the consumption of renewable energies" placing emphasis on cultural characteristics and the need to define renewable energy projects based on cultural values of the customers (Pelau, Pop, 2018). Some authors "recognise the need for the scientific community, conservation practitioners, and climate change advocators to combine objective with subjective arguments to overcome their barrier of engaging people with climate change" (Gallardo et al., 2017) and others state that "Knowledge isn't only power" but can also mean survival when it comes to climate change (Rood, 2022).

Back to the question: Why do people not want to act to protect nature and the future of their children? A look at Maslow's motivational model (McLeod, 2018) shows that the people with the main deficiency needs fulfilled will be less motivated to act, while the ones where the self-actualization needs are reached are the ones ready to proceed in a sustainable way. Remaining within the psychological perspective, the study of Walsh (2011) where his model conducts to values chain framework redefinition to consider that "self-actualization and sustainable development are one and the same".

Education is one of the main self-actualization needs, a reason why we will cite the study from Australia: "Education for sustainability in business education programs: a question of value" (Sidiropoulos, 2014), which provides a very good analysis of the importance of sustainability in the tertiary business education system. In the fourth chapter of her research paper, Prof. Sidiropoulos presents the gradual inclusion of sustainability topics in Economics with the effect on the environment and society, in Marketing and the importance of creating green products, creating brand image and brand value based on ethical behaviour and the importance of volunteering activities and "doing good" for the community and the environment.

We have identified psychological and sociological models, technical concepts and projects, the importance of education, but a concept of how exactly the final consumer/citizen is directly involved in sustainable activities is not easily found in the consulted studies.

The need for education in the sense of sustainable development was identified, but only for a small group of consumers, i.e. those participating in some form of education (Ntona et al., 2015).

3. Research Questions / Aims of the Research

The current paper serves to get a first overview of what *ordinary citizens* know about sustainable products or services, their carbon footprint, or the reasons why we should take action against global warming. The survey used was not designed to be 100% scientific, and the degree of representativeness is not necessarily significant.

The questionnaire is not intended to be answered by people who are qualified in the field of sustainable and/or green energy. What is the questionnaire and its results? It is an x-ray of what people in our local area think about the carbon footprint, green energy, and related education, climate change mitigation/adaption or carbon emissions. We believe the answers are just a starting point for our future work to understand the reasons why end-users are not adopting new sustainable technologies. Surely, the next steps will be research papers, which will bring much more scientific and solid documentation to find motivational factors for each of us as end consumers to think and act sustainably.

Our world today is working more and more with modern concepts like people-planet-profit, and there is a move away from separation, competition and conflict, which are being replaced by unity, connection, and collaboration. The best example of unity, connection, and collaboration comes from the IT sector and is the way companies have started to work with Microsoft 365, where everything is in the cloud, everyone participates in projects, is connected online from anywhere via the Internet and contributes to the projects they are involved in.

The main research question is what pain points we should approach in order to identify the triggers that can be used to encourage and motivate every citizen in their role as end consumer to participate in climate protection and achieve a zero-net carbon target.

The hypotheses we started from are:

(1) If people are better educated, then they know a lot more about climate, carbon footprint, global warming, and what they should do to prevent it.

(2) If people live in urban areas, then they have more access to information and will do more to protect the climate.

(3) If there is a defined strategy at central/local level, then residents will try to follow it and contribute to climate protection.

4. Research Methods

The research method is the survey method, a quantitative research method for data collection.

The instrument of the survey method is the online questionnaire with 21 questions, 10 of them are closed-ended questions, 10 mixed, and the last one is an open-ended question. The addressed questions are structured on following categories: 11 multiple choice questions, 8 rating scale questions, 15-point Likert scale question and one final open question used to collect critic or missing ideas.

To obtain responses to the questionnaire, the target group is 150 people and the collection data method used is a combination of "snowball sampling" and "haphazard sampling".

We chose this method because the questionnaire is a quick, efficient, and inexpensive way to collect large amounts of information from many people. The respondents can answer whenever they find time, they are not bound by a time limit, but a major disadvantage is that they can postpone or forget to answer.

5. Findings

Even though the number of the respondents was quite small (31), they are represented mainly by high educated people (90% bachelor, master, or PhD). There are 52% women and 48% men in the majority from Europe (58% East and central Europe, 36% from West Europe). From the age perspective, we had 48% in the category 31-45 years, 39% in the category 46-59 years, 10% are 18-30 years old, and 3% from the category over 60.

We did a correlation between the answers provided by the respondents by different questions to identify and comment on the validation or invalidation of the hypothesis we wanted to check.

(1) If humans are better educated then they should know a lot more about climate, carbon footprint, global warming and what they should do to prevent it

This hypothesis was invalidated as the respondents, even they are identifying the main reasons for climate change (Figure 1), they do not know how to calculate their carbon footprint (71% - Figure 3); the participants identify as one of main reasons for climate change the transport and vehicles, but they continue to commute mainly by car from one location to other (74%). For sure, it can be determined by a bad infrastructure, but without having any measurements tools for the final consumers are the consequences not tangible. It is important to note that end-users did not rank electricity generation among the top 5 causes of climate change, even though we use the most fossil fuels to generate electricity.

Figure 1. Climate Change reasons identified by questionnaire participants
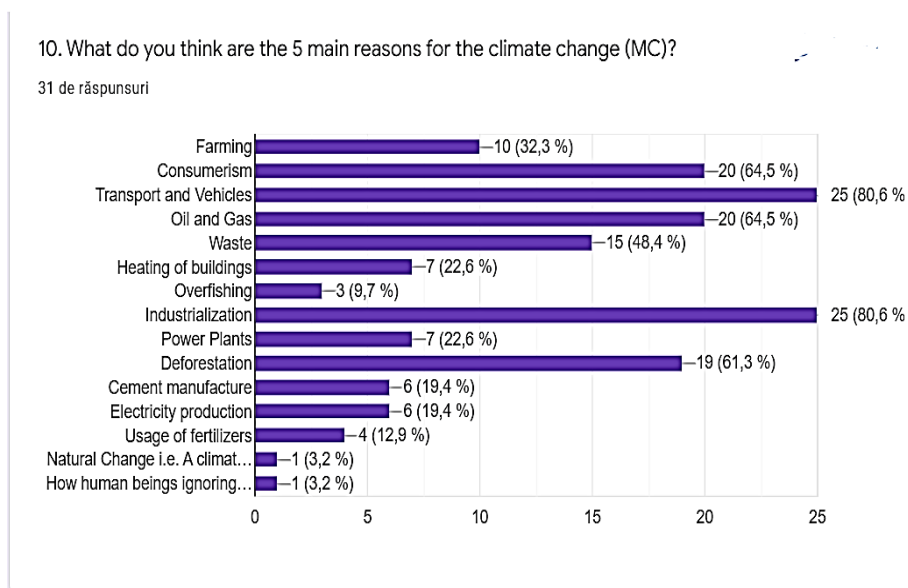
Source: Graph produced with Google Forms (not editable).

Figure 2. Transportation used by respondents

13. How do you usually commute from one place to the other (MC)?

31 de răspunsuri
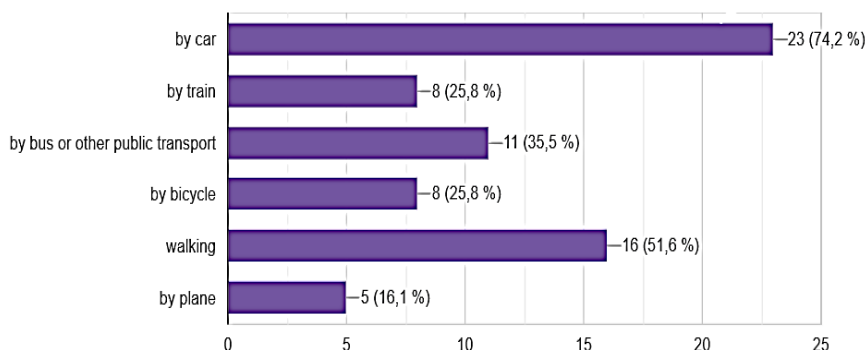
Source: Graph produced with Google Forms (not editable).

Figure 3. Carbon footprint impact

12. Do you know/use any tool to measure your/your family carbon footprint?
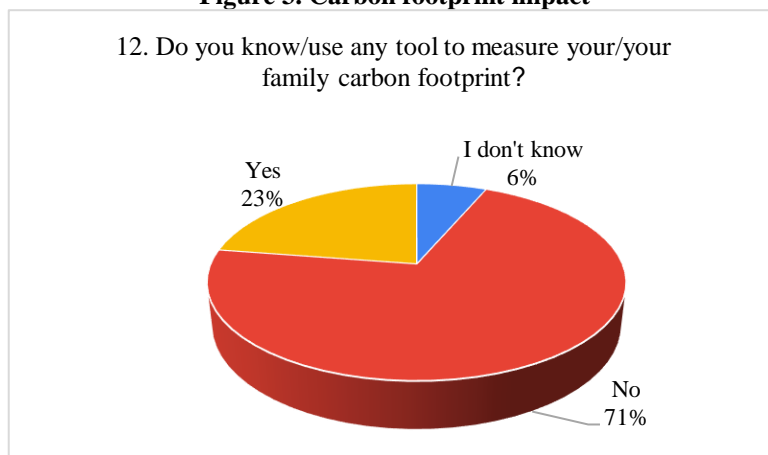
Source: Graph produced with Excel based on the answers of the participants.

(2) If people live in urban areas, then they have more access to information and will do more to protect the climate

The invalidated hypothesis as shown in Figure 4 shows that people in small towns or in the countryside use hybrid electricity most often, even if they do not know the climate protection strategy of the local authorities.

People in big cities are partly aware of their cities' strategy, but use hybrid electricity less.

Figure 4. Corelation strategy awareness versus home area of the participants

Count of 14. What do you know about the country/region/local-wide strategy related to green energy/climate protection in your home area?	big city	countryside	small city	Grand Total
a clear strategy exists in my area	5	3	1	9
my home is connected to the electricity network (on-grid)	5	2	1	8
my home is using electricity from the network and from own production (hybrid)		1		1
a green energy strategy is not needed	1			1
my home is connected to the electricity network (on-grid)	1			1
I didn't hear about a strategy	9	1	9	19
my home is connected to the electricity network (on-grid)	9	1	6	16
my home is using electricity from the network and from own production (hybrid)			3	3
I don't know	2			2
my home is connected to the electricity network (on-grid)	2			2
Grand Total	17	4	10	31

Count of 14. What do you know about the country/region/local-wide strategy related to green energy/climate protection in your home area?	Column Labels				
Row Labels	Asia	Central and East Europe	North America	West Europe	Grand Total
a clear strategy exists in my area	1	2	1	5	9
a green energy strategy is not needed				1	1
I didn't hear about a strategy		15		4	19
I don't know		1		1	2
Grand Total	1	18	1	11	31

Source: Graph produced with Excel based on the answers of the participants.

(3) If there is a defined strategy at the central/local level, then residents will try to follow it.

Validated hypothesis just in case the strategy is properly communicated. This is visible in the answers the participants were giving to the question where people should the people learn about climate change and protection (Figure 5). Traditional education systems, local authorities, and free of charge learning platforms are in top as strong agreement. Interesting is the information that people are not expecting climate protection to be legally enforced, and even more clear is the importance the people are giving to non-profit organizations and universities (24 answers having strong and agree selected).

Figure 5. Learning sources related climate change and protection

Source: Graph produced with Google Forms (not editable).

Figure 6. Legend in the order of appearance (from left to right)

1. **Formal education (School, University, etc) (I.)**
2. Learning from the job (mandatory trainings to be delivered by employers)
3. Learning from our kids after they learn it in the school (reverse mentoring)
4. **Local authorities informing programs (II.)**
5. Learning from programs of big companies (free of charge)
6. **ONG and Universities Informing programs (teaching, training, storytelling, discussion, and directed research)**
7. **Free of charge learning platforms (III.)**
8. Learning from architects, constructors, plumbers and other professions crucial to climate protection
9. **No need to learn about it. Climate protection should be legally enforced**

Source: Graph produced with Excel based on the answers of the participants.

In Figure 7 we observe that 38,7% of the final consumers are aware of the advantages of sustainable energy, 25,8% see the important role of the financial help from the authorities, and there is a 22,6% regulation need when it comes to installation of sustainable technologies.

It can be concluded that the final customer expects a certain control of installed technologies so that people do not buy inefficient solutions, even though they are green because this would be a costly and inefficient investment for all parties in the medium and long term. The same conclusion comes from related incentives which the people are interested to obtain (depending on the defined strategy).

Figure 7. Climate protection technologies

15. What do you think about implementing/installing climate protection measures/technologies?
31 de răspunsuri

Legend:
- It is expensive and is possible just with big investments
- it seems expensive at the begining, but medium and long term is cheap
- it should be financially supported by the authorities to ensure a minimum thres…
- it must be stated by law and sustained by public programs
- it is not needed
- It isnt needed unless it has a medium…
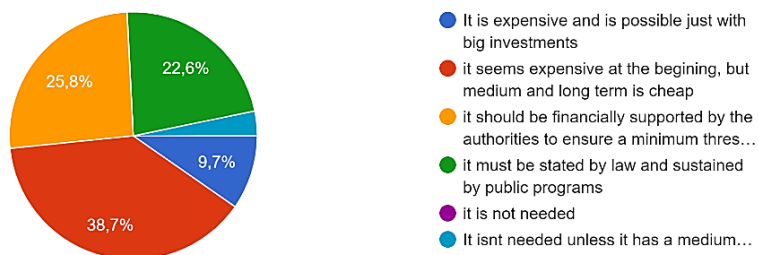
Source: Graph produced with Google Forms (not editable).

6. Conclusions

Communication should be appropriate and tailored to each type of consumer, and there should be programmes that are better presented and aligned with local, regional, or country strategies. It is not enough to educate people and communicate them the strategy if there is no visibility of what it brings for them. Important is to target people who have an impact on carbon emissions (it will not be the same to talk about electricity savings with the shepherd who uses a lamp or with an end-consumer having a fully digitised house).

The return on investment, the advantages, and disadvantages of switching to sustainable energy, but especially the consequences of not doing so, should be presented to people, especially those who have the financial resources to decide to make investments in sustainable energy.

It does not matter the level of training, the area/region, the level of salary of the final consumer, the important thing is that everyone can participate according to their power, eventually on a voluntary basis for the ones with reduced revenues.

Important is to give the people the instruments to measure their carbon footprint, to have the platforms to monitor and compare their results with similar end-consumers in the same or different regions, and to teach/educate them to use all these tools.

It must add value to the life of the final consumer. To have accurate and complete information on all aspects involved (activities to be done, professionals and regulation authorities that can be contacted, advantages, and disadvantages of switching to sustainable energy, the impacts and savings produced, and positive and negative consequences).

Universities and non-profit organizations are expected to play a big role in this information and communication process.

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Investigating Environmental Awareness of Young Adults in Romania

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Abstract

Nowadays, sustainable living is not an option anymore, but an obligation. The green industry, consisting of eco-friendly products and services, has evolved significantly in recent years. As a result, green consumer behaviour has received considerable attention from companies, marketers, and researchers. Many consumer studies have confirmed that the majority of people are aware of environmental problems and their interest in green products has increased. The popularity of this topic in today's society is a consequence of changing consumer habits, increased ecological awareness, and the shifting state of the environment in the pandemic context. Therefore, the main goal of this paper is to highlight and analyse Romanian consumers' attitudes towards the environment and their green buying behaviour. The article explores the importance of environmental protection for respondents and investigates their ecological behaviour, focusing on the consumption and buying of green products. The paper also discusses how consumers perceive the price of organic products. The main variables analysed are socio-demographic characteristics of respondents, including gender, level of income, and education. In terms of age, this study focuses on Romanian consumers aged 18 to 35 years. In total, data were obtained from 472 respondents, through a convenience sample. An online survey was promoted on social media channels and email. Data analysis revealed that women and families with children are more likely to buy green products. We hope that this research can foster the growth of green marketing efforts in the Romanian context. The findings presented offer practical insights for market segmentation approaches and educational initiatives that can encourage local demand for green products and increase the environmental responsibility of Romanian citizens.

Keywords: green products, sustainability, environmental protection, green marketing, consumer behaviour.

JEL Classification: M31, Q56.

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1. Introduction

During the 1990s, considered the "Earth decade" (McDaniel and Rylander, 1993, p. 4), people started to question the impact of their consumption habits on the environment. As this preoccupation intensified, a major debate arose regarding the connection between marketing and the environment. On the one hand, the marketing discipline was considered the villain because of its role in stimulating unsustainable levels of consumption and demand. At the same time, it was also considered that marketing could become the hero of the situation, by raising awareness of social and green issues.

This phenomenon of embracing environmental problems gave birth to a relatively new concept in the marketing industry, which evolved under different names, for example, "ecological marketing" (Henion and Kinnear, 1976), "environmental marketing" (Peattie, 1995), or "sustainable marketing" (Fuller, 1999). According to Peattie (2010), these three forms of marketing represent the progress of the interaction between marketing and the environment over time, each phase having different implications for the marketing discipline and its role in society. Nowadays, specialists refer to it as "sustainability marketing" (Kumar et al., 2013), a concept considered to be the final stage in the development of green marketing, which combines economic, social, and environmental components. According to Armstrong and Keller (2016), this new domain of marketing can be described as "socially and environmentally responsible marketing that meets the present needs of consumers and businesses, while also preserving or enhancing the ability of future generations to meet their needs" (p. 490).

These shifts in the marketing paradigm have put environmental protection and green products in the spotlight. Today, these two concepts are strongly related to consumers' buying and consumption behaviour. As a result, studies on green consumption have become very popular. Unfortunately, this topic is not sufficiently discussed when it comes to Romania, with very few studies concerning people's level of ecological awareness and behaviour. Considering that the country has different purchasing habits and socio-economic context, it is necessary to understand this topic from the perspective of Romanian consumers.

Therefore, the main goal of this paper is to understand the attitudes and behaviour of Romanian consumers aged between 18 and 35 years regarding environmental protection and green products. By touching on an underexplored topic of research at the local level, we hope that the findings presented will offer valuable insights for market segmentation strategies and educational initiatives that can encourage local demand for green products and increase environmental responsibility of Romanian citizens.

The present paper has the following structure. First of all, it offers a thorough review of the literature on the topic, focusing on both local and international papers. After that, the methodology incorporated for data collection is presented. The next section of the paper discusses the key data obtained. Finally, the paper concludes with a summary of findings and suggestions for further research.

2. Literature Review

As the current state of the environment is changing dramatically, a paramount global shift can be observed: consumers are paying more attention to their environmental impact and are actively engaging in different types of green actions, while companies are trying their best to act in a sustainable way. Many environmental specialists have confirmed that if people do not act green, environmental degradation will worsen (Sun et al., 2021). This is true at both the local and global levels. When looking broadly at current environmental problems in Romania, the country is facing many issues, with the most critical being air pollution, deforestation, and waste management. For example, in February 2022, the capital of Romania recorded a spike in air pollution; thus air quality sensors indicated "values that exceeded the maximum limit by as much as 700%" (Marica, 2022). This news comes as no surprise, after the latest report from the European Environment Agency which highlighted that Bucharest is one of the cities with the worst air quality in Europe (Euronews, 2021).

It could be argued that some of these issues could be resolved or improved by enhancing public awareness of environmental protection. However, in contrast to Western countries, the green market in Romania is still developing. For example, Liobikiene et al. (2016)' s cross-cultural study highlighted that Romania, together with Bulgaria, Italy and Lithuania, are the countries with the lowest consumption levels of green products in the European Union.

With regards to the current literature on the topic, there are limited studies available concerning consumers' green behaviour; therefore, this research area needs improvement. According to Nagy and Dabija (2020), Romania could become a key market for green products, but "the lack of information concerning the benefits of green consumption and the high prices compared to traditional products represent a factor which discourages the purchase of green products" (p. 9). In their study regarding the environmental responsibility of young people in Romania, Kardos et al. (2019) highlighted that consumers' lack of information is a key barrier to "green responsible behaviour" (p. 1). Therefore, local policymakers and marketers need to do more to raise the ecological awareness of the public.

It is important to mention that this lack of information is not only affecting consumers, but also researchers and specialists in the industry who do not have access to enough data on the green market in Romania. At the moment, there is no official Government data available regarding the real size of the organic market. Therefore, national statistics are missing, with no information on supply or demand. This type of information could be of great use to those interested.

On the other hand, there are other local studies more optimistic regarding the green behaviour of Romanian consumers. For example, in their study, Petrescu et al. (2017) mentioned that Romanian consumers tend to have strong positive attitudes towards the consumption of green products. To add more, Dabija et al. (2018) mentioned that Romanians "have started to understand the negative impact of conventional products on the environment" (p. 181). The authors added that Romanians are very similar to those living in Western Europe regarding their green

consumption levels, despite "limited access to infrastructure, limited assortment of products, and less opportunities to buy green products online" (Dabija et al., 2018, p. 182).

All in all, although local studies tend to address diverse green topics, their number is low. Moreover, most of these studies tend to focus on secondary data analysis, instead of collecting primary data. To conclude this chapter, the literature review findings highlight that more research is needed on this topic.

3. Research Questions / Aims of the Research

The main goal of this paper is to investigate the attitudes and behaviour of young adults (aged between 18 and 35 years) from Romania regarding environmental protection and green products. By investigating this topic, important information regarding their buying and consumption behaviour will be discovered. In order to achieve this goal, the following research questions are proposed:

- How important is environmental protection for Romanian consumers?
- What is their purchasing behaviour for green products?
- What are their attitudes towards the price of green products?

Although the number of green marketing studies concerning younger generations is increasing, most of the available studies tend to focus on teenagers (Lee, 2008) or students (Pagalea and Vlad Uta, 2012). At the time of the research, no local study concerning people aged between 18 and 35 years was found. It is worth highlighting that researchers tend to use different names to classify this age cohort. For example, some authors considered them "young adults" (Petry, 2002), while other papers called them "millenials" (Onorato et al., 2018).

There are various reasons why this age group was chosen. First of all, young adults tend to be the more informed and concerned about social and environmental problems, as well as more open to new ideas (do Paço et al., 2013). Second of all, "recent studies indicated the fact that young consumers, either Millennials or Zers, prefer green products" (Nagy and Dabija, 2020, p. 1). Last but not least, they represent a target consumer group for the development of the green market, due to their increased purchasing power. Considering these arguments, it is both relevant and necessary to investigate this age cohort.

4. Research Methods

The current study is part of a larger national research that took place during December 2020 and January 2021. An online survey distributed in Lime Survey was used to collect data, using convenience sampling. Online surveys offer multiple benefits, including "speed, cost, quality of response, no interviewer bias, and data quality" (Malhotra et al., 2017, p. 274).

Although the original data set contains a larger sample of Romanian consumers aged 18 years old or older, the file was split in order to analyse only those aged between 18 and 35. Therefore, the final sample resulted in a total of 472 respondents.

To add more, the original study includes more items and questions. Due to the page limit, only specific variables were chosen.

The current paper explores the importance of environmental protection for respondents and their ecological behaviour, as well as their attitudes toward buying and consuming green products. These variables are analysed in connection with key socio-demographic characteristics, including gender, level of income, education, and presence of children. Data analysis involved both univariate and bivariate procedures, implemented with the help of SPPS, version 20.0.

5. Findings

Before discussing the key results of the study, the socio-demographic characteristics of the sample are presented below.

Table 1. Socio-demographic characteristics of the sample (N = 472)

Variable name	Frequency	Percentage
Gender		
Female	361	76.5
Male	111	23.5
Marital status		
Not married	369	78.2
Married	103	21.8
Presence of children		
Yes	142	30.1
No	330	69.9
Area of residence		
Urban	413	87.5
Rural	59	12.5
City of residence		
Bucharest	213	54.9
Other	259	45.1
Income level		
Below 1.500 RON	132	28.0
1.501 – 3.000 RON	110	23.3
3.001 – 4.500 RON	105	22.2
4.501 – 6.000 RON	64	13.6
6.001 – 7.500 RON	22	4.7
7.501 – 10.000 RON	22	4.7
Above 10.000 RON	17	3.6
Occupation		
Student	187	39.6
Employed	255	54.0
Entrepreneur	15	3.2
Unemployed	15	3.2
Education level		
Secondary school or less	6	1.3
Highschool	136	34.5
Professional diploma	8	1.7
Undergraduate studies	217	46.0
Postgraduate studies	78	16.5

Source: Author's own calculations.

As shown in Table 1, most respondents are females (76.5%), while the rest of 23.5% are males. Regarding marital status, almost 80% of the respondents are not married, while the remaining 20% are married. The majority of respondents have no children (69.9%) and live in the urban area (87.5%). There is almost an equal split regarding location, with 54.9% of the sample living in Bucharest, while the rest living in other cities. When it comes to income level, most respondents are earning between 1.500 RON and 4.500 RON, a total of 45.5% respondents. Less than 5% of the respondents are earning over 10.000 RON each month. Regarding occupation, 54.0% of the respondents are employed, while almost 40% are students. When it comes to education level, the majority of survey participants have either finished undergraduate or postgraduate studies (62.5%), underlying a high education level across the sample. From the total sample, 34.5% of respondents only finished high-school, but this is not a surprising result considering that the respondents' age varies between 18 and 35.

5.1 Environmental Protection and Green Behaviour

In the beginning, respondents were asked to rate how significant is environmental protection for them on a 5-point scale (1 = Unimportant, 5 = Very important). The distribution of responses can be observed in Figure 1 below.

Figure 1. Level of importance given to protecting the environment (N = 472)
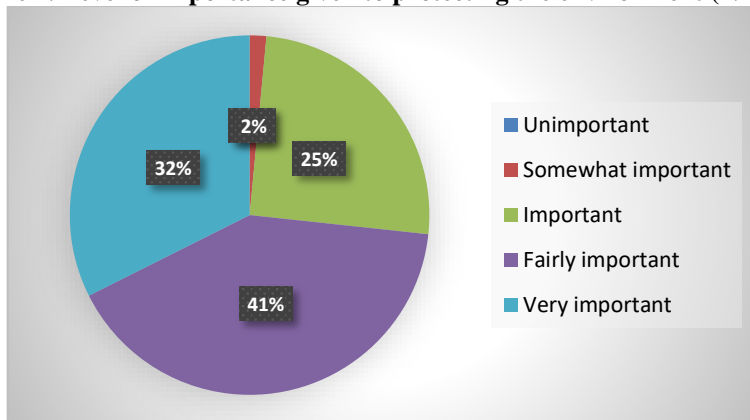
Source: Author's own calculations.

Most respondents (73.3%) considered the environment to be either "very important" or "fairly important" for them. Interestingly, no responses for option "unimportant" were recorded. Overall, there is a favourable appreciation of environmental protection for Romanian consumers. The correlation analysis revealed no significant relationship between level of attention given to environmental protection and demographic characteristics (p > 0.05).

In order to understand general green behaviour, respondents were asked to mention if they have taken any activities to protect the environment recently. From

the total sample, over 70% of respondents answered affirmative to this question. The most mentioned green activities were recycling (233 answers), avoiding plastic (206 answers) and choosing sustainable transportation (173 respondents). At the other end of the scale, the least mentioned green activities were diet change (99 answers), reducing water consumption (118 answers), and buying green products (122 answers). Surprisingly, from the total sample, less than 26% of respondents mentioned they have bought green products in order to protect the environment over the last half year. According to the latest report from Eurostat (2022), only 2% of Romanians are eating the daily recommended portions of fresh fruits and vegetables, the lowest daily intake across the entire European Union.

It could be argued that the level of perceived difficulty can affect environmental behaviour, as Romanian consumers tend to engage in lighter environmental activities, such as recycling, in order to not feel guilty for not participating in more difficult tasks which have a higher impact, such as diet change (Green-Demers et al., 1997).

The relationship between different behaviours was examined with the use of Spearman's rho (ρ) correlation coefficient. The strongest correlation was found between reducing energy consumption and reducing water consumption ($\rho = 0.28$, $p < 0.01$). To add more, a significant correlation, of low intensity, was identified between choosing sustainable transportation and buying second-hand items ($\rho = 0.21$, $p < 0.01$), discussing environmental issues with the others ($\rho = 0.19$, $p < 0.01$) and diet change ($\rho = 0.17$, $p < 0.01$). These correlations may be explained by what psychologists call "the spillover effect", "in which involvement in one form of pro-environmental behaviour increases the propensity of consumers to engage in others" (Peattie, 2010, p. 213). This result is consistent with Biswas et al.'s (2000) study, which found a strong connection between recycling and buying recycled products. Future studies could investigate this topic further.

With regard to demographics, there was a low, negative correlation between gender and avoiding plastic ($\rho = -0.18$, $p < 0.01$) and buying green products ($\rho = -0.14$, $p < 0.01$). This means that high levels of one variable are correlated with lower levels of the other variable. In this case, the gender variable was coded 1 for female and 2 for male in SPSS. Therefore, it can be argued that women are more likely to buy green products and avoid using plastic compared to men. Moreover, data analysis revealed that there is a significant positive correlation between education level and buying green products ($\rho = 0.13$, $p < 0.05$). Thus, high levels of education are associated with high levels of buying green products. These results match those presented in previous research (Tsakiridou et al., 2008).

5.2 Understanding Purchasing Behaviour of Green Products

This section presents the key results regarding the green behaviour of respondents, more specifically frequency of consumption, monthly amount spent, and perceived price of green products.

As shown in Table 2 below, when it comes to frequency of consumption, almost 80% of respondents declared that they buy green products either "a few times a year" or "a few times a month".

Considering the monthly amount spent on green products, around 85% of the total sample mentioned that they spend 300 RON or less. Both the frequency of consumption and the amount of money spent are quite low, therefore there it is no surprise that most respondents (71.7%) perceived the prices of green products as either "high" or "very high".

Table 2. Purchasing characteristics of green products (N = 434)

Variable name	Frequency	Percentage
Frequency of consumption		
Less than that	8	1.8
A few times a year	132	30.4
A few times a month	203	46.8
A few times a week	91	21.0
Monthly amount spent		
Below 150 RON	234	53.9
151 – 300 RON	135	31.1
301 - 450 RON	31	7.1
451 - 600 RON	18	4.1
Above 600 RON	16	3.7
Perceived price of green products		
Very high	52	12.0
High	259	59.7
Medium	116	26.7
Low	7	1.6
Very low	0	0

Source: Author's own calculations.

A moderate, positive correlation was identified between amount spent on green products and level of income ($\rho = 0.33$, $p < 0.01$). Therefore, the more money people have, the more they will spend on green products. Furthermore, the frequency of consumption tends to be higher for respondents who have children, 33.8% of them mentioned they buy green products "a few times a week" compared to 15.1% of those without children. The chi-square value of $\chi2 = 21.371$ indicated that presence of children influences frequency of consumption for green products.

5.3 Willingness to Pay More for Green Products

In one of the questions of the survey respondents were asked to mention the maximum percentage they would be willing to pay to buy green products. The collected responses were grouped into three categories to reflect consumers' willingness to pay more for this type of products: "a little more" (below 25%), "more" (between 25% and 70%) and "a lot more" (above 70%). The results are presented in Table 3 below.

Table 3. Respondents' willingness to pay more for green products (N = 434)

Category	Frequency	Percentage
A little more (<25%)	278	64.1
More (25% - 70%)	144	33.2
A lot more (>70%)	12	2.8

Source: Author's own calculations.

Around 23% of the total sample mentioned that they would be willing to pay 20% more for green products, making this the most mentioned answer. The highest percentage mentioned was 100%, picked by 9 respondents (only 1.9% of the total sample). Data analysis revealed that there is a significant, negative relationship between gender and willingness to pay more (ρ = -0.24, p < 0.01). Therefore, it could be argued that women are more likely to pay more for green products compared to men.

6. Conclusions

Overall, it can be concluded that Romanian consumers in the age group analysed tend to value environmental protection and engage in actions to protect it. However, when it comes to buying green products, the frequency of consumption and the amount spent tend to remain low. Future studies should look into the main motives that restrict Romanian consumers from buying and consuming more ecological products. Maybe consumers lack awareness of these products or do not trust their quality.

The present study is not without limitations. For instance, the paper did not consider the barriers that might impact green buying, while, due to the sampling method and the instrument chosen for collecting data, the study findings cannot be generalized. Research concerning Romanians' green behaviour should be further explored, by focusing, for example, on different research methods or other types of variables.

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Effect of Vaccination Campaigns on COVID-19 Awareness among Romanian Population: A Case Study

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Abstract

The area of social marketing to promote health awareness and prevention is attracting considerable interest due to the health crisis caused by the emergence of COVID-19. Over the past two years, the epidemic has proved to be a problem of economy, education, and inequality, as well. Due to the requirement to raise public awareness and persuade the audience of the dangers and the need to limit its spread, the current challenges posed by the pandemic have led to several strategic decisions in countries around the world. This work aims to assess the influence that official national and international information campaigns, part of the strategic plan, had on the initial attitude of the Romanian population toward receiving the COVID-19 vaccine. After seeing four vaccination campaigns conducted both in Romania and at an international level, respondents would have a better understanding of the topic at hand, namely the way these campaigns improved awareness of COVID-19. More research is being conducted on the influence of a wide range of psychological factors on increasing (or reducing) the willingness of participants to be vaccinated against COVID-19. The research is based on a literature review and an analysis of quantitative data collected from online surveys distributed between March and April 2022. The results showed that the participants were more willing to vaccinate if they received their information from official sources and tended to trust more the information transmitted through international campaigns. There was also a significant change in willingness to vaccinate once they found out that the vaccine was safe and effective.

Keywords: social marketing, vaccination campaign, COVID-19, Romania, health awareness.

JEL Classification: M31, M38, M39, I12.

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1. Introduction

Since time immemorial, long before the contemporary days, and in ancient times when they were known as plagues, the pandemics have been caused by the contracting of different bacterial or viral infections, with expansion across continents and multiple countries. Their appearance has caused trials of desolation and death through the centuries and to this day, with the current pandemic caused by the influenza virus SARS-CoV-2, the coronavirus that has caused the pandemic named COVID-19. A pandemic is classically defined as "an epidemic occurring on a scale that crosses international boundaries, usually affecting people on a worldwide scale" (Porta & International Epidemiological Association, 2008, p. 179).

Despite the well-developed theoretical plans, one can see the constant agitation caused by the unprecedented events in the general public. In addition to the already existing problems related to global warming, the refugee crisis, malnutrition, and the way they affect us all, there is also the health crisis caused by the appearance of the COVID-19 pandemic. Over the past two years, the pandemic has shown that it is not only a sanitary crisis, but also a problem of economic, educational, and inequality, among others.

The reason for such crises is a lack of knowledge and awareness of the problem. Therefore, we must take into account the concept of common good and think about ways to influence people's behaviour to achieve this.

Fortunately, there is an approach for such a scope: Social marketing. It helps to develop campaigns that can change or maintain behaviour for the benefit of a group or the society as a whole. It is, indeed, undeniable that the term social marketing has become a well-established component of the marketing lexicon at universities, government agencies, or NGOs.

The purpose of this study was to provide an assessment of the influence that official national and international information campaigns had on the initial attitude of the Romanian population toward receiving the COVID-19 vaccine. More research is being conducted on the influence of a wide range of psychological factors on increasing (or reducing) the willingness of participants to be vaccinated against COVID-19.This work offers one of the first investigations into the way the social marketing techniques used in the campaigns impact the behaviour of the Romanian population.

2. Problem Statement – Theoretical Considerations

2.1 Social Marketing as a Concept

The concept of social marketing was formalized in Kotler and Zaltman's 1971 article, which established the discipline of social marketing. In the article "Social marketing: an approach to planned social change", social marketing was formally defined as the "design, implementation, and control of programs calculated to influence the acceptability of social ideas and involving considerations of product

planning, pricing, communication, distribution, and marketing research" (Kotler, Zaltman, 1971, p. 5).

The consolidation led to the establishment of the obvious limits of the field. According to Andreasen, social marketing techniques could only be applied to the "analysis, planning, execution, and evaluation of programs designed to influence the voluntary behaviour of target audiences in order to improve their personal welfare and that of society of which they are a part" (Andreasen, 1994). The above emphasis helped identify whether social marketing, as compared to conventional methods, was the best solution to a certain problem. In the 21st century, the field has adapted to the actual world issues connected to the environment, public health, human rights, or policy changing. Kotler and Lee observed the change, stating that the early social marketing approaches "were those focused on family planning, tobacco and HIV/AIDS". However, they now approach more modern topics such as the enhancing of financial well-being" (Kotler, Lee, 2019, n.p.).

In other words, social marketing keeps its essence through all the different definitions. It is society-oriented, usually aiming at the well-being of the target audience while seeking to influence via techniques that are also used in commercial marketing.

2.2 The Ethical Dimensions of Social Marketing

Social marketing aims to improve society. Since improvement implies the idea of good and positive development, it is intriguing to learn who and what decides if a change brought about by a campaign is beneficial or harmful. Unfortunately, determining what is ethical in social marketing is rarely straightforward. In most circumstances, there is not a clear distinction between good and wrong.

Although there are many sophisticated, but essential, ethical theories to examine when studying social marketing, the ones that are the easiest to analyse when it comes to understanding what "beneficial" might be, are the deontological and teleological approaches. Kant is credited with inventing the most well-known formulation of deontological ethics. Kant's moral model is premised on his belief that humans have the unique capacity to reason. The moral worth of an action, according to Kant, is decided by human will, which is the only thing in the universe that can be regarded good without limitation (Kant, 1993, p. 15). On the other hand, for the teleologists (or utilitarists) the only thing that counts is the character of the outcome, be it good or bad. The contradictions between the two theories lead to questions such as how can someone establish the appropriate goal, while keeping an ethical view of it.

However, whilst marketers struggle to develop solutions that help society, these efforts might have unintended, unethical implications. Stigmatization, victim blaming, coercion, and the use of financial incentives, to name a few ethical issues, are all more likely to occur among social marketers (Eagle, Dahl, 2015, p. 187). Such ethical issues may arise from the environment, approach, methodology, and outcomes of interventions, and they typically bring into question social marketing's "social fairness".

One of the specific areas of social marketing that pose ethical concerns are those relating to targeting. A fundamental strategy for marketers is to "select target markets they can best affect and satisfy" (Kotler, Lee, 2008, p. 10). When used in social marketing, this method may result in the exclusion of some groups of the intended audience since they are hard or costly to engage (Brenkert, 2002, p. 15).

In the end, what is good for one target audience may be bad for another. The benefits to society cannot simply be based on a universal code of ethics, because it does not exist. It is up to the social marketer and their own set of values what the campaign is intended to accomplish.

2.3 Social Marketing Tools

Social marketing tools are used develop and promote campaigns that will act like behaviour changers or behaviour keepers. Generally, marketers make use of the traditional marketing mix, a proper organizer tool that ensures a basic framework for a successful campaign. Kotler and Zaltman were aware that the 4Ps can also be applied to social causes. They argue that "to the marketer, the success of a campaign depends on the proper development of product, promotion, place and price considerations" (Kotler, Zaltman, 1971, p. 12).

However, apart from the four Ps of commercial marketing (product, place, price, and promotion), social marketing proposes the integration of another 4 Ps, relevant for the particularity of this field: publics, partnership, policy, and purse strings (Weinreich, 2010). First of all, the social product is important, as we state what and whose behaviour we are trying to change. Furthermore, the social place is a significant factor. It is vital to assess the place where behaviour will thrive (or not) and where it should be promoted to reach the targeted audience. Another of the Ps is the social price. It refers to the "costs" that someone must pay in order to change behaviour. The last of the four commercial Ps refers to social promotion. It is crucial to determine which channels of communication to use to reach the target audience and ensure long-term demand for the product/idea/behaviour that is being sold.

To conclude, effective communication will be the key to changing the public's perception of an issue from one of ignorance to one of emotional attachment, or from one of pessimism to one of optimism. The application of commercial marketing techniques to social problems is the emphasis of social marketing. The only way to do so effectively is to understand what your audience wants and needs and cater to them campaigns with engaging messages.

2.4 The COVID-19 Health Crisis and the Intention to Receive the Vaccine – An Overview

The coronavirus pandemic (COVID-19) overtook the world in two years, and became one of the world's most serious public health concerns. As of April 15, 2022, more than 11.4 billion doses were administered in 184 countries (Bloomberg, 2021). In Romania, 16.8 million doses were administered (Bloomberg, 2021). Regardless of the fact that most countries launched public vaccination in early 2021, acceptance

rates varied greatly depending on regional progress. It is also important to examine the impact of official national and international information campaigns on the Romanian population's initial attitudes toward taking the COVID-19 vaccination. More research should be done on the impact of a variety of psychological factors on individuals' willingness to be vaccinated against COVID-19.

2.5 The Four Campaigns – A Brief Presentation

1. The initial COVID-19 vaccination campaign, which began in Romania on 27 December (as in all of the EU countries) under the name of "RoVaccinare"

On December 27th 2020, The Romanian National Coordinating Committee for COVID-19 Vaccination (CNCAV) began the first phase of the most important public health campaign in Romania – the Official vaccination strategy against COVID-19 (the "Strategy"). Its goal was to get positive messages about the vaccination and the benefits it will bring to the general public as early as possible. It also defined the principles, vision, and method of action for the delivery of COVID-19 vaccinations in Romania.

2. The GAVI's Global Campaign "Vaccines work"

The GAVI's Global Campaign "Vaccines Work" campaign is based on cooperation with countries to support and maintain regular vaccination against COVID-19 and to restore regular vaccination. The campaign is developed by experienced journalists from all over the world, aiming to provide scientific explanations on the facts behind vaccines, COVID-19 and human health, verified by expert review teams.

3. "Împreună învingem pandemia! Ce conține vaccinul? – "Together we defeat the pandemic! What does the vaccine contain?"

The creative concept of the communication campaign is based on the question "What does the vaccine contain?" It comes up with an emotional approach, where vaccination is not just about statistics, but it is also seen as a way to get back to normal. In a video posted on his official social media page, the prime minister offers an answer to this question and invites members of the Government, as well as Romanians, to come up with their own answer.

4. UNICEF "I vaccinate for you"

According to their official website, the campaign illustrates some of the consequences of the pandemic on children's lives as a result of quarantines that kept them confined and isolated for months. Three spots address commonplace difficulties that children have noticed have altered, such as going to school, visiting grandparents, and playing in the streets with their friends.

3. Aims of the Research

The purpose of this study was to provide an updated assessment of the influence that official national and international information campaigns had on the initial attitude of the Romanian population toward receiving the COVID-19 vaccine. This research is one of the first to look into how social marketing tactics were employed

in campaigns to reach Romanians. The respondents would have a better understanding of the topic at hand, namely how these campaigns attempted to increase health awareness regarding the COVID-19 pandemic and the benefits of taking the vaccine, after seeing four vaccination campaigns that were conducted both in Romania and on an international level, and would respond to our questionnaire accordingly.

4. Research Methods

Data were collected following the survey method. A Google forms surveys was distributed via social media platforms such as Instagram, Facebook, and WhatsApp. The online questionnaire was selected because it allowed for swift, thorough, and elevated data gathering and analysis. Data from fully completed questionnaires was retrieved and statistical analysis was performed. A sample of 85 participants completed the survey between March 25th - April 11th 2022. No personally identifying information was acquired, and data were collected anonymously.

4.1 Research instrument

The questionnaire consists of 16 questions structured into four sections (see the Annex). The first section included five questions about sociodemographic characteristics (age, gender, level of education completed, and whether the respondents suffer from chronic disease or not). The second section measured the attitudes of the participants towards the COVID-19 vaccine (if they did not receive it, then why not) and their intentions of receiving the COVID-19 vaccine using one closed-ended question and two questions with a five-point Likert scale. The next section used five questions with a five-point Likert scale to determine the influence that official national and international COVID-19 information campaigns had on the initial attitude of the Romanian population towards the vaccine. The last section consists of three five-point Likert scale questions to measure the Romanians' opinions after watching the campaign.

The variables considered were measured as follows:

1. *Factors of influence in vaccine hesitancy* included six items including "I was/am not sure about long-term side effects of the vaccine." A five-point Likert scale was used to collect responses, ranging from strongly disagree (1) to strongly agree (5). A higher score suggests that the issue has a bigger impact on people's unwillingness to get vaccinated against COVID-19.

2. *Sources of information* were measured with four items that explored the respondent's level of trustworthiness in the information sources about the vaccination process that are widely available for the population, such as the vaccination campaigns of international organisations (UNESCO, the United Nations, and the World Health Organisation). The response format was a five-point Likert scale from very untrustworthy (1) to very trustworthy (5). A higher score denotes a higher level of confidence in the sources.

3. *Importance of getting vaccinated* had three items such as "Protecting family, friends and vulnerable members of your community". The response format was a five-point Likert scale from not at all important (1) to very important (5). A higher score suggests that this aspect is more important in making the decision to be vaccinated.

The relationship of the respondents with each vaccination campaign was considered by looking at the following aspects:

4. *The level of familiarity* was measured by one item which explored the level of familiarity and exposure to each campaign. The item was measured on a five-point Likert scale from not at all familiar (1) to very familiar (5). A higher score indicates a higher degree of popularity of that specific campaign.

Four variables were assessed for each campaign to identify which had a better or worse effect on the target audience and which remained with them the longest time. A five-point Likert scale was used to collect responses, ranging from strongly disagree (1) to strongly agree (5).

5. *The accessibility of the message:* The purpose of an accessible message is to convince the intended audience. The message should be tailored to the degree of knowledge and potential reaction of the audience ("The message was accessible and straightforward").

6. *The positivity evoked by the message:* The purpose of a positive message is to elicit a moderate to positive response from the audience ("The approach was believable and evoked positive, hopeful emotions").

7. *Importance of the campaign motivators* was measured by five items which explored the elements of persuasion that were used in the campaigns: if people can come back to the normal life preceding the pandemic, then this might be seen as a strong motivator. The items were measured on a five-point Likert scale, ranging from not at all motivating (1) to very motivating (5).

8. *The change in the likelihood of getting the vaccine after having been exposed to the campaigns* was assessed by five items to determine the impact of the campaigns on one's vaccination intentions. The items were examined on a 5-point Likert scale, ranging from strongly disagree (1) to strongly agree (5).

5. Findings

This section presents the main results of the survey.

Demographic data

Table 1. Demographic characteristics of the sample

Category	Variable	Number of respondents	%(n)
Age	18-20 years old	5	5.88
	21-29 years old	46	54.12
	30-39 years old	15	17.65
	40-49 years old	14	16.47
	50-59 years old	4	4.71
	60 years or older	1	1.18

Category	Variable	Number of respondents	%(n)
Gender	Male	42	49.41
	Female	43	50.59
	Prefer not to answer	0	0.00
	Other	0	0.00
Level of education completed	High School	13	15.29
	Bachelor's Degree	37	43.53
	Master's Degree	16	18.82
	Ph.D. or Higher	19	22.35
Residence	Urban area	76	89.41
	Rural area	9	10.59
Suffering from chronic disease	Yes	16	18.82
	No	69	81.18

Source: Created by authors.

Of the 85 Romanian participants, 42 were men and 43 women. Most of our participants were between 21 and 29 years of age (n = 46), many had a university degree (n = 76, considering the Bachelor's, Master's, and Ph.D. or higher). At the time the study was conducted, 76 participants lived in urban areas, while only 9 lived in the rural areas. Additionally, a small number of respondents suffered from chronic disease, which means 16 out of a total of 85 respondents. Participants over the age of 50, those who lived in rural areas, and those who had a chronic disease were underrepresented in our sample compared to the overall survey respondents (see Table 1).

Initial attitude toward getting vaccinated against COVID-19

Table 2. Initial attitude toward getting vaccinated against COVID-19

Initial attitude toward getting vaccinated against COVID-19	n
I was determined to get vaccinated	44
I was not sure.	30
I was determined not to get vaccinated.	11

Source: Created by authors.

As it can be seen from Table 2, the initial acceptance of the COVID-19 vaccines was substantially high, in comparison to those that were determined not to get vaccinated or were not sure about their decision. In fact, 44 participants (37.5%) responded that they were determined to get vaccinated against COVID-19, whereas only 30 participants (25.5%) responded that they were not at all likely to get vaccination, and 11 participants (9.35%) were not sure about their decision.

1. Factors of influence in vaccine hesitancy

Table 3. Factors of influence in vaccine hesitancy

Factors of influence in vaccine hesitancy	M
I was/am not sure about long-term side effects of the vaccine.	3.04
I was/am skeptical of the vaccines.	2.35
I did/do not trust the government/medical authorities.	2.13
None of the vaccine options available suit me.	2.12
My medical condition exempts me from getting vaccinated.	1.82
My religion does not allow me.	1.29

Source: Created by authors.

As mentioned above, the majority of the participants intended to get vaccinated even before the promotional campaigns were launched. However, 30 respondents expressed their reluctance and other 11 stated their determination to not get vaccinated. Taking into account the mean value of their answer, the respondents were reluctant mainly due to the uncertainty of long-term side effects of the vaccine (M=3.04), which led to skepticism (M=2.35). The factors that least influenced the vaccine hesitancy were religion (M=1.29) and preexistent medical conditions (M=1.82) (see Tables 2 and 3).

2. Sources of information

Table 4. Sources of information on the vaccination against COVID-19

Sources of information about the vaccination process	M
The vaccination campaigns of international organisations (UNICEF, the United Nations, and the World Health Organisation).	3.91
Official information from the competent authorities (The Government, the National Committee for Special Emergency Situations, The National Coordinating Committee for COVID-19 Vaccination Activities, European Medicines Agency, etc.).	3.81
The vaccination campaigns of national organisations (the Romanian Government).	3.58
Medical professionals on social media.	3.53

Source: Created by authors.

The majority of the respondents have high trust in official campaigns, national or international, as can be seen from the high values of the mean for each item (3.91, 3.81, 3.58, and 3.53), (see Table 4). The vaccination campaigns of international organisations ranked first as trustworthy sources of information, with 31 respondents ranking them as trustworthy, while 35 ranked them as very trustworthy. The official information from the Romanian competent authorities is the second most preferred source of information, with 32 respondents marking it as trustworthy and 29 as very trustworthy. The third source ranked, again, quite high in the respondent's level of trust (28 ranked it as important, while 25 ranked it as very

important). On the last place, although with a high score, the information of medical professionals on social media does not seem to elicit as much trust (only 28 found it trustworthy, and 18 very trustworthy).

3. Importance of getting vaccinated

Table 5. Factors of importance for the vaccination against COVID-19

Importance of receiving the vaccines	M
Protecting family, friends and vulnerable members of your community.	4.40
Getting back to 'normal'.	3.93
Doing your part to end the pandemic.	3.85

Source: Created by authors.

As it can be seen, the importance of receiving the vaccines was positively and significantly correlated with innate human prosociality. The most important reason was to prevent harm to those who are less fit. Therefore, protecting family, friends and vulnerable members was the highest ranked (M=4.4), with 61 respondents considering it very important. Returning to the life before the pandemic was the second most important factor (M=3.93), while the moral responsibility of contributing to reach the end of the pandemic ranked last (M=3.85).

4. The level of familiarity with each vaccination campaign

Table 6. The level of familiarity with each vaccination campaign

Level of familiarity with each vaccination campaign	M
RoVaccinare	4.22
Împreună învingem pandemia! Ce conține vaccinul? -Together we defeat the pandemic! What does the vaccine contain?	3.46
UNICEF's "I vaccinate for you" International Campaign	2.71
The GAVI's Global Campaign "Vaccines work"	2.11

Source: Created by authors.

The most popular vaccination campaigns were the national ones, given the fact that all respondents are Romanian. The first place is occupied by the RoVaccinare campaign (M=4.22). Its popularity might be brought by the fact that it is the first campaign of this kind to be carried out in Romania so far. What made it so revolutionary is that its message could be reached by the target audiences via multiple channels (social media, radio, television). The second most popular campaign was "Together we defeat the pandemic!" (M=3.46). It was a continuation of the former "RoVaccinare", but this time the approach was a more emotional one. It was also done in partnership with UNICEF, which might have made it so popular. The least popular campaigns were the international ones, an understandable fact,

given that they are in English and are not tailored specifically for the Romanian people, but at a larger scale.

5. The accessibility of the message

Table 7. The accessibility level of each message

The accessibility of each message	M
The GAVI's Global Campaign 'Vaccines work'	3.64
Împreună învingem pandemia! Ce conține vaccinul? -Together we defeat the pandemic! What does the vaccine contain?	3.61
UNICEF's 'I vaccinate for you' International Campaign	3.60
RoVaccinare	3.59

Source: Created by authors.

According to the respondents, the most accessible message was the one transmited by GAVI. (M=3.64). The GAVI's spot that they watched on the safety of vaccines offer indeed clear, simplified data as to why vaccines are viable and do not represent a danger for health. The second most accessible one, Impreuna invingem pandemia, is quite similar to what the GAVI's campaign tries to convey. Here, the benefits of the vaccines are also explained, but from a rather emotional point of view.

6. The positivity evoked by each message

Table 8. The positivity evoked by each message

The positivity evoked by each message	M
Împreună învingem pandemia! Ce conține vaccinul? -Together we defeat the pandemic! What does the vaccine contain?	3.53
The GAVI's Global Campaign "Vaccines work"	3.51
UNICEF's "I vaccinate for you" International Campaign	3.46
RoVaccinare	3.40

Source: Created by authors.

As it can be seen, the most positive message were considered to be the ones whose title inspire a sense of togetherness and are accompanied by positive affirmations. For example, the campaign which ranked first (Împreună învingem pandemia! Ce conține vaccinul? - Together we defeat the pandemic! What does the vaccine contain? – M=3.53) implies that only a population that unites towards the same goal will be able to reach its scope. Unfortunately, the last campaign to evoke positivity was RoVaccinare (M=3.4). This probably might be due to the fact that a simple word is not enough to convey a message if it is not put next to a verb or a pronoun so that we can see who is included or not.

7. The importance of the campaign motivators

Table 9. Importance of the campaign motivators

Importance of the campaign motivators	M
Coming back to the normal life preceding the pandemic.	3.98
The information is transmitted via healthcare officials.	3.84
The same vaccines will be given both in Romania and in the EU.	3.67
Empathy for people that cannot get the vaccine (due to chronic illnesses or not fitting in the age range).	3.64
Officials affirm they will get vaccinated.	3.09

Source: Created by authors.

Table 9 shows that the most effective incentive depicted by the campaign was "coming back to the life preceding the pandemic", with more than half of the respondents (n = 45) ranking it as "very important". They also considered as "important" or "very important" the fact that healthcare officials were the ones who transmitted the information. The fact that we receive the same vaccines as our fellow EU members represented another motivator that ranked high in the sample. Unfortunately, the mistrust of the Romanians in the Government and the general skepticism when it comes to the representatives of power in our country caused the motivator "officials affirm they will get vaccinated" to rank last.

8. The change in the likelihood of getting the vaccine after having been exposed to the campaigns

Table 10. The change in the likelihood of getting the vaccine after having been exposed to the campaigns

The change in the likelihood of getting the vaccine after having been exposed to the campaigns		M
I kept my previous opinion (to get vaccinated).		3.88
I changed my opinion toward getting vaccinated.		2.80
I did not follow the vaccination campaigns.		2.45
I kept my previous opinion (not to get vaccinated).		2.32
I changed my opinion toward not getting vaccinated.		2.06

Source: Created by authors.

Table 10 shows that most of the respondents who intended to get vaccinated before being exposed to the campaigns, remained constant with their option, with 32 respondents strongly agreeing, and 12 agreeing. It can be seen that there is a tendency to adopt a pro vaccination attitude after being informed, showing that campaigns have reached their purpose (M=2.8). 12 respondents have stated that they "strongly agreed", and other 8 "agreed" with the idea to get vaccinated. Unfortunately, there are respondents who kept their reluctance towards getting the vaccine, or even

changed their initial attitude and turned against it. This can be caused, once again, by the expressed distrust that Romanians toward the authorities and any information that is given by them.

6. Conclusions

The current study looked into the primary motivations underlying Romanians' COVID-19 vaccination practices after being exposed to both national and international vaccination campaigns and demonstrated the potential for shaping public communication campaigns by studying the emotional and social origins of vaccine behaviour. The perception that vaccination helped safeguard vulnerable members of the community and one's own health was found to be the most effective motivator in this study. Furthermore, the Romanian's decision to get immunized is influenced by their level of respect on health authorities or the information provided by government authorities.

The novelty in this study stems from being the first to assess the effects that a social marketing campaign could have on the population depending on multiple factors such as: the source of the information, the transmitter of the information and how this information can influence the behaviour of the target audience (in a negative or positive way). A high positive emotional response could also be witnessed when it came to the campaigns whose titles evoke a sense of community and are accompanied by positive affirmations. The lessons learned would be helpful for understanding what Romanians would be truly influenced by and tailor future national vaccinations campaigns accordingly.
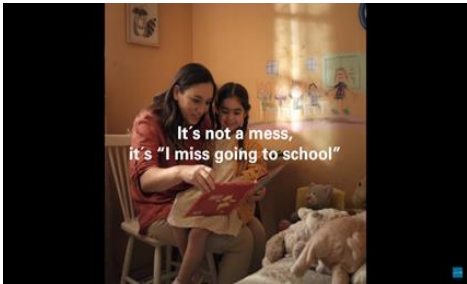
One limitation is that the study included individuals who were recruited from a small cohort and had a higher percentage of respondents who identified as living in an urban area, had a higher education than high school, and were less likely to have a pre-existing disease that would prevent them from getting vaccinated.

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Appendix: The four analysed vaccination campaigns

"RoVaccinare" campaign - Dr. Valeriu Gheorghita's (the campaign's coordinator) message *Source:* https://www.youtube.com/watch?v=x1JjoSlWMwE	**The official GAVI platform** *Source:* https://www.gavi.org/vaccineswork/about
"Împreună învingem pandemia! Ce conține vaccinul?" -Together we defeat the pandemic! What does the vaccine contain?' Publicity spot – A grandmother's message *Source:* https://www.youtube.com/watch?v=-hW59-f68Bs	**UNICEF'S Vaccination campaign against COVID-19** *Source:* https://www.youtube.com/watch?v=yHm67uRK0q0

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All Aboard: Towards Digitalisation.
Romania and Its ICT Sector

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Abstract

The ongoing pandemic context has highlighted the need to adopt information technologies in all socio-economic activities in order to improve the efficiency of the workflows of various institutions, business organizations and other categories of entities, as well as to build a high-performance digital infrastructure adapted to the current demands of the knowledge society. The COVID-19 pandemic has, to some extent, led to an increase in the rate of adoption of ICT technologies at national level and beyond, generating a significant increase for all hardware and software components, i.e., products and services offered by ICT companies. Therefore, we consider it of great interest to highlight the performance achieved at national level in the area of digitalization and the role and position of ICT companies at national level in reshaping the way economic and other activities are carried out.

Keywords: digitalization, information technology, performance, digital economy.

JEL Classification: M15, M21, O33.

1. Introduction

The business environment and the society as a whole have experienced many changes in the last decades due to the development of technology. In the same time, the needs and individual's preferences have evolved and become more complex. As a result, the strategies of business decision-makers have undergone major reconfigurations in order to respond effectively to the demands/needs of their customers . Within this framework, the adoption of information technologies becomes a necessity for business organizations to carry out innovative activities in order to perform and to be competitive in a business environment where the competition is increasing. Thus, a digital strategy, which involves more than the acquisition of IT equipment and software, but also the optimization of some

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processes through the use of digitalization, can have the expected effects on the activity of organizations. The challenge is higher when we take into consideration the human resources that needs to be prepared in order to use all the technology, so how will the integration of such tools improve companies' activities/processes? What is the role of the ICT sector in developing and implementing such solutions in the digital economy?

2. Research Methodology

The aim of this research is to give an overview of how business organizations in Romania have incorporated information technologies in their workflow, highlighting the importance of the ICT sector in implementing digital solutions. As a subsidiary, we propose the following objectives:

O1. To explore the benefits of digitalization in the long-term development and progress of both companies and society as a whole.

O2. To analyse the progress made in the area of digitalization by business organizations in Romania in comparison with those in the European Union.

O3. To highlight the role of the ICT sector in the digital economy.

The research included a qualitative, and therefore theoretical, component and a quantitative dimension. On the one hand, it consisted in the analysis of the existing literature on the topic addressed in this research, and on the other hand, it implied the analysis of statistical data available on the online tempo platform of the National Institute of Statistics and the Eurostat database. The research included all four components that refer to the use of ICT by business organizations, i.e., internet connectivity, e-business, e-commerce and website and social networks, as they are available in the databases mentioned above. For each component a selection of indicators was made, based on criteria such as: availability of data for both Romania and the EU, existence of data for several years and the importance of the indicators for this research. Subsequently, we considered presenting some aspects related to the activity carried out by companies in the ICT sector at national level, whose contribution in the adoption of information technologies is essential (in fact, the activity carried out by such companies is conditional, i.e., based on software and hardware tools).

3. Literature Review

The concern of business organizations to run efficient operations and achieve high performance has contributed to the reconfiguration of their business models and strategies. At the same time, the increasing global presence of companies and the changes in technology have, to some extent, forced the increasing use of information technology tools.

All the changes that have taken place in the last decade and are still in progress in business and not only, highlight the development of what we call the digital economy. The digital economy involves digital infrastructure, efficient management systems and content creation (Coates, Holroyd, 2015). In this new framework for the

development of socio-economic activities, information becomes digital (bits), communication takes place through digital networks and the internet becomes the basic component (Tapscott, 2015). These issues have also become of real interest to governments due to the impact on society, economic development and long-term progress. Therefore, the policies adopted aim to strengthen the infrastructure needed to operate/function digital technologies, more specifically to provide the connectivity component, the basic element of a digital ecosystem (Vagadia, 2020).

Regarding the digital economy, a number of its characteristics are mentioned in the literature such as digitalization and use of ICT tools/equipment, adoption/implementation of new processes/methods for business development, codification of knowledge, repositioning of information as an essential asset in the organizational infrastructure (Sharma, 2005).

According to EIB (2020), economic entities that incorporate digital technologies in their workflows are more efficient and perform better than non-digital ones. At the same time, digital companies are distinguished by management practices that promote and support innovative activity and higher efficiency in production processes and other operations carried out by an enterprise. At the same time, EC (2016) points out that the use of ICT tools has significant benefits for both SMEs and MNCs. Among the most obvious benefits we mention: a more efficient allocation of resources, increased product quality, reduction of waste and scrap, improved performance, improved innovation infrastructure through the development of partnerships/collaborations, etc. A study carried out under the initiative of the OECD (2011) highlights the need to make investments in the development of an efficient ICT infrastructure. According to the same study, such investments have positive effects on work productivity and, at the same time, contribute to high resource efficiency. In addition, they also have a direct impact on the development of networks and the enhancement of innovative processes, in the sense that the use of such tools allows companies to develop new processes, new ways of working and, therefore, new products/services. Moreover, digital technologies have a significant contribution to make in the development of IT/digital platforms which in turn encourages/facilitates partnerships/collaborations between different entities. Such ecosystems encourage creative and innovation processes as well as organizational processes that will reflect on a company's innovative capacity (BCG, 2019).

The interest in adopting new technologies, i.e., innovative activity and the adoption of new business practices can be found in the strategy implemented at management level (OECD, 2004). Inevitably, the results achieved in terms of the use of ICT tools will be influenced by the decisions taken by the management of the companies, by the vision of the managers towards all that represents the digitalization processes for the success of the company. As the interest in and need for the adoption of such tools grows, the ICT sector becomes essential for the digital economy. In addition, digital technologies produced by companies in this field have expanded at a faster rate globally than any other disruptive technology, with effects on many market segments (Coates, Holroyd, 2015).

ICT companies are an essential part of the digital economy; in this respect Jordan (2020) shows that to some extent companies such as Apple, Microsoft, Google and Facebook are a component of the digital economy. Their activities focus on the development of ICT products, ICT infrastructure but also information and electronic content, highlighting the connection between information, communication and technology. The use of ICT products/services can be supported by a number of arguments that clearly highlight the benefits for companies: they have a significant impact on reducing operating or day-to-day costs, improve productivity, facilitate decision-making, improve customer relations and encourage the implementation/ development of new strategies (Turban et al, 2004).

Charan (2021) emphasizes that we are experiencing a reconfiguration of what represents the competitive advantage for companies in the digital economy. Thus, according to the author the core/underlying elements of a business organization's competitive advantage are built around what are computing/artificial intelligence platforms and machine learning algorithms. Digital technologies are, to some extent, forcing business decision-makers to reconfigure their business strategy/model, which may entail a radical change in the way they do business, a rethinking of value chains or a transition to running operations globally. At the same time, it may foster the creation of digital businesses, improve the current business model or even replace it (Westerman et al., 2014). In this regard, we recall Bounfour (2016) who mentions a new type of economic entity called digital enterprise that has at its core data, including the way it is processed in order to achieve the firm's performance (more precisely the way data is monetized). At the same time, Laudon (2020) refers to the digital firm as an organization whose relationships with stakeholders are digital (ICT technologies connect the firm with its partners) and whose core processes are carried out through digital networks. Similarly, Turban et al. (2013) refers to e-business when they mention companies in which a significant part of the activities is carried out through e-business processes (using digital technologies, the internet to accomplish a task; for example, in the recruitment process, the firm may post information about available jobs on its website). There are companies where only a small part of the processes is e-business, but there are companies that do all their business online (e.g., in the ICT sector).

4. Findings

In describing the aspects related to the research topic on the business environment at national level, we have chosen a comparative approach with the situation in the European Union. In order to analyse the use of ICT in enterprises, we have considered the four components available on the Tempo Online platform of the National Institute of Statistics, i.e., Eurostat, as follows: internet connectivity, e-commerce, e-business and aspects related to websites and social networks. For each perspective we selected the indicators for which data were available both for Romania and for the EU average. Regarding Internet connectivity we analysed 2 indicators: the share of firms out of the total number of firms, excluding the financial sector (with more than 10 employees) that have access to the Internet

and the share of employees out of the total number of employees using computers with access to the World Wide Web. As regards Internet access of companies in Romania and the European Union, the figure below shows the situation for the period 2012-2019.

Figure 1. The enterprises with internet access in Romania and EU

Source: Author's elaboration after https://ec.europa.eu/eurostat; http://statistici.insse.ro.
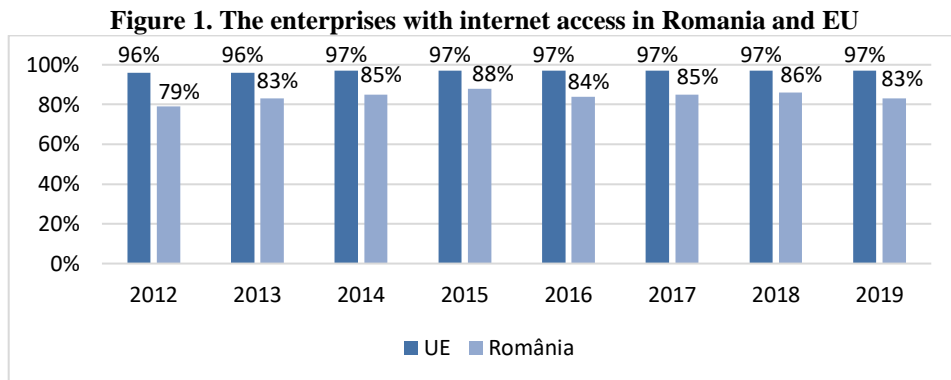
The available data show that, on average, in the European Union, approximately 97% of the firms in the sample analysed have access to the internet; in practice, we can see that from 2014 to 2019, this indicator has maintained its value. Regarding Romania, we find that the share of firms with internet access has increased in 2019 compared to 2012, but a broader analysis places Romania in last place in terms of the analysed aspect, being the only country at EU level for which less than 90% of companies have internet access. Regarding the use of computers with internet connection in the workplace, Figure 2 shows the data available for the period 2012-2021.

Figure 2. Persons employed using computers with access to World Wide Web in Romania and EU

Source: Author's elaboration after https://ec.europa.eu/eurostat; http://statistici.insse.ro.
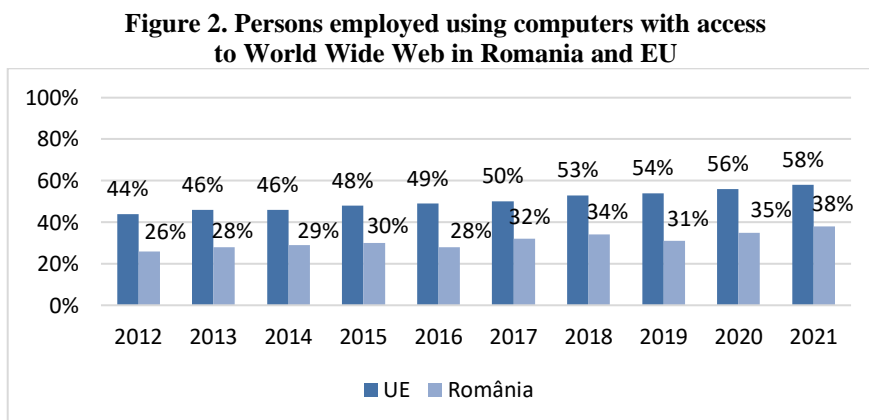
As we can see, the share of employees using computers with internet access has been evolving favourably both in the European Union and in Romania. However, the situation at national level is lower than the EU average, with Romania ranking

last in this respect as well. As far as the e-commerce component is concerned, we have analysed indicators showing companies that have recorded online sales and the turnover obtained from online sales. Regarding the share of companies that have obtained revenues from online sales, we show in the figure below the progress registered in the period 2012-2021:

Figure 3. Enterprises with e-commerce sales

Source: Author's elaboration after https://ec.europa.eu/eurostat; http://statistici.insse.ro.
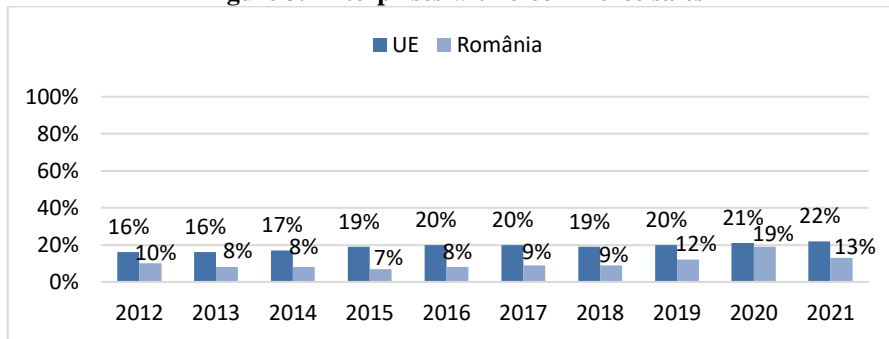
According to the available data we found that the share of companies that register online sales has shown an upward trend both at national and EU level. At the same time, we note that from this perspective, Romanian firms perform less well than the EU average. Regarding the turnover obtained from online sales, Figure 4 shows the evolution of this indicator between 2012 and 2021.

Figure 4. Enterprises' total turnover from e-commerce sales

Source: Author's elaboration after https://ec.europa.eu/eurostat; http://statistici.insse.ro.
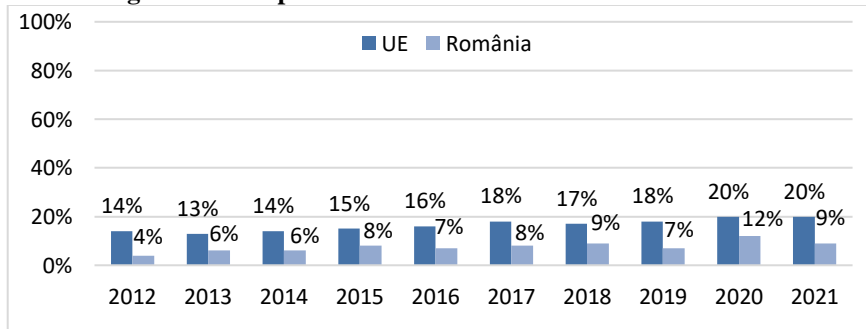
A comparative analysis of the data shows that the growth rate of the indicator for firms at national level was higher than at EU level. Thus, at national level the indicator increased by about 125% in 2021 compared to 2012, while at EU level it increased by about 40%. However, the position of the domestic firms is lower than the average for the European Union. As regards the e-business component, we have analysed companies that purchase cloud computing services used over the internet and companies that have ERP software package to share information between

different functional areas. As regards companies purchasing cloud computing services, Figure 5 shows the progress achieved in the period 2014-2021:

Figure 5. Enterprise who buy cloud computing services used over the internet

Source: Author's elaboration after https://ec.europa.eu/eurostat; http://statistici.insse.ro.
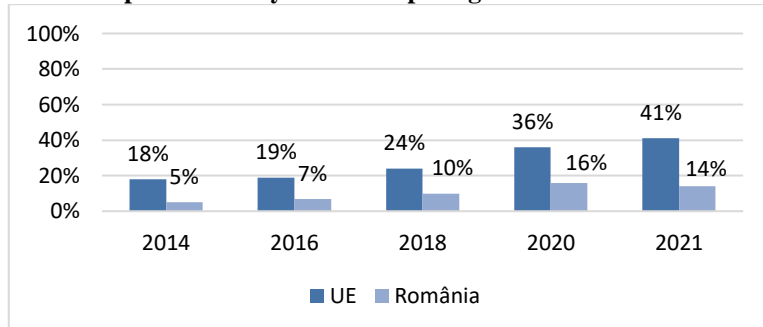
According to the figure above, we can see that the share of companies that have purchased cloud computing services has evolved favourably for both Romanian and EU companies. At the same time, we note that the value of the indicator recorded for the European Union as a whole is higher than that recorded at national level. Therefore, a positive pattern can be observed with respect to this component in the behaviour of business organisations operating on the EU market. With regard to the use of specialised software for running activities within organisations, the figure below shows the situation for firms using ERP (enterprise resource planning) software:

Figure 6. Enterprises who have ERP software package to share information between different functional areas

Source: Author's elaboration after https://ec.europa.eu/eurostat, http://statistici.insse.ro.
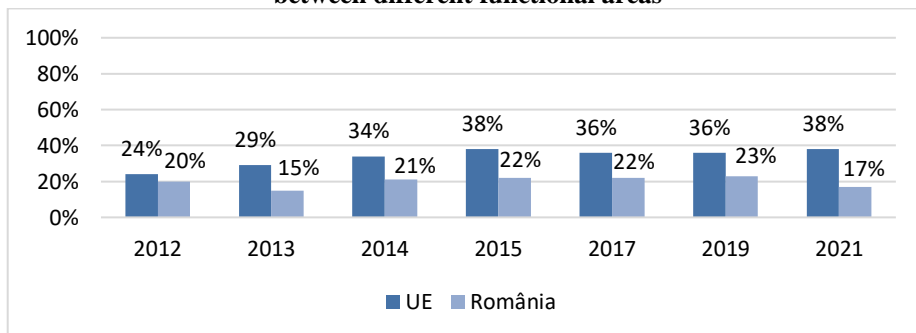
The share of EU firms using an ERP software package is much higher than for national business entities. Thus, in 2021 the amount of the indicator analysed is more than double that of the national market. The last aspect analysed concerns the website and social networks component which highlights the presence of companies in the

online environment. As far as companies owning a website are concerned, Figure 7 shows the situation for Romania and the European Union.

Figure 7. Enterprises with a website

Source: Author's elaboration after https://ec.europa.eu/eurostat, http://statistici.insse.ro.
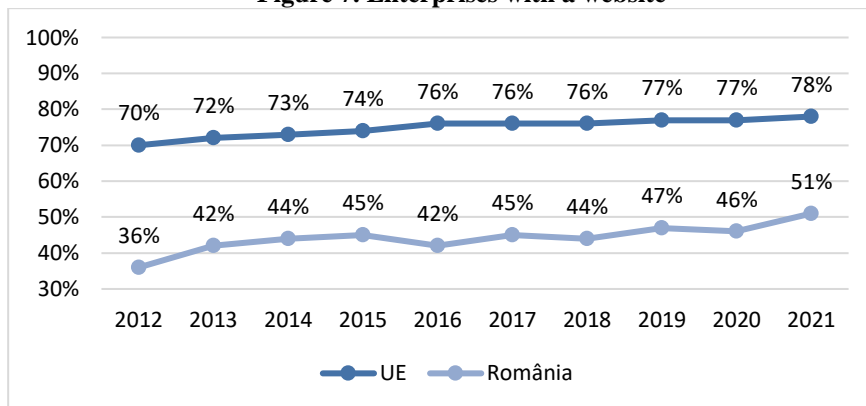
Regarding the number of companies with a website, we note that this indicator has shown a favourable evolution. The progress recorded at national level is significant; the growth rate of the indicator for Romanian companies is higher than the EU average, but the level is lower. With regard to social media, the figure below shows the evolution of the share of the number of firms that own a website and use social media in the period 2014-2021:

Figure 8. Enterprises that have a website and use any social media

Source: Author's elaboration after https://ec.europa.eu/eurostat, http://statistici.insse.ro.
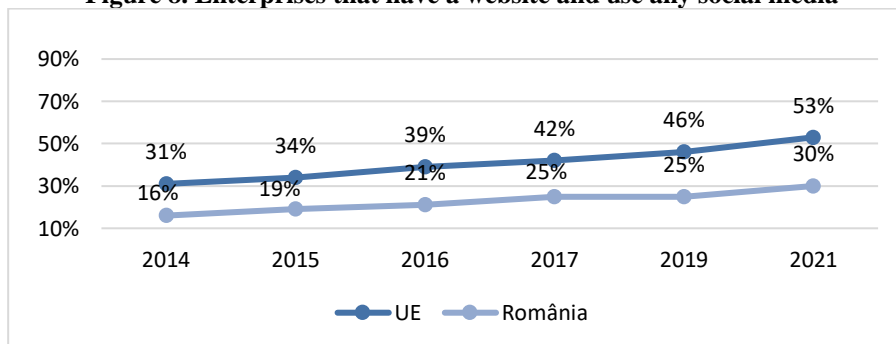
Both for firms operating on the national market and for those operating on the EU market, we observe a sustained growth rate throughout the period covered by the research. Moreover, we note that at national level the value of this indicator almost doubled in 2021 compared to 2014, which indicates the interest of companies operating on the Romanian market for the online environment.

Progress towards digitisation could also be seen in the development of the ICT sector which is making major contributions to the technological progress in the

national market. In this respect, we have analysed the evolution of the number of companies in this sector (we have included those entities with CAEN codes in classes 261, 262, 263, 264, 268, 465, 582, 61, 62, 631, 951 according to OECD, NACE Rev 2, 3 digit), the turnover obtained as well as the investments made. As regards the number of business organisations operating at national level in this field, the data available on INSSE's online tempo platform show a significant increase. Thus, in 2019 at national level there were 26,032 companies in this sector, more than 25% more than in 2015. Regarding the performance of these companies, we report the evolution of turnover and investments made in the period 2015-2019:

Figure 9. The revenues and investments regarding the ICT sector from Romania (lei)

Source: Author's elaboration after http://statistici.insse.ro/.
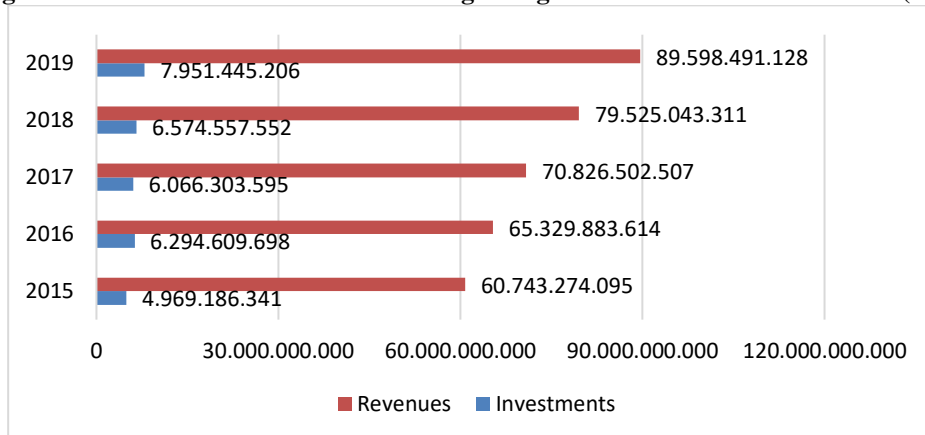
The highlighted data indicate a strong performance for ICT companies, with a favourable evolution for both indicators during the period under review. Thus, the turnover increased in 2019 by about 13% compared to the previous year and by about 48% compared to 2015 (the first year included in the analysis). Regarding the investments made by the companies in this sector, we note that these increased in 2019 by 20% compared to the previous year and by 60% compared to 2015. This suggests a high interest in the development of activities carried out on the domestic market which will have positive effects on the national economy.

5. Conclusions

According to the highlighted information, we find that the contribution of information technologies in the long-term performance and development of business organizations is a major one, representing a basic element in the strategies of successful companies. Technological progress in this area is due to the contribution of the ICT sector in the development of software, hardware, IT platforms and other digital solutions that are constantly being offered to individuals and business organisations. The solutions given by these digital architects represent a fundamental issue for the sustainable development of business organisations.

The progress achieved by Romania in the digitalisation sphere is limited compared to the EU situation. Although the ICT sector is developing, being one of the most dynamic sectors of the Romanian economy, the use of specific information technology tools is still limited in the activities of business organisations, compared to the EU average. We can state that this aspect is highly influenced by the lack of digital competences and also appropriate strategies on national level.

Acknowledgment

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Digitalisation: Connecting Businesses to Consumers

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Abstract

The current paper aims to identify the role of digitalisation in business development and business communication, as the use of digital technologies is important in the daily activities of both companies and individuals. Digitalisation is defined as the use of technology in business processes and operations, which stands as a key element in developing new business models and achieving high efficiency on the market while helping businesses to stay connected with consumers' needs and demands. As follows, the paper highlights the importance of digitalisation by overviewing previous studies and connecting them to the current business environment and the new consumers' behaviour, reshaped by the current social situation. The paper also exposes several points of view on how digitalisation has been used for business development and how digital technologies can be implemented in marketing strategies and business communication. Meanwhile, since the current economic environment has been strongly impacted by the COVID-19 pandemic, the usage of digital technologies represented an important strategic step for businesses to continue their activity and overcome the output of the crisis, keeping both companies and individuals connected. Therefore, the paper shows the necessity to integrate digitalisation in business development and business communication, as the main key to implement new business models and to benefit from the advantages determined by using digital platforms as instruments for building and maintaining a good relationship with consumers and the target audience.

Keywords: digitalisation, digital technologies, business development, business communication, social media, marketing strategy.

JEL Classification: D23, M20, M31, O33.

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1. Introduction

As the COVID-19 pandemic had a strong impact on the economic environment globally, many businesses and governments had to overcome themselves to keep their economic activities on track with the development of the situation. Therefore, digitalization has been strongly used for continuing their activities and to improve the business procedures and business models by digitalising the business environment, especially while adopting social distancing for reducing human-to-human transmission of the virus. Meanwhile, economically, these actions lead to reductions in consumption and unfortunately to the elimination of businesses in some cases (Gregurec et al., 2021).

For a better understanding of the context, the evidence of the most incumbent firms across industries are based on digital processes and operations, while there is a new demand created for digital technologies, that will redefine business models and business plans, so organizations will be able to improve and to keep up with their competitors for providing a long-term value for costumers, highlighting the fact that digitalisation and innovation represents a pair of instruments that must be implemented simultaneously (Parida et al., 2019).

Meanwhile, the current state of the economic environment determined new customers' behaviour and their relations with the business environment. Therefore, digitalisation is also used for connecting businesses with the target audience and to achieve a long-term collaboration with the clients by maintaining a good relationship with them.

Overall, the paper aims to show, by an overview of the scientific literature, that digitalisation is a strong instrument used in both business development and business communication, especially in the current social and economic context in which the Internet of Things (IoT) and social networking platforms are strongly used every day by both organizations and individuals in order to satisfy their needs and to achieve their goals, and since technology and the technological innovation are vitally important in order to improve the efficiency, leading to sustainable growth (Jones et al., 2017).

2. Problem Statement

As Brennen and Kreiss (2014) exposed in their paper, digitalisation can be defined as "the adoption or increase in the use of digital or computer technology by an organization, industry, country, etc.", while digitization can refer to "the action or process of digitizing; the conversion of analogue data into digital form'' (Parviainen et al., 2017).

In the last period, most businesses tended to implement the latest digital trends that can improve the accessibility of all processes and operations, while providing greater efficiency for organizations to incorporate the latest technologies for increasing their sustainability. Based on that, using the computerized technology innovations, companies provided a smoother approach to their activities and operations, while establishing better management for keeping up with the business

environment's needs and customers' behaviour. At the same time, digitalisation has been used for developing administrative operations, making it easier for human resources to complete tasks by designing new communication services to increase the accessibility of incoming or outgoing information. Thereafter, the role of digital technology is not too foreign to many organizations that have implemented digitalisation in their business operational model (Hendriato, 2021).

Meanwhile, in this increasingly digital era, the COVID-19 pandemic also determined the relationships between organizations and customers to be reshaped and new business models to be created by companies to overcome the economic and social impacts of the situation. Organizations in all industries needed the agility to be flexible and to pivot rapidly for pursuing new business opportunities and to adopt to the fast-paced global business environment's development (Parida, 2018). In addition, current digital technologies have reshaped the way businesses approach their value proposition and value demonstration by creating new requirements for business models and business strategies (Ritter, Pedersen, 2020).

Digitalisation seems to be concentrated on data and the large amounts of information that can be accessed using a computer linked to a network connection, but this data should be considered exactly what it is: a model of the world that it describes (Gray, Rumpe, 2015), which should be used by companies to increase their reach to the targeted audience, while reforming their processes and activities, facilitating a better development in their production segment, and organizational management.

At the same time, leading ICT (information and communication technology) companies have suggested that while using their sector, businesses can have a better approach to achieve the sustainability goals, while leveraging the mobile networks to deliver their messages or their services to the targeted audience or the direct clients. As the literature has already confirmed, ICT relates to sustainable development, contributing to the achievement of the sustainability goals of the business environment and, as the current state has proved, to overcome some difficulties generated by the lack of human-to-human contact while doing business in the pandemic (Jones et al., 2017).

Parviainen et al. (2017) affirmed in their paper that while companies implement digitalisation for their activities, both the managerial environment and the operational environment are subjects of changes at several levels: process level – adopting new digital technologies for reducing manual steps; organizational level – creating new services and reshaping new services for offering them in new forms; business domain level – implementing changes in organizational structures and value chain in ecosystems; society level – redefining society structures (such as type of work, fields of work, influencing decision making, etc.).

Therefore, digitalisation and the Internet of Things have changed both economic and social environments, bringing more value to the activities of both companies and individuals, generating more economic growth to achieve the sustainability goals (Jones et al., 2017). By using both, besides the increase in their competitiveness, companies can also transform their services and products into digital business

opportunities, while using the tools provided by IoT for studying consumers' behaviour and analysing attitudes and consumption to establish a better business model for their activities (Sestino et al., 2020).

3. Research Questions / Aims of the Research

The main goal of this research is to prove that digitalisation is a significant key for businesses to overcome a crisis and to develop in the current state of the business environment while improving their processes and activities, especially the business communication between organizations and the targeted audience by the marketing strategy.

Therefore, the purpose of the study is to highlight the importance of implementing modern technologies in both economic activities and business communication by answering the Research Question: *Did digitalisation facilitate business development and business communication?*

4. Research Methods

For answering to the question of this study, the researchers will use in their investigation the method of reviewing and analysing the previously published case studies that approached related questions. The case studies have been searched electronically and selected from a digital database. All the case studies that have been used for this paper are listed as references.

To state a valid answer, the authors seek to understand the questions about digitalisation by reading preliminary literature and driving the highlights of the study cases, focusing on publications between 2008 and 2021.

5. Findings

5.1 Digitalisation and Business Development

Since digitalisation is already impacting organizational processes and the business environment, companies have elaborated new ways of working, acknowledging that without implementing the digital technologies, their business model cannot keep up with the changes in the market (Parviainen et al., 2017).

Firstly, and the most important aspect of digitalisation and the business development is that after companies understood the benefits of using the digital technologies as tools for their business model and business strategies, organizations are able to increase their collaborations, to accelerate their decision making, and to create and build new products while gaining more visibility across operations and activities. Thereafter, by implementing the digital approach as their targeted solution, businesses can make a higher profit and can transform their activities to continue innovating while using digital technologies for increasing their connectivity with customers (Hendriarto, 2021).

Secondly, as Parida (2018) demonstrated, in this digital era, the biggest challenge for the companies to adapt to the current digitalised environment represented

the lack of digital skills and culture in organizations. Highlighting the need to focus on people and culture for achieving the digital transformation, as shown in Table 1, Parida (2018) identified five digitalization transformation challenges and some solutions for the exposed aspects. But this does not mean that digitalisation can be implemented without social or economic impacts. Taking into consideration the manufacturing industry, the automatization and digitalisation will provide greater efficiency by using the digital technologies, but at the same time, the labour force will need to be restructured or reinstructed with new digital skills, as many workplaces will be reduced due to the replacement of humans with technological instruments.

The skill revolution will take place because organizations will face a strong challenge by integrating devices, computers, and the workforce into their economic activities to achieve higher efficiency and sustainability by using digital technologies. Meanwhile, the most important aspect is that while applying the digital technologies, companies cannot develop alone. This is the reason why, while implementing digital technologies, the microeconomic environment should be relating to the macroeconomic current situation, and why the governments are also responsible for creating the necessary infrastructure for digitalisation to be organized and available for companies to develop sustainable business models.

Table 1. Digitalisation transformation challenges

Challenges	Actions to be done for overcoming the challenge
Implementing political digitalization agenda	stimulating the development, spread, and use of the new available digital technologies by exploiting the potential of digitalization on national level and adapting the infrastructure while creating framework conditions and instructing the new knowledge
Digital platforms for entrepreneurship	developing digital strategies and action plans for reducing the number of jobs and implementing new business models
Workforce requirements and new skill development	integrating new skills for increasing the sustainability provided by digitalisation while promoting flat organizational structures and more management innovations
Digitalization forces business model innovation	embracing service-oriented business models for staying competitive in the manufacturing industry while exploiting digital technologies for offering advance services
Unrealized value of big data analytics	providing the easiest access for all stakeholders to big data by actuators for data collection and networks of low-cost sensors

Source: Adapted from Parida (2018).

Thirdly, as Ritter and Pedersen (2020) showed in their paper, digitalisation must be employed in the business model, because otherwise, a company's digitalisation capability will represent just an expense with no returns on the investment. Since implementing digitalisation requires transition costs, if the digital technologies are not integrated into the organization's processes and activities, the company will not develop its value proposition and value demonstration based on its business plan's capabilities. Once again, the integration of digital technologies and workforce is highlighted as the most important aspect of developing business models based on digitalisation and customers' behaviour.

Meanwhile, digitalisation also pushed companies to adopt hybrid business models that required investments in people skills and corporate culture; reshaping the organizational culture of companies.

As Sestino et al. (2020) presented in their paper, companies had to implement digital workplaces characterised by mobile, flexible, and team-oriented working methods; taking into account at the same time not to neglect employees' psychological needs for a secure workplace and their attitudes about shifting from the established corporate culture to a new working environment based mostly on uncertainty.

One more aspect is that "Digital business strategy is different from traditional IT strategy in the sense that it is much more than a cross-functional strategy, and it transcends traditional functional areas (such as marketing, procurement, logistics, operation, or others) and various IT-enabled processes (such as management, customer service, and others)" (Bharadwaj et al., 2013). This is especially important in the context in which digital operations have been predominantly used in the last two years as the COVID-19 pandemic was impacting directly the global economic environment and many businesses kept their activities ongoing by using the digital platforms, social media networks, video conferences, and digital communication channels.

Therefore, implementing digital technologies in business models represents one of the key decisions to prosper in the actual business environment and the economic situation of the market, based on the characteristics determined by the current digital era.

5.2 Digitalisation and Business Communication

As far as digitalisation and implementing digital technologies helped business development; it has also removed the traditional supply chain by creating new intermediates and offering direct access to consumers through the increase in the social media platforms and mobile devices use (Parviainen et al., 2017).

As follows, it is important to discuss the implications of digitalisation on business communication and marketing strategies as well. Therefore, over the last two or three decades, companies understood that a digital functional-level strategy must be incorporated into the business model (Bharadwaj et al., 2013), especially when digitalisation can reshape business communication and marketing

strategies, due to the increase in usage of the digital technologies by both businesses and individuals.

Since the digital era determined appropriate levels of information and knowledge to be the critical key to success, organizations adopted processes and technology changes for adapting to the world of increased environmental complexity (Al-Debei et al., 2008), so the need for digitalisation has increased considerably and its elements have been implemented in business communication as a response by companies in order to adapt their business strategy to the customers' new economic behaviour.

As a result, the business faced a gap between the business processes and business strategy, a gap determined by the dynamic environment, a high level of competition, and uncertainty. This gap has been proved important once more in the environment established by the COVID-19 pandemic in which digitalisation alongside business communication has played a significant role in developing new business models, reshaping strategies, and marketing approaches for keeping the activities running and prospering in the current situation.

The main goal of business communication is to provide a strong connection between the company and its customers. Thereafter, digitalisation is a crucial element in developing business communication, considering that nowadays in business model innovations, the preference to increase brand and corporate awareness using social media is highly suggested. This is relevant because the social network users are mostly teenagers and young adults; therefore, companies can use this to their benefit by attracting fresher and younger potential clients that can be retained and formed as long-term customers by the marketing strategies (Hendriarto, 2021). At the same time, companies can increase the sustainability of their activity by maximizing their profitability, providing a platform for the consumers to reach the organization and to offer feedback, which can be used furthermore for improving the products or gaining new consumers.

New customers' behaviour means at the same time a new kind of consumer that demands a new way of approaching business activities and processes. In this way, nowadays many companies are using new digital technologies and platforms for building a better customer relationship, thinking about implementing in their operation new social digital platforms, such as: websites, social media accounts, and marketing strategies to facilitate the interaction with consumers and their target audience (Ilcus, 2018).

Moreover, Patrutiu-Baltes (2016) exposed some advantages of using digital technologies in business communication, such: networking; brand development; reduced costs; global market access; permanent interactivity with customers; attracting new customers; faster dissemination of information; analysis of direct competitors; developing a long-term relationship with customers; as well as the possibility of recruitment in vacant posts.

As presented in Table 2, digital business communication can be used by several means and tools, each one being helpful in transmitting information to the target audience. At the same time, some platforms can also be used for several other

actions; therefore, the marketing strategy should incorporate more than only one tool for establishing a good marketing mix and a higher reach within the globalized economic environment. Business communication is also part of the marketing strategy of an organization, therefore thanks to digitalisation, companies nowadays also have access to new tools that can be used by marketing managers to collect data for identifying gaps or emerging current trends in consumers' behaviour.

Table 2. Usage of digital business communication

Mean	Tools	Benefits
Direct communication by digital platforms	Mobile devices	Business communication must be adapted for mobile devices, becoming easier to access and reaching a higher audience since individuals are permanently connected to their smartphones.
	Websites	Should represent business cards for companies and can provide easier access to data subtraction.
	Blogs	Can help to improve the brand personality by allowing custom communication and long-term relationships between businesses and customers.
Direct communication between the companies and the targeted audience	Email marketing	The most valuable tool for Business-to-Business communication, helping the direct communication between the company and the targeted audience by contacting the consumers that have subscribed to Newsletters.
Digital communication using social network platforms	Facebook	The largest social network in terms of the number of users that can connect people worldwide with the company's business, is ideal for medium and small businesses since it can reduce the marketing costs by improving the direct communication between companies and customers.
	Twitter	Even if it provides a smaller reach, can be used for marketing and promotion, generating leads, and helping companies to communicate different information and offers to the targeted audience.
	LinkedIn	Since it is the largest online professional network, can be also used to raise awareness, improve the company's image, and for recruitment of new employees.
	Instagram	Companies should include it in their marketing strategy to promote their products/services using pictures and videos, which can be transmitted in a user-friendly environment to capture users' attention.

Mean	Tools	Benefits
Secondary communication by digital platforms	YouTube	Allows to create an online community using video materials such as: product presentations, tutorials, problem-solving situations, etc.
	Specialized forums	Can increase the trust of the targeted audience using reviews written by customers as "word of mouth" publicity.
	Webinars	Sensitive tool that can be used to raise awareness and to increase the company's reputation by determining the targeted audience to gain more trust in the company's products.

Source: Adapted from Patrutiu-Baltes (2016).

Digitalisation helped as well in establishing stronger bonds with the targeted audience, by shifting toward multichannel and multimodal communication, increasing users' immersion, developing stronger customer retention and better consumer experiences. In this digital era, customers can now purchase products and demand services without leaving their home, by using a mobile device and the available communication channels, so the customer experience is better because even the online stores are slowly eliminated and the post-purchase experiences are sustained by reviews and website visit, improving businesses' awareness in the targeted audience using the word-of-mouth. Meanwhile, as speed and personalization represent the pylons of e-commerce, companies and individuals can communicate in real-time and agree easily on transactions by direct connections using social media networks. Also, the targeted audience will increase its trust in the products and the organization based on the reviews that are easily accessible online.

Therefore, business communication is highly important for business models as part of the marketing strategy, because it will help the company to develop and to prosper by keeping in touch with its clients and its targeted audience, but at the same time increasing the credibility of the stakeholders while communicating the general impacts of the company and their benefit to the community (Lopez, 2020).

6. Conclusions

As the scientific literature shows, the business model is derived directly from the business strategy, so for organizations to survive and to be permanently improved, digital technologies should be implemented in their processes and economic activities. Moreover, digital technologies are in continuous development; therefore, it is crucial for companies to adapt to the new digital technologies and to integrate them into their business strategy for achieving great competitive advantages (Al-Debei et al., 2008).

Meanwhile, a good marketing strategy can improve business communication in the current digital era, and by use of digitalisation, companies can also increase their efficiency and their products' quality; can integrate records by using digital systems; can improve response time and client service by increasing the accessibility of knowledge sharing while implementing better business plans and reducing costs

(Ilcus, 2018). While in the past the business communication strategies required considerable costs, nowadays the digital technologies have helped companies to increase their reach to the target audience and to reduce their marketing costs, becoming more efficient in both producing goods or services and promoting them (Patrutiu-Baltes, 2016).

To answer the Research Question: "*Did digitalisation facilitate business development and business communication?",* as the evolution of digital technologies created great opportunities for businesses, it also came with complex challenges (Sestino et al., 2020) in implementing and adapting them to the business strategy, while reshaping the business environment. But, as Patrutiu-Baltes (2016) also affirmed, digitalisation helped business communication by enabling multichannel business communication, accessible and dynamic, with low costs and great accessibility for adapting to the needs of the targeted audience. Therefore, as the last years have shown, while the COVID-19 pandemic reshaped the economic environment and many businesses have been challenged to survive and adapt to the new conditions of the market, digitalisation has been an important key to maintaining their economic activity and their contact with the customers while increasing their visibility to the targeted audience.

Meanwhile, since the pandemic influenced several emerging trends, digitalisation and the combination of digital technologies in both processes operations and communication operations helped the business to overcome the outcome of the COVID-19 pandemic while facilitating a better sustainability for the business environment (Gregurec et al., 2021), the ICT industry, stressing its vital role played in driving progress towards the global transformation and the economic growth (Jones et al., 2017).

So, digitalisation facilitated both business development and business communication, providing them with the tools to overcome an important crisis of the current era, emerging a new era for sustainability and economic growth.

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Economic Policies Adopted in Romania after the COVID-19 Pandemic. A Study Case: Comparing Romania with Other EU Realities

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Abstract

As a member of the European Union since 2007, Romania has been one of the countries that registered one of the highest economic growth in the EU in recent years. However, as in the rest of the world, the COVID-19 pandemic has caused significant effects and impacted the economy. This paper aims to analyze Romania's government measures and economic policies to restart and help reconstruct the national economy. The recovery is continuing around the world for different realities. So, considering the OECD Economic Surveys, Romania's GDP will have grown by 4.5% during 2022-2023 and register a growth of 6.3% in 2021. Our review focuses on the consequences the pandemic had internationally, especially at the national level, while presenting a comparative analysis of the policies adopted in Romania and among other EU member states. This paper can be a good starting point for post-pandemic development policies needed for the swift recovery of the national economy. A specific consolidation plan can provide Romania with a gradual reduction of the budget deficit by accelerating the absorption of EU funds, e.g., the NextGeneration EU or improving the effectiveness of public spending. EU funds such as NextGeneration with the Recovery and Resilience Facility (RRF) will support the implementation of investments and reform measures and enable Romania to emerge stronger from the COVID-19 pandemic. Therefore, the RRF will represent a common European challenge by permitting a green and digital transition, bracing the Single Market's economic and social resilience and cohesion.

Keywords: Economic policies, COVID-19, restarting economy, Romania, EU Funds.

JEL Classification: F63, I18, F43, P51.

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1. Introduction

Since 2020, when the COVID-19 pandemic became a reality affecting all the states of the world, a great concern for the topic has been manifested by scientists aiming to look at the impact of the pandemic on both developed and emerging economies.

A large part of the research in the field has been concentrated on the most transparent consequences of the pandemic, generally to estimate the financial requirements and needs over the recovery phase of the economies (Carnap et al. (2020), Chang et al. (2021). While the COVID-19 pandemic has affected different countries with varying intensity, due to lockdowns in Europe and the rest of the world, it is clear that it has severely affected the European Union (EU) economies at multiple levels (national, industrial, at a company level, etc.) (Belhadi et al., 2021; Ibn-Mohammed et al., 2021), which poses difficult challenges for national governments. In Romania, the first case of COVID-19 was reported in February 2020, and the government has since implemented a set of measures designed to delay the progression of the virus while supporting the financial system and the Romanian people. Among those measures were a national emergency state, social distancing measures, and the closure of schools and all kinds of entertainment.

An impressive number of measures and plans have also been mobilized at the European level in order to overcome those unexpected challenges. However, in agreement with the report on the Global Economic Effects of COVID-19 (Congressional Research Service, 2021), in the early phases of the coronavirus pandemic, as opposed to the response developed during the 2008-2009 global economic crisis, the EU countries did not embrace a fully synchronized fiscal policy, which led to the EU advocating for better coordination among the EU members "in developing and implementing monetary and fiscal policies to address the economic fallout from the viral pandemic" (2021). Given the unusual challenges the world was facing, the EU was also confronting internal disputes over vaccine distribution, which increased public criticism of government leaders in some EU countries and prompted renewed business lockdowns and school closures (Chazan, 2021).

After several discussions, the European leaders came to an agreement on July 21, 2020, to assist and support the European economies with the amount of €750 billion (approx. $859 billion), consisting of a Recovery and Resilience Facility considered the centerpiece of the NextGenerationEU program, which is to provide funds for "existing budget priorities to speed up Europe's recovery from the economic impact of the pandemic" (European Commission, 2021).

For the most part, the EU members used a combination of national fiscal policies and ECB bond buying to address the economic impact of the pandemic. Individual countries adopted quarantines and required business closures, travel and border restrictions, tax holidays for businesses, extensions of certain payments and loan guarantees, and subsidies for workers and businesses (Congressional Research Service, 2021, p. 81).

Being part of the EU since 2007, Romania has benefited from the response to the COVID-19 crisis at the European Union level. Thanks to loans to national

governments or other non-reimbursable funds, designed to mitigate the impacts of the crisis, support the economies and help compensate for the losses caused by the pandemic as much as possible. Romania, like the other individual EU members, developed recovery and resilience plans to support "clean technologies and renewable energy (...), digital transformation, and education and skills training, among other areas" (Congressional Research Service, 2021, pp. 81-82).

In September 2021, the EC has approved and "given a positive assessment to Romania's recovery and resilience plan, which will be financed by €14.2 billion in grants and €14.9 billion in loans" (European Commission, 2021).

According to the OECD, before the start of the pandemic, the economic representation of Romania was considered impressive. "In less than 20 years, Romania has reduced the gap in GDP per capita to the OECD average by half, from close to 70% to around 35%. The population at risk of poverty or social exclusion had fallen to 30% in 2020, from around 50% thirteen years before" (OECD, 2021). However, the crisis had a considerable negative impact on the economy and the GDP fell by 3.7% in 2020 before surpassing its pre-crisis level in 2021 (OECD, 2022).

This article focuses on the COVID-19 experience in Romania in the first two years of the pandemic and on the policies adopted during that period. Therefore, Romania's case is analysed as an example of how government measures can influence the national economy. According to the IMF, "among EU countries, Romania experienced a relatively shallower overall economic contraction rate of only 3.9% for 2020. This reflected the easing of lockdown restrictions, including the rebound in EU trading partners, and growth also continued to be supported by COVID-19 support measures" (IMF, 2021).

As of 4 April 2022, the total number of confirmed COVID-19 cases in Romania has reached 2,872.849 million cases, at the same time registering a stable situation with many new cases not exceeding 3000 cases daily.

2. Problem Statement

Several studies and research have been conducted on the COVID-19 crisis and its consequences, and according to the Congressional Research Service (2021), COVID-19 "has affected the $90 trillion global economy beyond anything experienced in almost a century".

The International Labor Organization has also raised numerous concerns about the uncertainties brought about by COVID-19 warning that it could cause "half of the labor force around the world to lose their jobs (2020)". All these unexpected threats and changes have turned COVID-19 into 'a national security crisis that many countries also need to address to protect their people's wealth and well-being. As such, when and how to restart national economies has stirred debate across the globe as predictions about COVID's resilience and persistence vary" (Zahra, 2021, p. 2). As a response to the economic consequences of the pandemic, governments around the world provided support to households and firms. As specified by the World Bank (2021), support to firms was provided "to prevent mass insolvency and bankruptcy of viable firms facing financial distress and related knock-on effects for the financial

sector, to prevent losses of jobs and firm-specific intangible capital, and to reduce the friction costs of firms temporarily exiting the market" (World Bank, 2021, p. 71).

Admitting that a post-pandemic recovery will include a close collaboration between the EU member states, the European leaders have agreed on a "financial package of €1,824 billion, which combines the Multiannual Financial Framework (MFF) and the newly created Next Generation EU (NGEU) recovery instrument" (Cătuți et al., 2020, p. 3). According to the authors (2020), the MFF will cover a standard period during the years 2021 and 2027, while the Next Generation EU is providing the member states with the means to address the challenges raised by the COVID-19 pandemic.

Taking into account the fact that the Romanian economy is integrated into the global economic system, it is right to assume that the COVID-19 pandemic had its effects on the national economy of Romania. The impact of COVID-19, however, has been different across several countries and regions, depending on "the level of development, trade structure, the stringency of containment measures, and government's capacity to implement policies supporting business and households" (Khorana et al., 2021, p. 5). To understand these consequences, we will succinctly analyze the effects the pandemic had on the Romanian economy. Even today, with a pretty stable COVID-19 situation nationally and internationally, there is still a significant level of uncertainty about the dimensions and depth of the economic effects the pandemic has had, influencing "perceptions of risk and volatility in financial markets and corporate decision-making" (Global Economic Effects of COVID-19, 2021, p. 26).

The latest research from the EU shows that Romania is currently experiencing a positive but moderate growth outlook, with the real GDP set to grow at 4.5% in 2022 and 2023. In addition, investments are expected to remain a strong pillar of the Romanian economy, as they will be supported by the Recovery and Resilience Facility among other EU funds. In the case of Romania, the RRF will become a very important instrument for the national economy, as it will provide up to € 800 billion to support investments and reforms across the EU.

In particular, the Romanian plan forms part of an unprecedented coordinated EU response to the COVID-19 crisis, to address common European challenges by embracing the green and digital transitions, to strengthen economic and social resilience and the cohesion of the Single Market (European Commission, 2021).

In terms of finance and economy, Romania has adopted a set of policies designed to help the economy restart. Namely, the government has launched a RON 16 billion scheme (European Commission, 2020), designed to grant support in the form of direct grants and state guarantees for investment and working capital loans, to support and be accessible to the SMEs affected by the coronavirus.

Another sector that was affected by the COVID-19 pandemic is the foreign trade that decreased during the crisis period, and according to Khorana, Zarzoso and Ali (2021), it was due to the interruption of "economic activity due to lockdowns, travel restrictions, closure of borders, and other containment measures" (Khorana et al., 2021, p. 5). Looking directly at the relationship between international trade and the

COVID-19 crisis, there are not many studies that were identified (Nicolescu, Tudorache, 2021, p. 70), however, as reported by Maliszewska, Mattoo, and van der Mensbrugghe (2020, p. 14) in their study about the likely impact of COVID-19 on GDP and trade, it is exemplified that the most affected services were international tourist services and other domestic services. On the other hand, Khorana et al. (2021), state that "there has as yet been no detailed contextualization of the linkage between the incidence of COVID-19 and the trade flows within different countries" (2021, p. 5).

Although there were several initiatives by the Romanian government (Volciuc-Ionescu, 2020), and the Government has introduced certain facilities for a loan granted by credit institutions and nonbanking financial institutions to certain categories of debtors, following the World Bank Group on a study on Competition and Firm Recovery Post-COVID-19, it is said that the national government has provided "one of the lowest fiscal stimuli in the EU to mitigate the impact of COVID-19, reflecting the limited fiscal space" (2021, p. 120). It is, therefore, necessary for Romania to avoid the increases in debt levels, and one of the ways to prevent this and lead to a sustainable recovery would be the maximal absorption of the EU Multiannual Financial Framework and Next Generation EU funds.

In a scenario of 100% absorption of the Resilience and Recovery funds, Romania's real GDP growth will, on average, rise by one percentage point per year between 2021 and 2026. Private and public investment will benefit from the phasing in of projects financed by EU funds. Exports are set to recover, aided by the gradual recovery of global trade. As growth recovers, inflationary and current account deficit pressures are expected to strengthen, requiring an appropriate policy response (World Bank Group, 2021, p. 122).

3. Aims of the Research

The purpose of this paper is to present the impact the COVID-19 crisis had on the Romanian economy, more specifically to analyze the responses adopted by the Romanian government to support the economy. One of the main objectives was to identify and describe the economic situation in Romania, comparing it with other realities in the EU after the COVID-19 pandemic. Moreover, another objective was to measure its ranking among different EU countries during the last years. However, the objective of this paper is not to evaluate the success of the responses of the EU countries to the pandemic, but rather to analyze some of the imposed measures and provide practical information to support the current policy efforts and the future resilience plans. This paper contributes to the existing literature on the field, as it helps expand the literature on the economic policies adopted in Romania by examining detailed data provided by the World Bank, the European Commission, the National Institute of Statistics, etc.

As a case study, we have chosen to compare Romania with six other countries (Czech Republic, Estonia, Lithuania, Poland, Slovakia, and Hungary), measuring the health of the country's economy over future and past periods.

4. Research Methods

The research method used in this paper is a methodological review of the literature that analyses the ongoing process of the economic policies adopted by the EU after the COVID-19 pandemic focusing on the Romanian situation. The research method consists of a collection of data from both the Romanian economy and from different realities of the EU countries. The methodology chosen for this research is based on a three-step process:

1. The first step consists of a comparison between seven EU countries (including Romania) regarding the allocation of EU funds based on OECD 2022 Surveys.
2. The second step of this paper consists of describing the most important policies adopted in Romania after the COVID-19 pandemic, also focusing on the economic outlook of Romania.
3. The third step regards a comparison between the GDP of seven countries, measuring the health of a country's economy over future and past periods.

The gathered and selected materials came from different sources such as academic journals and quantitative data of the EU institutions, the OECD and EU institutions reports. The criteria used to select material sights at the year of the publication, therefore, we decided to pick the most recent materials focusing on the Romanian situation.

5. Findings

Up to this point, 22 EU States can use the EU recovery plans to boost their economies and assist the recovery from the COVID-19 pandemic. The last three EU countries to get accepted to the EU recovery plans were Estonia, Finland, and Romania, on the 29th of October 2021 (European Council, 2022). With NextGeneration EU (NGEU), the EU aims to demonstrate its capacity to give an immediate policy response to the pandemic by creating jobs and financing investments with a sustainable and resilient recovery. Therefore, the RFF the centrepiece of NGEU will employ 750 billion euros (at 2018 current prices) updated to 806.9 billion (in August 2021 at current prices across the EU. The NextGeneration EU investments will have to align with the EU priorities of green and digital transition due to their potential for growth and job creation (Crescenzi et al., 2021).

In the first step of our Findings, we selected data from the OECD Economic Surveys: Romania 2022 and compared them with other realities of the EU. In Figure 1 we select six countries to compare the situation of Romania in terms of Cohesion Policy (CP) and RRF grants. The CP is the main investment policy in the European Union (European Commission, 2014). It includes three main funds present both for 2014-2022 and 2021-2027 which are the European Social Fund (ESF), the European Regional Development Fund (ERDF) and the Cohesion Fund (CF) (European Commission, 2014). Figure 1 represents the total allocation for 2021-2027 period in current prices of CP as a percentage of 2020 GDP and the RRF as the max. allocation of the RRF over the period 2021-2026, again expressed as a percentage of 2020 GDP (OECD, 2022).

Figure 1. Romania vs other EU countries on receiving the EU funds
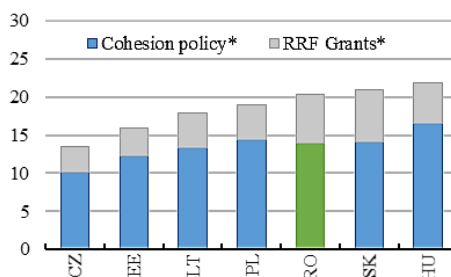
*Expressed values are at current prices.
Source: OECD, 2022, and author's own selection of data.

The selected countries in Figure 1 are Czech Republic (CZ), Estonia (EE), Lithuania (LT), Poland (PL), Romania (RO), Slovakia (SK), and Hungary (HU). The figure indicates that Romania will receive a large amount of funds and grants to finance its national resilience and recovery plan, as stated in the OECD 2022 Surveys of Romania.

The second step includes the most relevant policies adopted in Romania after COVID-19. According to the European Bank for Reconstruction and Development, different policy responses will be in place for the next years or were approved and are ongoing.

Figure 2. Responses to Romania's policies after and during the COVID-19 pandemic

Source: European Bank for Reconstruction and Development, 2021,
and author's own selection.

As indicated in Figure 2, different policies are in progress in Romania. Regarding the National Recovery and Resilience Plan, COVID-related fiscal measures, and other initiatives from the digital, service, or law field. Furthermore, according to the OECD Economic Surveys issued in January 2022, Romania's GDP is growing by 4.5% during 2022-2023 and registered a growth of 6.3% in 2021. In addition, the unemployment rate will gradually decrease from 5.4 in 2021 to 4.8 in 2023. Table 1 represents the information mentioned above in more detail:

Table 1. Economic outlook of Romania

	2021	**2022**	**2023**
Gross domestic product	6.3	4.5	4.5
Unemployment rate (5%)	5.4	5.2	4.8
Public debt (% of GDP)	50.3	54.1	57.1
Fiscal balance (% of GDP)	-8.0	-6.6	-5.3

Source: OECD, 2022.

The last step regards a comparison between Romania with the above-mentioned countries (Czech Republic, Estonia, Lithuania, Poland, Slovakia, and Hungary) based on the countries' gross domestic product (GDP). The effects of the pandemic on global economies were different in each sector, country or dimension. Considering the following example based on countries' GDP: in 2020, the GDP registered a decrease for each of the countries in Table 2. The Czech Republic has the highest GDP decrease, -5.8, and the lowest was in Lithuania with -0.1. Regarding Romania, it had a decrease of -3.9 which place it at the fourth place.

Table 2. GDP outlook of seven EU countries

COUNTRY	**GDP**			
	2020	**2021**	**2022**	**2023**
CZ	-5.8	2.5	3.0	3.9
EE	-2.7	9.6	4.5	3.8
LT	-0.1	5.1	3.8	3.5
PL	-2.5	5.3	5.2	3.3
RO	-3.9	6.3	4.5	4.5
SK	-4.4	3.2	5.0	4.8
HU	-4.8	6.9	5.0	3.0

Source: OECD, 2021.

The crisis affected all the segments of the economies, and its effects differed across countries. The European States registered a growth after the pandemic, and surely recovery and resilience facilities, the European support and the active cooperation between states have contributed to this growth consistently. We can only hope that the pandemic will not cause any more damage in terms of lives and economic crisis. Even if another conflict is knocking at the European doors, and it involves each of our realities.

6. Conclusions

This article aims to outline the economic situation of Romania, comparing it with other realities in the EU after the COVID-19 pandemic. Moreover, it has measured its ranking around the EU realities during the last years, following a methodological

literature review. Our study demonstrates that, after the pandemic, the policies adopted in Romania are in a mature phase with regard to the ongoing legislative, economic, and strategic initiatives. Moreover, unemployment is expecting to decrease in the coming years. This approach had numerous advantages: understanding the EU policies and the economic situation is actual and involves various segments. Moreover, data are available everywhere: from the EU to the OECD reports cited in this paper and from academic journals to specific institutions' predictions. The weaknesses of the research is based on the multitude of information available about the chosen subject. Additionally, conducting the research from only one perspective cannot be exhaustive. That is the reason we wanted to provide both qualitative and quantitative analysis. Lastly, it is essential to mention that this study focuses only on some parts of the economic policies adopted in Romania after the pandemic and only on some of the available economic data (such as GDP). That is because it is challenging for governments, academics or institutes to put together unique studies or official documents about economic outlooking since it is a very broad subject. Our findings underline the future of the EU economies, especially of Romania, giving concrete and sustainable economic inputs, thanks to the EU recovery plans.

We can conclude that efficient budgeting of resources is requested to reduce the recovery period after the pandemic and revitalize economic growth. According to multiple institutions such as the European Commission and the OECD, one of the critical elements to revive the national economy is expanding it with investments in numerous sectors such as the green economy, renewable energy, and digitalization. Access to EU funds is also bringing variety to the Romanian economy and, simultaneously, is preparing the country for potential future threats.

Considering the need for further research, our paper can be developed in multiple future directions. Based on the research we have conducted so far, there are very few scientific articles focusing on the Romanian economic reality, which is the reason why we anticipate that our study can bring value to the scientific field. Given the international research, we were able to identify a more increased interest in the topic reflected in a larger number of papers (Carnap et al., 2020; Chang et al., 2021; Belhadi et al., 2021; Ibn-Mohammed et al., 2021).

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The "Invisible hand" of Digital Economy

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Abstract

The transition of conventional economics to the data-driven digital economy has become a focal point for the scientific community in the adjustment and transfer of basic economic principles and parameters in the metaverse. Thus, the context of interdependence among countries created by globalisation has allowed for a new form of interdependence to emerge, through the increasing role of cross-border data flows as a new key resource in international economic relations and development. The main purpose of this research paper is to study the evolution of the digital economy under the impact of major effects that occur in a severe and dramatic context with many widespread potentially negative consequences. With the development of Industry 4.0, the concept of digital economy must be endorsed by international policymaking, which is flexible and takes into account the countries different levels of digital maturity, as well as development objectives or digital readiness. Since the last three years have been characterised by an overlapping of black swans with the disruptive effect of full lockdown, the digital transition to digital economy has begun to gather pace. The methodology used implied both a quantitative and qualitative analysis, following a thorough scoping review of scientific literature, by means of a macroeconomic approach with the purpose to assess the major four components of the digital economy: gross domestic product (GDP), economic output, employment, and the Outsourcing growth rate from the IT sector. The research was centred on the case of the potential for the digitization from Romania to become a key player in ensuring true support for the Romanian economic prevalence under very unlikely events compared to the EU27.

Keywords: digital economy, digitalisation, digital transition, Industry 4.0, black swan, pandemic, COVID-19.

JEL Classification: E60, O33, O47.

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1. Introduction

Humanity's recent history has been marked by multiple series of *black swans* (Taleb, 2010) that have been proved to play an essential role in how we perceive and use digital technologies. Thus, the COVID-19 pandemic has created the ideal setting for the steep rise of digitalization, which was no longer perceived as an alternative way of addressing economic issues, but as an intrinsic obligation to respond to people's needs in a contemporary fashion.

The pandemic has also emphasised the increasing dependence of our societies in relation to the potential role that data can play in combating global crises through data-driven digital technologies. Real-time data and technology assistance made it possible for the governments to monitor and control the spread of the pandemic, and to cooperate with scientists in order to develop new vaccines in record time (UN, 2021). Using cross-border data solutions and technology collaborations on an international scale, governments were able to fight a crisis that spread across national borders and affected human beings all over the world.

In order to address the increasing number of interconnection and interdependence challenges in the global data economy, the developed countries paved the road for the entire world to implement the design model of their digital economies and institutions. Yet, the current industrial revolution driven by the force of digital technology has been foreseen for more than fifty years ago, when Moore stated that the number of transistors in a dense integrated circuit (IC) doubles every two years (Moore, 1998). As an extension of this technological development, digital equipment diversified exponentially its operational capabilities in terms of storage capacity and processing speed of computers, or even home appliances wireless connected to our mobile phones.

Nowadays companies benefit from the constant monitoring and control of machinery equipped with technologies by process optimisation of their energy efficiency. Hence, digital technologized companies have been able to reduce their electricity and thermal consumption, water and waste consumption and even labour costs (Maggiore et al., 2021). In a new COVID-19 reshaped world, social distance and lockdown measures transformed the way we carried out our daily activities, and home became the new headquarters of teleworking, shopping, socialising, or receiving education.

In the light of the recent pandemic, the Southern European countries have adopted national recovery measures in the interest of addressing the social inequalities, teacher-training deficit, and the distribution of educational opportunities with solid further investments in the digitization process (Zancajo et al., 2022). Regarding the role of IoT technologies in the transition to the digital economy, both the IoT and the economy are affected by highly unexpected events, technological innovations, economic developments, or production (Nistor, Zadobrischi, 2022). As a result, the digital economy could not be perceived as an alternative solution for our societies, but as the main tool behind the force of economic recovery. The decline in human development worldwide due to the confluence of crises generated by the

COVID-19 pandemic was equivalent to erasing six years of progress, due to the contraction of GDP, trade, employment, and investment (Larionova, 2020).

Taking into account the intensive interest manifested over the last five years by the scientific community in the process of digital transformation from both macroeconomic and microeconomic perspectives, this paper aims to evaluate the potential for the Industry 4.0 to positively impact economic growth, as well as address social inequalities and act as an *Invisible hand* in the economic recovery process for the Romanian economy.

Furthermore, the main focus of this research condensed on a comparative macroeconomic analysis between Romania, EU27, and G-20 countries, with the mission to determine the performance of digital economies under an overlapping crisis.

2. Literature Review

The current phenomenon of digital technologies has culminated around 2015 and most research studies focus on business and economic implications, but omit related initiatives, such as Work 4.0, Management 4.0, Marketing 4.0, and others (Maresova et al., 2018). Still, even if digital transformation can occur in countries with very different economic backgrounds (Corejova et al. 2021), digitalization must be endorsed by complementary strategies to support the extremely poor to share the benefits of economic digital transformation (Subramaniam et al., 2020).

Research studies focused on the COVID-19 pandemic impact on the potential for digital transformation under *black swans*' effect have also concluded that an economy in crisis has a negative impact on the potential for digital transformation (Corejova et al., 2021). With regard to the European economies, one of the main issues to be addressed in order to reduce the gap in the sustainable and inclusive economic growth is the competitiveness performance of high-tech and digitalized industries in the global production value chains (Boikova et al., 2021).

The trend towards Industry 4.0 acts like an *invisible hand* that erases boundaries between manufacturing industries, service enterprises, IT-providers, and tech data giants (Winter, 2020) and sets the scene for the expansion of the paradigm of digital economy. Due to the perfect setting of uncertainties and pressures generated by the pandemic, the metaverse gained traction throughout the creation of new value by the means of data-driven innovation technologies (European Commission, 2021).

Studies show that one of the main factors that could help close the digital gap between the extremely poor people and the rest of the world is the governments' role in ensuring that the benefits of digitalization could be reaped by people who live in extreme poverty as well (Subramaniam et al., 2020). Other authors also concluded that globalisation and e-government development improve economic growth and eradicate poverty and income inequality by boosting digitalization, investments, job creation, and wage increases for the semi-skilled and unskilled labour-intensive workforce (Ullah et al., 2021). Other studies focus on the Internet and Communication Technology (ICT) impact on economic growth and

development, highlighting the positive contribution of ICT's regardless of the country's development level (Habibi, Zabardast, 2020).

In the light of European's Union goal to create a single digital market that uses its first computer with quantum acceleration (COM, 2021/262 final), the European Commission offers support to member states in designing and implementing growth-enhancing reforms and facilitating the digital transition in areas such as e-government, digital economy, digital infrastructure development (broadband), e-health, and digital skills through the Technical Support Instrument (EU, 2021/241). Therefore, the European Commission has been using the Digital Economy and Society Index (DESI) since 2014 as a comprehensive tool in monitoring member states' digital progress and offering an overview of the state of digitalisation in Europe. The DESI 2021 reports reflect the member states' ambitions for the next six years, as expressed in their Recovery and Resilience Facility (RRF), starting from a 2020 baseline (European Commission, 2021).

The global village that interconnects millions of people through the digital economy must solve our current challenges and achieve the Sustainable Development Goals (Espinosa et al., 2021). In contrast, the costs of anti-pandemic measures, the drop in revenues, and growing debt on top of historically high pre-crisis debt levels became long-term threats to sustainable development (Larionova, 2020).

3. Research Questions

The main purpose of this research is to study the impact of digitalization, digital economy, and economic growth under the *black swan* effect. The main focus of this research concentrated on a comparative analysis between Romania, the European Union, and G-20 countries, in order to assess the performance of digital economies under an overlapping crisis. Taking into account the current trend to fastening the economic decoupling using the advantages offered by the Industry 4.0, the research questions proposed are:
1) What is the current state of Romania's digitisation process?
2) How did the COVID-19 pandemic affect the transition of Romania's economy to the digital economy, compared to the most developed countries?
3) What are the key elements that could provide an increasing potential for Romania's digital economy to expand rapidly and fill the gap in terms of economic growth among the most developed countries?

4. Research Methods

Digital economy is strongly related to the digital transformation, which implied a thorough scoping review of more than 200 scientific papers published between 2017 and 2022 for synthesising research evidence. The scoping process implied the use of various academic scientific libraries identified in the Web of Science database that offer both open and institutional access to their scientific literature in the economic and social sciences field. For the purpose of this article, the online search

was refined by applying two-word combinations of the following keywords: digital economy, digitalisation, digital transition, Industry 4.0, black swan, pandemic, COVID-19.

Then, a macroeconomic approach was applied with the purpose to assess the four major components of the digital economy by conducting a qualitative analysis of the following: gross domestic product (GDP), economic output, employment, and the Outsourcing growth rate from the IT sector. The Digital Economy and Society Index measures the degree to which the digitization transition has been successfully provided to improve the methodology and to take into consideration the latest technological and policy developments.

The structure of DESI indicators has changed along with the continuous expansion of the digital economy and consists of four cardinal points of the Digital Compass that replace the former dimension of five: human capital, connectivity, integration of digital technologies, and digital public services. Also, the main objective of this assessment of the progress towards the green and digital economy is to investigate the targets' achievement in a comparative scenario between Romania and the EU27 over the last five years.

Next, the Global Innovation Index (GII) takes into account more than 80 indicators which measure the level of Innovation inputs and outputs in order to offer a comprehensive view over world economies in terms of innovation capabilities. Since the analysis of the relationship between innovation input and output performance is directly linked to the level of economic performance, the impact of the pandemic was investigated from a comparative perspective of Romania's GII with Europe and top ten countries.

As stated by the World Intellectual Property Organization (WIPO), the GII is determined by seven fundamental pillars: knowledge and technology outputs, infrastructure, Global Innovation Index 2021, Institutions, Business sophistication, creative outputs, market sophistication, human capital, and research. Even if GII data are available only for the last decade, these reports provide a useful overview of the 130 United Nations' economies with respect to their innovation capabilities.

5. Findings

According to the Digital Compass target, member states must facilitate the transition to fully digital key public services for their citizens and businesses with optimal quality and efficiency. As stated by the European Commission (DESI, 2021), the Digital Economy and Society Index monitors the online provision of public services by scoring member states on whether or not they have completed each step of key services completely online.

Over the last five years, Romania is one of the countries from the bottom of the hierarchy, scoring the lowest progress in terms of digitalisation, along with Bulgaria and Latvia, as shown in the figure below (Figure 1). On the contrary, the most significant progression in the digital transformation was noted by Denmark, Netherlands, Spain, and Finland with the highest scores.

Figure 1. Digital Economy and Society Index- Member States' progress, 2016-2021
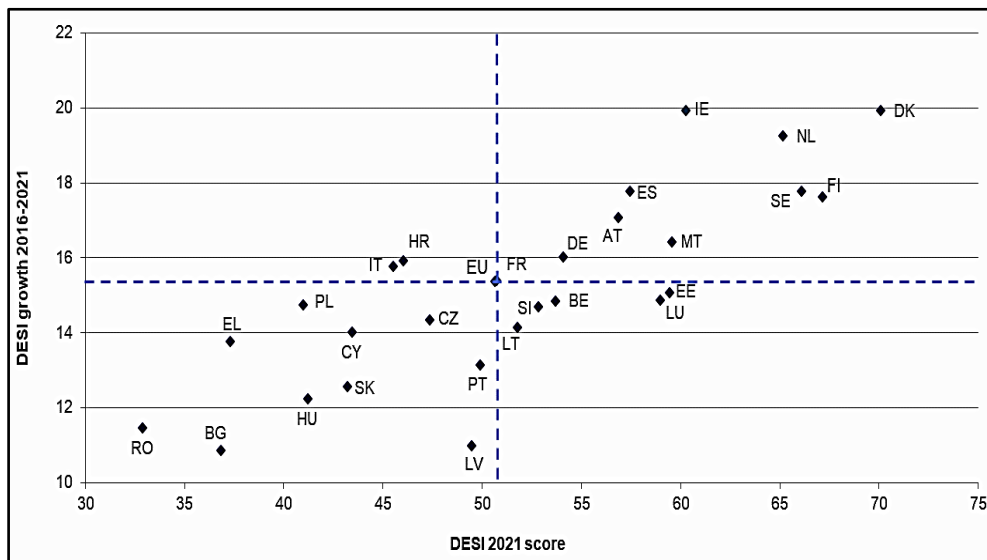
Source: DESI 2021, European Commission.

If the pandemic acted as a propulsion force for many developing countries to adjust and rethink their transition to the digital economy, it was clearly not the case for Romania, which remained the less advanced digital economy in the European Union in 2021, followed by Bulgaria and Greece (Figure 2). The list of countries with the most advanced digital economies in the EU remains constant: Denmark, Finland, Sweden, and the Netherlands.

Figure 2. Digital Economy and Society Index in EU, 2021
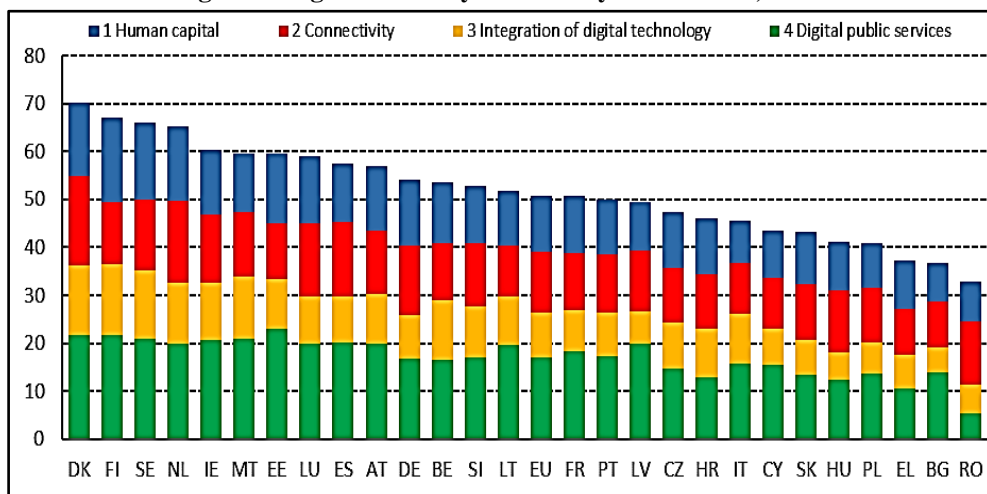
Source: DESI 2021, European Commission.

In terms of connectivity, the Digital Economy and Society Index (DESI) measures both the demand and the supply side of fixed and mobile broadband, assessing not only the availability of fast broadband and fixed very high-capacity networks, but also the population coverage of 4G and 5G networks and the retail prices of fixed and mobile offers.

While being the less advanced digital economy in the EU, Romania succeeded in achieving one of the highest scores for the mobile broadband sub-dimension, among the top ten most developed countries in the broadband connectivity dimension. The best score was once again noted by Denmark, followed by the Netherlands, Spain, and Luxembourg. On the other hand, Bulgaria and Greece do not benefit from the same connectivity opportunities, hence their lowest scores (Figure 3).

The integration of digital technology in EU states measures the level of digitalisation of businesses and e-commerce, by the means of ten different digital technology indicators: SMEs (Small and Medium Enterprises) with at least a basic level of digital intensity, electronic information sharing, social media, big data, cloud, AI, ICT for environmental sustainability, e-Invoices, SMEs selling online, e-Commerce turnover, and selling online cross-border.

Figure 3. Digital Economy and Society Index 2021, Connectivity in EU states
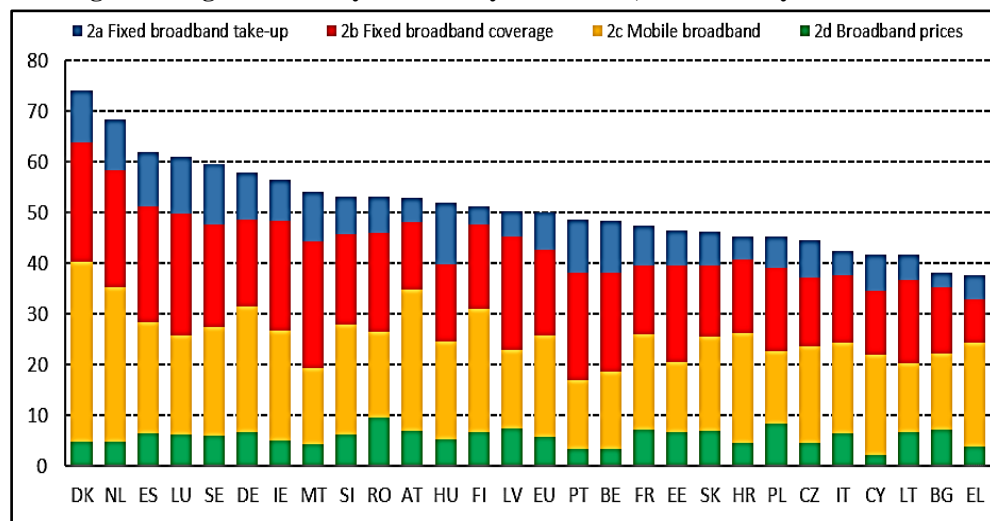
Source: DESI 2021, European Commission.

As shown in the figure below (Figure 4), Romania has one of the weakest performances in the integration of digital technologies, still scoring better than Hungary or Bulgaria, while Finland and Denmark achieved the best performance.

**Figure 4. Digital Economy and Society Index 2021, Integration
of digital technology in EU states**
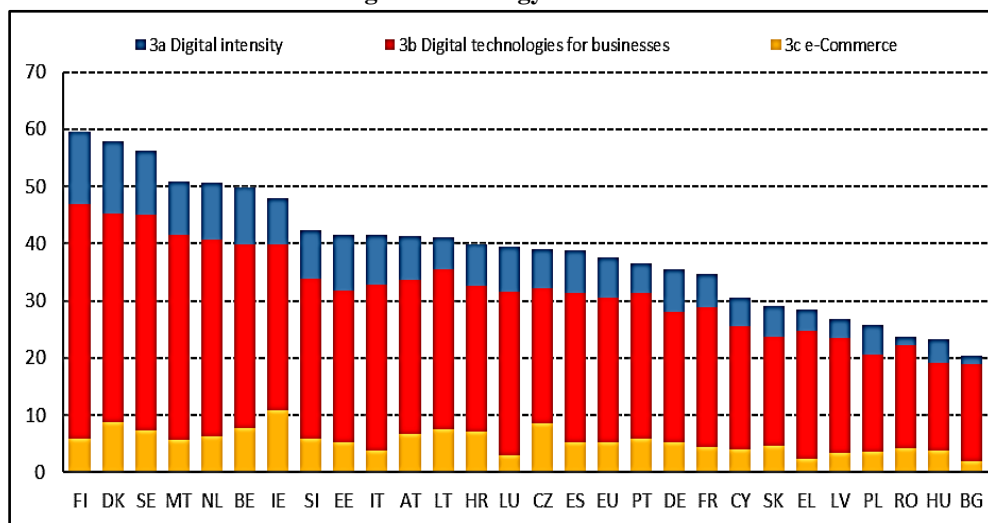
Source: DESI 2021, European Commission.

Since effective e-government has the capacity to provide a wide range of benefits, including more efficiency and savings for both governments and businesses, as well as an increasing transparency and openness, it is very important to study member states' ability to implement digital public services according to their Digital Decade targets. According to Figure 5 below, Romania and Greece have the lowest score of open data and digital public services, while Estonia, Denmark, and Finland have almost fully achieved their target in the digitalisation of the public sector.

Figure 5. Digital Economy and Society Index 2021, Digital public services in EU states
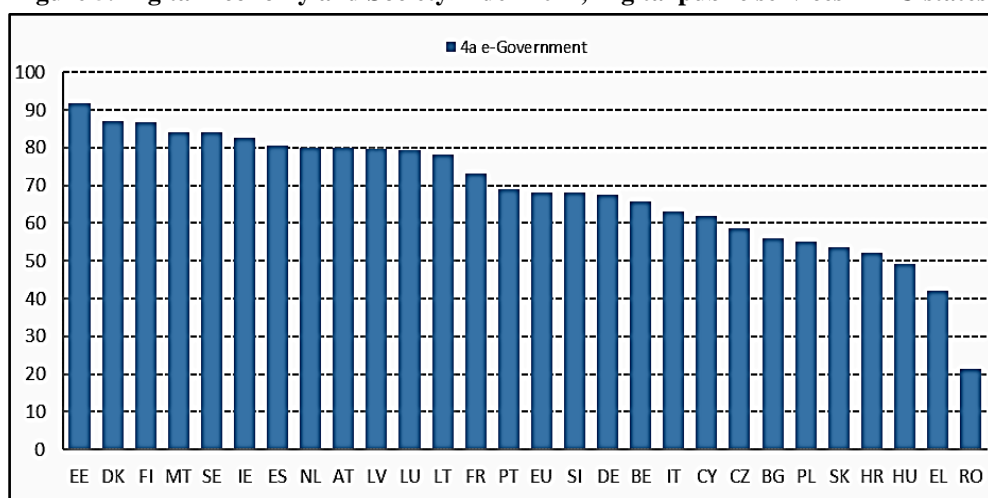
Source: DESI 2021, European Commission.

Romania contributed to ICT value added in 2018 with EUR 55 billion or 5% of EU value added in ICT, while the average European level of ICT as percentage of GDP was 4.4% (Figure 6). On the other hand, Denmark has a less large ICT sector as percentage of GDP (4%), while Bulgaria, Czechia, Cyprus, Estonia, Malta, and Luxembourg have the largest ICT sector as percentage of GDP (all more than 5.5%).

Figure 6. ICT sector Value Added, EU27, EUR billion, 2018 (left axis)
and ICT sector share of GDP, EU27, %, 2018 (right axis)
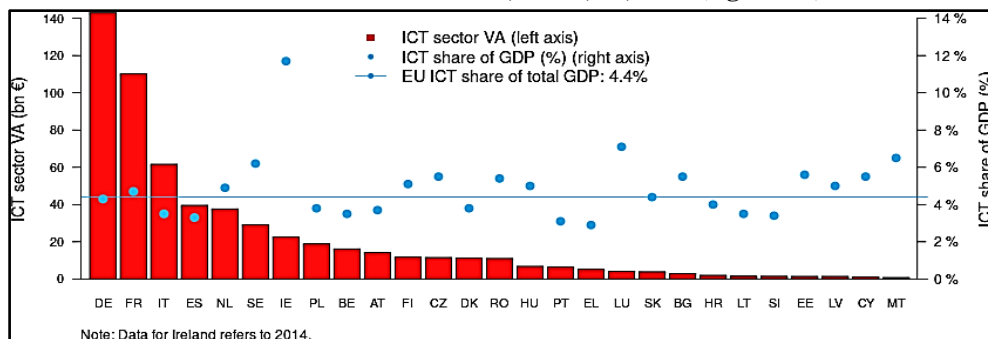
Source: DESI 2021, European Commission.

More than 64% of total ICT sector employment in the European Union in 2018 was accounted for by the top five largest employers: Germany with over 1.3 million people, equivalent to 22% of total EU ICT workforce, followed by France with almost 900.000 people (or 15%), Italy with 650.000 people (or 11%), Spain with 500.000 people (or 9%) and Poland with 430.000 employees in the ICT sector (or 7%). In Romania, almost 250.000 people are employed in the ICT sector, placing the Romanian state among the top seven countries in terms of employment in the ICT area (Figure 7).

On the contrary, many other countries accounted for weak performance in terms of employment in the ICT sector. For instance, Greece had the smallest ICT sector share over total employment, with 1.7%.

Figure 7. Employment in the ICT sector, EU27, million individuals, 2018 (left axis)
and ICT sector share of total employment, EU27, %, 2018 (right axis)
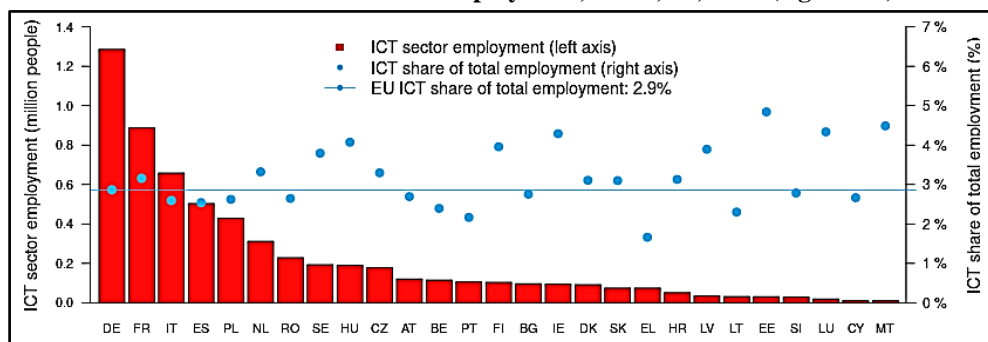
Source: DESI 2021, European Commission.

The average level of labour productivity in the EU27 ICT sector referring to services and trade was EUR 101.000 per person employed in 2018, while labour productivity in the telecommunications sub-sector was the highest (more than EUR 169.000 per employee). As shown in the figure below, Romania and Bulgaria are once again at the bottom of the scale in terms of labour productivity in the economy (Figure 8). Nonetheless, these countries have a good performance expressed by the ratio of labour productivity in the ICT sector over the economy.

Figure 8. Productivity in the ICT sector, EU27,
thousand EUR PPS / individual employed, 2018 (left axis)
and ratio of ICT productivity over total productivity, EU27 (right axis)

Note: Data for Ireland refers to 2014.
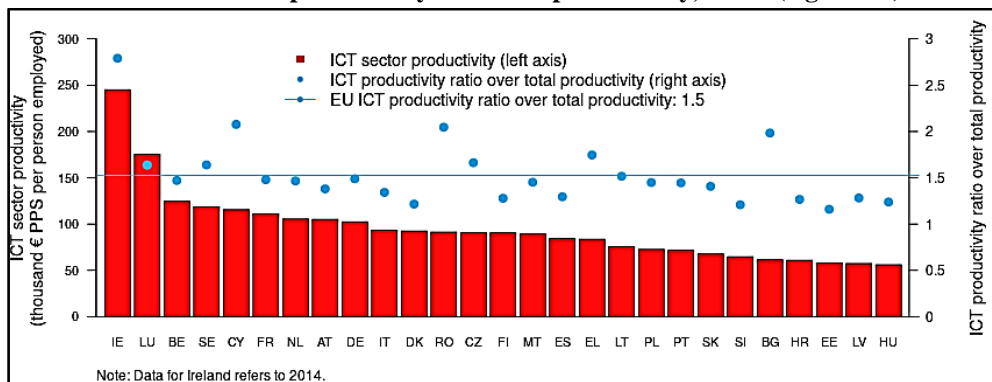
Source: DESI 2021, European Commission.

Next, the following table (Table 1) presents the position of Romania between 2019 and 2021 in the hierarchy of world economies, in accordance with their innovation capabilities. There is clear evidence that the pandemic stopped Romania's development in terms of innovation because 2021 marked a lower rank than 2020 for both innovation inputs (rank 54 in 2021 versus 51 in 2020) and outputs (rank 50 in 2021 compared to 46 in 2020). Also, in 2021 Romania fell two positions in the global economies rank for the GII, from the 46th place in 2020.

Table 1. Global Innovation Index of Romania, 2019-2021

Year	Innovation inputs	Innovation outputs	GII
2019	54	53	50
2020	51	46	46
2021	54	50	48

Source: Authors' contribution using GII 2021, United Nations databases.

Despite the fact that Romania performs below the high-income group average in all GII pillars, as well as below the regional average in all GII pillars, its best performance is represented by the knowledge and technology outputs. As presented in Figure 9, Romania must quickly adapt and find new solutions to address the challenges in market sophistication, human capital and research, and creative outputs, which perform in a negative direction and place Romania in the second half of the hierarchy.

Figure 9. The seven GII pillar ranks for Romania in 2021
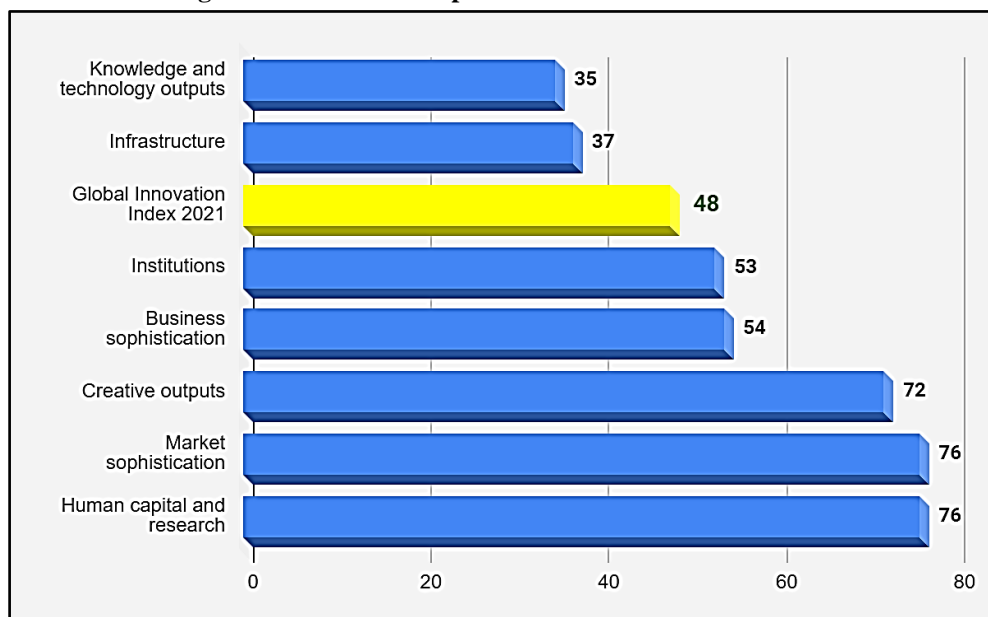
Source: Authors' contribution using GII 2021, United Nations databases.
Note: The highest possible ranking in each pillar is one, from a total of 130 countries.

According to the National Institute of Statistics, the Romanian IT exports market has been in a continuous expansion by 15% each year, being estimated at $5.5 billion in 2021. With an even higher annual outsourcing growth rate of 20%, Romania exports approximately 90% of ITO services to the EU27 countries (UK, France, Germany, the Netherlands, or the Nordic countries).

The cost-effectiveness perspective of Western countries in choosing Romanian software development services that have similar prices to other Eastern European countries is underlined by the cheap IT labour force. Another great advantage of the Romanian IT outsourcing market is the high level of professional skills of the second largest hub of software engineers in Europe (after Ukraine) that can provide customised delivery models for the best quality-cost ratio, depending on the buyer's preferences and budget.

In addition, companies involved in the software development area are exempted by the Romanian government from paying any tax on income for their employees,

and they can also receive a 50% deduction on their research and development costs. Therefore, Romania is one of the most competitive countries in terms of outsourcing.

As presented in Romania's National Recovery and Resilience Plan, based on a green and digital economic transformation, public services digitalisation is the main element that must be addressed for the e-Government to be realised. Another fundamental priority of the Romanian government's IT strategy is the Digitalization of the public sector, upon the application of corresponding cybersecurity programs.

Once the COVID-19 pushed the transition to digitalisation as a response to the need for social distancing, the context was seen by the Romanian early adopters as a high-priority opportunity for the e-Government implementation strategy.

6. Conclusions

Affected by the convergence of both the sanitary crisis and the natural hazards that occurred during the last two years, the impact of COVID-19 worsened the financial gap between developed and developing countries (Izumi and Shaw, 2022). This traumatic period of lockdown experience and a chaotic e-learning experiment for many teachers, students, families, or even policymakers, has accelerated the transition to an immediate digitalization (Zancajo et al., 2022).

Previous research has already highlighted the lack of sufficient financial government support and investments in innovations and training conducted by the SMEs in countries with a very low degree of implementation of digital technologies (Trasca et al., 2019). This is the case of Romania, Bulgaria and Hungary that have been rated as "beginners" in terms of digital maturity of SMEs, due to their inability to adopt simple technological solutions (Brodny, Tutak, 2022).

Our findings concerning the evolution of the digital economy, under the impact of major effects that occur in a severe and dramatic context with many widespread potentially negative consequences, suggest that digitalisation plays a decisive role in accelerating the post-pandemic recovery process.

Through the scoping review analysis, it was possible to answer all the research questions addressed in this paper. Thus, the limitations of this study have been the use of a single scientific database (Web of Science) and the analysis of online publications, taking into account only the specific keywords indicated previously.

On the one hand, sound macroeconomic policies and regulations must be adopted in order to address post-pandemic recovery and increase economic resilience. To this purpose, the Industry 4.0 could prove to be an effective ally for the policy makers to develop different policies that aim decarbonisation goals and energy efficiency mechanisms specifically designed to support energy efficiency in the industrial sector (Maggiore et al., 2021).

Learning from the post-epidemic recovery from China, an effective way to cope and mitigate such external shocks is strengthening economic resilience and establishing a more complete risk emergency mechanism and social governance system, and thus ensure the stability of the economic operating environment and promote economic resilience (Jiang et al., 2022).

However, the positive impact of digitalisation on climaxing the climate emergency and achieving absolute decoupling could be submerged by the continuing quantitative growth of the global economic activity (Kunkel, Tyfield, 2021).

On the other hand, governments must increase their investment in the educational systems, which has already been proven to positively impact economic growth and eventually provide the economic and knowledge base for higher education (Volchik et al., 2018).

From the perspective of Romania's potential for digital transition and its current state of digitisation, we found that the Romanian state figures among top seven countries from EU27, in terms of employment in the ICT area, while the COVID-19 pandemic slowed the conversion of Romania's economy to the digital economy. As a result, Romania ranks in the last position among the European countries having the least advanced digital economy in the European Union in 2021, followed by Bulgaria and Greece.

Moreover, Romania has one of the weakest performances from the EU27 states in the integration of digital technologies, open data and digital public services, and labour productivity in the economy. In contrast, the Romanian economy has a good performance, delivered by the ratio of labour productivity in the ICT sector over the economy.

Furthermore, Romania fell two positions in the global economies rank for the Global Innovation Index, arriving on the 48th place in 2021. Given the fact that Romania has a lower score than the high-income group average in all GII pillars, as well as compared to the regional average in all GII pillars, its best performance is portrayed by the knowledge and technology outputs.

Regarding the future lines of search, it is strongly recommended to extend the current combination of keywords used in the bibliometric analysis, in order to include social or geographical clusters for a better interpretation of results, in accordance with their specific context.

For the digital economy to be fully implemented, Romania must strengthen collaboration between the public and private sector, but also inter-sectoral and intra-sectoral collaboration, which is why further research should focus on identifying different models of organisational structures in terms of regulations, policies, and guiding principles that could be transferred in the transformation process towards a decoupling economy.

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The Importance of Digital Education
in a Pandemic and Post-Pandemic Context

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Abstract

The pandemic context has changed the way we think, live, act, work, spend our free time and travel, profoundly affecting our health, education, and behavior. This paper aims to make a diagnostic analysis of the Romanian education system before and after the pandemic, presenting, through a SWOT analysis, the strengths, weaknesses, threats and opportunities of the entire education system, solutions, and recommendations. The transition of the educational process from the "face to face" system to the online, remote system has produced a digital segregation that has only accentuated the inequality between different social groups. This concept refers not only to unequal access to digital content and the acquisition of skills to use information technology, but also to stale, underperforming computers, internet connection, slow speed, etc. Human interaction, communication, empathy, visual, auditory, and kinaesthetic impact are the necessary ingredients to learn effectively, to focus our attention, and to develop normally from a physical, social, emotional, and psychological point of view.

Keywords: digital education, digital segregation, pandemic, post-pandemic.

JEL Classification: I21, I23, I25.

1. Introduction

The digitisation of education was forced upon us with the outbreak of the COVID-19 pandemic. All actors involved in education, teachers, students, and parents have been affected by the brutal impact and forced shift from traditional

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face-to-face education to digital, online education through platforms such as zoom, google classroom, teams, skype, etc. Thus, each school adapted on the fly to the new conditions, as did students and parents who overnight found themselves sequestered at home and trapped not only in work problems, but also in the problems of adapting to the new technology.

The digitisation of education has been talked about since 2011, so the National Education Law no.1/2011 stated that a virtual school library will be created, containing a series of courses, teaching materials, assessment tests, etc., accessible to both teachers and students throughout the country. Through this method of digitisation, teachers were supposed to draw inspiration from the best and teach students new and interesting things, but unfortunately this has not happened due to political instability and lack of political and social commitment and responsibility. We can say that the pandemic has forced the digitization of the Romanian education system, a change that has brought both good and bad things, but unfortunately the burden has fallen on the shoulders of parents and teachers.

Digitisation is a catalyst that has pushed things forward, and today it has become visible. If you were to ask someone before the pandemic how they saw the future of education, one of the answers was surely digitisation, but not the first. Today, this trend has become more pronounced, even if we all had a hard time, and in the beginning there was resistance to change, for 2 years we had no choice but to adapt as we went along, so that things did not stagnate, and we slowly built up the necessary antibodies to face the new challenges.

Historian Yuval Noah Harari (Carthaus, 2020) urges a balanced use of new technologies, especially biometric devices, because on the one hand they will become invasive on the human heart and brain, and on the other they will widen the gap between social classes. We must not forget the difference between the human being and technology, the human being has free will, and we must not become slaves to technology. Psychologists, neurologists, and specialists in digital education draw attention to the negative effects of too much screen time on physical and mental health, as well as on the social, school and family environment.

Digitising education does not solve all the problems; just because we have access to certain materials, courses, and tests does not mean that learning has been achieved. Education is not about memorising or learning things; it is much more than that; it is about transmitting values, patterns of behaviour, attitudes, a way of being and thinking, which cannot be achieved through digitisation.

Digitisation increases accessibility, but it does not solve all the problems of the education system, putting a tablet in a student's hand does not mean they will know the information put there. The atmosphere, the environment in which the information is learned, the auditory, visual, and kinaesthetic means are equally important in the learning process. Each of us has a particular learning style, but combining styles is the most effective way to understand, retain, and make connections.

We must also distinguish between the word *"know" and "to know",* to know means to read or to become aware of certain things, facts, events, but to know means to experiment, to put into practice the information, the knowledge acquired in order to acquire certain skills. Studies have concluded that learning outcomes are better when students learn from books than when they learn from tablets. Obviously, digitisation is an irreversible path; we can see that the current generations have much better developed digital skills than other generations.

Digital education is weaker in its effects than face-to-face education, but if you come with traditional and put digital on top, then the effect is greater and studies show that it is up to 25% greater because the mechanisms mesh and the learning is different from person to person. Technology must help us discover new ways of teaching, new ways of generating content, new ways of interacting with the learner/student and motivating them to learn and stimulate their curiosity to investigate.

Digitising education is not about putting certain lessons or books on email, it is about the existence of two elements: the audience that will use the material and they (teachers, students, parents), would be better off being digitally literate, and the second element is the need of tools. These two elements go hand in hand, they interlink, for nothing we have an audience if we don't have tools and vice versa.

PISA scores have been declining in recent years, and if we correlate PISA scores with digitisation, they are not relevant because we should take into account several variables, the level of economic development, the share of GDP that education receives, but also its value, the level of teacher training, etc. PISA is a comparative educational test, on three components: language, mathematics, and science, for 15-year-olds, and it matters because the direct effect is tracked in the economy, not in education.

The Evolution of Digitisation in Romania and the EU

According to information provided by the European Commission, the evolution of a country in terms of digitisation is measured by 4 key factors: connectivity; human capital, digital technology integration, and digital public services. If we analyze the Digital Economy and Society Index (DESI) and compare it with the EU, we can see (see Figure 1.) that Romania is at the bottom of the ranking, if in the period 2018-2020, it was ranked 26th and with an overall increasing score, in 2021, it will be ranked 27th out of 27 countries with a lower score of 32.9 compared to the EU score of 50.7 and the DESI components have undergone small changes, so human capital occupies 26th place, connectivity 10th place, digital technology integration 25th place, and public digital services last place.

Figure 1. Digital Economy and Society Index 2021
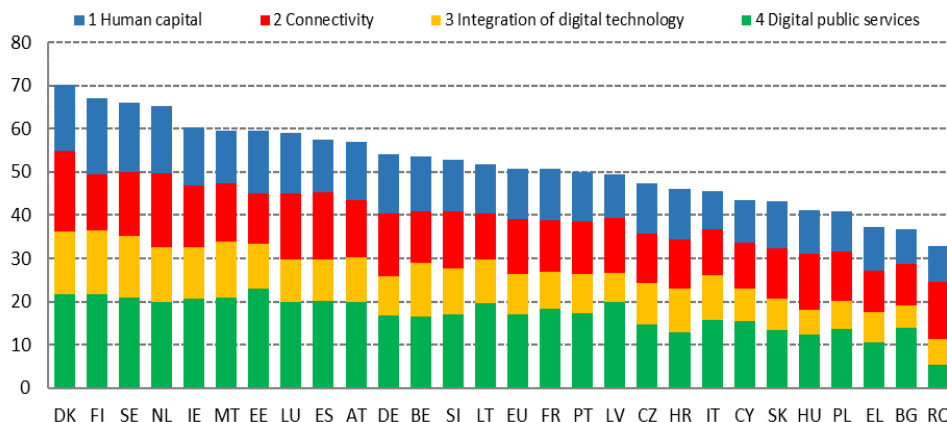
Source: DESI 2021, European Commission, Digital economy and Society Index (DESI)
2021, data accessible online at https://digital-strategy.ec.europa.eu/en/policies/desi.

The first component of DESI is connectivity; Romania ranks 11th in 2020 and
10th in 2021 (see Table 1), managing to approach the European average in terms of
high-speed broadband and 4G coverage, and in terms of broadband prices (fixed,
mobile, converged), Romania ranks first. What remains a problem for Romania is
the digital divide between urban and rural areas, but here too we are above the EU
average (39% vs. 20%).

Table 1. DESI rankings and score for Romania and the EU, 2018-2021

1. Connectivity		DESI 2018	DESI 2019	DESI 2020	DESI 2021
Romania	rank	6	8	11	
	score	48.8	50.0	56.2	
EU	score	39.9	44.7	50.1	
2. Human capital					
Romania	rank	28	27	27	
	score	31.5	31.1	33.2	
EU	score	47.6	47.9	49.3	
3. Integration of digital technology					
Romania	rank	27	27	27	
	score	20.8	21.3	24.9	
EU	score	37.8	39.8	41.4	
4. Digital public services					
Romania	rank	28	28	28	
	score	41.1	45.0	48.4	
EU	score	61.8	67.0	72.0	
TOTAL DESI Romania		**26/35.1**	**26/36.5**	**26/40.0**	**27/32.9**
TOTAL DESI UE		**46.5**	**49.4**	**52.6**	**50.7**

Source: European Commission, Digital economy and Society Index (DESI) 2018-2021,
data accessible at https://sph3ra.ro/wp-content/uploads/2021/07/DESI-2020-Country-
Analysis-Romania.pdf (DESI, 2021).

The second factor taken into account in the statistics is human capital, where Romania is below average, occupying the last positions. Thus, in the period 2019-2021 the level of digital skills did not change much, so in 2021 at least 31% had at least basic digital skills (compared to the EU 56%), 35% had basic software skills, while the EU average was 58%, and 10% of Romanians had skills above the basic level (see Table 2). Romanians' digital skills translate into common operations using devices and software applications, but digital competence is defined as an accumulation of knowledge, skills, and attitudes, which help us to use ICT tools safely, to form a critical sense in choosing information sources, and not to overuse them in order not to endanger our physical and mental health.

According to the Frames & Factory 4.0 study, Romania ranks last in the EU in terms of basic and advanced digital skills. Thus, only 1.6% of employees have followed different types of vocational training, in contrast to Sweden 37%, Switzerland 39.4%, even in Bulgaria the percentage was higher than 2.3%, Poland 7.7%, Hungary 7.3% and the EU average being 14.8%. Romania is facing a paradox, it has the best internet connection in the world, a competitive software industry, and in terms of human capital it is at the primary level, so according to the study, 18% of people aged 16-74 have never used the Internet, as opposed to the EU average of 9% (Mazilu, 2021).

Table 2. Romania-EU level of digital competences

	DESI 2019	DESI 2020	DESI 2021	EU DESI 2021
1a1 At least basic digital skills	29%	31%	31%	56%
1a2 Digital skills above elementary level	10%	10%	10%	31%
1a3 At least basic software skills	32%	35%	35%	58%
1b1 ICT specialists	2,2%	2,3%	2,4%	4,3%
1b2 Female ICT specialists	24%	24%	26%	19%
1b3 ICT training companies	5%	6%	6%	20%
1b4 Graduates in ICT	5,6%	5,8%	6,3%	3,9%

Source: European Commission, Digital economy and Society Index (DESI) 2020-2021,
data accessible online at https://digital-strategy.ec.europa.eu/en/policies/desi
(DESI, 2020; DESI, 2021).

The integration of digital technology into business activities ranks 25th in the EU, so most indicators in this dimension were well below the EU average (electronic exchange of information, social communication platforms, big data, and cloud). In terms of digital public services, Romania ranks last in terms of key indicators such as digital public services for citizens and businesses, e-government service users, and pre-filled forms.

The Romanian government launched in July 2020 a series of projects aimed at meeting various digital priorities that are included in the National Investment and Recovery Plan, with a budget allocation of €100 million from EU and national funds, covering the period 2021-2030. Romania's Recovery and Resilience Plan includes measures that are fully or partially related to digital skills, thus the total budget allocated is approximately €1.267 billion (Vulcan, 2021).

2. Literature Review

The IEA's International Informatics and Education Study (ICILS) 2018, demonstrates the extent to which young people are able to use information and communication technology (ICT) for study, work, and life in a digital world, and using tools and methods this study measures international differences in information and computer literacy (CIL) of adolescents (Fraillon et al., 2019). Drossel et al., 2017, in their study show that the use of new technologies by secondary school teachers for educational purposes is very important in terms of school and teaching processes, and the use of digitization supports learning processes and improves the quality of education (Drossel et al., 2017). Sen Grupa, 2020, highlights the importance of understanding some of the concepts that are used in the field of digitisation and discusses the differences between digitisation, digitalisation, and digital transformation. Digitization is about transforming something non-digital into a digital representation or artifact, digitization improves existing business processes but does not change or transform them, and digital transformation is about transforming the business, possible by digitization, the essence is about changing business processes enabled or forced by digitisation technologies (Sen Gupta, 2020). Botnariuc et al., 2020, conducted a study trying to show the ability of teachers and the education system to adapt from the face-to-face system to the online system (Botnariuc et al., 2020). Diana Graber (2020), digital literacy specialist and creator of Cyber Civics, in her book gives us lots of pragmatic advice and teaches us how to help children have a healthy relationship with technology, is a must read for parents raising their children in the digital age. Kilbey Elizabeth (Kilbey, 2019), a child psychology specialist, draws parents' attention to the risks children face if they overuse electronic devices and gives tips on how to successfully connect with them. Ceobanu et al., 2020, provides a new perspective on learning content by integrating the opportunities provided by new information and communication technologies, and the pandemic health crisis has highlighted the advantages and disadvantages of digital education in different contexts. Cucoș, C. (2020), foreshadows aspects of the future of education over the next two to three decades and outlines a series of lessons from the COVID-19 pandemic. Martin L. Kutsher (Kutsher, 2018), a paediatric neurologist, offers solutions to prevent the negative effects of prolonged screen time, which are manifold: loss of concentration and attention, lack of interest in school, limited creativity, stress, fatigue, obesity due to unhealthy eating and sedentary lifestyles, aggression, lack of control, etc., and urges balance and moderation. Quartz Matrix (QM, 2019), has launched a series of projects for digital education, the ACCED project – Today's child, tomorrow's creator, which supports teacher training for digital education, managing to train and educate 100 teachers from Bucharest and Bihor in the use of the following technologies: interactive whiteboard, ProLang digital language lab, mozaBook educational software, Microsoft 365 or Kahoot app.

3. SWOT Analysis of the Education System in Romania

Strengths	Weaknesses
Free compulsory education; ensures the right to education and provides equal opportunities for all; freedom of expression; experienced teachers; classrooms with modern equipment, fully equipped laboratories; involvement of pupils/students in various national and extracurricular projects; unlimited access to the internet and other programmes; varied educational offer; good results in sports competitions, contests, conferences and Olympiads; merit, study and social scholarships; numerous programmes, projects and partnerships with the community, etc.	Insufficient financial resources in relation to educational needs; unmotivating and unstimulating remuneration for employees; school curricula not adapted to the reality of the labour market; large discrepancies between urban and rural areas (conditions, equipment, qualifications, training); emphasis on theory and very little on practical aspects; monetisation of illegitimate interests in education; assessment based on grades and less on knowledge level; large number of hours spent at school and then at home on homework and too little time for recreational, creative and sporting activities; outdated teaching system, teacher dictates, pupil writes, pupil loses curiosity, motivation and attention; classrooms are not properly equipped (lack of sports halls, old and insufficient technological equipment); lack of motivation to perform increases absenteeism and drop-out rates, etc.
Opportunities	**Threats**
Erasmus and internship programmes; professional and psychological counselling; facilitating distance learning and the hybrid model; attracting funds for improving teaching and assessment methods; emphasis is also placed on other subjects such as financial education, psychological education, sports, nutrition, personal development, etc.; maintaining a state of discipline and security for pupils; good school-primary-community-business collaboration; opportunities and access to education for minority groups and certain disadvantaged groups; extending the use of modern teaching and seminar methods and enriching the existing book stock in libraries; organising competitions, conferences both nationally and internationally, etc.	Migration of well-trained teachers to centres; educational centres, both nationally and internationally; international; reducing the birth rate; funding through local budgets do not cover all the expenses necessary for a efficient education system; lack of qualified staff which forcing the system to employ poorly trained staff, more especially in rural areas; education is dominated by ideologies political parties; lack of accountability, solidarity and optimism; students are not prepared for life but for doing to face exams; our education system provokes stress and dissatisfaction on the part of all actors involved in education; due to low and unmotivated salaries, the quality the quality of teaching leaves something to be desired; teachers are not respected and they are not respected at their true value and then they are not 100% committed in the educational process; instability and ambiguity the legislative system; lack of investment in infrastructure and technical and technological means; corruption and bureaucracy, etc.

We note that in this analysis we have captured the most important aspects of the education system, but there are certainly many more.

4. Research Methodology

In order to identify possible problems faced by the students of the Bucharest University of Economic Studies during the period March 2020 - March 2022, when the educational activities were conducted online, we conducted a questionnaire in Google Forms and distributed through the institutional addresses. The research hypothesis: can we keep online activity in learning/teaching and assessment practice, to what extent, at what cost and with what return?

The sample consists of 269 respondents/students and the questionnaire consists of 15 questions, these are of several types: closed-ended questions, open-ended questions, opinion, introductory questions and rating scale questions using a response matrix (Vulcan, 2021). Following the grouping of the survey data, we conducted a horizontal and vertical analysis of the responses. The horizontal analysis involves the independent presentation of responses to each question, while the vertical analysis aims to correlate responses and identify statistical links and associations between the characteristics recorded. The procedure is quantitative and involves presenting the instructions that subjects received. The questionnaire includes an introductory letter containing a series of information about the purpose and social significance of the research, the guarantee of confidentiality of the answers, and explanations of how to respond. At the beginning of the questionnaire, several questions are inserted providing information on gender, age, and residence and form of education.

5. Research Results

The sample consists of 269 students, of which 95.2% are students in the full-time bachelor programme and 4.8% in the full-time master programme. The vast majority of respondents, 94.1%, are aged 18-24, 4.1% are aged 25-35, and 1.9% are aged 36-45. The female part accounted for 67.7% of the respondents and the male part for 32.2%. During the pandemic, 68% lived in urban areas, 30.1% in rural areas, and 1.9% outside the country.

In order to find out to what extent certain aspects of the teaching/learning/ assessment process affected the respondents, to the question, *"What affected you in the teaching/learning/assessment process during the pandemic period?",* we used the Likert (1932) scale calculation method (not at all score 1, to a small extent score 2, to a medium extent score 3 and to a large extent score 4), and obtained the following results:

My insufficient level of digital skills: $1 \times 176 + 2 \times 66 + 3 \times 22 + 4 \times 5/269 = 1,46$
Limited Internet access: $1 \times 180 + 2 \times 54 + 3 \times 24 + 4 \times 11/269 = 1,5$
Lack of motivation: $1 \times 106 + 2 \times 63 + 3 \times 63 + 4 \times 37/269 = 2,10$
Focus of attention: $1 \times 91 + 2 \times 68 + 3 \times 57 + 4 \times 53/269 = 2,26$

Lack of courage to ask questions: 1x128+2x59+3x45+4x37/269=1,96
Lack of a well-structured programme: 1x115+2x55+3x54+4x45/269=2,11
Lack of habit of using new technologies: 1x191+2x49+3x14+4x15/269=1,45
Stress/depression/anxiety: 1x130+2x49+3x42+4x48/269= 2,03

From the results, we can deduce that the respondents were largely affected by the ability to focus on an objective and to pay attention to teaching new concepts or to completing tasks, then by the lack of a well-structured programme due to uncertainty and the pandemic context, lack of motivation coupled with lack of attention and time management, then the onset of anxiety, depression, and stress which increased dissatisfaction and dissatisfaction in the teaching/learning process, leading to poor results in the evaluation process. However, in the last places were the aspects related to internet connection and the ability to use technology and acquire digital skills, which shows us that the respondents have managed to adapt to the new requirements and to the way of relating through online platforms, especially the ase.ro platform.

To analyse the responses to the question, *"What will help the teaching/learning/ assessment process during the pandemic?",* we used the same Likert (1932) scale (no score 1, low score 2, medium score 3 and high score 4) to determine to what extent the aspects listed below helped students in the teaching, learning, and assessment process. The results are as follows:

Lecture and seminar materials: 1x5+2x14+3x69+4x181/269=3,58
Videos/audio materials/posters: 1x10+2x35+3x75+4x18/269=3,35
Teacher explanations and guidance: 1x8+2x20+3x75+4x166/269=3,48
Exercises and case studies: 1x8+2x29+3x85+4x147/269=3,38
Homework check: 1x27+2x53+3x84+4x105/269=2,99
Peers' ideas and guidance: 1x31+2x42+3x92+4x104/269=3,0
Various tutorials found online: 1x16+2x55+3x75+4x123/269=3,13
Tests given during the semester: 1x27+2x58+3x89+4x95/269=2,94

Analysing the results we can say that the respondents appreciated, as an aid, first of all the lecture and seminar materials accompanied obviously by the teachers' explanations and guidance, as well as the exercises and case studies in the seminars, then the videos/audio materials as well as a number of tutorials found online, and to a lesser extent the ideas and guidance of peers as well as the checking of homework, which was to be expected given that the pandemic affected interpersonal relationships and especially among first year students, as they did not have the opportunity to meet face to face and have a social connection.

To the question, *"What does the digitisation of education mean?"* , 56.4% of the respondents answered, more than half of them failed to give a clear definition of digitisation, i.e., they tried to stress the importance of posting teaching materials on the online platform ase.ro, and others answered: it is an evolution, a progress, it gives the possibility to learn anywhere/anytime, the use of electronic means and

digital technology, a new way to receive information, information can be accessed anytime, etc.

The most used online applications were: zoom (99.6%), online platform.ase.ro (91.8%), Google Classroom (41.3%), Microsoft Teams/Office 365 (24.5%), Facebook/Messenger (7.8%), Whatsapp (2.2%), Skype (3.3%), and others but in very small proportions (see Figure 2). We can see that the online.ase.ro platform was used by 91.8% of the respondents, who appreciated how easy the platform is to access and use, both in the teaching and seminar process.

Figure 2. Applications used for online learning activity in times of pandemic
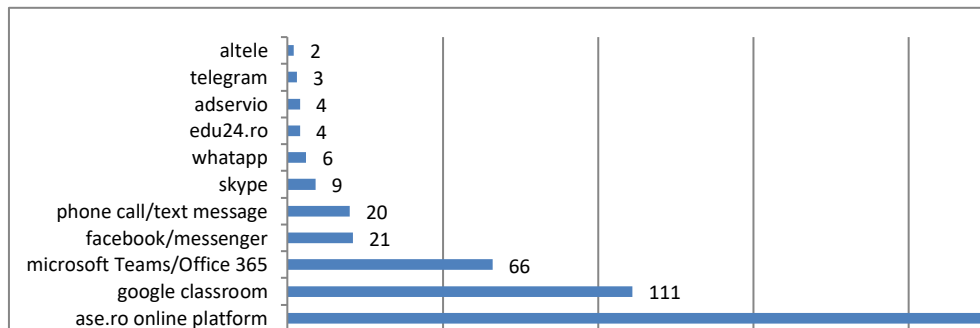
Source: According to the results obtained from the questionnaire applied on Google forms https://docs.google.com/forms/d/1CJ8KxsQI67OxbygbAq_6CXDIVIlI7FH8EqVUCiTeolo/edit.

To the question, "What are the most appropriate ways of teaching/learning/ assessment after two years of testing other ways of conducting educational activities?", the results are captured in Figure 3.

Figure 3. The most appropriate ways of learning, teaching and assessment after testing online learning activities
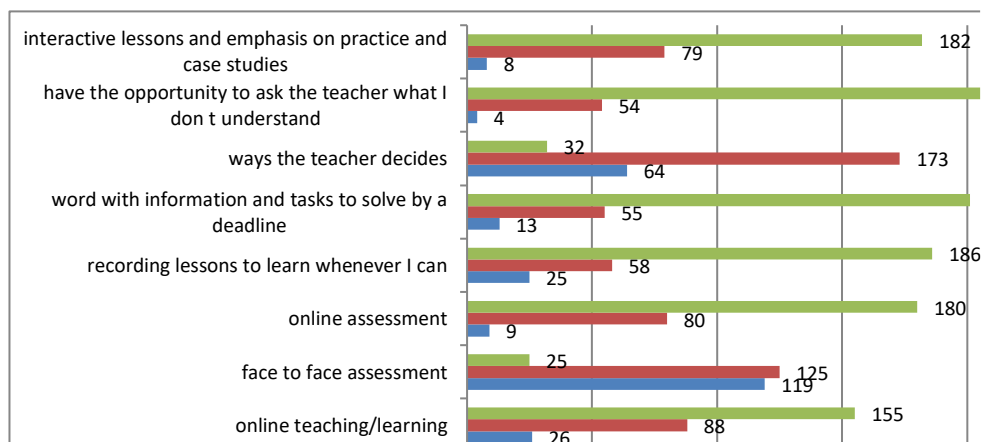
Source: According to the results obtained from the questionnaire applied on Google forms https://docs.google.com/forms/d/1CJ8KxsQI67OxbygbAq_6CXDIVIlI7FH8EqVUCiTeolo/edit.

Based on the results, we can see that the respondents, after testing the online learning, rated the online teaching/learning in a high proportion of 90.4% (suitable + very suitable) and the online assessment in a proportion of 96.6% (suitable + very suitable), compared to the face-to-face teaching/learning system of 68.4% (suitable + very suitable) and 55.8% for face-to-face assessment, respectively. Obviously, they also appreciated other ways of conducting educational activities, namely: being able to ask the teacher where they do not understand or where there are unclear points, materials with information and tasks to solve by a deadline, recording lessons so they can listen and learn at any time, appreciating interactive lessons and case studies that focus on practice.

The teaching activities carried out online were appreciated as interesting and useful in a proportion of 80.7% and 10.4% considered that they were uninteresting and tiring, and the remaining 8.9% did not know how to appreciate. It is quite clear that the students have adapted to the online teaching activities, managing to appreciate them in a fairly large proportion after two years.

To the question, "*What are the advantages of online learning?*", respondents answered: saving money on transport/gas passes and waiting time; no more time wasted on the road, breaks from college, travel time from college to home; attendance at courses and seminars increased because even those who could not get to college for various reasons would turn on their phone or computer; can record lectures and seminars and re-read/review whenever needed; greater availability and convenience; ability to be present regardless of location, no formal setting; gave us the opportunity to get a job, and now we had to quit for a 2 month physical system; the lessons were held in our comfort zone which allowed us to understand certain notions much better; lack of anxiety and social embarrassment; possibility to have all lessons in online format; an advantage for those who live in areas bordering Bucharest, having to travel more than 2 hours on the road; low costs both for school supplies and for clothing, shoes and services; the possibility to protect oneself and be safe from contracting COVID-19; more free time for personal development and individual study; saving money and stress; increased courage to ask questions and say what is not understood; test and exam results are given immediately via the online platform ase.ro; no need to print out projects and lectures on dozens of pages, avoid wasting paper; forced to adapt on the fly to new technology and new methods of presentation and assessment; lower rent/housing costs; possibility to learn and work at the same time; more effective learning by seeing and hearing very well, time needed to write down certain observations, no longer matters where in the classroom in relation to the board; information can be accessed at any time, assignments have clear teaching dates, online platform ase.ro is very useful and it would be a shame not to use it anymore; no more having to decipher handwriting on the board if it is not clear or the kite is very poor; if you have a cold you can attend from home without having to catch up or take lessons from colleagues; convenience, accessibility, flexibility; hybrid system would be most effective, online courses and physical seminars, etc.

To the question, *"What are the disadvantages of the teaching/learning/ assessment system*?", respondents indicated: lack of motivation, concentration, attention, connection, and interest; in some areas especially in rural areas the Internet connection is unstable and weak; not all students have unlimited access to the internet; not everyone has access to a computer and high-performance technical means; poor digital literacy both on the part teachers as well as students; spending a large number of hours in front of the computer computer/phone/laptop and at home; lack of socialisation, communication and interpersonal contact; inadequate assessment; lack of communication and interaction leads to depression, anxiety and isolation; being in your comfort zone can be distracting for lack of courage to ask questions and the teacher's inability to read on the student's face if he or she has understood or not understood; there are no disadvantages, etc. More than 40% of the respondents answered that they do not find any disadvantage in the online learning system and did not answer this question.

To the question, "*Would it be useful for online learning to remain part of educational practice?",* 94.4% of respondents answered that it would be useful for online learning to remain part of educational practice after face-to-face return, and only 5.6% answered that it would not be useful. In this respect, respondents were asked to give reasons for their choice, and those who answered yes, overwhelmingly repeated the points made under the advantages of online learning, while the proportion of those who answered no was quite small and almost insignificant. From the total number of respondents' answers, we have selected a few answers that reinforce the relevance of online education: even if we came back face to face, the online environment should be frunctified more, especially in terms of posting teaching materials/lessons, lectures and seminars; lectures can be recorded and saved on a platform where they can be accessed at any time, especially by students who did not make it to class for various reasons; lectures should be held online because we understand, see and hear much better when each of us has them in front of our eyes, than when they are posted on the screen, and everyone's position is different from the blackboard/screen; it is useful that online learning remains part of educational practice, as it is an evolved, modern, current and future-proof way of learning and training on the professional side and reduces downtime, breaks, windows, commuting to college; face-to-face activities are much more tiring and demanding; time is the biggest advantage, it reduces pollution, it reduces costs, there are students with certain problems to whom the online system brings benefits; online learning could remain an alternative for those who cannot reach physically; it is efficient for those who do not live in Bucharest because they do not have to pay rent, transport, meals, etc. ; it creates an advantage for those who have a job; since we don't have practical subjects, I think it would be advisable to do online; online activities have taught us to look for information on our own, whoever wants to learn can learn in any learning system, be it physical or online; online learning gives us freedom and the possibility to take responsibility; it helps us to acquire digital skills; it is effective in crisis situations; online learning is revolutionary and much more effective than traditional learning; it is a step forward

on the ladder of evolution in education; because materials are electronic, students pay more attention to what the teacher is explaining and do not waste time on notes; it allows us to access information from anywhere; I prefer to keep classes online because it is much easier for me to hear the teacher, to see on the screen and to shere screen so I can view when I want; it is effective in crisis situations and for this reason it would be desirable not to abandon this system for good.

The last question was to propose solutions to improve the teaching/learning/ assessment system, and respondents indicated the following: educational activity to be kept online, or in the best case hybrid, online courses and physical seminars; a friendlier and more accommodating attitude of teachers toward students; interactive and more practical lessons; recording lessons and putting them on the online platform ase.ro and not to abandon this practice; further posting of materials; the problem would be solved if we had online lectures and seminars and physical exams, I think it would increase the level of engagement and seriousness; experiential learning by creating interactive and engaging/interesting materials as well as learning through case studies, assessment through quizzes; focus on the ability to work with an information, not on the ability to memorize and render; I prefer the online mode of assessment as I am a more panicky nature and it was much better for me to take exams in a relaxed and enjoyable environment; teachers to speak in a way that everyone understands and use accessible language; exam topics to be in line with the difficulty of the exercises worked on in class; face-to-face classes with the possibility for those who cannot get face-to-face to enter either online or for lectures/seminars or lectures to be recorded etc. A significant proportion of respondents supported the return to the online system considering it to be an advantage from all points of view, hearing, seeing, understanding, repetition, etc.

6. Conclusions

With economic development, people have been satisfying their needs at an increasingly high level, both in terms of quantity and quality, and in this respect, in recent decades, an important role in increasing efficiency and economic performance has been played by digital technology, which combines the process of digitisation with that of digitalisation. The integration of digital technology into business has given a positive impetus to competitiveness and quick access to a range of databases and information, and the digitisation process improves work efficiency and productivity and provides better insight for decision-making.

Romania faces a paradox, it has the best internet connection in the world, a competitive software industry, it is close to the European average in terms of high-speed broadband and 4G and 5G coverage, but it is at the bottom of the EU ranking in terms of DESI, so of the four DESI factors, only connectivity ranks 10th, while human capital ranks 26th, digital technology integration ranks 25th, and digital public services ranks last.

Digitisation is an important step of the present moment, but it does not solve all the problems, especially in the education system. The sudden shift from face-to-

face to online system has forced us to adapt to new learning/teaching and assessment methods and techniques, which we initially found quite difficult to accept, and now, two years later, we are thinking about whether this system should be integrated into the classical educational system, as it could benefit both sides, students/pupils, and teachers.

We conducted a questionnaire on a sample of 269 respondents, most of whom are students in the full-time undergraduate program at the Academy of Economic Studies in Bucharest, aged between 18 and 24 years, predominantly female, and 70% of whom lived in urban areas during the pandemic. The aim of this questionnaire was to identify the following aspects: What were the most important issues they faced in the period March 2020 - March 2022 in terms of educational activities (teaching/assessment) carried out online; what were the most important aspects that helped them in the online teaching/learning/assessment process; what applications they used during the pandemic period and how much it helped them in this process; to identify the advantages and disadvantages of the online educational process; to appreciate and place the teaching activities carried out online in the current context; to make proposals and recommendations in order to make the teaching/learning/assessment process more efficient.

During the pandemic period (March 2020 - March 2022), students faced problems related to attention, motivation, time management, communication, anxiety, depression, stress, and less problems related to digital skills and internet connection, which shows us once again the high degree of connectivity in Romania and the ability of the new generations to access and use technology. What helped them during the pandemic period were the course materials and seminars posted on the ase.ro platform, the explanations and guidance of teachers, the applications and case studies solved together with teachers on the zoom platform, the teachers' recommendations in terms of viewing tutorials and audio and video materials online, the tests given during the semester as well as checking homework, etc. The online platform.ase.ro was used in a proportion of 91.8%, being appreciated as easy to use and accessible both in the teaching and assessment process.

The students saw several advantages and a few disadvantages of conducting teaching activities online, with 94.4% saying that it would be useful for online learning to remain part of educational practice. Working online brings a number of advantages, lower costs in terms of accommodation, food, clothing, transport, but also ensuring some comfort and safety. Obviously, they also found strengths of the face-to-face system, and these relate to the interpersonal side, communication, socialising, understanding, focusing, attention, and concentration.

The proposal is to maintain a hybrid system, where courses are held online and seminars are held face-to-face, with the possibility for those who have health problems to come online or both courses and seminars are held both physically and online, so that those who cannot come physically for various reasons can connect online. The online platform.ase.ro is an important source of transmission of teaching materials and testing/assessment along the way, and it would be advisable to exploit it, improve it, and why not direct it towards a digital era.

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Urban Green Infrastructure, Ecosystem Services and Challenges for Universities to Respond to the Needs of Society

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Abstract

Universities are more and more interested in responding to the society's needs and contributing to the sustainable development of cities. The COVID-19 pandemic challenges universities to innovate and develop more adaptive educational practices. The green urban infrastructure is designed and implemented to improve sustainability and reduce vulnerability to natural hazards. It is increasingly advocated as a win-win solution for nature and human communities. The biophysical structure of the green infrastructure generates ecological processes and functions that humans can appropriate as ecosystem services that contribute to human well-being. This paper aims to assess the students' perception of the current state and problems faced by the green infrastructure in Bucharest, the students' willingness to get involved in volunteer and service-learning activities, and their knowledge of the ecosystem services concept. We applied face-to-face questionnaires. As hypothesized, students' perceptions and knowledge of the current state and threats to the urban green infrastructure and ecosystem services depend on their professional background. However, more than 94% of the respondents consider that the current number of green spaces in Bucharest is insufficient. Even more of them (97%) believe that the level of protection of urban green spaces is inadequate. More than three-quarters of those involved in research are interested in participating in volunteer and service-learning activities. Our results could inform the university's decision-makers and stimulate innovation by allowing students to develop a deeper understanding of environmental issues, engage in problem-solving, and make informed and responsible decisions. It is for the benefit of civic universities, students, and communities alike.

Keywords: perceptions, students, civic engagement, universities, urban green infrastructure, ecosystem services.

JEL Classification: I23.

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1. Introduction

The Ecosystem Services (ESs) framework has enabled the broader public to acknowledge the benefits that nature provides to humans (Felipe-Lucia et al., 2015). According to the Common International Classification of Ecosystem Services – CICES (Haines-Young, Potschin, 2012), these include tangible or material benefits such as provisioning services (e.g., food, raw materials) and intangible benefits such as cultural services (e.g., recreation, environmental education and aesthetic enjoyment), regulating and supporting services (e.g., climate regulation, habitat provision, and soil formation). ESs have become essential for decision-making, their assessment being a support tool for urban and landscape planning to improve the quality of life (Cheng et al., 2019).

The green spaces within and around cities designed by humans or fragments of once natural-origin ecosystems, compact or discontinuous, accessible to the public or not, with or without active management, projected for recreational use or not and regardless of a specific spatial scale, are all considered urban green spaces (Swanwick et al., 2003) or urban green infrastructure – UGI (Tzoulas et al., 2007). These can be fragments of rivers crossing a city, wetlands, forests, cemeteries, gardens, parks and play areas, green roofs and walls, linear trees, shrubs or herbs around railways, and roads (Wolch et al., 2014). They can consist of various species of vegetation and have different connectivity to one another or different types of legal protection – i.e., urban protected vs. unprotected areas (Wolch et al., 2014). UGI provides a suite of ESs that are widely recognized as critical to health, well-being, and sustainability on an urbanizing planet (du Toit et al., 2018): microclimate regulation, mitigation of the urban heat island, increased air quality (Martins, 2022). UGIs represent biodiversity hotspots in cities (Attila et al., 2021) and participate in the carbon storage process (Davies et al., 2011).

A stakeholder can be defined as a "group or individual who can benefit from the ESs provision" (Haines-Young, Potschin, 2012). The involvement of stakeholders (e.g., representatives of locally affected communities, national or local government authorities, politicians, civil society organizations, and businesses) in the process of identifying the ESs provided by natural capital is an essential condition for effective governance (Felipe-Lucia et al., 2015). However, there are few specialized works in which the students are involved as beneficiaries of the ESs delivered by UGI (Lungu, Rîșnoveanu, 2021).

The societal protective measures taken during the COVID-19 pandemic were highly effective in preventing the spread of the virus (Brauner et al., 2021). However, concerning mental and physical health, social distancing posed significant risks to people of all age groups (Flanagan et al., 2021; Lades et al., 2020). These measures could have fundamentally changed the relationship between people and UGI regarding the use and perception of ESs they provide (Ugolini et al., 2020). In this context, UGI offered specific ESs for human well-being, such as the possibility of carrying out recreational and sports activities, aesthetic benefits, and growing food (Lehberger et al., 2021; Ugolini et al., 2020). A survey developed between April and July 2020 (Robinson et al., 2021) reported that more than 90% of the respondents

increased the period spent visiting UGI, such as gardens (48%), woodlands (14%), and urban parks (11%).

Previous studies have focused on the relationship between green spaces and the academic benefit of students showing a positive effect of UGI on their well-being and academic performance (Collins et al., 2022). University students are considered a vulnerable group as a matter of mental and physical health both before (Holm-Hadulla, Koutsoukou-Argyraki, 2015; Kousis et al., 2020) and during (Browning et al., 2021) the COVID-19 pandemic.

Service-learning involves university initiatives designed to engage students in community learning and service activities as part of their regular coursework (Martin et al., 2005). Successful university-community partnerships acknowledge and incorporate the participatory efforts of the various stakeholders (Lasker et al., 2001; Martin et al., 2005).

2. Problem Statement

In recent decades and especially during the COVID-19 pandemic, people changed their exposure patterns to nature, valuing the UGI more. Universities have a social responsibility to improve the well-being of society (Dhakal, Chevalier, 2017). They may offer research opportunities and courses on UGI and its ESs (Dhakal, Chevalier, 2017), can partner with various institutions in order to train communities (Rîșnoveanu et al., 2021), advise more efficiently the policymakers (Poole, 1997) and have more initiatives on campus greening (Sima et al., 2019).

Students represent a particular category of stakeholders who can ensure the connection between the academic environment, society, decision-makers, and other stakeholders (Poole, 1997), being valuable providers of information and solutions. However, students are rarely involved in the identification and mapping of ESs (Lungu, Rîșnoveanu, 2021). Despite recognizing the role that UGI plays in cities, there is not enough awareness of ESs among stakeholders. We hypothesized that students' perceptions and knowledge of the current state and threats to the UGI and ESs relate to their professional background. Understanding patterns of perception among students with different academic backgrounds helps universities identify practical opportunities and challenges for students to apply practically the theoretical knowledge and increase their professional capacity, stimulate critical thinking, and develop skills and competencies for the benefit of civic universities, students, and communities alike.

3. Aims of the Research

The aims of our research were: i) to assess the students' perception of the current state and problems faced by the UGI in Bucharest; ii) to assess the students' willingness to get involved in volunteer and service-learning activities; iii) to assess the students' knowledge of the ESs concept.

4. Research Methods

During the COVID-19 pandemic, from 22 to 25 November 2021, within the CIVIS initiative, we were able to carry out a series of online workshops and use Google forms to apply questionnaires (for questions, see Table 1) to assess the students' perception and knowledge of the current state and threats to the UGI of Bucharest and the ESs it provides. We promoted the research through social networks of student associations and professors involved in CIVIS OpenLab initiatives. The involvement of students was voluntary, and without any restriction.

Table 1. Questions asked in the student questionnaire

No.	Question	Potential answers
1	Do you consider that more green zones are needed in/around Bucharest?	1-high need, 2-average need, 3-not a need
2	Do you think that better protection of green urban zones is needed?	1-high need, 2-average need, 3-not a need
3	Which of the following problems do you think Bucharest is facing? a) The development of road infrastructure b) Development of the real estate industry c) Climate change d) Exploitation of natural resources e) Intensive tourism f) The air pollution g) Economic activities h) The ambiguous legislative framework regarding UGI i) Non-prioritization of the social role of UGI j) Waste disposal k) The disinterest of decision-makers l) Lack of infrastructure for visiting green zones (in the case of larger green zones) m) Inadequate zonally urban planning plans n) The disinterest of the citizens o) Lack of awareness of ecosystem services p) Inconsistent application of the law q) Invasive species	1-high risk, 2-average, 3-not a problem
4	Are there other issues that Bucharest faces that have not been mentioned before?	Open question
5	Are you willing to get involved in volunteer and service-learning activities?	Yes/No
6	Do you know the concept of "ecosystem service"?	Yes/No
7	How would you define ecosystem services?	Open question

Source: Authors' own research.

Although most of the students participating in the workshops are not permanent residents of Bucharest, they benefit from the ESs offered by the UGI throughout the academic year, when they spend most of their time in the city. The research involved 174 students from six faculties of the University of Bucharest (Business and Administration, Biology, Geography, Psychology, Letters, Sociology, and Social Assistance).

To account for the different perceptions related to students' academic background, we grouped the students into four groups: life sciences (biology, ecology, geography), business and administration, social sciences (sociology, psychology, pedagogy), and philology (letters). We applied face-to-face questionnaires during four online workshops (one for each group), which included both closed and open questions. For each closed question (e.g., questions 1-3 in Table 1), students were asked to allocate weights from 1 (very important) to 3 (the least or not important).

Also, we assess the students' willingness to get involved in volunteer and service-learning activities. Considering the need to make operational the ecosystem services concept and its role in feeding the decision support system by translating complex functions and processes of ecosystems into indicators for urban planning and governance, we test how familiar the students are with this concept.

5. Findings

Our research involved 140 women and 34 men between 18 and +36 years old. Most of them (87%) are 18-25 years old. A large proportion (85%) consists of undergraduate students. Only 5% are Ph.D. students. Students' perceptions, desire to engage in volunteer activities, and their knowledge of UES do not differ by genus, age, or level of studies.

5.1 The Students' Perception of the Current State of UGI and the Problems It Faces in Bucharest

More than 94% of the respondents consider that the current number of green spaces in Bucharest is insufficient. Even more of them (98%) believe that the level of protection for UGI is inadequate and needs to be improved. These results are consistent with Badiu et al., 2016, who revealed that in the largest cities in Romania (including Bucharest), the surface of UGI is 16.82 m2 per capita, 97.36% of them providing fewer green surfaces compared to national legislation.

The great majority of students consider that Bucharest faces all the issues listed under question no. 3 in Table 1. Among the issues perceived to pose a high risk to the city's development, the disinterest of decision-makers accounts for the highest score (85.71% of students in philology) and the invasive species the lowest (19.04% and 22.2% of students in philology and social sciences, respectively). There is an agreement among students in all four groups (more than 70% of respondents) that the disinterest of both decision-makers and citizens and inadequate waste disposal pose urban green spaces at high risk. The highest proportion of students in life

sciences and business and administration (more than 65%) perceive the lack of awareness of ESs and inconsistent application of the law as being issues of high importance the UGI faces. Students in life sciences and philology (more than 70%) point to the development of the real estate industry, and those in business and administration and philology (>75%) to air pollution. Students in business and administration (>65%) also allocate high weights to non-prioritization of the social role of UGI in urban planning and lack of infrastructure for visitation, and those in philology (>66%) to the exploitation of natural resources.

Students identify some supplementary issues, apart from those in Table 1. Among them, it is worth mentioning the following: lack of environmental education and limited awareness of the ESs provided by UGI (students in life sciences, business and administration), noise pollution (students in business and administration, social sciences), insufficient parking places that end up in the use of UGI for cars parking (all groups) and decrease in quality of life (students in life sciences and philology), incoherent management of synanthropic species and lack of landscape planning especially in the marginal districts (students in life sciences), too few places to spend time outdoors with kids (students in business and administration), and lack or insufficient infrastructure within UGI – e.g., toilets (students in philology).

5.2 The Students' Willingness to Involve in Civic Engagement Activities

The CIVIS initiative, a European civic universities alliance, encourages and promotes the activities that allow students' civic engagement by carrying out projects and workshops. Our results show a high interest of the students at the University of Bucharest in actively participating in the current problems of society related to the UGI through volunteer or service-learning activities. The highest interest was expressed by students in life sciences and philology (96%) and the lowest by students in social sciences (73%).

5.3 The Students' Knowledge of the ESs Concept

Less than half (48.6%) of attendees consider themselves familiar with the ESs concept. Most of them (56.5%) have a background in life sciences (biology, ecology, geography) – Figure 1. On average, more than 50% of the respondents consider ESs to be the benefits that humans receive from nature (Figure 2). While a greater proportion of students in life sciences (65%) and philology (74%) perceive ESs as benefits offered by nature, a significant proportion of students with training in social sciences (19%) and in business and administration (22%) point to the decisive role of ESs for human well-being. Between 11 and 14% of the respondents know that UGI provides direct and indirect, tangible and intangible services, excepting students in philology (Figure 2). Only one student with a background in life sciences associates ESs with the functions and processes in natural systems. Another highlights the importance of the concept in assisting the decision-making process.

About 28% of those familiar with the concept could not define it accurately – Figure 2. Among the most common mistakes, we mention the attribution of the

provision of ESs to human socio-economic systems or the consideration of ESs as actions of conservation and protection of nature.

Figure 1. Percentage of students who declare they are familiar with the ESs concept
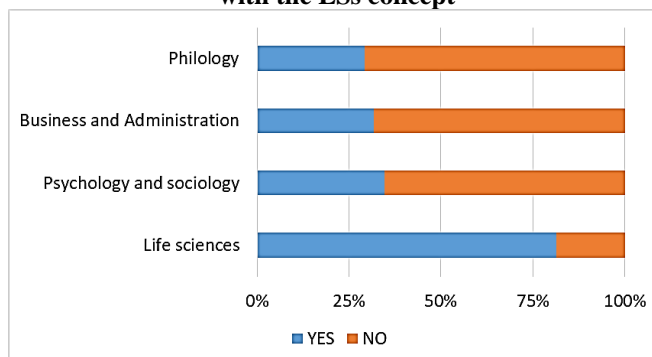
Source: Authors' own research.

To define the concept of ESs, students used phrases such as: "care and cleaning of the environment", "help regulate green spaces", "protect ecosystems", "benefits for natural or artificial ecosystems", "which refers to ecology ", "representing human activities necessary for the maintenance of a clean environment", "all the components of nature and its components", "the place where different species live", "several elements correlated in nature", "the goods provided to the environment that helps to improve it with human help", "systems that bring us benefits", "services that take place within an ecosystem", "the benefits that human communities obtain from the ecosystems that exploit them" and even "services that keep track of green spaces and contribute to certain economic sectors, such as forestry, tourism and agriculture".

Figure 2. Students' knowledge of the ESs concept. Keywords of the concept of ESs mentioned by students with an academic background in life sciences, business and administration, social sciences and philology
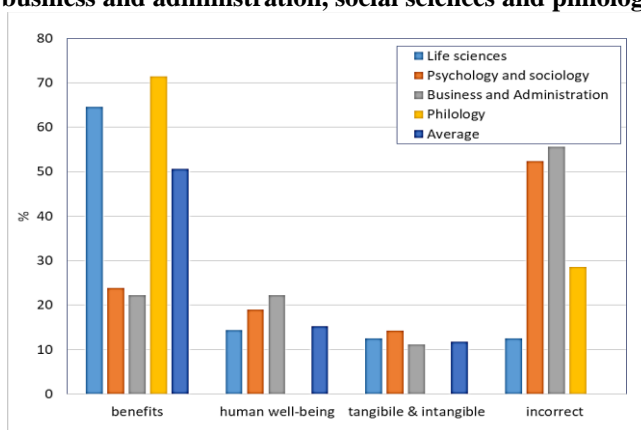
Source: Authors' own research.

6. Conclusions

Urbanization creates a range of environmental, social, and economic challenges. Despite the small sample size, our research shows that students' knowledge of UES and their perception of the importance of UGI are related to their academic backgrounds. It demonstrates a need for a deeper understanding of environmental issues to increase the professional capacity of students and broaden their skills and competencies for the benefit of civic universities, students, and communities alike.

Although the desire to get involved in volunteer activities is encouraging, the different challenges students face and the need for enhanced knowledge require more innovation in academia. Informal training, service-learning activities in mixed groups with students from different faculties and fields of study, and engagement through the OpenLab initiative could be among the solutions universities can promote to give students opportunities to practically apply the theoretical knowledge and engage in problem-solving activities. Universities could better use information and communication technologies and develop interactive web interfaces to encourage open participation and barrier-free access to information. Thus, they open the opportunity for citizen science, which is undervalued in the region.

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Identification of Gaps and Barriers in Building Renovations through a Targeted Survey to Professionals of the Built Environment to Upgrade the Quality of Building Stock and Mitigate Climate Change

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Abstract

Deep energy renovations (DER) in buildings are now required to satisfy the European Union's low carbon emission efficiency standards in order to confront the climate crisis and boost the economic recovery of Europe after the pandemic outbreak. With annual energy renovation rates expected to double in the next 10 years, the building sector is expected to make a substantial change to achieve high energy efficiency goals by 2050. The construction sector and building experts are urged to upskill their workforce. This implies both meeting the targets and learning to use innovative approaches and technological solutions to ensure high-quality construction and to increase the energy performance of buildings. However, there are aspects that prevent the implementation of DER to a large extent. The aim of this research is to identify gaps and barriers for energy efficiency implementation methods in Greece and Cyprus through a targeted survey for building experts related to technical, financial, and policy issues that may pose challenges to further boost building renovations. The first results revealed that limited access to funding, poor legislative frameworks for renovations, and poor expertise of professionals in the renovation market are among the constraints that delay the renovation wave's propagation. Based on the findings, recommendations are provided for the development of qualitative university training courses as a means of upgrading existing knowledge and paving the way towards a sustainable, energy efficient, and decarbonized European building stock.

Keywords: buildings, renovations, barriers, technical survey, professionals.

JEL Classification: I25, J24, K32, L74, O18.

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1. Introduction

The construction industry is a major energy user worldwide. Buildings, in particular, account for 16-50% of total global energy consumption (Saidur et al., 2007), with buildings accounting for 40% of Europe's energy use (European Parliament and Council, 2012). As a result, upgrading older buildings offers tremendous opportunities to reduce energy usage and greenhouse gas emissions.

Building rehabilitation is becoming increasingly important in nations across Europe. One cause for this is an aging construction stock. Another factor is the requirement for more ecologically efficient buildings that reduce energy usage and greenhouse gas emissions in order to prevent the damaging climatic effect. At the same time, many structures must be upgraded to improve the quality of life – social sustainability, for example, by improving indoor climate – and to raise efficiency in the building process to provide cheap housing – economic sustainability.

Deep building renovations are now necessary to meet the European Union's high-energy and low-carbon emission efficiency criteria, as well as to help Europe's economic recovery following the pandemic epidemic. The European Commission (EC) communicated the policy "A Renovation Wave for Europe – Greening our Buildings, Creating Jobs, and Improving Lives" in 2020 to achieve this dual goal of increased energy efficiency and economic growth. According to this, EC intends to double annual energy renovation rates over the next ten years. These upgrades in the building stock will not only help Europe fulfill its decarbonization ambition, but will also improve the quality of life for those who live in and use the buildings, as well as create a large number of new green employment in the construction sector.

To reach decarbonisation targets, the deployment of Nearly Zero-Energy Buildings (NZEB) refurbishment packages in Europe must be hastened. To achieve this goal, the way buildings are being renovated must be improved (Jensen et al., 2018), boosting both the rate and depth of renovations (Artola et al., 2016). To achieve this goal, a good remodelling strategy aimed at zero-energy buildings that balance a lower energy demand against locally generated power is required.

Despite several good attempts to increase the energy performance of Europe's building portfolio, it is evident that a slew of impediments is significantly restricting full potential. This underperformance is due to a combination of obstacles. There are several classifications for obstacles, and they have been defined in numerous ways over the years. The BPIE 2011 survey found four major kinds of impediments that have a specific impact on existing buildings: 1) Financial, 2) Institutional and administrative, 3) Awareness, guidance, and skills, and 4) Spending and benefit separation.

There are several impediments to knowledge, information, and technical skills. Without a question, accurate and timely information is critical for the market to function properly. Ambitious renovations are a huge choice that can only be successful if the correct energy advice to take action is accessible, the energy efficiency service sectors are capable of providing such measures, and finally, adequate customer satisfaction levels can be ensured.

To meet these challenges and opportunities, the National & Kapodistrian University of Athens (NKUA) joins forces with Hellenic Passive House Institute (HPHI), Cyprus Energy Agency (CEA), and Da-Di-Werk municipal enterprise in Darmstadt – Dieburg, Germany, in the UPGREAT project. The UPGREAT project aims to create the necessary conditions for the minimization of the performance gap between design and construction phase, especially in school buildings in Greece and Cyprus. UPGREAT proposes the development, application and dissemination of a Total Training Toolkit – an educational package- which comprises of three different training programs. One for institutions of higher education, one for vocational high schools, and one for lifelong training for professionals coming both from public and private sector. The overall capacity development in UPGREAT includes the upgrade of knowledge and experience on energy efficiency measures & circularity processes in school renovations, the enhancement of competence between engineers, architects, and building experts, and the strengthening of national and international interaction between target groups.

2. Problem Statement

Much research has been conducted to investigate the obstacles to building retrofit adoption. Bjørneboe, Svendsen, and Heller (2018) found three major barriers: information, financing, and procedure. Davies and Osmani (2011) identified four major barriers: 1) financial and economic problems, 2) design and technological challenges, 3) regulatory challenges, and 4) environmental and cultural issues. Tuominen et al. (2012) classified building retrofit hurdles into four categories: regulatory, organizational and decision-making, financial, and information, promotion, and education. Building retrofit hurdles were categorized by Baek and Park (2012b) into four categories: 1) lack of knowledge of energy performance, 2) financial reasons, 3) insufficient information, and 4) lack of regulatory mechanisms. Bertone et al. (2016) classified the obstacles as follows: 1) knowledge barriers, 2) regulatory hurdles, 3) financial barriers, and 4) modeling issues. The primary impediments to public building retrofit, according to Alam et al. (2019), include a lack of political will, finance mechanisms, department/agency expertise, industry competency, quality assurance, and misaligned incentives. Seven major bottleneck types have been identified by Konstantinou et al. (2021) which are the following: (1) a lack of knowledge; (2) ambiguous definitions; (3) normative and compliance issues; (4) coordination and communication; (5) duties and assurances; (6) untrustworthy assessments; and (7) technological obstacles. As can be seen, barriers can be classified in a variety of ways, although most research highlights three types of barriers: administrative, financial, and knowledge/information.

Furthermore, numerous EU initiatives (i.e., 4RinEU, P2ENDURE, Pro-GET-OnE, and MORE-CONNECT) have addressed the primary challenges to comprehensive renovation in recent years by looking for creative technology solutions to overcome the restrictions existing in the energy requalification market. We categorize the major impediments discovered during extensive refurbishment

activities into the following macro-groups: Technical impediments; financial impediments; and social impediments (D'Oca et al., 2018).

3. Research Questions / Aims of the Research

The primary purpose of this study is to address the most significant bottlenecks in order to improve renovation efficiency by conducting an experts' survey in Greece and Cyprus. The goal is to identify the prominent barriers for financing building energy renovations, the most important policy gaps for the applicability of energy efficiency policies, the difficulties that were hard to overcome in deep energy renovation (DER) projects and the drivers that may boost the DER projects in both countries, which can then be utilized to enhance the workflow between all players.

4. Research Methods

In order to identify the barriers for energy efficiency implementation methods, a targeted survey for building experts related to technical, financial, and policy issues that may pose challenges to further boost building renovations and the achievement of high quality retrofits was developed. An online version of the questionnaire survey was created on LimeSurvey in Greek and English and was distributed between April and May 2022. The questionnaire was disseminated to participants through emails and social media and it was targeted to blue & white collar professionals (technicians, installers, architects and engineers and other building experts) responsible for the design and implementation of deep energy renovation measures. This purposeful sampling technique was used to identify information-rich cases for the most effective use of limited resources. Out of the 94 participants who opened the survey, 72 responses were considered as valid, with the vast majority of them (61) being from Greece. The questionnaire includes multiple- and single-choice questions. In the first type of close-ended questions, participants were offered a set of answers they have to choose from, while in the second type, respondents can choose one option. Finally, the answers were collected online, and afterward they were coded, quantified, and analyzed using the statistical computer-based programs Microsoft Excel and IBM SPSS. For the derivation of the results, a quantitative analysis that involves bar charts and percentages was used.

5. Findings

In the following paragraphs, a comparison of the main findings of this work between Greece and Cyprus is presented. The gaps in energy efficiency policies are presented in Figure 1, the financial barriers to implement deep energy renovations in buildings are shown in Figure 2, while the particular difficulties that were hard to overcome in deep energy renovation projects and the drivers that may boost DER are illustrated in Figure 3 and Figure 4 respectively.

5.1 Gaps in Energy Efficiency Policies

In Greece, "Poor national legislative framework for renovation of existing buildings" was considered as the most important gap in energy efficiency policies, selected by the 34% of the participants. Eighteen percent (18%) of those surveyed stated that the "inadequate adaptation of Energy Efficiency (EE) policies" is the most important policy gap, while another 12% regard the lack of communication actions on the benefits of energy efficiency and lack of training as the most important policy gap. In Cyprus, the options "Poor overall ambition of the EE policies", "No monitoring of the implementation of the legislation", "Inadequate renewable energy legislation" and "lack of voluntary national DER standards for renovating existing buildings" was equally selected by the 20% of those surveyed.

Figure 1. Most important policy gaps for the applicability of energy efficiency policies
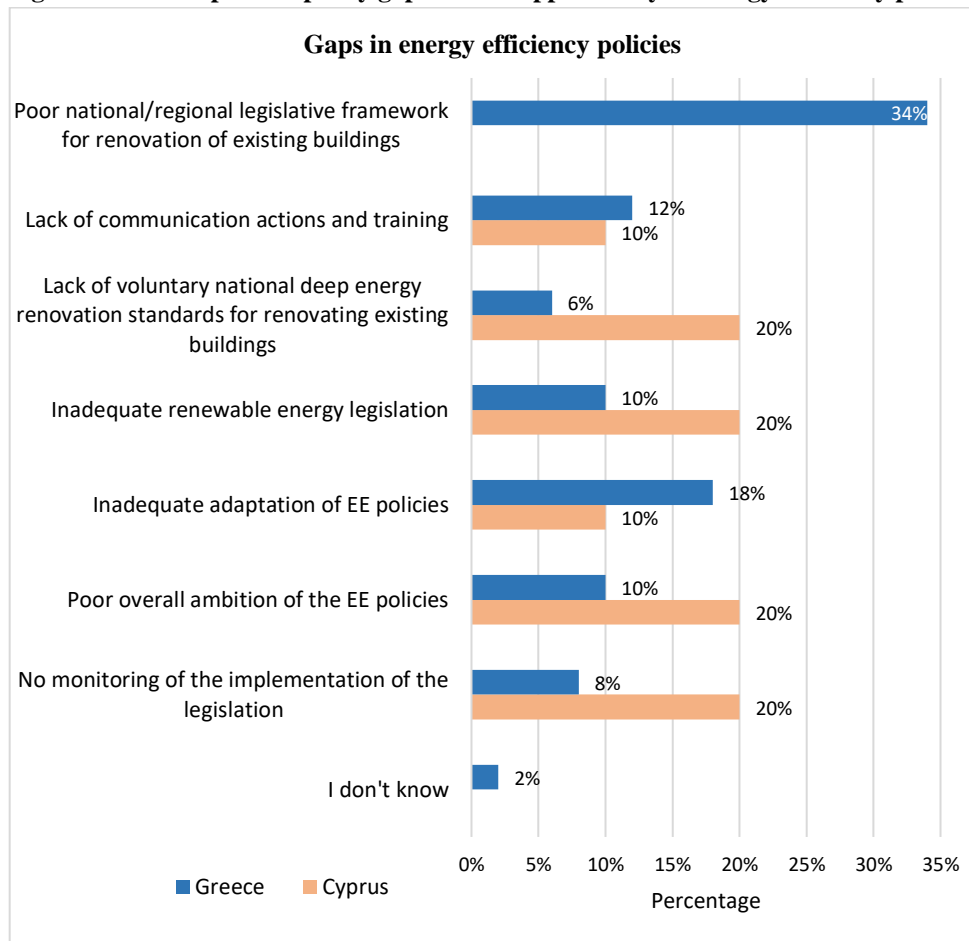
Source: Authors' own contribution.

5.2 Financial Barriers

With regard to the financial barriers (Figure 2) that pose a challenge for DER, the top 3 prominent barriers for financing building energy renovations are the same for Cyprus and Greece. "Lack of funds or access to finance" is regarded as the most important financial barrier in Greece, selected by the 36% of those answered while in Cyprus this option was chosen by the 20% of those surveyed. "Poor financial incentives" was selected by the 34% and 20% of the Greek and Cypriot respondents, respectively, while "High capital costs and financial risks" was chosen by the 20% of Cypriot respondents and 11% of the Greek participants.

Figure 2. Prominent barriers for financing building energy renovations
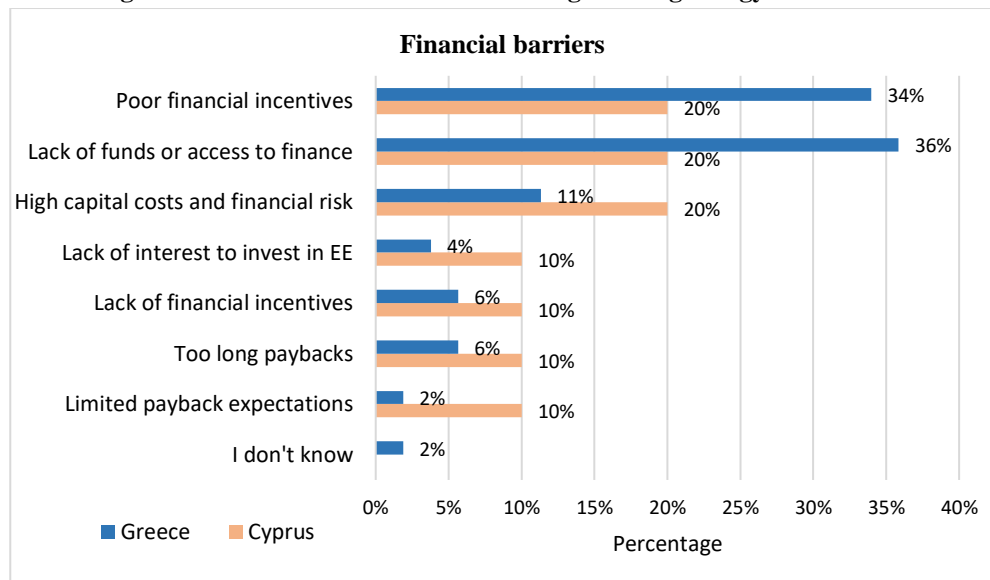
Source: Authors' own contribution.

5.3 Difficulties in DER Projects

When it comes to the particular difficulties that were hard to overcome in the DER projects (Figure 3), the Cypriot respondents equally selected "Legislation restrictions" (22%) and "Finding skilled actors" (22%) as their main difficulties faced during der projects. For Greek respondents, technical issues in the "construction" (15%) and in the "design" (15%) phase followed by "legislation restrictions" (14%) were stated as the most frequent hard to overcome difficulties in der projects. Interestingly, in both countries, a high share (22% Cyprus, 24% Greece) did not know about such difficulties.

**Figure 3. Particular difficulties that were hard to overcome
in deep energy renovation projects. A comparison for Cyprus and Greece**
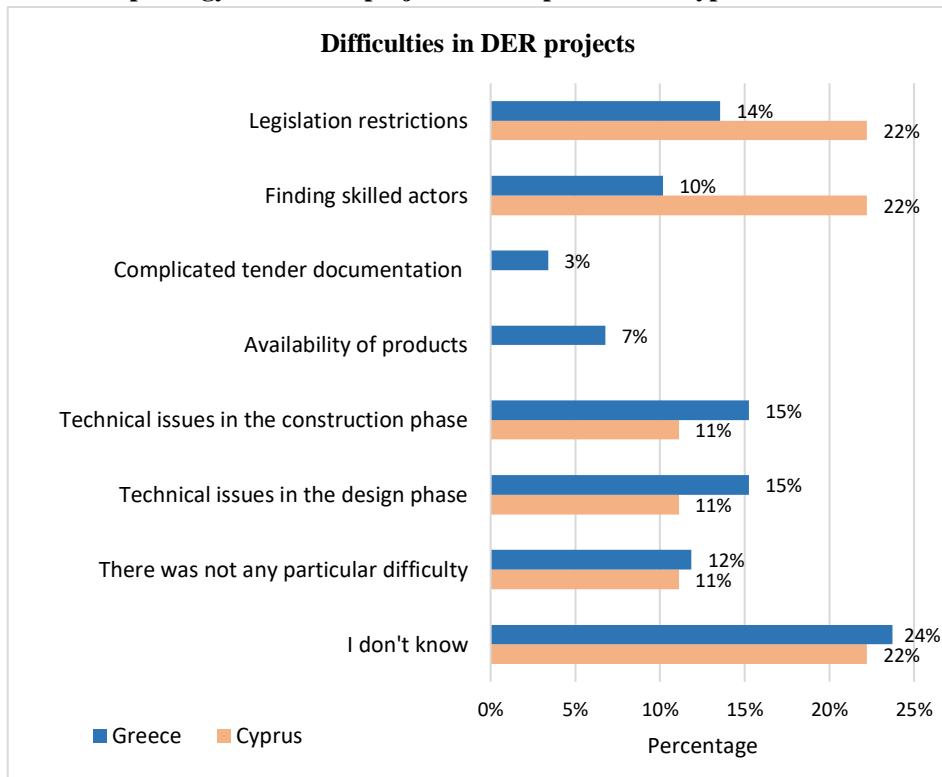
Source: Authors' own contribution.

5.4 Drivers to Boost DER

Finally, the drivers that may boost DER projects were examined. In both countries, the vast majority of respondents (82% Cyprus, 77% Greece) highlighted that "improved financing solutions" may boost the deep energy retrofits in buildings. Forty-five percent (45%) of the Cypriot respondents, stated that "Upgrading the skills of professionals" involved in der would boost deep energy renovation projects whereas another 45% regarded the raise of societal awareness on DERs as a mean to increase support and therefore boost deep energy retrofits as an important factor. In Greece, 48% of the respondents answered that consultancy and training would be a tool to boost deep energy renovations in the country, followed by a 46% of those surveyed that regard "clear technical guidelines on DERs" as an effective tool that could boost the deep energy renovation projects.

**Figure 4. Drivers that may boost the deep energy renovation projects.
A comparison between Cyprus and Greece**
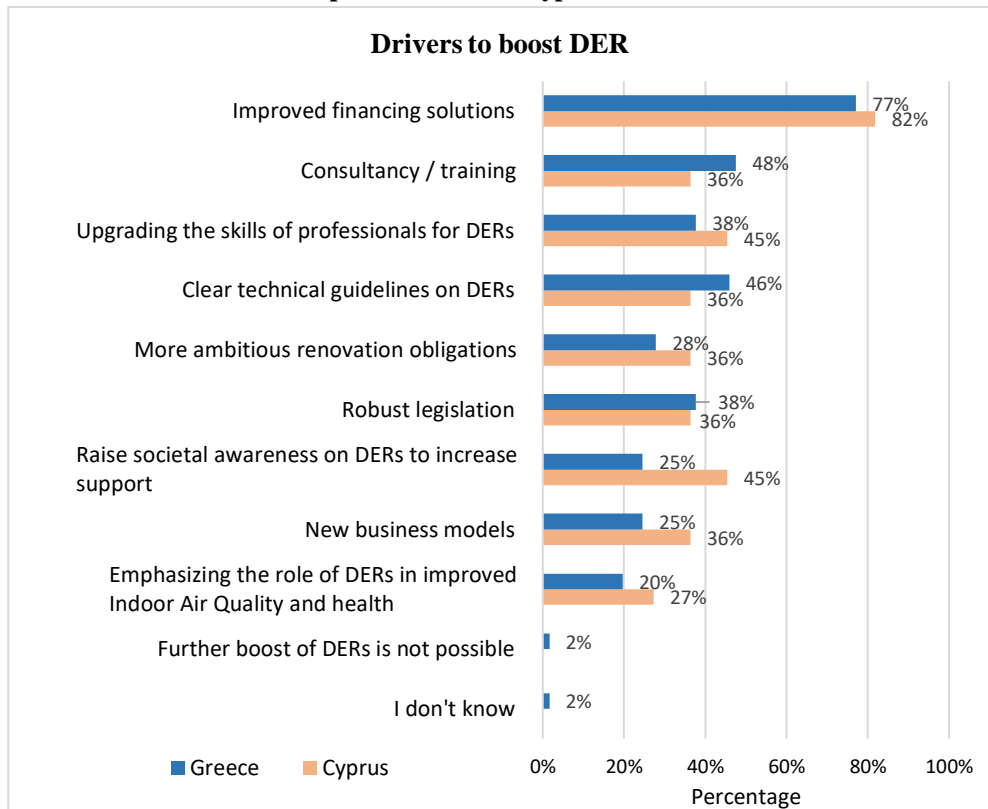
Source: Authors' own contribution.

6. Conclusions

The findings of the assessment of the survey results in Greece and Cyprus indicated that a percentage of 22% in Cyprus finds that legislation restrictions and a lack of skilled actors prevail in the difficulties faced in DER projects. In Greece 15% indicate technical issues in the design and construction phase as the main difficulty faced, while a significant percentage of 22% approximately in both countries has no opinion on the issue. Economic and financial barriers also play an important role in DER projects (40% in Cyprus and 51% in Greece). Concerning the drivers that may boost the deep energy renovation projects, the results show improved financial solutions by 80% approximately. Consultancy & training, upgrading the skills of professionals and clear technical guidelines for DERs are considered main drivers to boost deer energy renovations. An important policy gap for the applicability of energy efficiency policies is the poor national/regional legislative framework for renovation of existing buildings in Greece by 34%, while in Cyprus the gaps are related to lack of voluntary national DER standards, inadequate renewable energy legislation, poor overall ambition of the EE policies, and no monitoring of the

implementation of legislation (20%). Concerning financial barriers, the most prominent are the poor financial incentives, lack of funds, and high capital cost and financial risks in both countries.

The results presented in this study were collected while the survey was still ongoing, and thus they should be considered as an initial depiction of a broader picture. Due to the small sample size, a factor that limits generalizability, the results should not be considered either representative or sufficient of the entire building professionals' universe but as indicative, and so they should be used with caution. The present work will be extended to add further data, thus becoming more representative of the building professionals' population in each country.

The survey methodology for assessing the experience of building experts in DER projects in order to identify gaps and barriers in energy efficiency implementation is the first level toward the UPGREATs project scope which is the development, application and dissemination of a Total Training Toolkit – an educational package– through capacity building actions for different target groups involved with energy renovations in buildings. However, these first results provide an indication that training and upgrading the skills of professionals are a main driver in upgrading the existing building stock that requires an integrated training methodology.

Within this context, universities can play a key role, firstly by doing cross-disciplinary research to identify the gaps and barriers that prevent the full deployment of deep energy renovations in buildings as a means to boost energy savings and mitigate climate change and secondly by upgrading the skills of the professionals through updated training courses and technical seminars in a lifelong manner. Therefore, the development of qualitative training schemes, the provision of training courses and the upgrade of existing knowledge, the production of reference documents with renovation roadmaps based on real-life examples, the involvement of related stakeholders' groups, as well as the dissemination of information to public authorities and the general public is highly recommended. As a result, universities can become a multi-stakeholder hub that impacts the local, regional, or national economy paving the way for the new European Bauhaus movement, which calls on all of us to imagine and build a sustainable and inclusive society, responding to needs beyond functionality.

Acknowledgment

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How Realistic are ECTS Credits
from the Student's Perspective?

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Abstract

Various Bologna tools have been developed in order to compare higher education systems with each other, to easily understand higher education systems in different countries, and to ensure recognition and transparency in higher education systems. The European Credit Transfer and Accumulation System (ECTS) is one of these tools. This research aimed to investigate whether there was a difference in reaching ECTS credits between university students studying in an accredited program and those in non-accredited programs. For this, students responded to a survey asking how much time they spent in the courses they attended. The data obtained from the survey are ECTS credits according to the students' opinions. The differences are calculated by subtracting these credit values from the ECTS credits in the curriculum. These differences should be close to zero. In non-accredited programs, this difference is statistically different from zero, and the mean is greater than zero. These findings showed that the ECTS credits in the curriculum and the ECTS credits determined according to the students' opinions in non-accredited programs are different from each other and that the student completes the course with a workload less than the workload in the curriculum. On the other hand, there was no difference between the ECTS credits calculated according to the answers of the students studying in accredited programs and the ECTS credits included in the curriculum of these students.

Keywords: accreditation, ECTS, higher education.

JEL Classification: I23.

1. Introduction

The main functions of universities are education, research, and sharing them with society. Significant changes are taking place in the fulfilment of these functions of universities. It is essential to make this change sustainable and comprehend and

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implement the change. For this purpose, states can act together to achieve qualified education.

The Education Ministers of France, Italy, Germany and England put forward the idea of creating a common European Higher Education Area at a meeting they held in the Sorbonne in 1998. The Bologna Process officially started in 1999, with the ministers responsible for higher education from 29 European countries meeting in Bologna and signing the Bologna Declaration to create a common higher education area in Europe. The main goal of this process is to create a European Higher Education Area (EHEA) by 2010. This framework is aimed to expand the mobility of students and lecturers in order to improve the role and effectiveness of Europe in higher education, implement the European Credit Transfer and Accumulation System (ECTS), to create easily understandable and comparable higher education diplomas and/or degrees, and to establish and expand the network of quality assurance systems in higher education.

The European Credit Transfer and Accumulation System (ECTS) is a tool of the European Higher Education Area to make studies and courses more transparent. It helps students move between countries and have their academic qualifications and periods of study abroad recognized. ECTS credits allow courses in one higher education institution to be counted towards a qualification studied at another higher education institution.

There are some problems in determining ECTS credits and student workloads (Karseth, 2006). Lecturers trying to plan with ECTS credits in higher education institutions are often faced with the task of having to assign learning times that are unknown in principle and must be estimated (Garmendia et al., 2008).

In most studies that aimed to determine how much time students take to complete a course, students are surveyed at the end of the course and asked to give an overall estimate of the time they have spent on that topic. The results obtained in these studies are very variable (Kolari et al., 2006). Properly formulated, administered, and processed questionnaires can indeed provide consistent answers (Cohen et al., 2007).

In this study, it was compared whether the workload collected from the students through questionnaires differed from the ECTS credits in the curriculum of the students. In addition, the differences between accredited and non-accredited programs were discussed separately. Thus, the relationship between quality assurance and ECTS credits was also examined. As a result, it has been tried to present a study that can create new ideas and form a basis for the calculation of ECTS credits and quality assurance elements.

1.1 European Credit Transfer and Accumulation System

The European Credit Transfer and Accumulation System (ECTS) is a tool of the European Higher Education Area for making studies and courses more transparent. It helps students to move between countries and to have their academic qualifications and study periods abroad recognised. ECTS supports the planning, implementation, and evaluation of higher education programs. It is an effective and useful tool in the Bologna process, making national education systems internationally comparable.

ECTS credits represent learning based on defined learning outcomes and their associated workload. According to Andrich (2002), there is a strong link between behaviourism and outcomes-based education, and outcomes-based education is the planning and implementation of what is required for all students to successfully do everything in an education system.

There are three methods applied to determine ECTS credits. The first method is the "top-down method", in which the lecturer in charge of the course calculates, based on his individual experience, by estimating how much time the average student should devote to which applications to be successful in the course. The second method; based on the results of the survey applied to the students, is the "bottom-up method" in which the average amount of time allocated to the basic stages of the course is calculated. The third method is to calculate the ECTS credits according to the learning outcomes of the course. According to the literature, these three methods have positive and negative aspects (Lavigne, 2003; Loskovska, 2008).

In this research, it was planned to determine how realistic the ECTS credits are from the students' perspective in a university where the top-down method is generally used. The purpose was to contribute to this gap in the field of higher education by presenting empirical data to the criticisms of this method. Research results could provide faculty members with a different perspective on ECTS credits in curriculum designs.

1.2 Quality Assurance in Higher Education

The demand for higher education is increasing day, by day and it is estimated that the number of students studying in these institutions will reach 263 million by 2025 (Karaim, 2011). As the demand for quality education increases, quality assurance (QA) has become a necessity rather than an option for universities where the mobility of students, faculty, programs, and higher education institutions in global networks increases (Hou, 2012; Varonism, 2014). Quality assurance can be a driving force for institutions to achieve excellence in higher education. However, ensuring that the quality of education programs simultaneously meets local and international standards has become a major challenge in many countries (OECD, 2007). Therefore, the cooperation of quality assurance agencies and the acceptance of quality assurance review decisions are needed (Ryan, 2015).

In order to create a quality assurance system in higher education, learning design, content, and pedagogy will be evaluated effectively (Puzziferro, Shelton, 2008). According to Barnett (1992), the quality of higher education can be measured by reaching the determined performance indicators. Another way to describe quality in higher education is faculty-student interaction (Lundberg, Schreiner, 2004).

Accreditation is a review of the quality of higher education institutions and programs (CHEA, 2014). An institution or program is accredited if it meets minimum quality standards. The main objectives of accreditation include quality assurance assessment and continuous improvement. Accreditation agencies have developed standards and procedures to guide institutions in the process of voluntary

commitment to continuous improvement through the application for accreditation. These standards are used by review committees as a basis for decision making and for making recommendations.

One of these standards is the curriculum of the program. Considering that one of the components of the curriculum is ECTS credits, quality assurance of these credits should be established. In this study, the opinions of students studying in accredited programs about ECTS credits were investigated. The findings were aimed to provide knowledge about the quality assurance of ECTS credits.

2. Methodology

The main purpose of this research was to investigate whether there was a difference in reaching the prescribed ECTS credits between university students studying in an accredited program and those in non-accredited programs. The survey model was adopted by collecting quantitative data in the research. The research participants were students studying at a state university in Turkey. At the end of the semester, the students were asked questions about the effort they put into the courses they attended. The questions are given in Table 1. ECTS credits based on the working hours spent by the student were obtained by dividing the total workload obtained from the questions by 25. Because one academic year corresponds to 60 ECTS credits, equivalent to a total workload of 1500-1800 hours. The university decided to put this workload on 1500 hours and one ECTS credit corresponds to 25 hours.

Table 1. Survey questions

No	Activity in the semester	Repetition	Time spent	Time
1	How many weeks was the lesson held during the semester?	….weeks	How many hours per week was the lesson held?	… hours
2	How many times did you prepare before the lesson during the semester?	…times	How many hours per week did you work on average for preliminary preparations?	… hours
3	How many times did you prepare homework within the scope of the course during the semester?	…times	How many hours on average did you study for the assignments?	… hours
4	How many presentations/seminars did you prepare during the semester?	…times	On average, how many hours did you work for the presentation(s)?	… hours
5	How many times was a quiz given in the course during the semester?	…times	On average, how many hours did you study for each of the quizzes?	… hours
6	How many times were the midterm exams made during the semester?	…times	How many hours on average did you study for the midterm(s)?	… hours

No	Activity in the semester	Repetition	Time spent	Time
7	How many times did you prepare a project/semester homework during the semester?	…times	How many hours did you work on average for the project/semester assignment?	… hours
8	How many times did you do practice/laboratory/field work outside of class hours during the semester?	…times	On average, how many hours do you spend per week for practice/laboratory/field work?	… hours
9	How many activities (research, forum, discussion, etc.) did you do during the semester, apart from preliminary preparation, homework, and seminars?	…times	On average, how many hours did you work for each of the activities (research, forum, discussion, etc.)?	… hours
10	How many hours did you study for the final exam?			… hours

Source: Authors' own research.

Participants completed the questionnaire on a completely voluntary basis. The number of students who answered the questionnaires about the courses studied from non-accredited programs was 1847. The number of students who answered the questionnaires from accredited programs was 974. In a non-voluntary survey study, question marks arise about the reliability of the data collected, since the student is obliged to answer. In this case, the student may write random numbers in the required fields to complete the questionnaire quickly and cause contamination of the information to be transferred to the academic units.

ECTS credits should be calculated on the basis of the "average student". In order to find the average student, it is the calculation of the arithmetic mean from the remaining data by removing the highest and lowest 25% parts of the data, which is also known as the "interquartile mean" in the literature (Bickel, 1965). In this way, it is not possible to calculate exactly the theoretical distribution of the statistic obtained. However, it is known that this distribution converges to the normal distribution as the number of samples increases (Maronna et al., 2006).

With the data obtained from the ECTS survey, the variable "ECTS credits according to student" was calculated for each course. This value was deducted from the variable "ECTS value in the curriculum". The difference was labelled as the "ECTS credit difference" variable. The fact that this difference value is close to zero means that the value in the curriculum and the effort of the student are equal. Therefore, one sample t-test was used to find out whether the variable "ECTS credit difference" is different from zero. Zero was taken as the test value.

3. Findings

Survey data were obtained for 1054 different courses from 68 non-accredited undergraduate programs. These data were subjected to the extraction procedure and the opinions of the students in the lower and upper quartiles of 25% and the opinions of only one student for a course were excluded from the analysis. As a result of this process, 549 different courses were included in the analysis. Survey data were obtained for 372 different courses from 18 accredited programs. After the data were extracted, the ECTS credit difference was calculated for 258 different courses. Descriptive statistics of "ECTS credit difference" variables are presented in Table 2.

Table 2. Descriptive statistics of the ECTS credit difference variable

ECTS credit difference	N	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Non-accredited	549	-6,10	10,64	,453	2,541	-,224	,245
Accredited	258	-3,16	2,34	,069	1,524	-,342	-,967

Source: Authors' own research.

In Table 2, it can be said that the distribution for both variables is close to the normal distribution because of skewness and kurtosis values. Some researchers suggest that skewness and kurtosis up to an absolute value of 1 may indicate normality (Huck, 2012; Joyner et al., 2018). It is striking that the range and standard deviation are larger in non-accredited programs. In addition, the mean for both variables

was greater than zero. When calculating the difference, the ECTS credits in the curriculum were subtracted from the survey data, so if this difference was greater than zero, it means that the students put in less effort than expected in the curriculum.

One sample t-test was conducted to investigate whether the difference from zero of the "ECTS credit difference" variable was statistically significant. Here, the test value was taken as zero. The results are presented in Table 3.

Table 3. One sample t-test

ECTS credit difference	t	df	p	Mean Difference
Non-accredited	4,177	548	,000	,453
Accredited	,733	257	,464	,069

Source: Authors' own research.

When Table 3 is examined, the difference between "ECTS value in the curriculum" and " ECTS credits according to student " of non-accredited programs differs significantly from zero (t=4.177; p<0.05). If this difference is significantly greater than zero, it means that the effort made by the students is less than the ECTS credits in the curriculum. On the other hand, this difference value is not

significantly different from zero in accredited programs (t=0.733; p>0.05). This result shows that the ECTS credits specified in the curriculum are more consistent in accredited programs.

4. Conclusion and Recommendations

In this study, it was investigated whether there was a difference between university students studying in accredited programs and those in non-accredited programs in reaching the ECTS credits specified in the curriculum. For this, the students answered a survey asking how much time they spent in the classes they attended. This study had some limitations during the data collection phase. The fact that the participation in the surveys was on a voluntary basis decreased the representativeness of the population of the sample. In addition, the fact that the questionnaire was administered at the end of the period may have affected the reliability. Because during the whole semester, students may have forgotten how much they had studied. The data obtained from the survey were the ECTS credits in the views of the students. The differences were calculated by subtracting these credit values from the ECTS credits in the curriculum. These differences should be close to zero. In non-accredited programs, this difference was statistically different from zero, and the mean is greater than zero. These findings showed that in non-accredited programs, the ECTS credits in the curriculum and the ECTS credits determined according to the students' views were different from each other and that the student completed the course with a less workload than the workload in the curriculum. On the other hand, there was no difference between the ECTS credits calculated based on the answers of the students studying in accredited programs and the ECTS credits written in the curricula of these students. Based on this finding, it can be said that the workload of students in accredited programs is more realistic. This result may be the result of accredited programs providing quality assurance in education systems. Because the function of national accreditation systems is to provide quality assurance of the program through an evaluation process. (Andreani et al., 2020). In fact, quality assurance for ECTS credits must be established in all programs, accredited or not. ECTS credits determined by faculty members and ECTS credits obtained from student responses should be compared. In cases where the workload is low according to the student, the number of in-class and extra-curricular activities should be increased or the ECTS value of the relevant course should be written lower when revising the curriculum.

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A Responsive Approach to the New Academic Mobility. Building a Conceptual Framework for Embedding Digitally Enhanced Mobility in a European University

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Abstract

Educational practices have dramatically changed in the past few years, especially due to the COVID-19 pandemic. Universities, academics, and civil society had to respond to a shifting educational landscape. The growing interest of that time for student mobility had to take a break, offering the opportune context for innovating mobility formats and enriching the presence of virtual (digitally enhanced) mobility in higher education teaching and learning. Targeting many "mobile" students, European Universities Alliances had to quickly react and adapt to these changes, reconfiguring their educational offerings and the corresponding conceptual framework. In this context, at the level of CIVIS – a European Civic University, one of the first alliances of the European Universities Initiative, we designed an innovative conceptual framework for embedding virtual (digitally enhanced) mobility in the alliance's educational offer, integrating methodological and procedural components into a unique tool, as a coherent approach to the emerging growth of virtual and blended learning at the European level. Therefore, we proposed a virtual mobility matrix, as a basis for developing enhanced virtual learning components, and as a starting point for larger curricular constructs, such as the European Degrees. The aim of the current paper is to present the process of designing and implementing a conceptual virtual mobility framework, as a starting point for developing an integrated and innovative educational offer at the higher education level. The framework adopted by CIVIS European University renders the intermediate steps towards implementing European Degrees and embedded mobility approaches at the alliance level, contributing to the objectives and visions of the European Universities Initiative and the development of the European Higher Education Area.

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Keywords: digitally enhanced mobility, flexible curricula, micro-credentials, European universities, higher education.

JEL Classification: I230.

1. Introduction

Virtual mobility has encountered an important increase in international higher education practices, not only because of the pandemic's impact on designing and delivering education, but also due to the dynamics and changes of students' needs for a more flexible approach to teaching and learning. Some boundaries and clarifications are yet to be made on the role and presence of virtual mobility experiences in learning activities, and here is where contexts such as the European Universities Initiative (European Commission, n.d.a) play a major role in testing and piloting new approaches for designing a coherent way for such processes.

The aim of the study is to present the steps and actions that were taken for designing and developing a conceptual curricular framework in one of the first European University Alliances, CIVIS European University, starting from the construction of a virtual mobility conceptual approach. The paper will describe both the work and process, as well as the outcomes that serve as a basis for shaping a CIVIS innovative educational offer.

The main component of the present study is based on the CIVIS Handbook on Virtual Mobility (Iucu et al., 2022), a practical tool which offers support and guidelines for designing, managing, and delivering educational activities that are accompanied by virtual mobility components. The CIVIS curricular framework offers a conceptual and practical way forward for academics, researchers, and decision-makers to develop new formats for teaching and learning, in a flexible way, addressing the needs of all students in an inclusive manner. The educational components included in the matrix, described in the present analysis, can stand as a valuable example of a piloting process that supports innovation in the European higher education sector, while also creating a context for sharing best practices with other alliances and universities.

There are more documents emphasising the idea of developing virtual mobility as a means for increasing students mobilities (European Commission 2017; 2022), whereas only a limited number of studies that are focused on the institutional perspective of developing it (Ubachs, Henderikx, 2018). We consider it important to maintain a holistic approach when investigating the process of developing and implementing a scalable framework for virtual mobility. In this regard, precisely, this study proposes an empirical dimension towards this approach, and its novelty represents the integrated way for building and embedding virtual mobility in higher education contexts, based on modularisation of learning activities.

2. Problem Statement; Digitally Enhanced Mobility for Flexible Curricula in Higher Education

Virtual mobility has great potential for developing new and flexible learning pathways, connecting universities, and ensuring an integrative approach to student mobility. The concept is widely used, especially in recent years, and different definitions are given. Moreover, there are different terms related to virtual mobility and the similarities and differences between the terms are analysed. Higher education institutions strived to create contexts that promote mobility for all members of the academic community. Internationalisation proved its potential in increasing the quality of educational processes, and universities sought new / improved ways to collaborate and open their campuses for international students (Altbach, Knight, 2007).

Information and communication technologies (ICT) significantly contributed to a new kind of mobility, more accessible and easier to achieve virtual mobility. "Internationalisation at home" (IaH), a term coined by Bengt Nilsson in 1998 (Crowther et al., 2000), was the starting point for increasing access to various international learning experiences for students who cannot access physical mobility. The concept of virtual mobility opened students' perspectives and borders to enriched learning experiences and intercultural collaboration in an innovative international environment created through the collaboration between universities and was reshaped according to the educational policies and strategies for the higher education environment in line with substantial developments in the field of ICT. There are some terms and concepts related to virtual mobility and debates about what can be included in this category. For example, MOOCs (Massive Online Open Courses) have many of the virtual mobility features, but are a tool that can be used to support virtual mobility, due to collaborative intercultural efforts. Dondi and Salandin (2010) underline that the differences between the dimensions that characterise virtual mobility are not present in e-learning and distance learning: internationalisation and cooperation, virtual exchange, while virtual mobility uses distance education principles to build its learning framework. There are significant similarities between virtual exchange and virtual mobility and the two terms are often used with the same understanding; still, in virtual exchange, the aim of the activity is "on people-to-people interaction and dialogue" (European Commission, n.d.b), also integrating virtual exchange components for soft skills development.

The European Commission has addressed virtual mobility as a key issue for the future of higher education, including virtual mobility in the Erasmus+ initiative with the aim of increasing the number of students' mobility (to 50% in 2025). Virtual mobility is also defined as a type of mobility that uses the advantages offered by ICT to create learning experiences with the same benefits as physical mobility (Commission of the European Communities, 2009). However, even if virtual mobility was seen at a certain point as an alternative to physical mobility, other approaches brought different perspectives, and virtual mobility was used in addition to physical mobility.

In the CIVIS Handbook on Virtual Mobility (Iucu et al., 2022), the concept of virtual mobility is analysed together with previous CIVIS experiences in conducting learning activities with virtual or blended components: "virtual mobility can cover a wide range of international learning and teaching, research, and collaborative activities, in an online environment, empowering students with learning experiences, and promoting the development of the competences for a knowledge-based society" (Iucu et al., 2022, p. 11). Considering this definition, different CIVIS physical and virtual learning experiences were analysed and framed to identify common understandings.

The COVID-19 pandemic was a worldwide challenge for educational institutions and Emergency Remote Teaching (ERT) was adopted to ensure access to education, shifting from face-to-face to online education. There was an increased focus on virtual mobility, and there were concerns about the potential of replacing physical mobility with virtual mobility soon. The students' representative bodies at the European level, such as the European Students' Union (ESU) and the Erasmus Student Network (ESN), underline the importance of separating virtual mobility from physical mobility, which has been seen as the main driver for transformative experiences. In their vision (ESU & ESN, 2021), virtual mobility can be used in addition to complete physical mobility or as a support to increase internationalisation and access to specific online learning activities, using digital means. As a response to the reshaping needs of mobilities within the European Higher Education Area (EHEA) and ESU's statement on what virtual mobilities should represent in the future, the Rome ministerial conference (EHEA, 2020) further commits to "enabling all learners […] to experience some form of mobility, whether in physical, digitally enhanced (virtual) or blended formats". This conceptual redesign and interpretation recognise that virtual mobilities must not be seen as replacements or substitutes for physical or blended mobilities, but as complementary learning opportunities.

3. Research Questions / Aims of the Research; Pathways for European Degrees

Starting from the need of establishing a common framework for designing and implementing virtual mobility learning opportunities across the alliance, work has been done for identifying the most suitable educational components that would answer to the student's needs and the alliance's specificities. The process of designing and implementing a conceptual and curricular framework for delivering virtual mobility educational components at the alliance's level considered some questions and concerns, of which some research questions (RQ) are presented here:

RQ1: How can we define virtual mobility and what are its main characteristics?

RQ2: What are the most suitable learning components to be delivered based on virtual mobility at the level of the alliance?

RQ3: How can we embed an approach to micro-credentials in the new curricular framework?

As one of the first pioneering European University Alliances, part of the European University Initiative's (European Commission, n.d.a.) first wave of

alliances, CIVIS aligned its strategic priorities to the major development directions at the European level, this including topics such as the European approach to micro-credentials, the European student card initiative, as well as the new Erasmus+ framework for blended mobilities across Europe. The framework thus addressed the need for developing a more flexible approach to designing education, as a CIVIS modular approach, in line with the European approach to micro-credentials (European Commission, n.d.c).

We consider that the results of this analysis will support the exchange of best practices with regard to building an innovative educational offer at the European level. As piloting arenas for innovation and change in higher education, we believe that the alliances' experience represents valuable assets for a real community of knowledge.

4. Research Methods for Building CIVIS Virtual Mobility Framework

The modularisation of learning activities together with virtual mobility was extensively explored to design a coherent framework applicable to the CIVIS Alliance and other European alliances and academic communities. The research used a qualitative approach, and it was organised in three stages: literature review and document analysis, workshops with stakeholders, and best-practice analysis. Moreover, it started with literature and document analysis to identify the existing concepts and experiences in the field of virtual mobility. One of the key issues was to identify the pillars to support a virtual university environment that enables students to build their own learning pathways. The analysis included research on policy documents, evaluation, and frameworks and offered qualitative data used to establish the current state of the examined components. The results of this stage consisted in pointing out the main dimensions of a virtual mobility environment.

These dimensions were discussed and validated through four thematic and two transversal workshops organised within the first CIVIS Virtual School on Virtual Mobility, with more than 150 participants, involving policy makers, stakeholders, academics, and researchers. Each workshop was planned around a specific subject:
a) building European Study Programmes - strategic decisions and policies needed;
b) research and innovation strategies and operational tools for thematic activities;
c) course design with virtual or blended component to build flexible curricula;
d) innovative pedagogies as necessary ingredients for virtual learning activities;
e) multilingualism as a strategic point for the development of the project. The discussions explored each topic, collecting the participants' input.

Data analysis included the revision and organisation of information offering an improved theoretical framework that needed to be adapted to the alliance's context. Examples of learning activities with virtual or blended components were provided by CIVIS partner universities. They revealed a variety of learning activities, from regular courses to short-term and modules in CIVIS universities. The analysis of best practices considered several characteristics and focused on the common dimensions of a coherent virtual mobility framework, with modularisation as a key indicator.

Our study also poses some limitations, especially due to the research context and the COVID-19 pandemic impact, the first of which refers to the literature review and the extent of previous studies on this topic. Even though the concept of virtual mobility has a long history in the educational language, it was mostly analysed through European and international policy documents rather than in research studies. The pandemic changed perceptions on virtual mobility and on its role in ensuring accessibility to different learning contexts. Secondly, our study's research design did not include quantitative data analysis, understanding that such approaches could offer insight into designing a coherent curricular approach, based on virtual learners' experiences in virtual mobility learning contexts.

5. Findings; CIVIS Virtual Mobility Framework

The CIVIS modular approach was designed on pillars such as embedded mobility (virtual, physical, or blended), innovative pedagogies, multilingual practices and contexts, enhanced recognition of learning (through ECTS credit points, an umbrella agreement, and the CIVIS Passport), and flexible learning pathways.

Table 1. CIVIS Virtual Mobility Curricular Matrix

No.	CIVIS VM	ECTS	Delivery mode	Recognition & Certification
1.	**CIVIS Open Courses**	1-10	Virtual (DE)	Full / Partial & CIVIS passport
2.	**CIVIS Modules / Micro-Programmes**			
2.1	CIVIS Summer / Winter Schools	5-15	Virtual (DE) / Blended / On site	Full / Partial & CIVIS passport
2.2	CIVIS "Bootcamps" (Practical / Research Intensive Stages)	5-15	Virtual (DE) / Blended / On site	Full / Partial & CIVIS passport + Transcript of Records
2.3	CIVIS Micro-Programmes	5-15	Virtual (DE) / Blended	Full / Partial & CIVIS passport + Transcript of Records

Source: Adapted from Iucu et al., 2022, p. 26.

As the CIVIS Matrix shows (Table 1), the alliance built an educational offer starting from individual courses, mainly delivered in a virtual format, as a first level of modularity, and the CIVIS modules (CIVIS Summer / Winter Schools, CIVIS Bootcamps, and CIVIS Micro-Programmes) as the second level of the matrix. The matrix not only allows the development of several educational components that are interrelated and allow recognition of previous learning, but also especially promotes a flexible "stackable" design, in which each CIVIS Module is composed of smaller units, independently delivered and recognised, but able to build on larger certifications, such as CIVIS European Degrees, delivered jointly at the alliance level through the transnational cooperation of at least three partner universities. As one of the testbeds (European Universities) for innovating higher education across Europe,

the proposed curricular framework developed in CIVIS (see Figure 1) creates the conceptual and pedagogical context for transforming European strategic priorities into concrete higher education innovation practices.

Figure 1. CIVIS Curricular Diagram
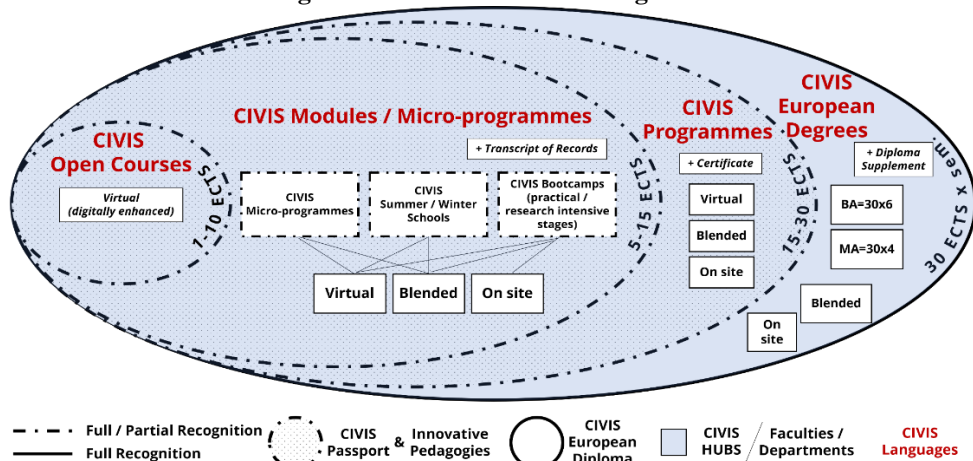
Source: Iucu et al., 2022, p. 25.

Along with a short description of each building block of the CIVIS VM matrix, we designed a framework that mentions paths of delivery and length, ECTS credit points for each category, and formal recognition possibilities, as well as the potential of contributing to building the European degree. An overview of some of the main features of each category can be found in Table 1, while below we include a short description for each of the components. Regarding the ECTS credit points, as can be seen in the CIVIS curricular matrix, all activities should mention ECTS credit points, assigned based on the overall length of the activities, and clearly defined according to the student workload (25-30 hours per credit point) and assessment / graduation requirements.

Benefiting from the different major languages spoken in the Alliance (English, French, German, Spanish, Greek, Italian, Swedish, or Romanian), CIVIS supports the linguistic diversity through multilingual tools, communication, education, and research, but also offers innovative language-learning methodologies for its students. Therefore, all activities included in the Virtual Mobility Matrix can be delivered in any of the languages present in the alliance or in any combination of these languages (more than one language per course). This process recognises and empowers cultural exchange and multilingualism as strategic development points for the Alliance.

Innovative Pedagogies are not just practical means for innovation teaching and learning in higher education, but also a strategic approach for creating a CIVIS educational brand connected to the higher education and European universities landscape. Linked to the theoretical and practical aspects included in the CIVIS Handbook on Innovative Pedagogies (Ciolan et al., 2021), pedagogical innovation

practices should be included in the teaching design, either by replicating at least one of the examples provided in the CIVIS Innovative Pedagogies Database, or by enriching the database with new designs and proposals (contributing to the continuous development of this project and providing practical models of pedagogical innovation to academics and practitioners from all CIVIS universities).

CIVIS Open courses, as core building blocks of the CIVIS programmes, can include a variety of different learning experiences, courses / disciplines, regardless of the status of the discipline (compulsory, optional), its category (fundamental, specialisation courses), duration (from few weeks with concentrated activities to a full semester) or study programme type (full-time or part-time). It can cover regular online/ blended courses or newly designed courses or learning experiences outside the current curricula, with the possibility of integrating them in the curricula according to national regulations. Moreover, there are CIVIS Courses collaboratively designed and delivered by at least three CIVIS partner universities, either through different calls or by a direct collaboration between faculties, departments, or doctoral schools, with different length and structure, from one to multiple learning units.

CIVIS Summer / Winter (Seasonal) Schools consist of a series of events and activities that might be accomplished through workshops, webinars, and / or lectures, accompanied by individual study. They cover a large variety of subjects / topics and can be organised at Bachelor, Master, or Doctoral level (BA, MA, PhD). CIVIS Seasonal Schools can be either physical, blended, or virtual, and an intensive approach is recommended to develop the educational activities included in their schedule.

CIVIS Bootcamps stand for intensive research / practice stages, since these components of research and practice are in many cases basic requirements for study programmes, at any of the cycles (BA, MA, PhD), but especially linked to doctoral studies and post-doctoral programmes. Moreover, ECTS should be assigned based on the regulations and practices existing at national and institutional level and in accordance with the ECTS Guide (European Commission, 2017). In essence, students of all levels are interested in extending their experience in additional research experiences, with emphasis on practical components, or as internships in any of the CIVIS universities. Depending on the level of study, research activities / internships can be research / innovation-oriented (addressing a restricted number of students, depending on the thematic) or research-informed / learning-oriented (addressing mainly to BA students and appropriate to larger groups of students). Activities included in these stages can cover several weeks of intensive activities (as, for example, during summer break of students), or it can be spread over one semester, linking it also with a traditional Erasmus mobility.

CIVIS Micro-programmes (MPs) represent learning components that offer students short and medium sized learning activities, on a variety of topics and formats, built on different smaller units of learning (courses, research, and practice activities / projects, etc.) that exist within CIVIS curricular offer or are newly designed for the micro-programmes' purposes. MPs allow students to combine

multiple CIVIS Single Learning Activities (SLAs) into one coherent learning pathway that reinforces or complements their main study programme. With transdisciplinary or disciplinary approaches and interests, MPs offer CIVIS students the possibility to follow their own learning and training interests, deepening their knowledge in specific topics. They provide the students access to a wide range of disciplinary / interdisciplinary / transdisciplinary learning opportunities linked around one large topic, in a collaborative and modular curricular framework, but also extra-curricular topics and interests, in the training of transferable skills or challenge-based learning approaches, linked, for example, with the CIVIS challenges.

6. Conclusions

Virtual mobility remains an important component for delivering innovative educational activities at the transnational level. Its added value and relevance for the new approaches towards an inclusive and sustainable learning environment and experiences up to this moment do not tend to present virtual mobility as a "pandemic-only" solution only. Nevertheless, lessons learned during these transformative times will remain in higher education practices, and virtual learning components are yet to become even more important in building new teaching and learning activities. In the most recent Erasmus+ programme (European Commission, 2022), blended learning has turned out to be one of the most interesting and attractive tools for innovation.

Defining virtual mobility is an ever-changing challenge, as technology is not static, and the students' needs and abilities have different response rates to these changes. Society is highly impacting such indicators, testing the conceptual statement through several scenarios and educational contexts. We believe that the CIVIS conceptual virtual (digitally enhanced) mobility framework offers space for innovation, allowing future emulations that can adapt to change and developments in this area. The alliance's view on how virtual mobility can become an asset for learning activities successfully responds to the new educational paradigm, in which students are empowered through enriched learning activities that "promote the development of competencies for a knowledge-based society" (Iucu et al., 2022, p. 11). Moreover, the CIVIS practice has been also further analysed in a UNESCO study on the role and presence of virtual mobility in different higher education contexts across the globe (Sabzalieva et al., 2022). Virtual mobility is regarded as an experience where students collaboratively build a knowledge-based society, fostering all formats of exchanges, supported by the growing offer of online platforms and tools. Answering to our first research question, virtual mobility can be seen as an inclusive approach for creating enriched transnational learning opportunities for all students, opening access to non-traditional students and to those with less chance to venture on a traditional long-term physical mobility.

Developing a virtual mobility framework not only supported understanding of the concept and using it for further design processes, but became the baseline for developing an educational offer. This offer starts from small learning units and builds larger educational components in a stackable and modular approach. The alliance's response to the European approach to micro-credentials (European Commission,

n.d.c.) and the experience of enriching learning experiences through virtual mobility activities paved the way for an enhanced educational curricular framework. The framework encompasses the most suitable teaching and learning activities that could respond to the changing educational landscape and the students' needs for flexible and customised learning pathways. With a relevant emphasis on the modular design, innovative pedagogical approaches, multilingual and multicultural exchanges, and recognition of all types of learning, the new curricular framework becomes a model for innovation and change in the designing process of educational activities at the European level. This allows academics to design flexible programmes, based on modular designs and interconnected components, in line with the European agenda and the approach on micro-credentials, offering the students an active role in creating their own learning pathways.

The analysis does not represent an over-functional model for educational innovation in European higher education but can be seen as a useful experience for all academics, researchers, and decision-makers that are engaged in developing new frameworks for designing and delivering innovative approaches to teaching and learning in higher education. We consider that such analyses could be replicated and address several higher education contexts, offering a common answer to the needs for flexible, modern, challenging, and innovative European curricular frameworks.

Acknowledgment

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The Revenue for the New Market
using Innovative Business Model

Sabin-Alexandru BĂBEANU[1]

Abstract

Objectives – The purpose of this paper is to identify the business growth, customers' request, and revenue resulting from the implementation of the value-driven innovative business model. Tools – Literature review provides a framework for observing the implementation of the innovative business model. It is necessary to identify client requests to address the innovation of a market and observe which one generates more revenue: the new market or the innovative market. Methods – Analyzing the literature review, counting 109 articles, identify the indicators for Ansoff matrix construction. These components are for market development through the new market offering and the diversification of services using digital technologies. Moreover, generating revenue is verifying the assumption that the new market changes the profile of customers who use digital data and accept digital transformation. Results – Restructuring the business by creating new business model, creating and developing the new digital value based on consumer preferences conducting to future revenue, interconnecting products to the new digital technology are the main components behind digital transformations, which can define the new market. Limits – The research is based on an innovative business model in the automotive industry. Thus, future research will be generalized to any activity domain. Conclusions/Originality – This article presents the digital value highlighted in an innovative business model that adopted Industry 5.0 in the new market. On this line, a simple strategy has been built to implement product presentation directions in the new market.

Keywords: business growth, customer, new market, digital value, revenue.

JEL Classification: M21, M41, M31.

1. Introduction

Companies in the automotive industry are increasingly interested in technological innovations involving artificial intelligence (Abrardi et al., 2021), but customers

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are the ones who come to their aid through the demand for new technologies (Ellis et al., 2012).

Increasing customer expectations, a number of environmental factors and competitiveness on the car market are the basis for innovation and companies' revenues (Ili et al., 2010). Thus, the emphasis is on the strategy of developing the market (Li et al., 2021), by creating new markets; in this case it is virtual (Henriques et al., 2020), which have not been explored and for which we do not know the associated risks with the implementation and development costs.

Innovating an existing market is the solution that generates considerable revenue (Sanchez et al., 2010). By changing the structure of an existing market, in which there are already customers (Sanchez et al., 2010; Kjellberg et al., 2015), it will be a certain behavior and with clear requirements for innovation of existing technologies (Yalamov, 2021), but also with the reorganization of the business model (Kjellberg et al., 2015).

Scientific research has shown that virtual reality is an environment for analyzing market innovation at low cost (Henriques, Winkler, 2021). Additionally, the emergence of Industry Revolution 5.0 (I5.0) makes the innovative business model comply with the production process (Xun et al., 2021) based on artificial intelligence or other innovative technologies (Ozdemir, Hekim, 2018).

Flows containing innovative business processes (Sxoinaraki, Panou, 2017), customers and their requirements, revenues, cost generated by production (Pallares et al., 2021) in the automotive industry, market positioning of the finished product (Lei et al., 2014), or investors are components of the innovative business model, which creates digital value in addition to the value of physical goods (Beqiri, 2014).

2. Problem Statement

In I5.0, the emphasis is on value and implicitly on the value resulting from the use of artificial intelligence (AI) (Xun et al., 2021). However, the implementation of I5.0 has a major impact, especially in the automotive industry through innovation ecosystems (Sun, Su, 2015). Therefore, computerization will transform business processes and lead to new customer demands (Roblek et al., 2021).

In this sense, innovation in the I5.0 environment, based on the Internet of Things (IoT), leads to much faster product acquisition (Aslam et al., 2020). In the innovative business model, the supply chain in the production process contains IoT (Akundi et al., 2022).

Inventory management is currently highlighted by developed IT systems that aim to minimize costs and maintain minimum inventory (Singh, Verma, 2018; Conley et al., 2019). However, most of the time, inventory management is done with IoT.

Innovation in a market, compared to a new market, is based on the customer. If in the first case we already have customers (Kjellberg et al., 2015) that we should attract with new products, in their field of interest, in the second case, the customer's request is still unknown (Cleff et al., 2015), for the simple fact that we do not have customers yet.

In a new automotive market, we need a number of factors (Taylor-West et al., 2020) to define the environment for quality assurance of goods, setting market rules, and generating market representations (Harrison, Kjellberg, 2016). They depend on the brand and the group of customers for whom it is intended.

In this context, a new business model is born, based on innovation in the automotive industry. This model is defined by operations to reconfigure the organization of the entity, business processes, computerization of production flow, all stages of accounting, business promotion through successful marketing to virtual clients, highlighting digital value, and preparing accounting statements (Xun et al., 2021; Ozdemir, Hekim, 2018; Fraga-Lamas et al., 2021; Aquilani et al., 2020; Müller, 2019).

Given the above, the innovative business model in relation to the purchasing power of customers requires the analysis of all participating actors (Sxoinaraki, Panou, 2017).

The presentation of a car, in the virtual environment, and its configuration for production remain major challenges for the manufacturer.

The Ansoff matrix identifies the strategy by which a new market is built using technologies, according to the adopted innovative business model.

Both the automotive industry and the marketing of products are experiencing changes in the innovative business model.

3. Aims of the Research

With the implementation of the innovative business model, questions are posed about how we structure the market in order to have advantages. Thus, the questions answered by the research are as follows:

Q1- How do we identify if a new market is suitable for the sale of a car built in an innovative business environment?

Q2- How do we identify revenues in a new market?

4. Research Methods

At this stage of the research, it is important to choose the specialized literature using 82 articles representative of the innovative business model. Initially, articles on economic growth, customer requirements, and revenue identified in the innovative business model were extracted from the Web of Science. However, by studying the articles, it was found that the research needs a number of details about the market, customer requirements, and the digital value created.

Subsequently, there are 27 other articles that support the idea that the strategy of building a new market for an innovative product in the I5.0 environment is based on digital value. This strategy is carried out using the Ansoff matrix.

From the 109 articles, the components for the Ansoff matrix indicators following the analysis of situations in which the product, in this case the car with multiple innovations, can penetrate the market (Yin, 2016). The studies consulted show that a new market is needed (new customers, new locations, new products, etc.) or it can innovate the existing market (old and new customers, new technologies and

techniques to penetrate the market, new or innovative products, etc.) (Kjellberg et al., 2015; Thomas, Maine, 2019).

Research investigates which of the two markets brings the highest revenue to the company and how the product is presented on the market, in relation to customer requirements, by identifying the digital value.

We are proposing to produce a car brand and we still do not know if the innovative market will accept this product (Thomas, Maine, 2019), or if we will have to develop a new market (Kjellberg et al., 2015).

Marketing studies, from the selected articles, are those that show if this product will be sold and if the customer's requirements are met. Moreover, this product will lead to the economic growth of the company (Gusev, 2021) and implicitly to the generation of income if we choose a new market.

The Ansoff matrix, which is a marketing strategy (Gurcaylilar-Yenidogan, Aksoy, 2017), as shown in Table 1, contains the indicators to be implemented (Yin, 2016), presents the steps of developing a new market, but also updating the production process, from an existing product on the market to a new innovative one (Lenfle, Midler, 2009). Existing products on the market are sold in physical stores, showroom type, because the company must remain competitive in the market (Fonseca et al., 2019).

Discounts offered to customers are starting to become less important to them (Lee et al., 2015), and therefore marketing strategies are needed to increase direct sales (Uhlaner et al., 2013). However, the new niche can generate sales risks (Hofmann, 2011). Therefore, a reorganization in a sense of the innovative business model is the virtual sales market (Lawson et al., 2015; Fahmi, Alwy, 2020), in which the customers can choose their own options. They can order the car with the desired options and to be manufactured (so the car is not in stock, in the configuration required by the customer) (Karadgi et al., 2009).

The presentation of the cars is made by a robot (Sumpsomboon, Varodhomwathana, 2017), which is much more efficient and actually defines the innovation of the market (Dana et al., 2022). However, the impact of this robot on revenue flow remains constant. Even if this robot takes over human activities, the company's employees observe and verify it.

However, there are risks associated with the innovative market, such as whether market competitiveness remains the same as before the innovation process (Dana et al., 2022). Customers know how to use information related to innovation (Henriques, Winkler, 2015), which leads to the identification of the resulting value (Exner et al., 2014), even if it is a digital value (Paolucci et al., 2021). The robot collects data and information about customer preferences (Dana et al., 2022), and this is, in fact, a value for the company (Exner et al., 2014) and implicitly an income (Sanchez et al., 2010).

Table 1. Ansoff Matrix

Ansoff Matrix	Current product	New product
Current market	*Market penetration*	*Product development*
	Promoting cars that already exist in stock, with attractive financial measures for the customer (discount, credit, etc.); Increasing market share through promotion; Brand sales leader; New physical stores; Extending the variation of products to attract customers.	Creating new prototypes that meet the needs of customers. Superior quality of materials used in the production of cars, at low prices;Innovation of some important functions of the car; New products according to the need and customer profile; Periodic review of the offer to customers.
New market	*Market development*	*Diversification*
	Increasing the number of stores to attract new customers; Innovative market; Increasing revenue from dedicated offers.	Special system for direct sales, at low prices; Digitized services; Virtual stores.

Source: Adapted for the automotive industry from Yin, 2016.

Physical store-based infrastructure is maintained, but until the new virtual market develops (Fahmi, Alwy, 2020). Much higher income is obtained than the existing one, or there is a risk that the physical store will have much higher costs than the income and will not be able to support itself financially.

The proposal, in this case, is a new market, which we develop by attracting customers to use innovation (Dana et al., 2022) and implicitly new technologies. In this case, the company will be able to develop new product prototypes (Exner et al., 2014), requested by the customer, following completion of the information in the virtual showroom (Fahmi, Alwy, 2020).

Product diversification would mean selling prototypes developed within the company (Exner et al., 2014; Elverum et al., 2014) or producing them on a large scale, taking into account the options desired by most customers (Dana et al., 2022). Another diversification could be car accessories or even service provided during the warranty period (Paolucci et al., 2021), identified by the created digital value.

5. Findings

The business model depends on the strategy of choosing a product (Oresky, 2019), the correlation of the architecture of the innovative business model with the innovative product (Climent, Haftor, 2021), and the environment for the new or innovative market (Polgári et al., 2017), which will lead to a market strategy (Taylor-West et al., 2020).

An analysis of the literature leads to the identification of the factors underlying the market strategy, through the Ansoff model of the development matrix (Rojek, 2019).

In this regard, we observed from the studied works that this matrix model allows the identification of development needs (Lawson et al., 2016). The architecture of the innovative business model must be flexible and scalable (Akundi et al., 2022), which means that it stimulates the flexible adoption of products in the I5.0 manufacturing environment.

These results suggest that new market models (Polgári et al., 2017) based on Industry 5.0 technology in the automotive industry lead to a business with computerized support (Oresky, 2019) and economic growth, leading for example to higher revenues, than an innovative market. Moreover, the supply chain in the production process is done with IoT (Akundi et al., 2022). In addition, this makes inventory management much easier.

IoT-based innovation in the I5.0 environment leads to much faster products (Aslam et al., 2020), which result in economic growth and thus revenue.

Therefore, this paper contributes to the literature in three ways.

First, the research focused on how to create revenues resulting from the adoption of the innovative business model.

The second way was to choose the type of market. From the specialized literature, we have identified the innovative or new type of sales market. The high price in the new market brings selective customers (see Tesla).

It is necessary to compare the new market with the innovative one. This comparison results from revenue generation, according to Table 2.

The third way was to create digital value in a new market. Even if there are specialized works that show that the innovative market has many more values (Fonseca et al., 2019), more studies of selected articles have shown that the new market is much more advantageous than the innovative one, according to Table 2.

The presentation, in the specialized literature, of the preparation of a new market presupposes the existence of several indicators, depending on the market activities. Search for "New market in automotive industry" on Web of Science returned 1145 results, which were summarized in Table 2.

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A combination of these markets cannot be called into question for several reasons. The marketplace is where the manufacturer and the customers can meet.

First, customers have different preferences, the customer profile is different in the two market models (Taylor-West et al., 2020), and revenues are much higher in a new market (Sanchez, Ricart, 2010), selective from construction, rather than innovation and the loss of customers along the way.

Table 2. Creating revenue in a new market

Source studies	Preparing New market	Stages of implementation of the new market	Resulting digital value	Revenue
(Cleff et al., 2015)	"Methodology for identifying lead markets in the European automotive industry"	New market shape in automotive industry	Structure of a new online market	Revenue from creating a new database with clients
(Stoean, 2018)	„Significant market share and possess key intellectual property, patents and copyrights"	Drives performance	Electronic components of the vehicle	Revenue from the sale of digital materials
(Oresky, 2019)	„Changing the core company functions as are product development, IT,manufacturing, logistics, marketing, sales, and after-sale service"	Reshaping roles in the value creation process	Reconfiguring the departmental structure	Revenue from software sales developed in-house, in the process of creating digital value
(Thomas, Maine, 2019)	„Innovation management frameworks are useful ... giving ...better chances for value creation and capture".	Tesla Motors – „competing electric vehicle models"	Electric vehicle configured online	Revenue from the sale of vehicles configured by customers in production

Source: Adapted for the automotive industry from source in the first column, resulting digital value to generate revenue.

A combination of these markets cannot be called into question for several reasons. The marketplace is where the manufacturer and the customers can meet.

First, customers have different preferences, the customer profile is different in the two market models (Taylor-West et al., 2020), and revenues are much higher in a new market (Sanchez, Ricart, 2010), selective from construction, rather than innovation and the loss of customers along the way.

Customers in the innovative market (Rojek, 2019) do not fully migrate to the new market, due to financial availability or products. In addition, if these are the requirements of the customer, the question may be asked what the combined markets should look like.

However, there is a lack of description of how the customer is present in the online environment (Cleff et al., 2015), he is presented with a car and can buy it, without interacting with a physical store.

When generating revenue by segmenting the market in relation to customers who have made requests for robotic product presentation, in the innovative or new market, revenue streams automatically recognize costs (Sxoinaraki, Panou, 2017; Fahmi, Alwy, 2020).

6. Conclusions

The structure of the innovative business model identifies the realization of a product that meets the requirements of customers in a new market. This means that the customer's needs and requirements are taken into account when launching a new product. In conclusion, we have the answer to the first question.

Revenues from digital value are highlighted in an innovative business model, which has adopted Industry 5.0, in the new market, and therefore we have the answer to the second question.

The implementation of an innovative business model based on studies in the literature leads to customer research. Thus, the customer's request regarding the evolution of a certain product of the automotive industry (Toni et al., 2021) includes a series of requirements for the implementation of special equipment, in line with the industrial revolution I5.0 and technological progress (Yilmaz, Ustaoglu, 2013). These requirements are both software, by identifying and processing customer data (Cleff et al., 2015), and the car (Toni et al., 2021).

By generating revenue, it is verified that the new market (Polgári et al., 2017) changes the profile of customers (Li et al., 2021) who use digital data and accept the digital transformation of the product.

This paper shows that the new market with conditions imposed by customer demand, the market based on the innovative business model, is the one that generates revenue for companies. The study was conducted only on the basis of scientific articles with an impact on the automotive industry.

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The Impact of ERP Systems on the Organization's Sustainable Development in the Era of Digitalization

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Abstract

The objective of this paper is to observe how ERP systems influence the sustainable development of an organization, as well as the need to implement these ERP systems as a result of the massive change in technology in the last period. The aim of the paper is to add value to the literature and research conducted by other authors, given the advantages and disadvantages of digitalizing the organization's activities using ERP systems and the impact of these systems on the sustainable development of the organization. The research method used in this paper was quantitative, based on a questionnaire structured in two sections: a section containing questions outlining the profile of respondents and a section containing questions specific to the research topic of the paper. Thus, it was possible to observe the impact of ERP systems on the sustainable development of the organization. The data collected using the questionnaire were analysed with the Microsoft Excel application based on a regression model built by the author of this paper. The results of analysing the data collected using the questionnaire demonstrate that ERP systems have a significant influence on the process of sustainable development of the organization, as these ERP systems offer the ability to process or import a large volume of data, thus avoiding human error and ensuring a significant increase in the quality and transparency of information. However, without trained staff, the sustainable development of an organization would not be possible, as they have an important role to play in the processing or management of data in the database of ERP systems.

Keywords: ERP systems, sustainability, digitalization, technology, transparency.

JEL Classification: C88, M15, M40, M42, Q01.

1. Introduction

The continuous evolution of technology and the desire to automate tasks have favoured the progress of digitization of activities, so that a large number of organizations have begun to implement high-performance IT systems to automate

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processes, significantly influencing labour productivity and organizational performance.

According to the European Court of Auditors (2020, p. 4), digitalization is often associated with improving the organisation's performance in terms of "productivity, management practices, innovation, growth, and better paid jobs". This accentuated digital transformation in recent years has also occurred due to the fact that most organizations want to remain competitive for as long as possible.

The concept of digitalization is defined as "the use of new technologies, robotics, cloud services, intelligent systems and Big Data that have penetrated rapidly" (Boghian, Socoliu, 2020) that contribute in particular to increasing the efficiency of the organization's activities, as well as the accuracy of data processed with ERP systems. According to Ungur and Cuciureanu (2017), digitalization does not only refer to the acquisition of equipment or computer systems, but also to the possibilities offered by new technologies in streamlining the activities carried out by organizations.

An organization can grow sustainably as long as it is aware that the negative effects of its activity on the environment can be significantly reduced by implementing ERP systems. ERP systems contain many functions useful to the entire organization that decides to implement these systems, which are arranged modularly as follows: specific modules "supply business, finance, human resources, accounting, sales and other customer-specific modules depending on the field of activity" (Rajan, Baral, 2015). Thus, these systems offer the possibility to digitalize a large number of activities within the organization (Hietala, Päivärinta, 2021), so that the information processed with these systems is much more "correct and complete, providing a correct and complete picture of the situation of the organization" (Kanellou, Spathis, 2013).

2. Problem Statement

ERP systems integrate a lot of business processes such as: supply, accounting, human resources, finance, production, and sales (Spathis, Ananiadis, 2005; Hassan, Mouakket, 2015; Rajan, Baral, 2015). The main advantage of these systems is that they process a large volume of data in a short time. At the same time, all processed information is saved in the application database, ensuring quick access to data and reducing the amount of printed paper facilitating the sustainable development of organizations (Ursăcescu et al., 2019).

Sustainability is an important economic component both for the business environment and for managers and entrepreneurs (Dona, 2020). Danciu (2013) considers the concept of sustainability as an "important strategic component for the future of the organization", because, based on it and the data provided by ERP systems, managers make different decisions regarding the continuity of the organization's activity.

Organizations that want to grow sustainably must be "socially responsible" (Mirghafoori et al., 2017) and must use IT equipment that consumes less electricity and use complementary resources at the expense of traditional resources

(Mathews, 2015). Knut (2016) believes that the role of sustainability for an organization is to ensure value creation for as long as possible.

Oracle (2020) identified the main benefits of the ERP system within the organization:

- data accuracy;
- low operating costs;
- automation of a very large number of work tasks;
- reducing the risk of errors in the ERP system due to the controls implemented in the IT system.

Given the many advantages offered by ERP systems, HassabElnaby et al. (2012) consider that they have an impact on the fulfillment of "strategic, organizational, management, operational and IT infrastructure objectives".

Watson et al. (2010, cited by Bradford et al., 2012) consider that ERP systems provide a "multilateral view of the organization" because information in different areas is easily integrated and processed by ERP systems. The main criteria that an ERP system has in the sustainable development of an organization are efficiency, energy consumption as low as possible, reliability, and portability.

Following the digitalization process, the role of users of financial-accounting information will no longer focus only on document processing, but will also include skills related to analysis and consulting, being able to interpret the data that will be processed using ERP systems (Boghian, Socoliuc, 2020). Digitalization offers the opportunity to open new horizons, through which users of financial-accounting information "will be able to capitalize on their knowledge to provide new services to customers" (CECCAR, 2019).

3. Research Questions / Aims of the Research

The purpose of this article was to be observe how ERP systems influence the sustainable development of an organization, as well as the need to implement these ERP systems as a result of the massive change in technology in the last period.

4. Research Methods

The research method used in this paper was quantitative, based on a questionnaire structured in two sections: a section containing questions outlining the profile of respondents and a section containing questions specific to the research topic of the paper. The questionnaire contained closed-ended questions and 5-step Likert scale questions to identify the relationship between ERP systems and the sustainable development of the organization. The reason why I chose the quantitative research method was to conduct a detailed and in-depth investigation in order to observe the perception of ERP users regarding the sustainable development of the organization in the digital age.

The questionnaire was distributed between November 13, 2020 and November 24, 2021 to respondents who work in the economic field and use ERP systems, taking into account the level of studies graduated. The limitations of my research were due

to the limited access to the number of respondents who use these systems, some of the respondents using integrated applications implemented by the company. Even though the number of companies implementing ERP systems is growing, there are still quite a few companies using integrated applications implemented internally.

The respondents who participated in the survey were between 20 and 70 years old, most of them residing in urban areas (79.6%), the rest coming from rural areas (20.4%). The studies graduated by the respondents are mostly undergraduate studies (79 respondents), followed by those with master studies (29 respondents), and then doctoral studies (4 respondents).

In this study, I constructed based on the questionnaire a multifactorial regression model consisting of 5 components (independent variables) as follows:

$$y = \alpha_0 + \alpha_1 * SLOW + \alpha_2 * SQUAL + \alpha_3 * SPROD + \alpha_4 * SACT + \alpha_5 * SINFRA + e \quad (1)$$

where:
SLOW   = cost reduction;
SQUAL = quality and transparency of information;
SPROD = improved productivity;
SACT   = the influence of the activity of the organization in general;
SINFRA = the infrastructure of the organization.

I formulated 4 hypotheses presented in Table 1:

**Table 1. The hypotheses that will be tested based
on the multifactorial regression model**

No. crt.	Hypotheses	Relationship
H_1	ERP systems (SERP) provide support in the sustainable development of the organization	SERP and independent variables: SLOW, SQUAL, SPROD, SACT, SINFRA
H_2	There is a significant relationship between SERP and SLOW, SQUAL, SPROD	SERP and independent variables: SLOW, SQUAL, SPROD
H_3	There is a significant relationship between SERP and SQUAL, SINFRA	SERP and independent variables: SQUAL and SINFRA
H_4	There is a significant relationship between SERP and SACT, SINFRA	SERP and independent variables: SACT and SINFRA

Source: Author's creation.

5. Findings

The first part of the questionnaire contained questions based on which I was able to outline the profile of the respondents so that they could distribute the results according to their residence or type. Most respondents come from urban areas in a percentage of 79.6% according to the chart in Figure 1, and most of them being enrolled in university, master's or doctorate.

Figure 1. Distribution of respondents by residence
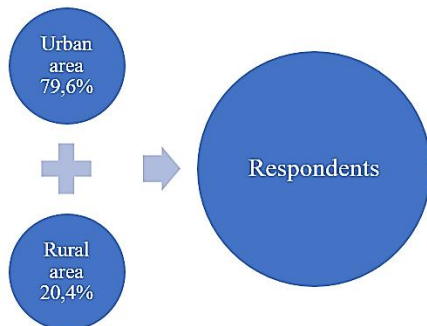
Source: Author's creation.

In Figure 2, I analysed the distribution of respondents according to gender and area of residence, observing that the largest share of respondents who responded to this questionnaire are female and live in urban areas.

Figure 2. Distribution of respondents according to gender and area of residence
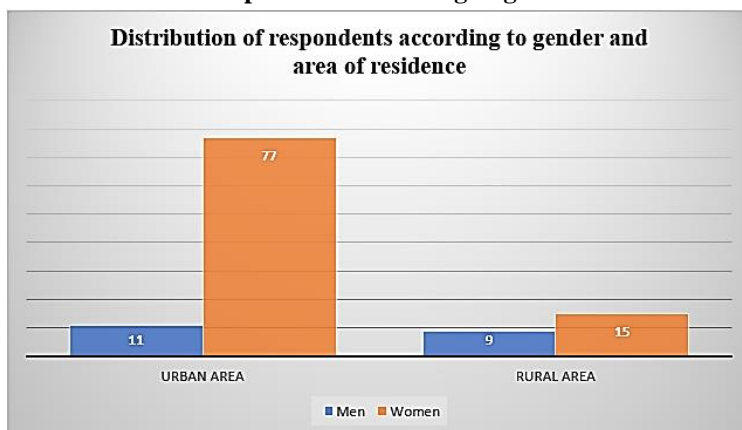
Source: Author's creation.

In Table 2, I presented a correlation between the age and the experience of the respondents in using ERP systems:

Table 2. Correlation between the age and the experience of the respondents

Age (years)	Experience				
	< 6 months	6 months - 1 year	1-5 years	5-10 years	>10 years
20 - 30	47	23	23	-	-
31 - 40	3	1	3	1	-
41 - 50	1	-	1	-	2
51 - 60	2	2	-	1	1
61 - 70	1	-	-	-	-
Total	54	26	27	2	3

Source: Author's creation.

According to data published by Eurostat in 2019, most young people start their first job at the age of 24 or 25, because younger people aged between 20 and 24 follow another form of education (university, post-secondary education). Some young people start working during their undergraduate studies.

In the second part of the questionnaire, I analysed whether ERP systems have an impact on the sustainable development of the organization, using the regression model built (1). The data collected using the questionnaire were statistically analysed using the Microsoft Excel application, performing a regression analysis to observe the impact of ERP systems on the sustainable development of the organization.

Based on the data that substantiated the construction of the regression model, I obtained the following relevant data from the regression analysis presented in Table 3:

Table 3. Summary output

Multiple R	0.9778
R Square	0.9561
Adjusted R Square	0.9453
Standard Error	0.9541
Observations	112

Source: Author's creation.

The regression coefficient (Multiple R) has a value of 0.9778 which is a value very close to 1, indicating that there is a very strong relationship between the SERP dependent variable and the independent variables (SLOW, SQUAL, SPROD, SACT, SINFRA). At the same time, according to the data obtained in Table 3, I can see that the variation of the dependent variable (SERP) is explained in a percentage of 95.61% (a value very close to 100%) of the independent variables (SLOW, SQUAL, SPROD, SACT, SINFRA).

Table 4. ANOVA

	df	SS (Sum of Squares)	MS (Mean Square)	F	Significance F
Regression	5	2130.60	426.12	468.07	0
Residual	107	97.41	0.91	-	-
Total	112	2228	-	-	-

Source: Author's creation.

According to Table 4, I tested the validity of the constructed regression model, observing that the value of the significance threshold (Significance F = 0) is less than 0.05, resulting that the constructed regression model is valid.

Table 5. Coefficients of independent variables

Model	Coeffi-cients	Standard Error	t Stat	P-Value	Lower 95%	Upper 95%	Lower 95%	Upper 95%
Intercept	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
X_1 - SLOW	0.0561	0.1181	0.4752	0.6355	-0.1780	0.2903	-0.1780	0.2903
X_2 - SQUAL	0.3146	0.1445	2.1764	0.0317	0.028	0.6011	0.028	0.6011
X_3 - SPROD	0.2921	0.1675	1.7432	0.0841	-0.04	0.6242	-0.04	0.6242
X_4 - SACT	0.0468	0.1754	0.2670	0.7899	-0.301	0.3947	-0.301	0.3947
X_5 - SINFRA	0.3445	0.1471	2.3420	0.0210	0.0529	0.6362	0.0529	0.6362

Source: Author's creation.

Based on the table 5, I established the coefficients from the regression model, which is below presented:

$$y = 0.0561 * X_1 + 0.3146 * X_2 + 0.2921 * X_3 + 0.0468 * X_4 + 0.3445 * X_5 + e \quad (2)$$

where:
X_1 = cost reduction (SLOW);
X_2 = quality and transparency of information (SQUAL);
X_3 = improved productivity (SPROD);
X_4 = the influence of the activity of the organization in general (SACT);
X_5 = the infrastructure of the organization (SINFRA).

At the same time, I tested the significance of the variables in Table 6, thus identifying only the variables that will remain valid within the constructed regression model. To calculate the significance of these variables, I used the values obtained in the P-value column of Table 5.

Table 6. Coefficients of independent variables

Independent variable	Calculating the significance of variables 100% - (p-value * 100)	Significant / Insignificant
X_1 - SLOW	36.44% < 95%	Insignificant
X_2 - SQUAL	96.83% > 95%	Significant
X_3 - SPROD	91.58% < 95%	Insignificant
X_4 - SACT	21% < 95%	Insignificant
X_5 - SINFRA	97.90% > 95%	Significant

Source: Author's creation.

From the regression model built, after testing the significance of variables it can be observed that the main factors influencing the sustainable development of the organization are the quality and transparency of information processed with ERP systems, but also the organization's infrastructure greatly influences the flow of information through ERP systems. Thus, the regression model remained composed of only 2 variables that which are significant:

$$y = 0.3146 * X_2 + 0.3445 * X_5 + e \qquad (3)$$

where:
X_2 = quality and transparency of information (SQUAL);
X_5 = the infrastructure of the organization (SINFRA).

The independent variables SLOW, SPROD, SACT obtained values lower than 95%, consequently these variables are not significant and were eliminated from the model.

In Table 7, I checked the hypotheses that are confirmed or denial to outline the final conclusions.

Table 7. Hypotheses tested based on the multifactorial regression model – confirmation or denial of hypotheses

No.	Hypotheses	Relationship	Confirmation / Denial
H_1	ERP systems (SERP) provide support in the sustainable development of the organization	SERP and independent variables: SLOW, SQUAL, SPROD, SACT, SINFRA	Partially confirmed only by variables SQUAL and SINFRA
H_2	There is a significant relationship between SERP and SLOW, SQUAL, SPROD	SERP and independent variables: SLOW, SQUAL, SPROD	Denial
H_3	There is a significant relationship between SERP and SQUAL, SINFRA	SERP and independent variables: SQUAL and SINFRA	Confirmation
H_4	There is a significant relationship between SERP and SACT, SINFRA	SERP and independent variables: SACT and SINFRA	Denial

Source: Author's creation.

The reasoning behind the confirmation or denial of the hypotheses formulated in the methodology part of the research was based on the significance of the independent variables in the regression model tested and statistically analysed. Thus, only hypothesis H3 was confirmed and hypothesis H_1, which was partially confirmed, because only between the dependent variable (SERP – ERP systems in sustainable development of the organization) and independent variables (SQUAL – quality and transparency of information, SINFRA - organization infrastructure) exist a significant relationship.

6. Conclusions

Given the rapid evolution of IT technologies in recent years, it has led to an increase in the degree of automation due to the need to process a very large volume of data in a short period of time, and the data processed to be as accurate and complete as possible, but also to increase the credibility of the data. The degree of automation of the activity carried out by the organization greatly depends on the increase of the competitiveness between the organizations.

Digital transformation also involves costs, efforts, and risks to keep up with technological developments. Thus, any organization must take into account changes in the field of IT technologies and invest in high-performance IT equipment or systems so that it can streamline its work, but also reduce the negative effects on the environment that could occur as a result of the activity carried out by the organization.

The use of high-performance IT systems, especially ERP systems, would allow the organization to develop sustainably in the context of the evolution of digitalisation. The use of ERP systems is the way in which organizations can significantly reduce the inefficient consumption of resources (paper, electricity), and all activities of the organization can be automated with these systems. Sustainable development is the key to meeting current needs without compromising the ability to meet the needs of future generations.

Given the results obtained in the study conducted in this article, I noticed that ERP systems offer a higher quality and transparency of data processed with these systems, while having an impact on managing the flow of information between departments in electronic format, to the detriment of printing excessive amount of information to be distributed between the departments of the organization, as the data is stored in the database of the ERP system.

All processed data is stored in the database of the ERP system in order to be easily accessed by employees of the organization in different departments for faster preparation of monthly reports that will be presented to managers. Data processed with ERP systems are much more transparent, providing a clearer picture of the organization. Based on the data provided by the ERP systems, the important decisions are taken regarding the continuation of the organization's activity, so as to reduce as much as possible the risks to which the organization could be subjected. Managers make the most important decisions regarding all the functions and assets of the organization, ensuring the continuation of the activity. Thus, before implementing an IT system, it must first consider the risks to which the organization may be exposed when transferring data from the previous system to the one in which it was implemented.

Managers' expectations regarding the implementation of ERP systems are mainly: supporting the achievement of business objectives, flexibility, accuracy, cost reduction, and supporting the entire activity of the organization.

In conclusion, I can say that ERP systems provide support in the sustainable development of organizations because they play an important role in the processing, storage, and distribution of data within organizations.

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Straightforward System – ERP Risk in Companies Life

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Abstract

When embarking on an ERP implementation, choosing the best ERP software for your organization is one of the most important things you can do. Technology plays a key role, so for most of owners that have no shortage of ERP Systems to choose from, it's hard to know what will fit their needs and business the best. Our qualitative study and the conclusions were found to be equivalent, supporting the validity of choosing and implementing ERP systems. We also involve quantitative study to demonstrate the understanding and adoption rate of straightforward system by different types of business. Business requirements are basically a definition of what organizations need from their technology to do and is usually based on business processes and on their future state that they are trying to accomplish. The corresponding results from this study show the importance of best practices in finding the best ERP, taking into consideration implementation ERP project failure that shows needs of an organization and how systems differentiate in the marketplace.

Keywords: Enterprise resource planning (ERP), risk assessment, failure indicators, DTS, straightforward system.

JEL Classification: O33, E32.

1. Introduction

Starting with 1990s adoption of ERP (enterprise resources planning) within organizations has achieved lots of interests in information systems (IS) research, that had outcome in a major count of research surveys. Enterprise systems embody a substantial mainstay of the business, which can control all organizational resources and relations in one system (Osnesa et. al, 2018).

Enterprise resources planning systems are synchronized of the self-software package that is assembled on best practices centered on different industries. Besides, ERP reply to the necessity for built-in solutions by swapping the legacy systems to prevent incompatible structures and database dismissal, also decreasing costs of maintenance servicing, and setting a common platform for organization.

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Hence, Fedi et al. (2019) point out the facilitating role of IT systems for an allowed compliance. An ERP system is a multipart business processes integration to mechanize the flow of material, information, and financial funds among all functions within a company using a central and unified database (Fedi et. al., 2019).

Thus, Enterprise Resources Planning became industry-driven basics and systems and widely acknowledged by the singular type of business as a realistic solution to accomplish the long-awaited cohesive enterprise information systems (Addo-Tenkorang, Helo, 2011).

ERP selection it is important, argues Panorama Consulting Groups, in 2021 reports, for organizations and their businesses upcoming goals to consider what functionality they will need in the next five years (Temur, Bolat, 2018). Once every organization understands those goals, it can lead to a particular vendor being good for a long term.

The actual literature about ERP system includes appreciable amounts of research, articles, publications, and other multiple sources like mass-media that define and talk about ERP implementation lengthwise with its substantial impacts on organizations from different perspectives and perceptions. This study not only proposed a crucial overall of ERP systems, but also offered the main factors that could practically influence organization decision in selecting the ERP system.

2. Problem Statement

The selection of an ERP system means a difficult process and must be effective in dealing with organizational doubts (Osnesa et al., 2018). The task of ERP in organizational activities is growing faster and, in line with it, organizations are imposed to use complex software systems to keep up with the density of products, industries services, and beneficiary expectations and needs, as well as the market pressures (Alavi, Eklili, 2011).

An Enterprise Resources Planning enables an organization to incorporate all business processes in order to improve efficiency and maintain a competitive position (Fotache, Hurbean, 2004), hence Chofreh et al. (2016) assumed that the implementation of ERP projects is not trivial and requires considerable effort to achieve. The process includes a wide- range of information covering management and technology (Chofreh et al., 2016).

Most of the time, implementation design comes with remarkable requests on time and financial resources. Incomplete incomes, such as a close-fitting time schedule or a lack of process knowledge and aptitudes of IT teams, as well as the extremely differentiated market, can turn the selection of an adequate ERP system into a highly complicated mission (Fischer et al., 2017; Fedi et al., 2019).

At the end of the 1980s, there was the market ERP system and a new category of software fit for enterprises, which at the beginning marked the big companies from the market. Those new complex systems, including turnkey resolutions, extremely expensive, proprietary, and dominant, the implementation comprises their adaptation to the requirements and specifics of business (Osnesa et al., 2018).

Alaskari and Ahmad, 2019 mention that ERP, in several cases, will not find the unique needs of a particular business. Thus, the decision to choose the best ERP to match business processes is important, elements of which are a capable system supplier are: installation; supervision organization and business processes of change, in consequence enabling productive ERP implementation (Alaskari et. al., 2019). Aloini et al. (2012) argued that implementation of a good ERP project involves selecting the appropriate ERP; because unsuitable ERP system selection would initiate the project to fail, adversely decreasing organization performance (Aloini et al., 2012). It is obvious that organizations have various number of ERP solutions that can be chosen. Most ERP systems offer a wide range of capabilities and have been implemented according to the best practices of the industry (Fischer et al., 2017).

On the other hand, Naaman 2020, argues that success or failure in ERP implementation is very challenging to measure, involving a lot of various factors, in addition to problems occurring in the early stages, those cannot be tracked (Yulianto et al., 2020).

Therefore, with so many solutions on the market, organizations frequently experience challenges in the adoption of the best ERP software.

This fragment of the study provides selection advice and analyzes the ERP decision of the organization about its size.

Table 1. Selection ERP

Rank I	Rank II
Systems designed for enterprises with complex size, which combines entity structure and consolidation needs with operational processes, but also for mid-sized enterprises that have only one industry and one entity to handle. Typically, organizations with 10$ million to $750 million revenue per year.	Systems adapt for mid-sized and smaller enterprises that have only one industry and need topic solutions with niche functionality, and for them there are hundreds of software providers.
Examples: Microsoft Dynamics 365 Finance; SAP S/4HANA, Oracle ERP Cloud, Sage X3, IFS	Examples: Sage ERP 300, Aptean, ECI, ASC Sage ERP 100.

Source: Interpretation according to Panorama Consulting Group, 2021.

The choice process should not be overlooked when selecting an ERP product, so that the success of the ERP implementation can be ensured. Choosing the suitable ERP system is expected to deliver accurate information, so that information and data can be used to make decisions and provide additional value for the company. Additionally, incorrect choice of ERP system can cause a burden for organization.

2.1 Assessing Risk

Based on the various frameworks, the word risk has been understood differently, and the authors have come up with several definitions in this sense. Therefore, risk assessment establishes a report that analyzes the potential for bad things to happen and the actions that must be taken to keep them from happening or minimize the risk, thus can be understood in other ways from people's experiences, and it is also different depending on the point of view and propensities (Aloini et al., 2012; Liu, 2019).

According to Aloini (2012), a "risk analysis" is the process of arriving at a risk assessment, also called a "threat and risk assessment, thus, risk assessment includes risk identification (RI) and risk qualification (RQ). Where, RI aim at sensible identification of hypothetical threats (in-house and outdoor risk factors) and their collision (effects) on project success. On the other hand, risk qualification proposes to prioritize threats to their risk-wide and involves two main steps: Risk Analysis (RA) which provides the treatment stage for the final risk and input to the assessment and preparation of the best response strategy. In addition to risk evaluation or RE defines class risk, choosing an appropriate, effective risk aggregation algorithm, the risk level for each recognized risk aspect can be expressed synthetically (Aloini et al., 2012). In theory, risk indicates the possibility of deviating from the desired goal at a given time. Also, terms like uncertainty or indefinite situation, ambiguity about the future are defined in the risk theory (Fischer et al., 2017).

Analysis of failure factor and their effects is listed to as a set of targeted actions to identify and measure impending failures of products, activities and their effects, overall process of identifying all the risks to and from an activity and assessing the potential impact of each risk (Carlton, 2019).

2.2 Risk Assessment and ERP Systems

Enterprise resource planning (ERP) projects have a risky implementation. According to Gartner, the failure rates for ERP implementation go beyond 75% (Gross, 2019). Meanwhile, ERPFOCUS, 22 August 2019 report, talks about 60% of ERP project failures, because implementing an ERP causes heavily change almost 80% of customers are unhappy with their current ERP. Additionally, 90% implementation is disappointing, providing non-quantifiable ROI (Kumar Behera, Kumar Dhal, 2020). Based on another study conducted by Learn Hub, 64% of ERP implementation projects spend more than the agreed budget, and on average 30% more time than expected.

The above results advise that vigilant and rigorous studies must be carried out on the ERP projects. Also, all the experts, managers, and user its technicians should be prepared to operate in a new system with standardized processes taking into account the improvement and adjustment of the information course in their most significant activities (Alavi, Eklili, 2021).

3. Research Methodology and Results

Remarking those various challenges with implementation ERP systems, this survey aims to identify six indicators why ERP implementation fails and to help organizations predict the risk and avoid the mistakes that other known infamous failed project of ERP implementation.

The main issue with ERP systems occurs when organizations are in contact with wrong selection. Thus, in the end clues towards improper planning, difficulties in functionality and a higher cost.

Exploring in most recent reports published in the last few years from Panorama Consulting Group, NetSuite, Forbes, and Deloitte, we identify six essential indicators why ERP implementation fails.

Indicators were made using analyses of many articles and publication on top reasons that ERP implementation failure.

Table 2. Indicators failure

No.	Description	Indicator
1	Unrealistic Timeless Expectation	UTE
2	Change Management	CMG
3	Improper Master Data	IMD
4	Deficient System Testing	DST
5	Wrong Partner Selection	WPS
6	Inadequate Resources	IQR

Source: Own processing: Tops failure reasons of ERP failure.

In our study, we use some of the famous failure that converts into viral failure implementation on the newspaper, publication, or mass media. This famous top holding great organization that realized a lot from their implementation processes.

Also, according to the publication, organizations that had the biggest issue with ERP project that became a huge failure it will be present in Table 3.

Table 3. Famous organization with failure ERP project

No.	Company	Failure losses	System Brand	Impact- year
1	Revlon	70,3$	S/4HANA	2018
2	LeasePlan	100$	SAP	2018
3	MillerCoors	100$	SAP	2017
4	Lidl	580$	SAP	2011
5	Nike	400$	In-house	2003

Source: Own processing from online – media data.

For each indicator recognized in businesses story we granted a point, so that in the end I could estimate a total of all the indicators encountered and their portion in the five implementations.

Where the presence of indicators has not been encountered or mentioned, it has not been taken into consideration.

Hence, we represent the indicators with their explanations of ERP project failure to get the most common indicator that must be avoided when an organization selects an ERP package and handles the implementation.

Table 4. Indicators by companies

No. Company	Company Name	Indicator						
		IQR	WPS	DTS	IMD	CMG	UTE	TOTAL
1	Revlon	1	1	1	0	1	0	4
2	LeasePlan	1	1	1	0	0	1	4
3	MillerCoors	0	1	1	1	0	1	4
4	Lidl	1	0	1	0	1	1	4
5	Nike	1	0	1	0	1	0	3
TOTAL		4	3	5	1	3	3	-

Source: Own processing online reports from Panorama Consulting Group, 2021.

DTS becomes the most awful indicator bump into all companies, because any other indicator influence impacting it, even if we talk about IQR, because resources are almost the main user who benefits from that kind of implementation or UTE, for the reason that companies have to take into account also testing in UTE.

DTS finished a failure step on all five businesses analyses and it turned to the first aspect of downfall. IQR stands on second position in our research because we found a lot of movements through teams who were involved in ERP implementation processes.

The third indicator was WPS, CMG and also UTE, all companies had some of them, two indicators or just one of them, which of course led to ERP failure.

IMD comes across just one point indicator, all other indicators considered more important than this one at the end of failures.

4. Conclusions

Based on our approach, the results can be used to identify the root causes of the ERP system implementation utilization failure and count the impact of

dangerous component failures or critical risk events in the implementation process and selection.

Concerning of rapid spread of ERP systems in the industrialized world, and facility launched by each intelligent business application research that helps to explain, choose of an ERP and how those differentiate in the market and also its impact on organization performance, is beneficial for professionals and not just them.

How could those prescribed companies have treated the issues in another way? First of all, they must be skeptical of perceptions such as Oracle's Unified Model, SAP's Model Company, NetSuite's Suite Success, Microsoft Business Basic and other ERP industry systems that may mislead to improbable expectations and search well if one of those can be fit with their business needs.

Digital transformations are too often misaligned with an evolving business model and overarching corporate strategy. It is nearly impossible to succeed in this type of situation. Furthermore, according to the Henrico Dolfing report, being a responsible buyer of technology and outsourced software development services and working well with suppliers during projects are crucial skills for any organization.

A systematic risk assessment might have equipped the organization for such setbacks. There are inherent risks to any Enterprise Resources Planning and expecting to go live without any issues is unrealistic.

This research work offers a new instrument to practitioners by allowing them a better understanding of the project of success or failure of the ERP system. The managers of the information system and the users of the new ERP need to realize the implication of their activities in the development of success and how they contribute to the improvement of performance.

The selection of the best ERP system taking into consideration that should fit our business needs leads to a successful implementation project that could transform your ERP into a straightforward system.

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Determinants of the Individual Decision to Travel Less during the COVID-19 Pandemic

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Abstract

In an effort to reduce the spread of the COVID-19 outbreak, the international tourist arrivals worldwide have been brought to pre-1990s levels, the travel and hospitality industry being one of the most affected industries during the pandemic. Multiple factors created difficulties in planning trips, decreasing travel demand. This paper investigates the determinants of the individual decision to travel less during 2020 and 2021, through a quantitative analysis of 224 survey answers collected from a convenience sample of people living in and outside Europe. The results show that the unease generated by the travel restrictions and scheduling when considering flights and accommodations had the highest impact on travel. Moreover, being older, and the fear of getting infected as a result of the trip increased the likelihood of travelling less. The respondents manifest travel-related anxiety and a preference for prudent trips (domestic, familiar, or tailored). The gender, occupation, income, and continent were not found as predictors of the level of travel during the pandemic.

Keywords: tourism, travel, COVID-19, pandemic, behavior, hospitality, airline, anxiety.

JEL Classification: L83, L93, D91, I12, I18, Z3.

1. Introduction

Travel and tourism companies struggled to adapt and survive during the COVID-19 pandemic. Customer behavior experienced changes, with potential long-term effects. However, as travel restrictions started to be removed, airports and

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airlines were unprepared to accommodate the surge in demand in 2022, producing delays, cancellations, and strikes (Amaro, 2022).

Individuals faced tremendous uncertainties when planning trips in 2020 and 2021, thus choosing or being forced to stay at home more. Travel restrictions, alongside health concerns and other factors, increased prudence when considering destinations, transport means, accommodations, entertainment, etc., prudence acting as a safety net for one's state of mind in uncertain situations and aiming to alleviate anxiety. Tourists influenced business models through their selections and feedback. New travel trends emerged, people preferring longer stays with higher spending, in domestic or closer destinations that offer "get away", sustainable and authentic experiences (World Tourism Organization, 2022).

This paper aims to assess the individual travel behavior and decision making during the COVID-19 pandemic. The investigation is based on the research question: *What are the determinants of the individual decision to travel less during 2020 and 2021?*

2. Context

In an effort to reduce the spread of the COVID-19 outbreak, the international tourist arrivals worldwide have been brought to pre-1990s levels, the pandemic having a stronger impact than the SARS epidemic of 2002-2004 or the global financial crisis of 2007-2008, as presented in Figure 1 (World Tourism Organization, 2020 and 2022).

Figure 1. International tourist arrivals in the past three decades (worldwide)

Source: As resulting from the World Tourism Organization (2020 and 2022).

The international tourist arrivals worldwide increased by 4% in 2021; however, this is still 72% lower compared to 2019 (World Tourism Organization, 2022). 64%

of the global tourism experts expect international tourism in their country to return to pre-pandemic levels in 2024 or later (World Tourism Organization, 2022).

The global business travel expenses were reduced by 52% in 2020 (Benefield et al., 2021). Although business travel accounts for only 12% of airline passengers, it generates up to 75% of profits (USfunds, as cited by Investopedia, 2021). This could lead to big losses for airlines, hotels and other industries serving corporate travelers, as lower volumes of business travel are expected even after the pandemic, due to increasing effectiveness and time savings through virtual meetings (Semuels, 2021).

The COVID-19 pandemic lowered air fares in 2020, as the air service providers tried to attract more customers; however, higher prices could be expected in the near future, since airlines will attempt to recover from two years of massive losses (The Conversation, 2021; Schengen Visa Info, 2021).

Multiple factors created difficulties in planning trips, decreasing travel and tourism demand, from countries temporarily closing their borders to all/most international travel and frequent changes in regulations, to the fear of getting infected, delays in treatment and vaccine availability, the emergence of new virus variants increasing uncertainty, etc.

The parasite-stress theory explains how a species identifies and avoids infected individuals, maximizing reproductive success and altering the species' values, social behaviors and immune systems (Fincher and Thornhill, 2017; Fincher et al., 2008). Pathogen threats predict greater in-group attraction, while individual differences in disgust sensitivity and subjective perceptions of pathogen prevalence, regardless of actual infection rates, predict out-group avoidance and prejudice (Meleady, Hodson, Earle, 2021; Landry, Ihm, Schooler, 2021), and higher levels of engagement in preventive health behaviors (Shook et al., 2020). The perception of the risk of human-to-human transmission of infection when travelling was greatly increased by the COVID-19 pandemic (Rahman et al., 2021), people manifesting greater levels of disgust sensitivity compared with pre-pandemic data (Stevenson, Saluja, Case, 2021) and increased anxiety (Makhanova, Shepherd, 2020). Furthermore, the actual or perceived pathogenic threat predicts authoritarianism (Pazhoohi, Kingstone, 2021) and collectivism (Fincher et al., 2008; Kashima et al., 2021). These cultural adaptations to pathogenic threats amplify in-group acceptance and out-group avoidance, through imitation of in-group members, ethnocentrism, obedience, and punitive attitudes toward dissenters. Since cultural patterns have a strong tendency to influence their future state through temporal autocorrelation (Kashima et al., 2021), long-term socio-economic setbacks could be generated, either as a result of widespread ideological compliance, or intense state and institutional distrust.

The COVID-19 pandemic was often studied in relationship with the behavioral immune system (BIS), which is represented by a series of psychological mechanisms allowing individual organisms to detect potential pathogens in their immediate environment and facilitate the avoidance of infection by triggering cognitive and emotional responses (Schaller, Park, 2011). However, some authors criticize BIS's applicability in infectious respiratory diseases due to the lack of apparent cues of infection, especially in asymptomatic and pre-symptomatic transmission, and the

limited utility of the behaviors engaged by BIS in combating this type of infection (Ackerman, Tybur, Blackwell, 2020).

The terror management theory, which focuses on the role mortality salience plays in different aspects of life, was also studied in relationship with the COVID-19 pandemic. While proximal defenses are activated to forestall death and provide a feeling of safety in the short term, distal defenses push for the pursuit of meaning and close relationships which buffer death anxiety in time of crisis, thus creating a tension between following the COVID-19 related safety measures and the desire to resume a "normal" life (Pyszczynski et al., 2020; Ahmed, Ahmed, Barkat, 2020).

Collective emotions, such as collective anxiety, could spread within populations as a result of pandemic awareness, the type of information people come into contact with, and the perceived credibility of the source, affecting human behavior and decision-making.

3. Methodology

A self-administered, online survey collected 224 valid answers during 2021 from people in and outside Europe selected through convenience and snowball sampling. The sample size meets the requirements for a 95% confidence level with a 6.55% margin of error.

The first section of the survey aims to gather demographic data (i.e., age, gender, occupation, average monthly net income in the last 12 months). The second and last section of the survey has 33 items measured on a 1 to 6 Likert scale (1 = "strongly disagree"; 6 = "strongly agree") for assessing the respondents' travel behavior and decision making during the pandemic.

Data analysis was performed in SPSS. A principal component analysis (PCA) was used for the Likert items and checked against a parallel analysis and reliability analysis. Index variables were constructed for each of the latent variables through arithmetic mean of their items. A multiple linear regression was performed for the predictors of the tendency to travel less during the COVID-19 pandemic (regardless of transport type, travel type or destination). Cluster analysis was employed for the demographic variables. Tests of correlation, association, and difference of means were used where appropriate.

4. Findings

The 224 valid answers came mainly from the younger generations, as available in Table 1. 90% of the respondents are from Europe, the rest living on the other continents. 70.5% of the total respondents are women. The dataset has no unemployed or retired respondents, 37% being students and 63% being employees of public or private organizations. 34% of the total respondents reported they had an average net income of 1000-2000 EUR in the last 12 months, 43.3% having below 1000 EUR and 22.7% above 2000 EUR.

Table 1. Dataset demographics

		Frequency	Percent
gender	man	66	29.5
	woman	158	70.5
age	18-25	140	62.5
	26-35	34	15.2
	36-45	13	5.8
	46-55	35	15.6
	over 56	2	.9
occupation	student	82	36.6
	employed	142	63.4
income (average monthly net income in the last 12 months)	under 300 EUR	37	16.5
	300-599 EUR	27	12.1
	600-999 EUR	33	14.7
	1000-1999 EUR	76	33.9
	2000-2999 EUR	20	8.9
	3000-4000 EUR	16	7.1
	over 4000 EUR	15	6.7
continent	Europe	202	90.2
	Other	22	9.8

Source: Dataset analysis in SPSS.

As a result of PCA, parallel analysis and reliability analysis, 30 Likert items were separated into five factors (Table 2): (1) Less travel in 2020 and 2021 – the tendency to travel less during the COVID-19 pandemic, regardless of transport type, travel type or destination; (2) Concern: Travel restrictions and scheduling – the unease with travel restrictions and scheduling when selecting flights and accommodations; (3) Concern: Destination and virus – the infection fear and caution when selecting a destination, flight, and accommodation; (4) Concern: Refunds and cancellations – the unease with refunds and cancellations when selecting flights and accommodations; (5) Travel anxiety and pacifying choices – the travel anxiety and preference for prudent trips (domestic, familiar or tailored). The other three Likert items in the survey are analyzed separately.

Table 2. Factor analysis results

Factor	Item	Cronbach's Alpha (std.)
Less travel in 2020 and 2021 (regardless of transport type, travel type or destination)	I have travelled less in 2020 – the first year of the COVID-19 pandemic.	.722
	I have travelled less in 2021 – the second year of the COVID-19 pandemic.	
	I have booked significantly fewer accommodations in 2020 - the first year of the COVID-19 pandemic.	
	I have booked significantly fewer accommodations in 2021 – the second year of the COVID-19 pandemic.	

Factor	Item	Cronbach's Alpha (std.)
Concern: Travel restrictions and scheduling (for flights and accommodations)	I have been very cautious when choosing the dates for my future flight in 2020 considering the pandemic.	.788
	I have been very cautious when choosing the dates for my future flight in 2021 considering the pandemic.	
	I was strongly taking into account the possible travel restrictions when booking a flight.	
	I have been very cautious when choosing the dates for future accommodation booking in 2020 considering the pandemic.	
	I have been very cautious when choosing the dates for future accommodation booking in 2021 considering the pandemic.	
	I was strongly taking into account the possible travel restrictions when booking accommodation.	
Concern: Destination and virus (social distancing and infection fears)	I was very cautious when choosing a travel destination in 2020 considering the pandemic.	.707
	I was very cautious when choosing a travel destination in 2021 considering the pandemic.	
	I was concerned about social distancing regulations implemented by the chosen airline company.	
	I considered the safety regulations (COVID-19-related) implemented by the accommodation when choosing and booking a place to stay.	
	I was very concerned regarding the possibility of contacting the COVID-19 virus.	
Concern: Refunds and cancellations (for flights and accommodations)	I was very careful when choosing the airline company in terms of the refund policy.	.847
	I was worried that the chosen airline company may cancel my booking due to unforeseen COVID-19 restrictions.	
	I was more likely to choose an airline company with a flexible booking policy rather than one with a no-change policy	
	I was concerned about not receiving the refund quickly (or at all) from the booked airline company.	
	I was careful when choosing the accommodation in terms of the refund policy.	
	I was very concerned about not receiving the refund quickly (or at all) from the booked accommodation.	

Factor	Item	Cronbach's Alpha (std.)
	I was more likely to choose accommodation with a flexible booking policy rather than one with a no-change policy.	
	I was worried that the chosen accommodation may cancel my booking due to unforeseen COVID-19 restrictions	
Travel anxiety and pacifying choices (domestic, familiar or tailored trips)	I was anxious about planning a trip in 2020 and 2021 due to COVID-19.	.706
	I was anxious about having to quarantine due to COVID-19 (at destination or when back home).	
	My psychological well-being was affected by the restrictive travel.	
	I considered planning trips inside my own country instead of abroad due to COVID-19 risks & restrictions.	
	I was more likely to choose an internal trip (inside my country) rather than an external one (outside my country).	
	I was more likely to explore my city rather than visit another one (within my country) taking into account the pandemic.	
	I was more likely to choose a tailored trip rather than a short and disorganized one due to the higher risks when travelling during the COVID-19 pandemic.	

Source: Dataset analysis in SPSS.

All factors have reliability values >0.7, with adequate inter-item correlations to allow for factor analysis, $p < 0.001$, and adequate sampling, KMO>0.5. The five factors explain 50.85% of the variance.

With the exception of the "I was more likely to explore my city rather than visit another one (within my country) taking into account the pandemic" item (M = 3.26, SD = 1.669), for which the respondents manifested slight disagreement, $p < 0.05$, all the other items had statistically higher means compared to the Likert scale midpoint of 3.5, showing a level of agreement with the statements, $p < 0.01$. No statistically significant difference was found between rating the level of travel in 2020 vs. 2021, $p > 0.05$.

The following index variables were constructed for each factor through arithmetic mean of their items: LESS (for the "Less travel in 2020 and 2021" factor); C:RESTR&DATE (for the "Concern: Travel restrictions and scheduling" factor); C:REF&CL (for the "Concern: Refunds and cancellations" factor); C:DEST&VIR (for the "Concern: Destination and virus" factor); ANX&PR (for the "Travel anxiety and pacifying choices" factor).

Figure 2. Answers distribution for the five index variables
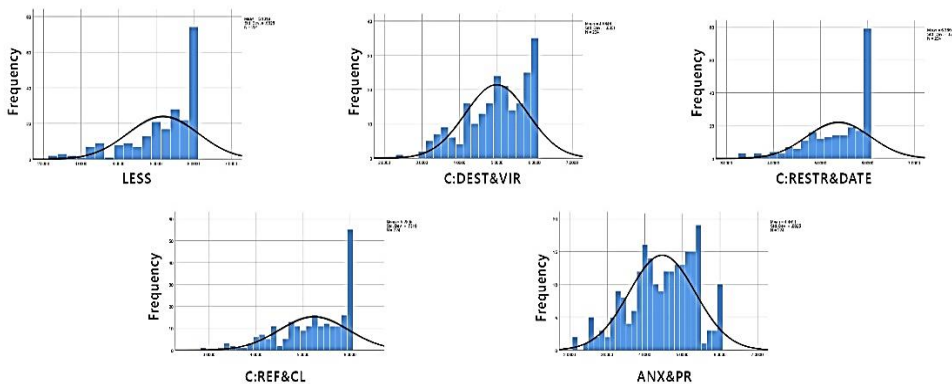
Source: Dataset analysis in SPSS.

As presented in Figure 2, the index variables follow a non-normal distribution with negative skew, Kolmogorov-Smirnov showing a significant departure from normality for all factors, $p<0.001$. The results show that the respondents were highly inclined to say they travelled less during the COVID-19 pandemic, being concerned with the travel restrictions, scheduling, refunds and cancellations when selecting flights and accommodations, and manifesting travel anxiety and infection fear, being cautious when selecting a destination, and having a preference for prudent trips (domestic, familiar, or tailored).

The index variables have moderate tendencies to vary in the same direction (Table 3). The demographic variables have very weak associations with the five index variables, Eta coefficients < 0.19. No statistically significant differences were found in the way each of the demographic variables (gender, age, occupation, income, continent) rated the index variables, Mann-Whitney and Kruskal-Wallis $p>0.05$.

Table 3. Pearson correlations between the index variables

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
LESS (1)	1				
C:RESTR&DATE (2)	.492**	1			
C:DEST&VIR (3)	.362**	.459**	1		
C:REF&CL (4)	.195**	.486**	.405**	1	
ANX&PR (5)	.260**	.408**	.485**	.322**	1

**$p<0.001$; *Source*: Dataset analysis in SPSS.

The dataset was split into two clusters based on the age, occupation and income variables, as resulting from hierarchical cluster analysis using the Ward method, followed by the k-means cluster analysis. The gender and continent items were not deemed significant for clustering. Figure *3* offers a visual representation of the clusters.

**Figure 3. Dataset clustering based on age, occupation and income,
as represented by the cluster center values**
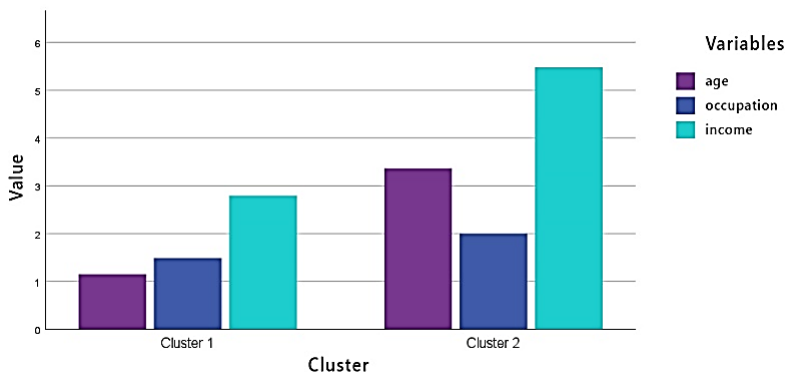
Source: Dataset analysis in SPSS.

Cluster 1 has 161 cases and is comprised of the younger generations (87% 18-25 years old, 11.2% 26-35 years old and 1.8% 36-45 years old) who are approximately 50% employed and 50% students, having an average monthly net income of zero to 2000 EUR in the last 12 months. Cluster 2 has 63 cases and is represented by the respondents who are at least 26 years old (55.6% 46-55 years old, 25.4% 26-35 years old, 15.9% 36-45 years old, 3.1% over 56 years old), 100% being employed, with average monthly net incomes of 600 to over 4000 EUR in the last 12 months. The clusters have very weak associations with the five index variables, Eta coefficients < 0.19. No statistically significant difference was found between the ways the two clusters rated each of the index variables, p > 0.05.

A multiple linear regression (MLR) was performed for the predictors of LESS. The model found that C:RESTR&DATE, C:DEST&VIR and age make a significant contribution to the prediction of LESS, p<0.05. There are no multicollinearity concerns, VIF≈1 (<10), Tolerance≈0.75 (>0.2) and the regression residuals follow a normal distribution. C:RESTR&DATE makes the strongest contribution in explaining the outcome, with Beta = 0.392, p<0.001, as available in Table 4.

Table 4. Summary of MLR for the predictors of LESS

Dep. var.	R Sq.	Adj. R Sq.	Std. Err.	F	Df1	Df2	Interc.	95% conf. int. for intercept	Predictor	Beta	β	95% conf. int. for β
LESS	0.281	0.271	.796	28.602 **	3	220	1.055	[0.164, 1.946]	C:RESTR&DATE	0.392 **	0.539	[0.362, 0.715]
									C:DEST&VIR	0.188 *	0.210	[0.067, .0352]
									age	0.125 *	0.101	[0.009, 0.193]

*p<0.05; **p<0.001; *Source*: SPSS.

28.1% of the variance in LESS is explained by the regression model. The model is a statistically significant predictor of the outcome, with $p<0.001$ and is defined by equation (1).

$$LESS_i = 1.055 + 0.539 * C:RESTR\&DATE_i + 0.210 * C:DEST\&VIR_i + 0.101 * age_i + \varepsilon_i \qquad (1)$$

The respondents were asked if they believe "we will go back soon to what we used to know as normal travelling", the results showing a slight agreement with the statement $t(223)=2.550$, $p<0.05$ ($M=3.75$, $SD=1.494$, Skewness = -0.078, Kurtosis $= -0.943$). People living in Europe were marginally more optimistic, $p<0.05$. To add, there was no inclination for investing or not "in travel insurance due to the risks presented by the pandemic", $p>0.05$ ($M=3.39$, $SD=1.804$, Skewness=0.060, Kurtosis $= -1.381$), and the respondents had almost 50-50 chances to report they were spontaneous when it comes to a trip considering the COVID-19 virus. People who were not from Europe were strongly disagreeing with being spontaneous when planning trips during the pandemic, $p<0.05$. However, the comparative analysis of people living in and outside Europe is limited by the small number of non-Europeans in the sample.

5. Conclusion

The tendency to travel less during the COVID-19 pandemic was particularly influenced by the unease with the travel restrictions and scheduling when considering flights and accommodation. Moreover, being older, and the fear of getting infected as a result of the trip increased the likelihood of travelling less.

There was a preference for prudent travel choices, such as domestic, familiar or tailored trips; however, this did not seem to reduce travel anxiety enough to produce a substantial increase in travel. Besides, a study based in South Korea, suggests that even if there are no strict travel restrictions for particular domestic destinations with low COVID-19 infection rates, the overall national situation impacts the citizens' decision to travel to those places (Ren et al., 2022).

Similarly, choosing airlines and accommodations with flexible booking and customer-friendly refund policies did not seem to reduce the concern of getting the trip cancelled (or not receiving a refund) enough to markedly increase the number of trips in 2020 and 2021.

The gender, occupation, income, and continent were not found as predictors of the level of travel during the pandemic taken individually, and neither was the combination of age, income and occupation.

The high number of extreme cases on the agreement side when considering various travel worries might capture strong collective emotions influenced by peers, travel restrictions, government regulations and information circulated in the mainstream media, social media and academic papers. However, there is a slight optimism when considering the idea that normal travel will resume soon.

While the pandemic forced states, institutions, and individuals to take decisions under remarkable uncertainties and pressures, it is critical to consider the cultural

and economic implications of pandemics and contemplate ways to avoid prolonged and cascading failure.

In an effort to reduce the spread of the COVID-19 outbreak, the international tourist arrivals worldwide have been brought to pre-1990s levels, the travel and hospitality industry being one of the most affected industries during the pandemic. This paper contributes to the understanding of the determinants of the individual decision to travel less during the COVID-19 pandemic, providing insight for governments, marketers, and industry players. However, this study has a demographically unbalanced sample, covering mainly the experience of younger Europeans, and did not account for multiple travel types (business, leisure, family visits, etc.) or other transport types apart from airlines. Thus, further studies could develop on this exploration by increasing the focus on specific issues, such as business travel, destination selection, or travel marketing receptiveness in a post-pandemic context.

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Preliminary Research on the Auditing of Material and Financial Resources in the Healthcare System – The Case of Romania

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Abstract

The hereby paper introduces the reader to the intricacies of the healthcare system by resorting to a rigorous audit of the organizational resources that the healthcare system has access to, namely the financial resources, the human resources and last but not least the material resources. By resorting to a complex mixed methodology, the paper sheds light on the healthcare system in Romania. a) This is a panoramic analysis of the entire health system, thus differing from a simple audit mission of an institution in this field. b) Alignment with the UN and the EU policies in the healthcare system is paramount in order for Romania to rank better in terms of medical services rendered to its population, and as such the focus of policies should be on ensuring organizational, human, material, and financial resources. c) The research methodology used to investigate the phenomenon in question is based on audit procedures established in the specialized practice, which is extrapolated from scientific research and adapted to the audit field. By employing the previously mentioned methodology, the present paper seeks to answer the main research question, which is: How does the increase in the health budget influence the quality of medical services provided in Romania? d) The main findings indicate that the Ministry of Health is unable to satisfy the different requests for financing and, concerning material expenses, in 2020 they have decreased significantly. e) One of the main contributions of the paper resides in deep practical character and can be used by professionals from all fields for activities such as substantiating public policies, government evaluations, and further research projects.

Keywords: health, healthcare, healthcare system, organizational resources, Romania.

JEL Classification: H75, I10, I15, I18.

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1. Introduction

Over the past decades, the complexity of the healthcare systems has increased progressively, as well as the challenges that it has to respond to and the shortcomings that it faces. The Sustainable Development Goals (UN, 2020) mention, among the seventeen goals, reaching good health and wellbeing which translates into reducing mortality from all sorts of causes, strengthening prevention and treatment, and achieving universal healthcare coverage (UN, 2019), which is an underlying principle according to which the citizen of the countries should be able to have undeniable healthcare access without facing financial adversity or distress. Countries trying to attain these objectives should create the premises for enhancing financing, strengthening policy (Calder, 2021), and, implicitly, improving service towards population (Adebisi et al., 2020).

In the light of the presented context, the paper aims to answer the main research question: *How does the increase in the health budget influence the quality of medical services provided in Romania?* To achieve this, the paper will meet the following specific objectives:

1. evaluation of the legislative, institutional, and organizational framework in the Romanian health system;
2. evaluati the impact of investments and endowments in the Romanian health system;
3. evaluating the efficiency of financial allocations at the level of the Romanian health system;
4. elaboration of recommendations on each research axis.

The paper is based on the results of a performance audit report in the field of human resources in the health sector, as well as on a documentation on the hospital infrastructure in Romania. Starting from the existing specialized literature, as well as through the contribution of its own research, the thesis will cover four fundamental axes of audit for the diagnosis of the entire healthcare system in Romania: Axis 1 – organizational resources audit, Axis 2 – human resources audit, Axis 3 – material resources audit, Axis 4 – financial resources audit, however, the main focus will stay on Axis 3 and Axis 4.

2. Problem Statement

Since Romania joined the European Union, it had to shift from a rather centralized healthcare system and heavily underfunded and underperforming (to certain extents, characteristic for a formerly communist country) to a more patient-oriented system that brought major improvements in the life quality of its citizens (Pop et al., 2020). Although Romania is trying to align with the EU levels, it is still one of the countries with the lowest share of health expenditure to GDP, attracting one of the lowest levels of expenditure per inhabitant (Romania insider, 2017).

As portrayed by Pop et al. (2020), in order to ensure better quality of the lives of our people, more attention should be paid to two fundamental issues: the brain-drain of medical professionals (Suciu et al., 2017) – which is a stringent problem because

the state pays for the education of the future medical professionals, however, they leave taking jobs in other countries and causing the state not only to incur no return on its investment, but also the actual loss of population, on the one hand, and on the other hand the necessary infrastructure in order to render high quality medical services to the population as stated by the Romanian Constitution. The healthcare system in Romania is organized on three levels: primary (general practitioners), secondary (also referred to as outbound – specialized ambulatory services), and tertiary (provided in hospitals). The universal condition for ensuring the proper implementation of public health policies is the existence of a functional system of active, competent, and responsible authorities, which have the power to effectively distribute the available budget (Smith, 2018).

The Romanian health system is provided by health units, respectively, hospitals, national health institutes, public health departments, county ambulance services, county health centers, which are subordinated to the Ministry of Health, local public administration authorities, Ministry of Transport, The Romanian Academy, the Ministry of National Defense, the Ministry of Internal Affairs, the Ministry of Justice, the Romanian Intelligence Service and other units.

In Romania, the health system remained largely centralized, to the detriment of the efforts of the authorities regarding the decentralization of hospital units, a first step being the adoption of the Government Decision G.D. No. 303/2011 for the approval of the National Strategy for the rationalization of hospitals. The Ministry of Health aimed to increase efficiency in providing medical services, maintaining their accessibility and quality, reducing costs in hospital units, which will allow a redistribution of resources to other segments of health care (primary medicine, outpatient care, day care, home care, etc.), which can ensure the treatment of a larger number of patients, with lower costs than those of hospitals.

These are the premises conducive to the elaboration of the current paper.

3. Research Methods

The methodology proposed for the purpose of this research is based on audit procedures established in the specialized practice, which is extrapolated from scientific research and adapted to the audit field. The procedures will be used to achieve the specific objectives and to pursue the four avenues of research. These are: a) audit procedures used to obtain audit evidence, namely: direct observation, examination of documents and questionnaires, and b) analytical audit procedures, quantitative and qualitative, used for the analysis of audit evidence, which explains the findings and establishes the cause-effect link. This category includes: comparative analysis (Benchmarking), cost-benefit analysis, cost-effectiveness analysis.

a) Audit procedures used to obtain audit evidence

The observation represents the pursuit in order to obtain audit evidence of the various activities carried out within the healthcare system, processes, or internal procedures performed by the persons within the audited entities;

The document analysis is a form of qualitative research, and it consists of the analysis of the information contained in the documents of the entities related to the audit objectives in order to disclose meaning.

The interview of people with responsibilities in the field is one way of collecting information during an audit and is essential for helping the auditors understand the entity beyond the documented processes and reveals duties which are not comprised in procedures or instruction.

  b) Analytical audit procedures, quantitative and qualitative

The comparative analysis is an audit procedure used to analyze audit evidence consisting mainly in examining trends, identifying ways to improve performance, and increasing economy in ensuring human resources (health personnel) in the national public health system.

The cost-benefit analysis is an audit procedure used for the analysis of audit evidence, which is performed by studying the relationships between the costs of providing human resources (health personnel) in the national public health system and the benefits derived from this action.

The cost-effectiveness analysis is an audit procedure used for the analysis of audit evidence and is performed on the relationships between the costs of providing human resources (health personnel) in the national public health system and the results expressed in costs per unit of obtained result.

4. Findings

In the previously presented context, normative acts were approved regarding the transfer of health care management subordinated to the Ministry of Health to local public administration authorities, as well as the list of public health units with beds for which health care management is done by local public administration authorities and Bucharest City Hall (Government Decision G.D. No. 529/2010).

Additionally, most of the health units are subordinated to the local public administration authorities, some are subordinated to the Ministry of Health, and some health units are subordinated to other ministries and public institutions, which shows that both the subordination and financing of the health system are mixed.

According to the provisions of Law no. 95/2006 on health care reform, as well as by G.D. no. 529/2010, the financing of the Romanian health system is ensured from several sources, as follows:

- from the state budget and from own revenues (excises) through the Ministry of Health;

- from the budget of the Single National Health Insurance Fund;

- from the local budgets that participate in the financing of some administration and functioning expenses, respectively, goods and services, investments, capital repairs, consolidation, extension and modernization, endowments with medical equipment of the public sanitary units of county or local interest;

- from the ministries and institutions of the system of defense, public order, national security, and judicial authority, through its own budget, which participates in the financing of some expenses for the administration and functioning of the sanitary units from their structure;
- other sources (non-reimbursable funds, donations, sponsorships, etc.).

An essential aspect of the health system in the vision of the Ministry of Health is the reversal of the pyramid of medical services, namely increasing the efficiency of medical services, accessibility in disadvantaged areas, and the ability to respond to beneficiaries of medical services.

In order to perform the audit of material resources, the existence of the following premises in the research activity will be considered, as they are highlighted in the financial statements of the Ministry of Health.

Table 1. Statements of investment expenditures at the level of the Ministry of Health, during 2016-2020

Year	2016		2017		2018		2019		2020	
Thousand lei	**Requested**	**Financed**	**Requested**	**Financed**	**Requested**	**Financed**	**Requested**	**Financed**	**Requested**	**Financed**
TOTAL Allocated funds, of which:	2.512.484	419.986	1.912.593	159.925	1.965.787	180.255	2.798.814	991.807	2.765.173	559.933
TOTAL CAPITAL TRANSFERS	2.380.749	401.341	1.870.003	145.916	1.930.290	166.112	2.729.498	982.352	2.682.041	520.860
TOTAL CAPITAL EXPENSES	131.735	18.645	42.590	14.009	35.497	14.143	69.316	9.455	83.132	39.073

Source: Ministry of Health Financial Statements, 2021.

As depicted in Table 1, capital expenditures registered a downward evolution in the period 2016-2018. Also, expenditures on goods and services had an upward trend in the period 2016-2018, followed by a significant decrease in the period 2019-2020. In terms of investments, the Ministry of Health received requests for investment funds in the amount of 11,954.851 thousand lei and allocated funds through capital transfers and capital expenditures (from the state budget and excise duties) in the total amount of 2,311,906 thousand lei, respectively 19%.

After the audit, the detailed situation of the types of investments financed from the budget of the Ministry of Health in the period 2016-2020 is presented in Figure 1.

**Figure 1. The structure of capital transfers carried out between 2016-2020
(OY axis thousand lei)**

	2016	2017	2018	2019	2020
Medical equipment	280.601	85.917	125.775	871.390	422.271
Investments in hospitals	61.283	33.727	28.780	75.908	63.057
Major repairs	59.457	26.272	11.557	35.054	35.532
TOTAL	401.341	145.916	166.112	982.352	520.860
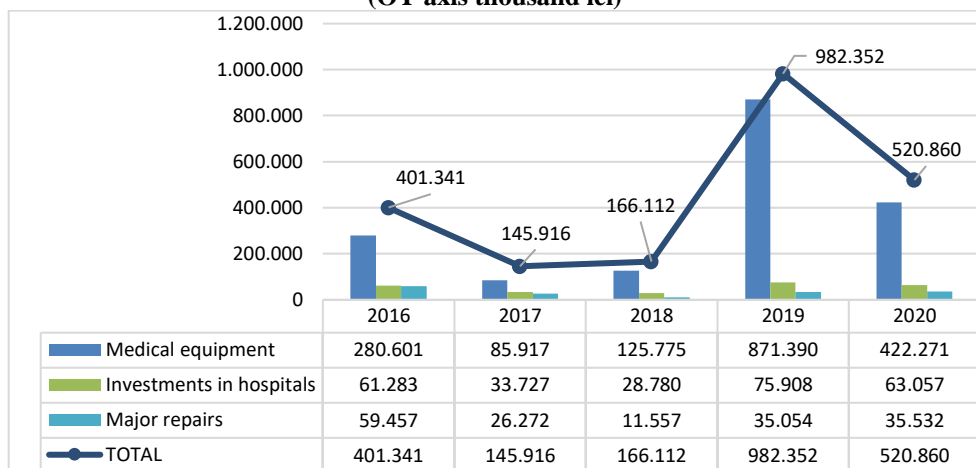
Source: Ministry of Health Financial Statements, 2021.

Investments in hospitals are rather fluctuating and investments in hospitals as depicted in Figure 1 undergo a downward trend, as well as the investment in medical equipment. This dire situation resulting from Table 1 and Figure 1 is a consequence of the lack of legal allocation procedures. Such procedures should be in place in order to consider also past requests of each hospital/unit and they should be evaluated in terms of scores for receiving the funding they need.

When it comes to the financial audit at the level of the Romanian healthcare system, after a careful analysis, we concluded that, between 2016 and 2020, the funds allocated to health have incurred an increase.

**Figure 2. Structure of expenditures (OY axis - lei)
of the Ministry of Health 2016-2020**

	2016	2017	2018	2019	2020
Expenditures from own revenues budget	1.378.913	1.503.320	1.863.142	76.000	76.235
State budget expenditures	4.188.006	4.408.699	5.904.797	9.394.104	11.250.588
Total funds allocated	5.566.919	5.912.019	7.767.939	9.470.104	11.326.823
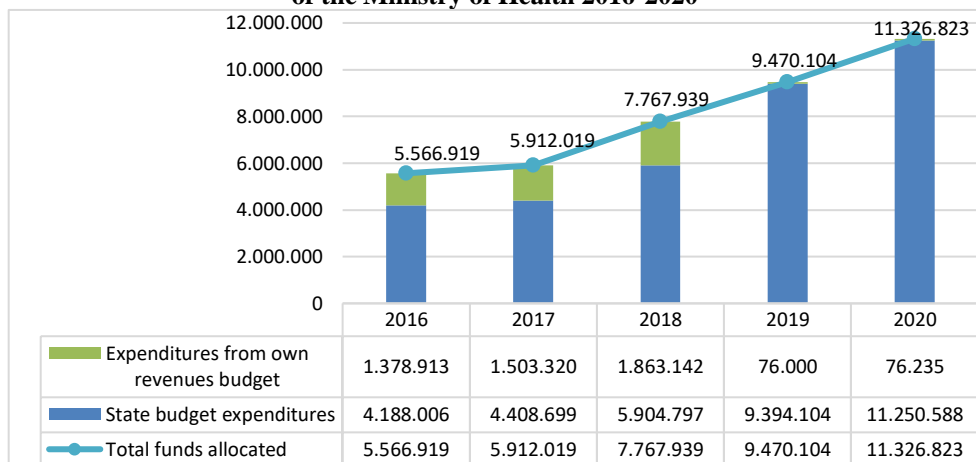
Source: Ministry of Health Financial Statements, 2021.

With respect to the revenues collected, the highest share is represented by revenues coming from excise (94.59% in 2016, 94.46% in 2017 and 90.78% in 2018). Own expenditures registered an increasing trend in the period 2016-2018, followed by a significant decrease in the period 2019-2020, respectively, by over 90%, because the Ministry of Health no longer collected excise revenues, due to legislative changes.

Figure 3. Detailed situation of expenditure (OY axis - lei) categories at the level of the Ministry of Health in the period 2016-2020

	2016	2017	2018	2019	2020
Staff expenditure	969.866	1.508.180	1.860.395	2.035.955	2.262.133
Goods and services	1.699.632	1.814.367	2.025.444	3.626.707	4.827.776
Transfers between public administration units	1.306.736	990.308	1.762.360	3.513.798	3.834.908
Other transfers	7.412	4.843	4.695	4.344	6.543
Post-accession FEN-funded projects	131.265	8.085	12.792	11.800	0
Projects with FEN funding for the 2014-2020 financial framework	4.031	5.402	12.588	11.937	59.203
Other expenses	1.194	975	9.863	10.998	12.195
Expenditure on reimbursable funding programs	48.449	76.000	216.000	168.596	208.478
Capital expenditures	19.421	539	660	9.969	39.352

Source: Ministry of Health Financial Statements, 2021.

The main conclusion we gather from the analysis of Figure 3 is that Personnel expenditure has generally been on an upward trend; Expenditures on goods and services had an upward trend in the period 2016-2018, followed by a significant decrease in the period 2019-2020; the expenses with the transfers between units of the public administration registered a downward evolution in the period 2016-2018, later (in the period 2019-2020) this type of expense has disappeared, and lastly, capital expenditures generally displayed a downward trend.

5. Conclusions

The Romanian healthcare system is characterized by a lack of integration between different sectors, so the Ministry of Health initiated legislative proposals as a result of which the G.E.D. no. 18/2017 on community health care. This legislative amendment aims to introduce community healthcare that contributes to improving the health of the population by ensuring equitable access to health services for all people in each community, regardless of socio-economic status (Vlădescu et al., 2016), level of education, its location in rural or urban environment or remote from the provider of medical services.

Currently, most health services are provided directly in the hospital, this segment being oversized, and the services provided in the community are provided much below the need (e.g., maternal and child health insurance services, home care services for dependent patients, and monitoring services for patients with various diseases). An anticipated evolution is foreseen by providing outpatient services, so that they have a much greater weight in the provision of specialized medical services and to contribute to the effective reduction of avoidable hospitalizations.

Regarding the financing of investment projects related to the infrastructure of the public health system, the conclusion was that it is not based on objective prioritization criteria, as it is necessary to adopt a normative framework to establish a uniform methodology for providing the necessary financial resources to the network of hospitals at the national level. The proposals focused on establishing unique criteria for granting investment financing.

The originality of the research comes from it being a panoramic analysis of the entire health system, thus differing from a simple audit mission of an institution in this field; moreover, the study is based on a diverse and complete range of data available for research; the research results can have a deep practical character and can be used by professionals from all fields for activities such as substantiating public policies, government evaluations, further research projects. Future lines of research should focus on organizational and human resources.

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Mapping Industry 4.0 in the Portuguese Industry

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Abstract

With Industry 4.0 and digital transformation, organisations have undergone enormous changes in business models, engineering, manufacturing, processes, and technologies. Hence, the need to investigate the status of its current knowledge and maturity. This research, supported by a survey for data collection (fifty valid responses), aims to analyse the knowledge and maturity (on a five-scale level) of Industry 4.0 in Portugal from the perspective of industrial companies. The conclusions highlight that the Portuguese organisations will have to adapt to the impact of Industry 4.0 on how their business is being developed and encompass the digitisation with new technologies. Unfortunately, adopting the concepts and methodologies inherent to Industry 4.0 is still incipient in Portugal, suggesting a possible lack of knowledge and poor leadership. Companies need to strategically change towards business models that are more flexible to the potential of technology and have a closer relationship with customers, ensuring increased operational autonomy and repositioning products and services. Having a team dedicated to digitisation increases the Industry 4.0 maturity level. Companies with a maturity Medium/High level of Products and Innovations have a higher level of perception based on their capacity for innovation, supported by new digital models and tools. Concerning Human Resources, the digitisation of knowledge management means and the promotion of new ideas for digital transformation increases its I4.0 maturity level. This study contributes to the start of the art of Industry 4.0 in Portuguese companies, mapping its present status, and providing insights for its future enhanced adoption.

Keywords: Industry 4.0; digitization; Portuguese industry; maturity level.

JEL Classification: O39, L60, C38.

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1. Introduction

Industrial revolutions contributed to significant enhancements in the output and productivity of the manufacturing industry. Industry 4.0 is transforming the manufacturing firm business models and can support production flexibility, efficiency, and productivity (GTAI, 2014; Ibarra et al., 2018; Rüßmann et al., 2015), fostering innovation, competitiveness, and improved industrial system sustainability (Müller et al., 2018; Stock, Seliger, 2016). The Industry 4.0 technologies adoption in companies and industries is a highly relevant topic (Luthra, Mangla, 2018; de Sousa Jabbour et al., 2018; Kiel et al., 2017). However, it is unclear how Industry 4.0 technologies can be integrated into existing production systems and what processes they can support (Kolberg, Knobloch, Züehlke, 2016).

Due to the lack of research encompassing the adoption of Industry 4.0 in Portugal, this research aims to analyse the knowledge and maturity of Industry 4.0 in Portugal from the perspective of industrial companies. The reaming of the paper is structured as follows: Section 2 provides an overview of the scientific literature in the industry 4.0 field. Section 3 details the Research Questions, and Section 4 the Research methods. The results and discussions are explained in Section 5, and Section 6 is devoted to conclusions, limitations, and suggestions for future research.

2. Problem Statement

Industry 4.0 leads to digital transformation where everything is interconnectted with a corresponding virtual representation, namely, business models, environments, production systems, machines, operators, products, and services (Alcácer, Cruz-Machado, 2019). Industry 4.0 is based on advanced manufacturing and engineering technologies, such as Cyber-Physical Systems (CPS). The CPSs integrate information technology with the physical system comprising the operational technologies, e.g., the production facilities and smart machines and storage systems (Kagermann et al., 2013; Qin et al., 2016). Furthermore, the Internet of Things (IoT) connects the CPS elements by monitoring the status of physical objects, capturing meaningful data, and communicating that information through networks to software applications (Blunck, Werthmann, 2017).

The enabling technologies for Industry 4.0, also called the nine Industry 4.0 pillars, have been identified as: Big Data Analytics, optimisation and simulation, cloud technology, virtual and augmented reality (VR/AR), horizontal and vertical system integration industrial IoT, additive manufacturing, autonomous robots, and cybersecurity (Rüßmann et al., 2015; Wee et al., 2015).

The main reported benefits of Industry 4.0 include: the enhanced integration of business processes across the entire value chain (Bonilla et al., 2018); innovation, flexibility, agility, productivity and efficiency improvements, in addition to cost reductions (Alcácer, Cruz-Machado, 2019; Oesterreich, Teuteberg, 2016); Support

for new business models supporting novel ways of value creation, e.g., cloud-based, service-oriented, process-oriented business models (Kiel et al., 2017); Ecological sustainability, e.g., more efficient resource utilisation, and social sustainability, e.g., workers more supported to do their job (de Sousa Jabbour et al., 2018).

Although Industry 4.0 is increasing notoriety, many organisations face obstacles to adopting the Industry 4.0 and are still trying to identify Industry 4.0 implications and challenges and what the required competencies are (Sanders et al., 2016). Moreover, it is often difficult for companies to establish their current state concerning Industry 4.0 development, failing to identify specific priorities, actions, and projects (Erol, Schumacher, Sihn, 2016). Nevertheless, several few roadmaps or maturity models have been proposed by academics, practitioners, and consultants, to support Industry 4.0 successful adoption. Namely Lee, Bagheri, and Kao (2015), Anderl (2014), the German Government (Schumacher, Erol, Sihn, 2016); Leyh et al. (2016); Ganzarain and Errasti (2016), Leyh et al. (2016), Pessl et al. (2017), Akdil et al. (2018), and PwC (2020).

However, the successful adoption of Industry 4.0 faces several challenges. Namely, the need for adequate training and education to overcome resistance to change (Yaseen et al., 2017), increased capital requirements and issues of data ownership (Brous et al., 2020), and to address privacy and security concerns (Oesterreich, Teuteberg, 2016). Moreover, academic research indicates that a lack of Industry 4.0 integration with the overall business strategy can negatively impact environmental performance (Oláh et al., 2020; World Economic Forum, 2018). Therefore, Industry 4.0 successful adoption requires strong leadership, the right human competencies, work ethics, and suitable management systems (Fonseca, 2017; World Economic Forum, 2018).

Several researchers investigated the application of Industry 4.0 in companies in specific countries. For example, Hamzeh, Zhong, and Xu (2018) present the results of a survey conducted in the New Zealand industry, where Industry 4.0 will be implemented to update and transform small and medium-sized enterprises (SMEs) in the future. Other researchers that studied this theme include Dalenogare, Benitez, Ayala, Frank (2018) in Brazil; Kim (2018) in South Korea; and Müller, Buliga, and Voigt (2018) in Germany. Furthermore, the consultancy firms Deloitte ("Industry 4.0 – at the intersection of readiness and responsibility", 2019) and PwC ("Global Industry 4.0", 2016) made relevant contributions to this topic. Specifically, Hamzeh, Zhong, and Xu (2018) analysed the contribution of Industry 4.0 to the business of the participants, the application of IT tools, and what are these tools, the window of possible implementation, the benefits, and obstacles of it, and thus determined the level of perception. Hence, this work provides valuable insights for the present research encompassing the adoption of Industry 4.0 in Portugal.

3. Research Questions / Aims of the Research

To successfully start the digital transformation process, companies must have a clear view of their current situation, their desired future state, and a strategic plan to achieve their goals (Rajnai, Kocsis, 2018). Therefore, it is essential to support corporations by providing them with guidelines for the required digital changes. However, due to the lack of research encompassing the adoption of Industry 4.0 in Portugal, namely empirical studies on the perception, knowledge, application and maturity of Industry 4.0 in Portuguese companies, the authors ask the following research questions: Q1: What is the perception and knowledge about Industry 4.0 by companies operating in Portugal?; Q2: What is the state of application of the tools and methods of Industry 4.0 by Portuguese companies?; Q3: What are the most critical factors for defining the maturity level of the implementation of Industry 4.0 in Portugal.

4. Research Methods

This study is framed with a quantitative methodology supported by an email survey encompassing a sample of 50 Portuguese companies. The survey featured distinct parts: Company characterisation; Industry 4.0 with six related companies' dimensions: Strategy and Leadership (SL); Customer Experience (CE); Operations (O); Products and Innovations (PI); Information Technology (IT); Human Resources (HR). After the survey validation, an email was sent to a total of 700 companies identified through a ranking of the largest companies in Portugal in 2019 and contacts made available by this research author(s). The data collection period was active between July and August 2020, and in total, 50 valid answers were obtained (response rate of 7.1%). Furthermore, the analysis of the sample survey results according to the company's characteristics suggests that this distribution is consistent with the distribution of the population. According to the proposed research questions, descriptive statistics were performed.

5. Findings

5.1 Characterisation of the Companies

In the 50 responses obtained, it was possible to observe a wide range of business branches, such as Services (20%), Metalworking (16%), and Automobile (12%) 72% of the companies were in the North of Portugal. More than 75% of employ more than 50 employees, and around 78% had a turnover greater than €1 million in 2019, of which 60% exceeded €5 million. Regarding the respondent's positions in the company, 30% hold Administration positions. These positions are closely followed by Owners, who represent 20% of respondents and Operations Managers, with 18%. Lean Manager and i4.0 Manager positions only represent 2% and 4% of respondents, respectively.

5.2 Industry 4.0 Companies' Tools Investments Analysis

Regarding the second part of the questionnaire, 60% of the respondents consider that the Industry 4.0 tools will have a contribution to the improvement of Production: more than 68% of the companies said that they use IT tools in Production Planning, Quality Management, Accounting and Finance and in Purchasing and Inventory Management, the latter having the highest usage rate (82%). Concerning the potential benefits of applying Industry 4.0, Increased Agility in Operations with 76% was chosen as the main benefit, followed, with 64%, by companies considering Improved Services to be offered to customers, and Reduced Production Costs as the second most significant benefit. In the opposite direction, when questioning companies about potential obstacles to implementing Industry 4.0, we can observe that the great focus is on the possible high-time investments and funds, being the options on which more than 60% of the companies focused. Furthermore, almost half of the respondents have difficulty accessing collaborators with the necessary knowledge to apply the changes implicit in the digitalisation of processes.

22% of the respondent companies have already implemented Industry 4.0 concepts, 26% have implementation forecast for the near future, up to 24 months, and almost one-third of the organisations have no plans for future implementation now. Regarding Industry 4.0 pillars, Augmented Reality, 3D Printing, Autonomous Robots, and Virtual Simulation are the least used in the companies participating in the study. Conversely, IoT/IoS (26%), Cloud Computing (24%), and Cybersecurity (20%) have the highest percentages of high usage (Figure 1). IoT/IoS and Cyber Security have usage rates above 72%. Horizontal and vertical integration of systems is the pillar more unfamiliar to the respondents.

Figure 1. Level (%) of use of the tools of the Industry 4.0 Pillars
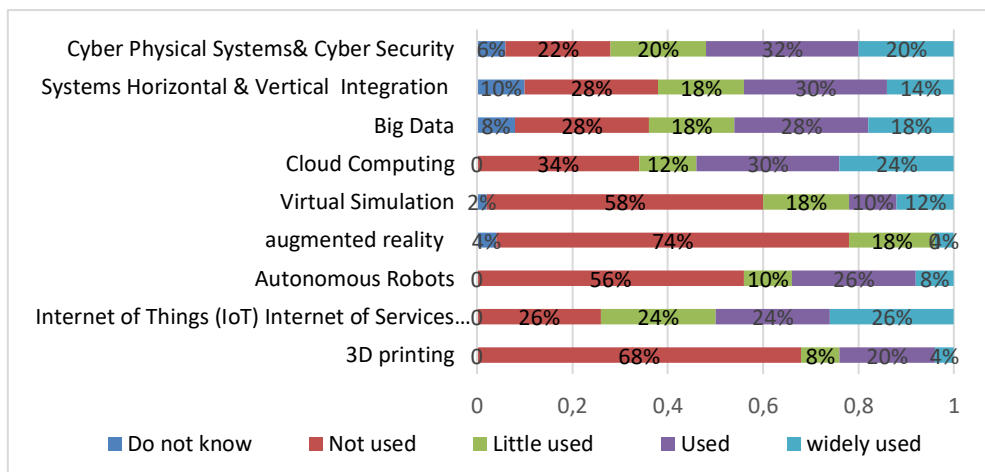
Source: authors' own elaboration based on data.

5.3 Level of Perception of Industry 4.0

Considering Hamzeh et al. (2018)' survey, when comparing the Portuguese self-assess level of maturity perception of Industry 4.0 with the results obtained from the survey conducted in New Zealand, as shown in Figure 2, the level of perception observed in the New Zealand study is higher than the Portuguese one.

Figure 2. Level of Perception of Industry 4.0
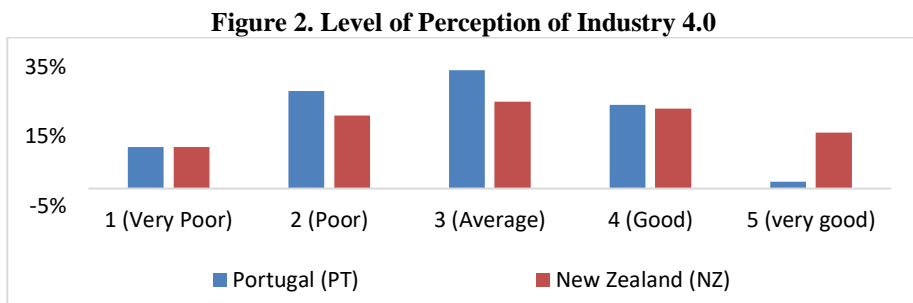
Source: authors' own elaboration based on data and compared.

5.4 Industry 4.0 Companies' Dimensions Analysis

Companies were analysed with six related company dimensions: Strategy and Leadership (SL); Customer Experience (CE); Operations (O); Products and Innovations (PI); Information Technology (IT); Human Resources (see Figure 3).

Figure 3. Mean assessment average of the surveyed companies
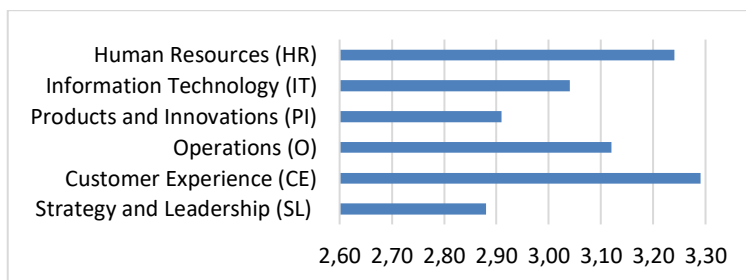
Source: authors' own elaboration based on data.

6. Conclusions

Overall, the research objectives were achieved by analysing the perception and knowledge about Industry 4.0 by companies operating in Portugal, ascertaining the state of application of its tools and methods in the national panorama, and determining the essential factors for defining the maturity level of the implementation of Industry 4.0.

Concerning the Research Question (RQ) 1 "What is the perception and knowledge about Industry 4.0 by companies operating in Portugal?" the Portuguese organisations will have to adapt to the impact of the Fourth Industrial Revolution on how their business is being developed. Furthermore, considering that the

industrial revolution is promoted with a solid technological base, organisations will need to enter the new reality of digitisation with new technologies.

Regarding RQ2, "What is the state of application of the tools and methods of Industry 4.0 by Portuguese companies? Unfortunately, the adoption of the concepts and methodologies inherent to Industry 4.0 is still incipient in Portugal, suggesting a possible lack of knowledge and poor leadership".

Finally, concerning RQ3, "What are the most critical factors for defining the maturity level of the implementation of Industry 4.0 in Portugal?" it is required to prepare and adapt to the successful adoption of Industry 4.0. E.g., by strategic change towards models that are more flexible to the potential of technology and have a closer relationship with customers who should be integrated into these services. Furthermore, greater autonomy and decentralisation will be needed at the level of operations. In addition, the adoption of the I4.0 paradigm also presupposes the repositioning of products and services.

In conclusion, although respondent organisations are aware of the potential benefits of Industry 4.0 implementation, they still look at this paradigm shift with some reticence. Namely, concerns with high monetary and time investments and insufficient human resources knowledge are difficult to obtain, which aligns with Sony's (2020) literature review. Therefore, there is a need to support the business case for I4.0. Furthermore, employees will have to develop new skills and qualifications since companies will demand a different employee, much more versatile, agile, and connected.

Nevertheless, the research results indicate that their actual Industry 4.0 level of knowledge is slightly higher than they initially assumed. This finding should be linked to the fact that, although they know and use industry 4.0 methodologies, they do not associate them with Industry 4.0 because they are unaware of their basic concepts.

Additionally, factor analysis and comparison of averages were performed, concluding that companies with a team dedicated to digitisation at the strategic level and making a cross-cutting effort to translate this digitisation at all levels increased their Industry 4.0 maturity. Furthermore, companies with a medium/high customer experience maturity level have a higher level of perception based on interaction with customers across multiple digital channels, continuously collecting information to improve products and services. At the level of Operations, the respondent organisations surveyed that have integrated management software for monitoring and process control with remote access increased their level of maturity in Industry 4.0 in this factor. This dimension causes a significant difference between companies with high maturity and low maturities. Moreover, the organisations with a medium/high product and innovation maturity level have a higher level of perception based on their innovation capacity, supported by new digital models and tools. Concerning Human Resources, the digitisation of knowledge management and the promotion of new ideas of transformation increases the level of maturity I4.0 of the Human Resources block. However, most companies do not have a dedicated team to do so.

Comparing this research results with Hamzeh et al. (2018), Portuguese companies report lower perceptions of Industry 4.0 than New Zealanders. However, companies in both countries have very similar hopes and fears regarding the implementation of digitisation. Finally, when comparing the results with previous studies by PWC and Deloitte, it was possible to conclude that Portuguese companies have not yet reached the scanning levels expected for 2020. Despite the increasing allocation of monetary and human resources to digital development.

The author(s) acknowledge that, despite their efforts, this research may suffer from the limitations inherent to the limited sample size and the survey methodology (e.g., possible bias). Concerning suggestions for future research, additional studies with increased sample sizes and further statistical analysis (e.g., the difference between sectors or organisation size) are proposed.

Acknowledgment

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Five Steps for Sustainable Business Modelling in The Metaverse

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Abstract

As we start experiencing the 4th industrial revolution, with the rise of the new Internet, people's physical and digital lives blend and new business opportunities arise for the next generation. We are still at an early stage of development for what we call "the metaverse": a real-time immersive world to be populated by avatars, digital twins, and all sorts of digital goods powered by an exponential rise in creators. In this context, all industries will have to redesign their business models to ensure a sustainable transition towards the next-generation engagement. Our paper proposes a framework for innovation consisting of 5 essential steps any company should take when approaching transformation in Web 3.0. In order to sustainably transition, businesses have to find the most suitable place in the digital space, ensure their presence, activate their community, co-create digital artifacts, and connect them with physical products. To deliver our paper we will build our research on qualitative and quantitative study, with the focus on exploring new-gen business case studies and conducting a series of interviews with experts from the international metaverse community.

Keywords: innovation, metaverse, business transformation, road map, sustainable, transition.

JEL Classification: M13, L10, L25, M30, O10, O32.

1. Introduction

"With the global outbreak of the COVID-19 pandemic, many people around the world have to stay at home and lack social interactions, leading to a surging demand for novel applications of social media" (Cheng et al., 2022). In this context, new digital platforms are creating room for more diverse opinions, encouraging peer-to-

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peer interaction, learning, and co-creating. These spaces are mostly shared virtual worlds, providing real-time immersive experiences, developed on gaming platforms.

Virtual worlds have been present in the online space for decades. Second Life, launched in June 2003, recreates the real world and gives its users the possibility to be whatever they want, generating at the same time an economy dependent on real money. Users are called residents, and they inhabit the digital world with their avatars. They meet and interact at social gatherings, experience live concerts, own digital assets, attend press conferences, and college classes. We can say that Second Life is a Web 2.0 metaverse, in the sense that it has three core elements: experience, economy, and community. In comparison, there are other current examples of more evolved versions of these digital worlds which are the closest to what we imagine as the metaverse, like Decentraland and Sandbox: they have their communities, economy, user-generated content and customized experiences, and they run on a blockchain infrastructure.

2. Literature Review

In this section, we explained the main factors standing at the basis of our research. For this scope, we provided the main definitions of the concepts set as a background for our paper.

Metaverse is the new interface that will take human-computer interaction to a new level. We will define it by extracting from the literature the terms that build this ecosystem, especially in technology: blockchain, AI, IOT, Cloud. In relation to the topic addressed in the research we will also introduce the terms crypto currency, gamification, and NFT. Metaverse is a term that does not yet have a universal definition; we know it was first mentioned in 1992 in Neil Stephanson's book Snow Crash (Joshua, 2017). On a general level, the metaverse is intended to have the ability to provide users with near-reality experiences and to enrich the quality of the experience, an action that involves advanced technology (Yuheng et al., 2022).

How do we define blockchain, IOT and cryptocurrency? A cryptocurrency is a digital form of exchange that uses encryption technology to develop and transfer funds. A blockchain records all the transactions that occur and is the basis of the trust protocol. At present, the Internet of Things (IoT) represents technologies such as that adopted for smart homes, smart sports activities, or smart transportation, applications developed to improve human life. Even though the IoT is currently undergoing continuous development, it is hampered by security, integrity, and data protection issues. Blockchain was created to help the use of cryptocurrency, but it needs to be integrated with IoT systems to mitigate the challenges it raises. (Ahamad et al., 2022)

Introducing AI. The literature identifies several starting points for the need to adopt AI. In the first phase, we can discuss the ability of AI to process large databases to discover repetitive patterns needed to generate value, increase efficiency and support decision making. From another point of view, AI is a solution to eliminate human errors through automation. We have noted throughout the research the need to integrate all terms into the AI ecosystem, because in the ever-evolving virtual

world, power and dependency are constantly negotiated between interconnected partners. (Keegan et al., 2022)

The term gamification was first developed in 2002, is still developing and should not be confused with other terms such as play, traditional games, or loyalty systems. The unique and differentiating element is the extension of the game term and the involvement of management in solving tasks. (Patricio et al., 2022).

Based on blockchain technology, NFTs have captured the interest of the public by being defined as tradable rights that can be registered as non-fungible tokens based on the aforementioned technology. (Hyungjin et al., 2022). NFTs are in fact cryptographic tokens and determine the ownership of certain objects such as songs, events, art, or other particular items. They can be sold or exchanged like any other cryptocurrency; the difference being that, unlike cryptocurrencies, their value is not equal but depends on the characteristics of the product they represent (Chalmers et al., 2022).

3. Problem Statement

There is still not an established official definition of the term "metaverse". Matthew Ball, venture capitalist and essayist, explains that the metaverse is a persistent and interconnected network of 3D virtual worlds that will eventually serve as the gateway to most online experiences, and also underpin much of the physical world (Ball, 2022).

However, with all the technology available, we are currently at the level of dial-up Internet phase of the metaverse. It is still very early, we are at peak hype, but the technology takes time to develop. Ultimately, the metaverse is the next evolution of the internet and will converge: IoT, blockchain technology, AI, augmented and virtual reality tools, cloud storage, and 5 and 6 G, which will connect all these innovations to build and maintain the metaverse. According to Tommaso Di Bartolo, entrepreneur and Faculty at the University of California Berkeley, the metaverse provides an immersive experience for consumers, with "self-sustaining, community-driven economy at its centre", and for companies, it enables them to create a next-generation type of engagement, "that empowers brands to make consumers part of the product versus being sold a product".

4. Research Questions / Aims of the Research

Becoming a metaverse enterprise is the natural transition that brands should prospect, from all sectors and industry, from media to fashion, travel, and hospitality.

The initial question that founded our research is: How does the metaverse transform businesses and which are the steps companies should consider to successfully pivot and become a metaverse enterprise?

5. Research Methods

The research methods used:

- Documentation in the literature, in order to synthesize the context of scientific research, especially in the field of the new environment dominated by the metaverse;
- Comparative analysis between different types of methods and steps used by companies in order to fulfill the needs of the market;
- One-on-one exploratory interviews, held virtually, on the Zoom platform. Using this qualitative research method, we covered the interlocutor's experience in the field of consulting brands that design products and services for the metaverse; interlocutor's research findings and methodologies in relation to the new business ecosystem; metaverse definitions and the range of tools and platforms which can be used to design and navigate virtual worlds.

6. Findings

Jon Radoff is an American game designer and entrepreneur, considered one of the 30 most influential people in the metaverse. His work revolves around the concept of the metaverse, designing market maps, consulting brands, and creating transformational methodologies. Teddy Pahagbia, from BLVCK PiXEL is currently based in Paris and is known as Mr. Metaverse. He is a keynote metaverse speaker and he supports companies transform through digital innovation in Web 3.0.

In 2021 we interviewed both specialist and worked closely with Teddy in a workshop designed for creative people who want to lead change in the metaverse. Through both experiences we collected notes and observed patterns which we further researched by analysing case studies, in order to propose a framework for transition.

The main finding is the urgency for businesses to transform in the context of the exponential rise in technologies which are shaping up Web 3.0 and the metaverse. According to Jon Radoff, the last 18 months have accelerated this transition. A habit started to be observed where people are getting accustomed to the idea that the Internet is becoming a place they go to participate in activities of all types, whether it is a game, a work collaboration, or an immersive social experience. Therefore, companies started to design strategies to enter the space and deliver to the new needs of the market: experience, community, and economy. Some companies operate at the level of technology, which means they are creating the infrastructure, others are designing tools, worlds, or experiences. Another insight is that games are going to lead the future of the metaverse, dematerialising physical space and building worlds where brands and consumers will live, co-create, share, and earn. Content for the new Internet is designed and proposed in collaboration with consumers, called user generated content.

After analysing the current ecosystem in which different metaverses are being built, and conducting interviews with experts in the field, we noticed that there are 5 important steps to take into consideration when pivoting towards metaverse business modelling.

6.1 Explore the Online Worlds

Online games mostly refer to games that are played over the Internet using PCs and game consoles (Papagiannidis et al., 2008). Web 3.0 evolution generates immersive, tactile, and decentralized Internet, and eventually human augmentation such as digital and augmented reality wearables, and brain-computer interfaces.

There are several metaverse experiences rising in the digital space like Ready Player One, Fortnite Concerts, Gaming, Virtual Real Estate platforms. Axie Infinity is a good example of a Web 3.0 metaverse. With a revenue generation of over 300 million U.S. dollars in August 2021, according to a research published on Statistica by Raynor de Best, the video game is a case in point of how to build decentralized finance protocols running on blockchain that increasingly generate more money and are, therefore, more appealing to users and brands.

Crypto is the currency of the metaverse, and NFTs are its capital. Since live music performances to large crowds disappeared almost overnight with the COVID-19 epidemic, the music industry has been forced to innovate and find new ways to reach their fans (Pryor, 2022). Sectors such as music and fashion are the ones which innovated the most in the space of the metaverse, generating monetizable experiences for their audience such as: Justin Bieber's concert on Wave, Travis Scott's collaboration with Fortnite, Gucci and Roblox cross industry value creation with Gucci Garden and Decentraland platform organizing the first metaverse fashion week where 70 brands among which Estée Lauder, Dolce & Gabbana, Forever 21 showed their style.

Gaming is informing the future of the metaverse. All these examples show the variety of possibilities in designing experiences and which are the typologies of these collaborations: new gaming intersections are remodelling businesses such as fashion, film, fitness, e-commerce and events; meaningful connections are established on new social media platforms; diverse representation by giving users the freedom to digitally embody any type of avatar, from human to animals or tailored characters; immersive escapism and joy is unlocked by performing the act of playing especially with AR or VR tools; seamless brand experiences which encourage co-creation with consumers rather than advertising products.

"Although most companies embrace the Metaverse's concepts and vision, cautions and doubts also emerge. While both Apple and Microsoft have virtual space applications, they consider that seamlessly connecting the Metaverse and the physical world is a key to its success, if not more important than the Metaverse itself." (Cheng et al., 2022). For the metaverse to really function, developers need to enable technologies which allow seamless interoperability among users and platforms.

In the last years, the Internet has radically changed. Such a pattern cannot pass unnoticed, since both academic and business worlds have shown great interest in such changes (Cagnina, Poian, 2009). We strive to offer a broad vision of the potential benefits which virtual worlds may provide for improving learning and collaboration (Acosta et al., 2013).

6.2 Ensure Brand's Presence in a Metaverse

To sustainably pivot, brands need to develop a metaverse lifelong strategy that suits the needs of their consumers. To generate value for the community, companies are practicing collaborations and are looking for partners that are going to provide for them the right infrastructure or perspective to further develop common worlds and products. To date, the experiments we have seen fall into the following categories: creation of immersive experiences for audiences in the music industry; launching digital coins like in the case of the rock band Portugal The Man; selling virtual assets or NFTs to extend brand experience into online worlds; generating experiences; trading and building on virtual real estate projects on platforms such as Upland.

Finding the right partner in the metaverse is acknowledging that, whereas once customers were only consumers of content, they are now content-creators and content-amplifiers as well. In the metaverse, the community will set the prices, and the value added to a virtual good will not be based on cost or utility but relationship.

"Importantly, high levels of local presence create user perceptions of virtual content as "being here" (i.e., within their physical environment due to high levels of realism or high levels of contextual embedding). Low levels of local presence indicate a more "functional" integration of virtual content, such as textual information. In contrast, telepresence in VR describes the degree to which users perceive themselves as being in the virtual world independent of their actual physical location." (Rauschnabel et al., 2022). VR is a technology that combines multisensory stimuli to generate the feeling of being present within computer-generated environments (Dozio et al., 2022).

6.3 Activate Brand's Community

Brands need to think of creative ways to build community and content. Because the metaverse is only as interesting as the content inside. If there is nothing to do when users enter the worlds, no one is going to come back.

When Mark Zuckerberg introduced the successor of Facebook, he described Meta as "a set of virtual spaces where you can create and explore with other people who aren't in the same physical space as you." (Huynh-The, 2022). Meta will build its own metaverse and create for their audience a wide range of experiences, for both business and fun: from virtual meeting rooms like Horizon space, to playing minigames.

This is one example of a company pivoting towards becoming a metaverse enterprise, that will influence the mass adoption of the technology and enable brand collaborations in the space. To activate a community for next-generation engagement, companies will have to revolve around finding partnerships that make the most sense for their audience and provide meaningful and inclusive experiences with the technologies available. Besides this, the content generated by the brand has to be a story of how to live forever by constantly adapting to users' needs and desires and allowing them to contribute. Digital game designers understand this philosophy.

When they develop a character, the basic structure is fixed and the player sees customization options which mix and combine to enable an infinite number of possibilities. Companies develop episodes, events, or movies in the current metaverse space. We see successful collaborations such as Upland and NFLPA Legits, where users collect Football NFTs that represent the most iconic players and trade them in Upland's open marketplace.

Table 1. Understanding NFLPA Legits

Category	First layer aspect	Second Layer aspect
NFLPA Legits Overview	One of a kind memento	Build Fan Score Collect essentials Trade NFLPA Legits
NFLPA Glossary	Terms and Types General Terms Bundles Mechanism and Features	Essentials, replicas, spotlights Minting, Existing, Total, Ending Bundle Description, Bundle Delivery Fan points, registering for mementos. Stadiums
Upcoming Features: fan shops, trading, registering for spotlights, autographs, Collections, Leader boards		

Source: http://community.upland.me/.

6.4 Co-create Artefacts

According to recent data from ARK Invest, the percentage of game revenues from selling digital items will rise 95% by 2025. Co-creation, in the context of a business project, is the process in which input from consumers is used to design services and products and plays a central role from beginning to end.

Figure 1. Understanding Co-creation in Metaverse

**Tools Required
to Build Metaverse**

- Unity3D
- Unreal Engine
- Amazon Sumerian
- SparkAR
- Cybernetics

Use-cases

- Gaming in Metaverse
- Meetings in Metaverse
- Virtual Learning in Metaverse
- e-commerce in Metaverse
- Travel in Metaverse
- Digital Identity in Metaverse
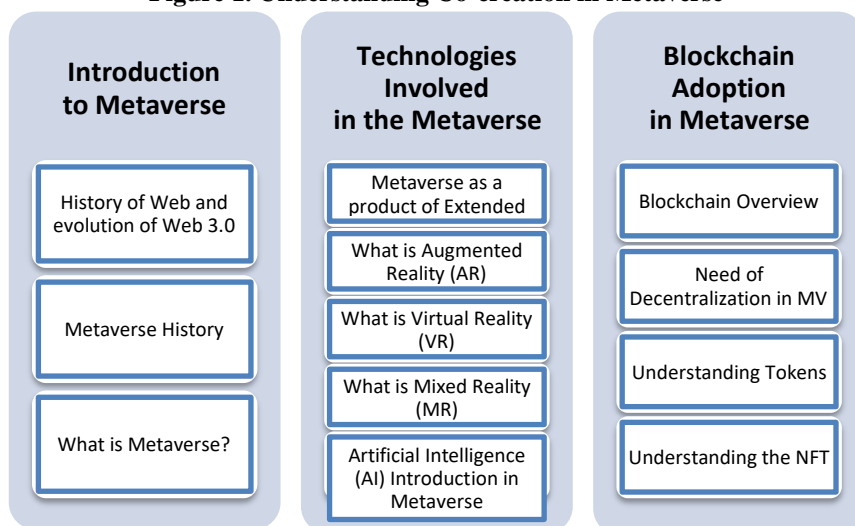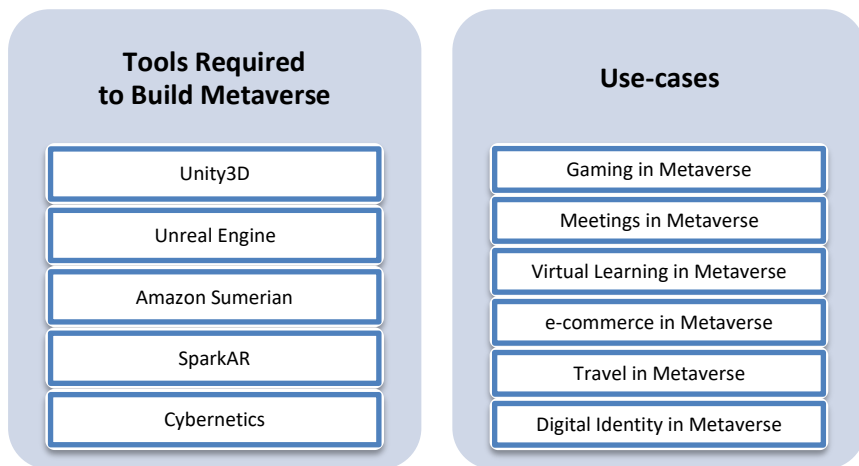
Source: blockchain-council.org.

In the metaverse, the real value behind a digital product is the opportunity given to users to be involved in the process of creating that particular item or experience. This process of co-creation brings consumers a sense of ownership and belonging, and even financial independence by creating their own personal economy. With games like Axie Infinity, people can support themselves financially only by playing and trading digital goods. Hatsune Miku is a character in a manga series named Maker Hikōshiki Hatsune Mix, written by Kei Garō. Hatsune is one example of how communities come together to co-create with their aspirational brands: she has transitioned from vocal synthesizer to adored "collaboratively constructed cyber celebrity with a growing user community across the world", according to its creators. She is Japan's beloved virtual superstar. Since her release in 2007, her popularity has escalated, and her image was licensed for all types of goods, games, and products.

6.5 Connect Digital and Physical Worlds to Enhance Experience

Virtual worlds have become an arena for user-generated innovation enabling a new wave of entrepreneurs to extract real-world value from virtual property (Zhou et al., 2018). Brands are generating NFTs or creating virtual retail experiences on gaming platforms to offer both their digital and physical products to a wider target.

However, according to venture beat, "The massive amount of data storage needed to develop the metaverse might undermine sustainability goals, based on the rapid growth required" (Parker, 2022). Brands need to include emerging global issues in their digital strategy. In July 2021, Coca-Cola launched an NFT collection that fetched $575,000 in an online auction. The company relied on the power of its brand to push forward its collection and raise over $500.000 for charity within 72 hours. The project House One Family Forever proceeds from each NFT purchase and funds

a safe home for one homeless family. Each NFT design is unique and linked to one IRL house that is about to be built for a family in Mexico or El Salvador.

The metaverse is also a societal evolution, not just a new technology or a marketing channel. As the world is undergoing great changes due to the exponential development of new technologies and the humanitarian and planetary crisis we experience, the role of brands is to generate purposeful collaborations with real impact.

7. Conclusions

The metaverse is a visual world that blends the physical world and the digital world (Zhao et al., 2022). The metaverse is expected to turn imagination into reality through the convergence of various technologies and should be considered as a medium for sustainable education, free from the constraints of time and space (Park, Kim, 2022). Driven by experience, community, and digital economy, worlds build as the metaverse have unique attributes depending on how businesses transfer their values, vision, and mission in a digital setting. However, a layer of sustainability needs to be added in order to generate massive adoption from consumers as well as inspire them to collaborate and co-create with brands. From our analysis, we extracted 5 concrete steps companies should consider when looking to pivot and become metaverse enterprises: Explore, Ensure, Activate, Co-create, Connect.

Figure 2. Steps for Sustainable Business Modelling in the Metaverse
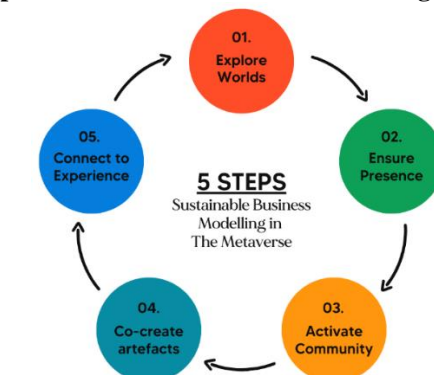
Source: Author's personal contribution.

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Entrepreneurship Business Restart Readiness

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Abstract

The new reality of COVID-19, as well as the present post-pandemic situation, have caused and continue to cause issues to most of the business activities. Many company owners and employees were forced to reorganize their usual ways of working. In fact, this led to turbulent restructurings in many spheres of the economic and social life, both directly and indirectly. In turn, the overall change has also necessitated the wider use of information and communication technologies, for which companies were more or less open.

The purpose of this research is to explore the readiness for a recovery of the entrepreneurship business from the post-COVID-19 pandemic challenges in the context of the Bulgarian business operators. Pursuing this particular line of investigation, the authors examine the difficulties of the entrepreneurship business in the specific timespan, the attitudes toward maintaining work in a digital environment after the pandemic, and adaptability to cope with the crisis. The role of government measures to support business handling the post-pandemic survival easier is another research inquiry.

As a research method, we apply the survey method comprising of closed-ended and open-ended questions pursuing to gain insight in to the post-pandemic business situation.

The results confirm the complexity of the business recovery and reorientation processes of companies, the need for a more active work in the digital environment, as well as the necessity for intensive tripartite meetings on issues related to business restart readiness.

Keywords: entrepreneurship, business recovery, digitalization, adaptation, measures.

JEL Classification: A11, E22, J08, O15.

1. Introduction

The coronavirus pandemic has caused drastic changes for all human beings as well as for the business world. The COVID-19 crisis has adversely affected many

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companies by forcing them to adapt their activities to the external changes, or even to stop their business operations. Many of the service companies stopped functioning altogether, and well-acknowledged standards such as competitiveness, growing revenue, and increased business volume stopped to be the leading criterion. The protection of human health and the need for a paradigm shift in businesses provoked new ways for businesses to function. In addition, many employees were forced to work in extremely stressful situations, and some of them could not cope with the burnout effect. It was also not uncommon for some of the employees, or to some of their family members to lose their lives. In these complex circumstances of social, health and occupational insecurities, it is now clear that COVID-19 was not only unconquerable, but it showed that life and business have to proceed. The question that theoreticians and practitioners are concerned about, both in social and humanitarian sciences, is what advantages society can gain and whether business and society are ready for a quick restart from the crisis. In this context, a relevant question is how business recovery occurs in the context of some Bulgarian companies.

Other issues subordinate to the main goal are questions about the specific difficulties in relation to the business operators. When summarising these answers, it will allow an assessment to be made, weaknesses to be more explicitly identified so that opportunities for future action plans to be better envisaged. The research conducted is based on 18 survey questions related to the business activities, the challenges in operations, and especially their adaptability to external and internal company problems. The main body of research is directed to subsets of business restart readiness from a post-COVID-19 situation.

2. Problem Statement

The issue of business recovery takes on an exceptional acuteness in any period of upheaval. A recent example of this can be associated with different reflections after the global crisis of 2007-08 (Tcholakova, Sotirova, Tzvetanova, 2017; Belova, Hadzhipetrova-Lachova, 2014). Based on this experience, and given the financial indicators of such events, more and more issues of recovery prospects in a global aspect (Desai, 2011; Floyd, 2011), and business performances and recovery mode are examined by other authors (Moutray, 2020; Caraiani et al., 2022), in particular. This type of management is particularly significant against the backdrop of both business-to-business markets (Döscher, 2014) and business-to-customer markets. Much in this vain, competitiveness (Alpopi et al., 2018) still remain strong indicators, along with loyalty (Russo, Confente, 2017) and customer satisfaction (Khan, Ghouri, 2018).

Alongside the main theoretical issues, opportunities from the field of business recovery testing are also being included (Watters, 2013). Similarly, the COVID-19 pandemic has given publicity to optimization and buzz response primarily in financial markets (Seven, Yılmaz, 2021; Yarovaya, Matkovskyy, Jalan, 2020).

A particularly strong need for a rapid recovery has also been noted in the manufacturing and supply chain fields (Moutray, 2020; Paul et al., 2021). The call for urgent measures was also particularly strong for small and medium-sized

businesses, for which two types of approach appear to be defining - towards Business Continuity on the one hand, and towards Disaster Recovery Planning on the other (Slade, 2021; Das, 2022). The levels of overall disruption due to the COVID-19 epidemic are also triggering responses for new sales channels, innovative digital solutions, and also encouraging thinking about the appropriateness of supporting measures in the pandemic periods.

In 2020, the European Commission adopted a temporary framework for state aid measures to support the economy during the outbreak of COVID-19. These measures regulated various forms of aid in the form of direct grants, loans, as well as subsidies paid to employees to prevent redundancies during the epidemic situation, which had national applicability for each member state.

3. Research Questions / Aims of the Research

This study represents the results of a case study which was conducted in 46 companies in South-West Bulgaria. The goal of the study is to gain a closer look at the difficulties businesses experience as a result of the COVID-19 crisis and on this basis to assess their readiness for business recovery. However, this is a problematic research endeavour related to a problem of a multifaceted socio-economic nature (business survival under conditions of health pandemic without clear vision neither for the company, nor for the employees). Admitting that this research scope is related to objective and subjective settings, the authors aim to gain some basic information about the companies' adaptability to a post-pandemic restart.

4. Research Methods

This study has used primary data. The primary data was collected through a survey which was distributed to 75 representatives from the managerial level, such as business owners, managers, HR directors and company's representative bodies of small and medium-sized enterprise businesses in Bulgaria.

The study was sent electronically; it was limited in time and place. The survey was conducted between February and March 2022 in Bulgaria. Using a questionnaire as a research instrument enabled the collection and analysis of quantitative data by using descriptive statistics. Data was collected from 46 enterprises using an own questionnaire applying open-ended and closed-ended questions related to their readiness for business restart in the post-pandemic situation.

The discussion of the survey results was based on the quantitative method, aiming to analyze and evaluate the results obtained using the approaches of grouping and graphical representation.

5. Findings

5.1 Sample Structure (Industry, Size, Age of the Enterprise)

Directly related to the problem under study is the determination of the profile of the enterprises studied according to three main criteria. Taking into account that an

important element of the business characteristics is the choice of the sphere of economic activity, the results of the study reveal that among the surveyed enterprises with the highest market presence are those in the field of trade (43.5%), followed by those with manufacturing activity (30.4%) and, lastly, are enterprises with the main activity of services (26.1%). In terms of the sample structure of the enterprises, according to their size, it was found that micro enterprises predominated (47.8%), followed by small enterprises (28.3%). It is noteworthy that the share of large enterprises is also relatively high (23.9%).

In regards to the distribution of enterprises according to the time of registration, it is significant that those operating for more than 10 years predominate (54.4%). The share of enterprises operating for 5 to 10 years is also significant (23.9%). At the same time, it is observed that the share of enterprises with a market presence of less than 5 years is the lowest (21.7%). Due to the sampling method used, there are no enterprises registered within the last 1 year.

5.2 Difficulties for Entrepreneurial Business

In order to investigate the state of businesses in Bulgaria during and after the crisis, respondents were asked a question concerning the emergence of difficulties in the COVID-19 period. It turns out that the majority of businesses (56.5%) experienced serious difficulties and ¼ experienced partial difficulties (26.1%). 17.4% of the respondents mentioned that they had no difficulties in their operations during the pandemic. A more detailed examination of the question reveals that these are large companies with long market experience, effectively studying the market situation and quickly adapting to the dynamic changes. These companies are the ones that specify that they are not currently experiencing any difficulties in their operations (19.6%).

However, it is a worrying result to have 28.2% of respondents categorically stating that they are still unable to cope with these problems. It is found that these enterprises are micro (84.6%) and small enterprises (15.4%) operating in the field of production and trade. For one in two enterprises (52.2%), the difficulties still continue after the pandemic, but only partially.

**Figure 1. Difficulties for entrepreneurial businesses
in the post-COVID-19 crisis period**
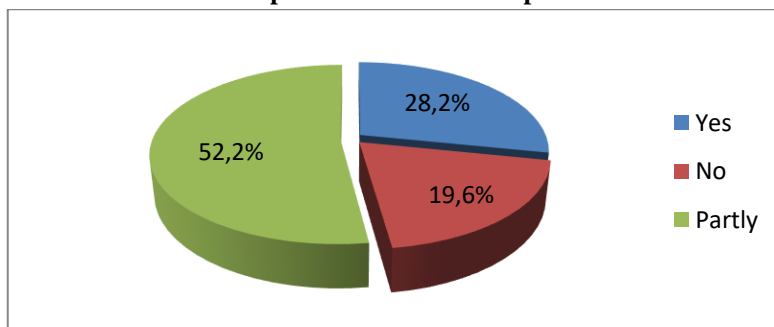
Source: Authors' survey, 2022.

The survey data indicates that the main problems are rooted in the uncertainty and insecurity of the socio-economic environment (67.4%), customer churn (52.2%) and staff sickness issues (41.3%). This, in turn, has led to the need to suspend business activities for a period of time (26.1%), a contraction in production (26.1%), and redundancies for some staff (32.6%).

Although one in three enterprises cited the lack of financial means to carry out operations as a major difficulty (34.8%), the proportion of those (15.2%) who thought that additional means to respond to a COVID-19 situation would solve these problems was not particularly high. It is interesting to note that no respondents mentioned the need to use credit as a key difficulty.

The study of attitudes and trends towards the immense use of ICT and the digitisation of business in the periods during and after the crisis is important to achieving the objectives of the study. The results indicate that one in three businesses operated online during certain periods of the pandemic (32.6%).

On the other hand, about 10% of the investigated companies had to go online during the whole period (10.9%). However, the vast majority of organisations (56.5%) did not have to resort to working in a digital environment. Due to the nature of the business, this was the case for 100% of manufacturing businesses, 40% of commercial businesses and 16.7% of public service organisations.

The main difficulties of working in an online environment appear to be the need faced for businesses to quickly reorganize operations (30.4%) and the lack of knowledge in relation to the tools that support employees to work in a digital environment (21.7%). Thus, company management faces problems such as inadaptability and lack of staff preparation (17.4% each). For 8.7% of the respondents, these difficulties would not have existed if the staff had participated in trainings about working in an online environment before the COVID-era.

The reorientation of enterprises' activities towards working in an electronic environment has led to a reluctance to work for a large proportion of staff. Employees cite uncertainty (21.7%) and inability to adapt (32.6%) as their main motives. Another part of the respondents pointed out problems with communication with the Internet (26.1%), the inability to work as a team (19.6%), and dissatisfaction with the results (8.7%). This, in turn, was caused by lack of experience (17.4%), knowledge (21.7%) or demotivation (4.3%). For 46% of the respondents, the negative attitude was due to the workload and performing additional activities that were not materially rewarded.

Despite these issues, 80% of businesses consider keeping some of the processes to work in an electronic environment as an effective business recovery option. However, one in five companies believes that there are no appropriate ways to deal with the crisis.

**Figure 2. Attitudes towards maintaining processes for working
in an electronic environment after the pandemic**
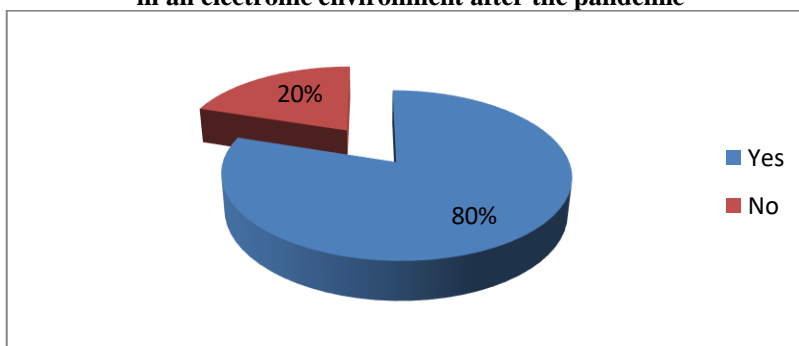
Source: Source: Authors' survey, 2022.

The state and trade unions have a key role to play in rebuilding entrepreneurial businesses. Respondents were almost unanimous in their opinion that tripartite meetings on these issues should be organised (97.8%). Only 2.2% are skeptical of the issue.

5.3 Role of the Recovery Measures

The 60/40 scheme is a short-term instrument for an emergency support from the state to businesses to maintain employment and guarantee the income of employees. The results of the survey show that only 21.7% of employers have benefited from the compensation provided (for 3 months - 30%; for 6 months - 60%; from the beginning to now - 10%). It appears that these are mostly micro and small enterprises engaged in commercial activities. It is noteworthy that the majority of employers have not shown interest in this measure - 78.3%. The reason for this is that 32.6% consider it to be partially effective, 45.7% - somewhat effective, and 8.7% - ineffective. 13% did not answer. None of the enterprise representatives considers this instrument to be fully reliable and effective in dealing with the crisis.

Only 2.2% of all enterprises received compensation under another measure, the Keep Me Employed project. The remaining 97.8% did not benefit from any other incentives from the state to cope with the crisis.

As part of NextGenerationEU, Bulgaria has developed a national recovery and resilience plan in 2021. The main objective of this mechanism was to facilitate economic and social recovery from the crisis caused by the COVID-19 pandemic. In this regard, 23.9% of the respondents mentioned that they were familiar with the Plan in detail, while 43.5% knew only some of its parameters. Unfortunately, 1/3 of enterprises in Bulgaria are not familiar with the advantages offered by this tool.

When asked whether the Plan would provide an opportunity for business recovery, 56.5% of respondents thought that it could be of partial help. Only 6.5% are strongly convinced of the effectiveness of this instrument. It is noticeable that these are only manufacturing enterprises. Unfortunately, a very high proportion of respondents (37%) find the measure ineffective. Detailed research of the question

shows that representatives of all types of enterprises, regardless of their size, age, or field of activity, think so.

Figure 3. Need for tripartite dialogue to find ways to manage the socio-economic and health crisis
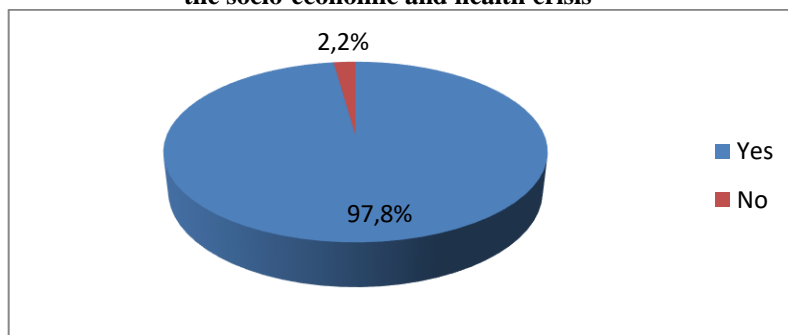
Source: Source: Authors' survey, 2022.

From all respondents, 17.4% identify gaps in the National Recovery and Sustainability Plan. However, the majority (82.6%) do not find any gaps or weaknesses in the Plan, citing insufficient knowledge of its parameters rather than its potential as the main reason.

6. Conclusions

Admitting that periods of crisis, disasters, and pandemics always confront humankind with a wide set of uncertainties, both for business and society, there is an objective need to better understand the nature of such challenges. This research was designed for that purpose and had the aim to reveal the readiness of the Bulgarian entrepreneurship business for a quick post-pandemic restart.

Obviously, the coronavirus crisis has affected all businesses, their strategies for survival in terms of processes, resources, and business operations for an easy recovery. Both the theory and the topicality of business recovery confirmed the wide range of issues studied so far, mainly in the field of recovery management, but also in terms of the specifics of recovery planning as well as the specific actions of the business in times of uncertainty. This sheds further light on entrepreneurial businesses and situates the problem in the context of preparedness of the economy for the disaster management.

The findings of this study confirm some of the authors' assumptions, that the companies are now facing difficulties in most of their business operations, but that they are ready to restart. However, it was additionally found that some of the companies managed to adapt well, on time and successfully to the challenges posed by the COVID-19 outbreak. Apart from the negative consequences, it appeared that it was possible to exploit new business processes and to rethink working distantly.

This research showed that in the context of this crisis, the investigated companies faced serious difficulties and they took significant risks for their survival. Businesses

were not able to fully meet their needs and completely adapt during the times of uncertainties.

The analysis of the results of this research proved that the additional government measures were a good opportunity, but rather had a restricted effect. An explicit finding of the survey is that the measures proposed by the state, which are the main instruments for supporting business, are not sufficiently used due to their insufficient duration. At the same time, the already adopted National Recovery and Sustainability Plan in Bulgaria, which is also a significant tool for the whole economic sector, contributes to the business recovery process and contributes to more successful intersectoral relations.

Despite having faced serious complications in carrying out their activities during the lockdowns and pandemic, the position of business managers, owners, and directors reveals that they feel ready for business recovery. They hope to overcome the post-pandemic stage soon.

In conclusion, without denying some of the limitations in the study (employees' viewpoint, size of the population sampling and economic activity of the business), this research confirms the importance of the business recovery discussion.

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The Role of Insurance Companies in Sustainability and Disaster Risk Reduction in Palestine

Hasan MAKKAWI[1]

Abstract

Natural disasters are a source of economic risk in many countries, especially small and low-income countries, and risk management requires advanced planning. Insurers and the Palestinian government have different, and sometimes contradictory, interpretations of the emerging new paradigm of "sustainable disaster risk management," which prioritizes nonstructural management measures over existing defenses. The current lack of agreement between the Palestinian government and the private insurance sector on the future of insurance against natural disasters such as floods, storms, earthquakes, and droughts is an excellent example of this. More research is needed to compare the outcomes of insured and uninsured properties, especially to better understand the role of insurance in climate adaptation. Given the anticipated changes in the insurance industry in Palestine, which has gone through conditions and stages that no other insurance industry in the world has gone through, beginning with reliance on neighboring countries such as Jordan and Egypt, as well as deliberate marginalization, in a time when the Israeli economy is so reliant on it, the diversity of opinions on the best approaches to disaster risk management is examined in this article. It considers ways to improve the use of insurance by vulnerable countries and suggests ways to judge the adequacy of insurance. The long-term viability of society in areas prone to natural disasters is one of the topics investigated. Finally, the research critically evaluates alternative approaches that could be used in the future to protect more disaster-prone sites while staying consistent with long-term policies for managing the risk of natural disasters, based on international experience.

Keywords: sustainability, risk management, insurance companies, disasters, reduce uncertainty.

JEL Classification: Q01, G32, G22, Q54, D81.

1. Introduction

Since 1994, the Palestinian Authority, the authority authorized to supervise and control the insurance sector in Palestine, has been established. Since 2004, the

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Capital Market Authority has been established to supervise and control the insurance sector, as a specialized body in this sector, and the General Insurance Federation of licensed companies has been established. The Palestinian Road Accident Compensation Fund, the beginning of the features of Palestinian legislation and insurance law (Palestinian Economic Policy Research Institute MAS, 2016).

The cost of natural disasters that stormed Palestine, millions of dollars over time, which posed a problem to the economy, especially for those who manage the risks of the economy, the insurance sector (Qandilou, 2020).

In the event of natural disasters, the state of Palestine suffers a lack of insurance coverage and support (Regional Assessment Report for Disaster Risk Reduction in the Arab Region, 2021).

Natural disaster insurance was not available before the establishment of the Palestinian Authority because the Palestinian territories were administratively subordinate to the Israeli government; as a result, there is no governmental or institutional support for insurance companies to cover natural disaster risks. The lack of insurance coverage for those who have been harmed by a lack of insurance services raises concerns about insurance companies' willingness and ability to cover these costs for those in more vulnerable areas of natural calamities.

If companies cannot recover from risks and crises or cannot adapt to them, they will be threatened with collapse; therefore, insurance companies face challenges in the Palestine insurance sector, weakness, and distortion, especially in its early stages as a result of the political changes that Palestine has undergone, hence the urgent need for an active insurance sector capable of achieving sustainability and facing disasters and crises that we are facing, which are sudden unexpected changes (Al-Jabari, 2021).

And because insurance companies in Palestine must bear a large part of the responsibility in the case of disasters, especially the compensation of property in the event of a disaster, the researcher considered it necessary to study the role of insurance companies in sustainability and disaster risk reduction in Palestine.

2. Problem Statement

At present, there is a global interest in the preservation of human life on Earth management as an important scientific trend toward which most studies and research are directed, especially in these countries that are working hard to achieve sustainable development in all its aspects, but in particular, they aim to achieve this in the insurance sector through sustainable risk management. One can note that the rapid developments the world is witnessing such as population growth are serious challenges for human beings in order to preserve their rights and the ability for future generations to continue in a dignified life far from dependence in all its forms (Al-Sabbagh, 2009).

Sustainable development is about meeting the needs of current generations without affecting the ability of also the future generations to meet their needs through the optimal use of resources.

The optimal use of resources in insurance companies can be attained through the application of proper risk management steps and improving business performance.

This would lead to improving management, reducing risks, and increasing the wealth of owners in line with sustainability.

Caraiman et al. (2020) clarifies that risk management is an integral part of the way any organization works and the basis of management approaches. Therefore, it should not be separated from the daily activities of any organization where risk management is necessary. Because as long as there are always doubts about the nature of the threats facing companies, and as uncertainty is an everyday reality, the reaction to uncertainty must become a permanent and a highly essential concern.

Philip et al. (2015) explains that Enterprise Risk Management (ERM) means the integrated management of all the risks an organization faces, which inherently requires alignment of risk management with corporate governance and strategy. ERM proposes that companies should manage all their risks comprehensively and coherently, instead of managing them individually. A company's overall strategy and strategic choices significantly influence its risk, and the uncertainty associated with high-level strategic choices poses challenges for ERM.

The study of Nugraha et al. (2022) examined the effect of implementing risk management on the financial performance of companies, which has a positive impact on market performance. The objective of the study is to demonstrate that financial performance has positive impacts on market performance. This study concludes that companies implementing ERM had better market performance and financial performance compared to companies that did not implement ERM.

The study of Zbar (2014) indicates the role of reinsurance complexes in covering major risks and how to reinsurance in the insurance industry sector through these complexes. The study clarifies that the greater the area of the complexes, the greater the insured area, which helps in controlling the risk, as it encourages the establishment of insurance complexes in the countries, especially when it comes to the insurance of possible major risks. Basically, the risks are greater due to natural disasters, which enables these companies to control them; therefore, reducing the risks of natural disasters.

Al-Badawi, Sh. (2014), expands on the necessity of applying sustainable planning in order to reduce disaster risks. The study explores and evaluates the Palestinian situation through the mechanism of work of the administrative system for disaster risk reduction, which shows that there are problems in the laws and procedures designed to deal with disasters. Also, there is an absence, on a regional level, of the process of sustainable planning for disaster reduction.

The study recommends activating the role of authorities and laws that help protect natural risks and disasters and developing financial policies with clear budgets to make insurance sustainable.

Salama (2014) indicates that it is necessary to plan for disaster response assessment of contingency response plan in governmental institutions. This study provides an emergency response plan for the Palestinian government institutions, and it also studies the most important challenges and problems faced by planners facing disasters. Moreover, it indicates that the system of risk and disaster management and emergencies in official institutions that are concerned with

responding to emergencies are weak and are not well-prepared to respond to emergencies.

The study recommends the necessity of integrating the concept of risk reduction and prepared programs within strategic plans and the development of their institutions with the need to develop laws and legislation for disaster management. In addition, it recommends the consolidation and development of a national reference for disaster management in order to focus on the risks of natural disasters that harm everyone.

Hattab's (2012) study demonstrates the responsibility of insurance companies to compensate victims of road accidents and it specifies the amount of compensation. Also, it clarified the position of the Palestinian law regarding compulsory insurance in terms of compensation coverage. In conclusion, the study finds out that Palestinian insurance is characterized by limited coverage of material damages and that in the Palestinian law there is nothing that obliges insurance companies to accept compulsory insurance. Finally, the study recommends that the Palestinian legislators should apply compulsory insurance to compensate for the material damage.

The study of Biswal, S. (2014) aims at reviewing the plans, policies, and laws followed by the Government to reduce disasters and face risks. The study concludes that the administration often fails to face disasters alone, which leads to the need to transferring part of the money from other allocations to implement disaster response plans.

We can summarize the previous studies, considering that achieving good risk management in insurance companies and improving business performance for sustainable development in this sector makes management better in addition to reducing risks and maximizing the wealth of owners, with a focus on the biggest risks that may sustainably affect the risks of natural disasters that harm everyone. In the previous literature, the focus was on each factor individually, but in this study it was clarified in a coherent manner so that it became clear that risk management is important in achieving sustainable development.

From here, we clarify the main problem of the study, the weak role of insurance companies in sustainability and disaster risk reduction in Palestine.

3. Research Questions / Aims of the Research

The aim of this study comes in light of the circumstances that Palestine is experiencing, in an attempt to improve the role of risk management in achieving sustainability in the insurance sector. The sub-objective is towards improving risk management and focusing on the risks of natural disasters.

We clarify here the central question: Is there a role for risk management in achieving sustainability in the insurance sector?

The sub-question: Does risk management address the risks of natural disasters in the insurance sector?

The need for this study is the current role in the insurance sector for such a study and its assistance in solving the problems of risks and disasters and their current and future impact on the population.

4. Research Methods

The current study uses a theoretical presentation of previous literature showing the achievement of sustainability through the role of risk management in the insurance sector through collecting data and information from books, press articles, online research, and annual reports.

Based on available literature, this study was conducted in a manner that uses descriptive research to shed light on the role of risk management in achieving sustainability in the insurance sector with a focus on the risk of natural disasters.

Data sets were in the form of words or information about risk management presented by various sources of data, such as texts, articles, reports, and doctoral dissertations relevant to the research topic were noted, written in a draft, and then analysed, The criterion of papers was, according to date, and according to proximity to the subject and place of research, also assisted with the process of obtaining semi-structured interview questions.

Forty research articles related to the topic under study were reviewed. Eight articles were included from the literature point of view and were referred to in the study. Only papers that discussed the role of risk management related to the risk of natural disasters, achieving sustainability, or better managing or minimizing risks, or those that dealt with the same topic in the context of insurance, were selected.

The data was analyzed and collected from the papers that were referenced to match the study's goal.

Four representatives of the major insurance providers in Palestine, namely, Trust Company, National Insurance Company and two industrial bodies, were interviewed in semi-structured interviews in the local market. Data were collected from the 05/01-20/03 of 2022, for the age group of 30 to 60 years of Palestinians residing in the West Bank.

Representatives of these organizations who were involved in the policy-making process were chosen, the following experts were selected for the interview: a regional insurance manager, a risk manager, and two general managers.

The responses to the questions were objectively analyzed (Table 1).

Table 1. Question Analysis

General	Specific
Information about the risk of natural disasters	Adequacy and connectivity of basic information, including information on natural disaster defense.
Natural disasters - Risk management planning	Insurers' participation
Resistance and resilience measures	Excess costs and policy adoption
Natural features / characteristics	Calculation of policy/excess within a catchment risk area

Source: This is the work of the researcher.

In the context of reducing the impact of natural disasters on buildings and following standard usage, "resistance" refers to measures designed to reduce the risk of floods and resist earthquakes.

Two focus groups were held with residents from two different areas in Palestine at the beginning of 2022; each group consisted of four people, both of whom had recently experienced natural disasters, although at different times. The following topics were discussed in these focus groups:

If insurance costs rise after the current mutual support agreements expire, there could be consequences for families.

The trade-offs that families may have to make between raising the cost of domestic insurance policies and increasing policy abuse.

At the household level, there is awareness and understanding of flood risk reduction measures. How many people have heard of proprietary level metrics and used them? Is there anything else the homeowners did to protect their property (either individually or collectively)? Have insurance companies noticed this, and if so, how?

Opinions on how to secure a "fair" model for future home insurance, particularly publicly funded subsidies.

5. Findings

The researcher used a set of previous studies related to the subject, and interviews, of the study and discussed the role for risk management in achieving sustainability in the insurance sector. The need for this study is the current role in the insurance sector for such a study and its assistance in solving the problems of risks and disasters and their current and future impact on the population.

The researcher concluded that the the risks that are associated with management and planning, the cost of compensation is less than the unregulated and planned risks, in other words, designed natural disaster defenses provide more certainty in risk projection than unstructured natural disaster defenses. Although it is obvious that these insurers recognize that other measures may reduce the risk of natural catastrophes in principle, and the risk management in Palestinian insurance companies does not have sufficient speed to pay compensation, and it must work to compensate property in case of disasters. Also, the use of risk management and planning steps to be able to secure risks and disasters, and thus achieve sustainability. In other words, the risk management in Palestine does not have the best management to deal with the risk of natural disasters, and therefore it must focus on how to deal with the best management so that the risk management deals with the risk sustainable natural disasters.

If a future model for residential flood insurance is to be fully "sustainable," it must meet certain criteria. Ideally, it should provide incentives for homeowners to take as much ownership of the flood risk issue as possible and minimize the risk to their properties in the short term while also advancing the longer-term goal of reducing the extent of residential occupancy of flood-risk areas. In addition to these criteria, the treatment of flood risk must reflect societal agreement on whether it is

individualistic, reflecting only individual household risk levels, or solidaristic, involving 'pooling' risk and premium costs.

High costs are why insurers do not consider using unstructured measures in their current accounts to manage risks. In a similar vein, another representative observed the following: There needs to be a type of safety net for these people [in disaster-prone areas] so that natural disaster defense can be established according to appropriate standards.

There is weakness in Palestinian law with regard to the laws related to the insurance sector, and there is nothing in it that obliges insurance companies to accept compulsory insurance, which leads to restricting the role of insurance companies in facing risks and disasters due to their weakness.

The focus group participants generally agreed that once explained, the current mutual support arrangement is a fair process model. The view that such an arrangement should continue if it worked to cover the costs of those living in high-risk areas who might not be able to afford to insure their homes received widespread support in the two focus groups. Furthermore, most participants agreed that all policyholders, not just those in high-risk areas, should provide mutual support or, as one participant put it: The focus group participants generally agreed that, once explained, the current mutual support arrangement is a fair process model. The view that such an arrangement should continue if it worked to cover the costs of those living in high-risk areas who might not be able to afford to insure their homes received widespread support across the two focus groups. Furthermore, most participants agreed that all policyholders, not just those in high-risk areas, should provide mutual support, or, as one participant put it:

It is probably about solidarity. I think I can pay a little more for insurance in order to create a more level playing field for people - there are a lot of things we pay for but don't use. There is a bigger picture here, and we need to keep that in mind.

It has been difficult to strike a balance between these objectives. Eliminating incentives for housing development in high-risk areas should be a priority to provide long-term management of the risk of natural disasters in Palestine. Previous research has shown that comprehensive insurance guarantees have a negative impact on development in high-risk areas. Furthermore, as a result of this situation, housing prices do not reflect the true level of risk of natural disasters on the property; any post-flood drop in the value of submerged properties appears to be limited and only temporary.

After answering the main research question in the interview, it was found that 75% of the interviewees proved that risk management contributes to achieving sustainability in the insurance sector, while 25% answered that it does not contribute to achieving sustainability, especially in the field of natural disaster risks.

**Figure 1. Contribution of risk management to achieving sustainability
in the insurance sector,**

Source: this graph is the work of the researcher according to the results.

The findings, however, reveal a disconnect between the acceptability of a suitable environment for managing natural disasters in the future and persistent differences in light of the specific measures that can be taken to reduce natural disaster risk. In the management of natural disaster risks, there is a general trend toward decentralization. Whether this decentralization occurs at the community or individual property level, questions remain about how specific measures will be formulated within the existing insurance framework, given insurer reservations and the apparent lack of incentives available to landlords.

6. Conclusions

After exploring the previous literature that dealt with risk management in insurance companies, achieving sustainability, and focusing on the risks of natural disasters.

Therefore, this study attempts to raise awareness of the role of risk management in achieving sustainability, and after insurer interviews, it was found that because resilience is defined as the inability to completely prevent natural disaster damage, it is impossible to completely prevent natural disaster damage.

The findings of this research show that there is still a long way to go to close the gap between the policy focus on long-term management of natural disaster risk and the implementation of the policy in practice.

This gap is pertinent and urgent for some societies at high risk for natural disasters. The reliance on the private sector risks creating an environment in which only those who can afford high insurance premiums can survive in areas known to be vulnerable to natural disasters. Given the insurance industry's current position on specific interventions aimed at increasing property and community resistance and resilience, direct government assistance in the form of special assistance zones can be an effective way to secure natural disaster insurance and a shift toward the "new

paradigm" of long-term disaster risk management. Combining this strategy with risk pooling would be extremely beneficial.

According to this study, they have public support, but it raises the pressing question of the availability of public funding. Whatever the future model emerges, social justice and equity require policymakers to consider the availability and affordability of insurance when making decisions about specific measures to manage long-term risks of natural disasters. By doing so, progress could be made toward ensuring the long-term viability of communities in high-risk areas, as well as presenting a policy change in favour of a new paradigm for long-term natural disaster risk management.

It was noticed that there is insufficient interest and research in this field in Palestine.

In conclusion, decision makers in the insurance business sector must be fully aware of the impact of risk management on helping their business achieve sustainable development through, better management, and reduce the risks associated with the risks of natural disasters because of their problems on all aspects of economic and social life through cooperation with all parties and working continuously to develop a sustainable development strategy in this sector.

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Appendix

Interview questions

1. Is there a role for risk management in achieving sustainability in the insurance sector?
2. Does risk management address the risks of natural disasters in the insurance sector?
3. How does the company plan to manage its risks?
4. How do companies classify natural disasters?
5. How do companies encourage residents to take out insurance?
6. What are the characteristics of the natural risks in Palestine facing insurance companies?
7. How do companies use the safety net to manage risks?
8. How do society and companies resist natural disasters?
9. What are the best ways to manage risks sustainably?
10. Is there an encouragement to secure real estate in high-risk areas?
11. Do insurance companies prevent harmful risks such as natural risks?
12. Do you think your company is taking enough risk management for natural disasters?
13. Is there community collaboration for disaster risk management?
14. Is your company prepared for unplanned risks
15. Can a new risk management model be created?

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Artificial Intelligence Algorithms and the Facebook Bubble

Emanuel SANDA[1]

Abstract

Products and services incorporating Artificial Intelligence are an ever-increasing presence in consumers' lives. Simply by browsing one's social media feeds, calling the bank, or asking one's smartphone to create a calendar appointment, individuals interact with AI daily, conscientiously, or unconscientiously. AI is not without controversy, starting with the basic task of defining it. Usually, a broader definition is adopted, leading to several categories representing current AI applications: recommender algorithms, intelligent digital assistants, chatbots, and intelligent robots. These have many things in common, but none like their dependency on being able to feed on enormous amounts of user data. This opens the door to how this data, largely personal in nature, is used, and the underlying privacy issues. Compounding the problem, some promote the idea that AI could evolve into what is called Artificial General Intelligence (i.e. independent, self-reliant robots), with all the threats this presents to the very future of humanity. Meanwhile, the recommender algorithms, most prominently employed for curating users' feeds by social media platforms, represent the most impactful form of AI at present with a high potential for creating bubbles, which can trap users in their own thoughts, biases, but also product usage and discovery. This paper presents the results of a survey conducted in 2021 among Romanian Facebook users to understand their perceptions, experiences, and desired level of control over their news feed. It identifies both current states and attitudes, as well as risks and concerns they might have in this regard. It opens the door for further research and discussion on the balance between the benefits of AI-driven algorithms in helping users navigate the deluge of information at their disposal, and the kinds of levers and controls those companies and authorities could allow consumers in order to escape the risk of a closed-in bubble.

Keywords: Artificial Intelligence, algorithms, Facebook, filter bubbles, consumer behaviour.

JEL Classification: M30, M31, M39.

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1. Introduction

Artificial Intelligence is one of the most debated topics today, both by academics and the general public. The term AI is used liberally, most frequently in relation to products and services developed by using recent technological advancements, which consumers rely upon on a daily basis. To some extent, AI is also used to refer to potential evolutions which could affect such change that our future might bear little resemblance to our present. It is the paradox of our times that while basic needs are yet to be fully satisfied for large proportions of our fellow humans (such as clean water or basic sanitation), those same people own a phone with an Internet connection and capable of running AI-based applications, such as face and speech recognition, to name the most common ones.

Because the concept of AI is seeing such broad use, one of the first questions one may ask is what AI actually is. What do people mean by AI when bringing the topic up in casual conversations, academic papers, or news reports? Is there a red thread connecting these conversations or are we dealing with various understandings of the phrase?

This paper focuses on presenting a summary of the current chatter around AI, looking at some of the definitions, and then assessing the current state of AI development, with emphasis on AI algorithms, how they are implemented in social media platforms news feeds, and the potential bubble effect they may create. Finally, we present a series of findings from a survey aimed at capturing the attitudes, perceptions, and concerns of Romanian users related to their experience with Facebook's algorithmically driven news feeds.

2. Artificial Intelligence – Definition, Implementation, Challenges

2.1 Defining AI

While Artificial Intelligence is defined in various ways by various parties, whether people in the academic field, technology writers, engineers, as well as laymen, common elements could be identified and a unified vision could be gained in this regard. (De Bruyn et. al., 2020) The challenge comes from the second half of the phrase – what is and how do we define intelligence itself? Depending on who is asking the question, whether a psychologist, a neurologist, or maybe even a philosopher, the definitions of intelligence itself could be many (Legg, Hutter, 2007).

One of the most accepted definitions of AI is "intelligence demonstrated by machines which would otherwise be observable only in humans" (Shieber, 2004). It follows that, like human intelligence, artificial intelligence should be able to learn, understand, reason, apply logic, solve problems, and be able to make decisions, while the next level would be self-awareness. The latter could lead to an even greater debate, as human consciousness itself still seems to be intensely debated among experts.

When we look at the different features of intelligence as mentioned above, we can conclude that much of what is nowadays called AI is actually Machine Learning

(ML), which could be most easily understood as the intersection between statistics and computational techniques, the result being software programs capable of making certain predictions, based on certain inputs, leading to specific actions or decisions (Jordan, 2019). ML is not new and could be considered the forerunner of Artificial Intelligence, representing the first efforts in the field of computer use to analyse data and find models based on which certain predictions could be made, which in turn would trigger specific decisions. ML dates back several decades, ever since engineers began manifesting a preoccupation for automating industrial processes.

When dimensions such as self-learning, self-awareness, sentient machines are added to ML, we move to a level where AI morphs into AGI (Artificial General Intelligence) which some researchers consider to be the only level at which we could truly speak of AI - the only one that bears a genuine appearance of human intelligence (Goertzel, 2015; Haenlein, Kaplan, 2019). By contrast, the forms and implementations of AI of today would be more appropriately called narrow AI – AI which is good at performing only very specific tasks well, without scalability to other tasks.

Consequently, along the broad spectrum of definitions, as well as expectations from AI, either everything could be called AI (i.e. any statistical model, no matter how simple, any algorithm processed by a machine and producing a certain result), or nothing could (as long as we are still far from generating a form of AGI, as defined above) (De Bruyn et al., 2020).

In addition to the way in which the scientific and technological communities position themselves towards AI and what it means, greater concern should be manifested towards how the general public, the millions and billions of users of products and services powered by AI, perceives and relates to AI as an emerging and potentially disruptive technology for our times.

2.2 Implementations of AI – Present State and Prospects

Opting for a broader definition of AI, we now look at the current implementations, incarnations, and applications of Artificial Intelligence that the general public is most likely to encounter on a day-to-day basis. Following is a review of the most common services and products which espouse some form of AI, with no claim of exhaustiveness or comprehensiveness.

Recommender Algorithms: perhaps the most common form of applied AI and one that is present in the lives of individuals at every step. Today, from the moment we wake up in the morning, the first thing most of us do is look at our phones. The screen can display information such as the current weather conditions and forecast for the day, traffic status from home to school or work, and future calendar appointments. An algorithm running on the phone corroborated this data from various sources residing on the phone to assemble the most relevant image of our day.

As the day progresses, we may find ourselves in need of writing a message or e-mail, at which point the predictive keyboard will try to guess and recommend words or phrases that might fit what we are trying to do or say. Opening your

favourite search engine from your web browser and typing only the first few letters of a search will trigger a list of suggestions relevant to our needs at that time and the location we find ourselves in.

As we place our next order online, whether for groceries, or routinely used products, or perhaps the rarer purchase of an expensive item, all e-commerce platforms will be ready to assist us with recommendations based on our own socio-demographic profile, past purchases, as well as those of millions of other buyers that an AI algorithm deemed similar to us (Smith, Linden, 2017).

At the end of the day, we sit in front of the TV for a few moments of relaxation and entertainment, when Netflix or YouTube will be ready to serve us the next episode of a series we watched, or a movie or video that has a high probability of providing us with maximum pleasure and satisfaction (Haenlein, Kaplan, 2019).

All of the above are powered by algorithms that are sometimes simpler, sometimes more complex, but all abundantly fed with a multitude of data points, sometimes in huge quantities. All algorithms aim to guess, predict, anticipate what should follow – based on our varied experience as individual consumers, based on our personal history and that of million other users "like us".

According to some sources, AI-powered recommender algorithms have become critical for Amazon (accounting for about 35% of its revenue) (Forbes, 2018) or Netflix, where 80% of subscriber content is influenced by its revenue-generating recommendation system, to the tune of $1billion per year (Gomez-Uribe, Hunt, 2016).

Intelligent Personal Assistants: Growing in popularity (and ubiquity), these personal assistants (e.g. Apple's Siri or Amazon's Alexa) can help with simple tasks, such as finding quick answers to specific questions, scheduling calendar appointments, setting reminders, texting, or placing orders online. Largely based on algorithmic logic, fuelled by large amounts of data, and augmented with natural language processing (NLP) skills, these assistants are becoming a growing presence in our lives, an opportunity for the general public to experience and assess the current progress in the field of AI, but also its most obvious limitations: along with artificial intelligence comes a respectable amount of "artificial stupidity" (Lo, 2019).

Chatbots: An increasing number of customer support centers are equipped with software robots capable of having simple conversations with customers. Whether we call the bank for basic information (e.g., how to open an account, check our balance), or go online to the help or customer contact page of a company or brand, most likely a robot using NLP will meet us - another variety of technology-based algorithms and predictive models that try to anticipate and answer a variety of questions we might have while at the same time trying to "sound" as human as possible (Luo et al., 2019).

Intelligent Robots: In this field of AI manifestation, many harbour views of a distant and sometimes dystopian future (recent example could be the robot Sophia or the Boston Dynamics robo-dog).

Meanwhile, the most tangible form of intelligent robot is represented by the autonomous vehicle - from delivery drones, to driverless trucks, to electric cars replete with autopilot functions. Although a crowded field, with dozens of different

players involved and fierce competitors in this potentially huge market, autonomous vehicles seem to be making slow and modest progress, not least due to intense scrutiny from authorities, but also the general public. As an example, a fatal accident in April 2021 in Texas, involving a Tesla car in which two passengers were riding on autopilot, received wide media coverage, while hundreds of fatal accidents in the same geographical area, but involving traditional cars and drivers, go largely unnoticed and unreported.

Add to potential consumer scepticism disclaimers subtly propagated by some of the players themselves, to understand that autonomous vehicles still have a way to go. For example, Waymo, one of the more prominent players in the field, admits that autonomy will always have some constraints, despite the fact that the way they try to position their service is "driving anywhere, anytime, in all conditions" (Tennant, Stilgoe, 2021).

2.3 Risks and Challenges in AI

Although the growth of AI has been exponential and will continue at the same pace for the foreseeable future, penetrating every facet of our lives, there is more and more talk about the challenges and threats posed by this technology and the impact it will have on individuals and companies alike. Increasingly, academics, business people, and regulators are getting involved and shaping what is now a new field – AI ethics.

Following the line of AI applications detailed above, some of the biggest concerns related to AI are dealing with (Du, Xie, 2020):

- algorithmic biases and the incorporation of ethical values of target consumers - from the perspective of the product itself (Howard, Borenstein, 2018);

- control over personal data and privacy, as well as cyber security threats and concerns - from a consumer / user perspective (Gwebu et al., 2018);

- the impact on the social fabric and human interactions, the potential loss of jobs, unemployment, and the rise of the so-called useless class – from a broader social perspective (Harari, 2019).

In terms of direct interaction with AI, individuals (as consumers) seem to have ambivalent feelings about these technologies: while most seem to receive and enjoy the benefits, novelty, or excitement when using products and services based on even partially developed forms of AI, at the same time many nurture feelings of fear and anxiety resulting from the potentially evil manifestations of such technologies (Mick, Fournier, 1998).

2.4 AI-Driven Recommender Algorithms – the Facebook News Feed

Algorithms may be viewed in a variety of ways: from a purely technical perspective, they are a set of instructions written in computer code (Knuth, 1998), but when that piece of software meets the human user, it turns into something that has the potential to impact our own existence (Kitchin, Dodge, 2011). This usually

happens largely without the users' participation or awareness of the presence, influence, and impact of the algorithm, particularly given the hidden and elusive nature of this particular piece of technology (Bucher, 2016). With Facebook adoption and usage levels at their highest among individuals of all profiles, compared to any other social media platform in existence today, it follows that the likelihood of people encountering, interacting (unknowingly), and being influenced by the algorithmic news feed of the platform is by far the most common and likely experience in this regard.

A common occurrence of late to which only some seem to be alert is this: a user might be talking to others about a particular product or brand or entity or idea, or might perform a search, or read a particular article, all outside Facebook's not-so-walled garden, and next time they open their FB news feed, an ad about exactly the same product or brand pops up. Is Facebook eavesdropping on us? Is it reading our entire activity on (and off) the web? This is perhaps the most glaring touchpoint where users might become aware of the existence of an invisible force guiding the content tailored just for them, and a constant presence in our everyday lives (Eslami et al., 2015).

The pervasive presence of algorithms in our lives today is an uncontested reality, and obtaining an understanding of the impact on people's emotional responses should be the focus of researchers' endeavours. As algorithms impact in our lives is only deemed to continue to intensify with every day that passes, our preoccupations should be related to learning to live, understand, and use these hidden forces for good. As a technology based on AI where explainability is quite elusive, it is equally important to strive to understand the inner workings of algorithms, how they "perceive" their users, and the extent to which they influence even their own sense of self (Bucher, 2016).

In principle, FB's algorithmic news feeds should serve two main purposes: one is to display whatever content is deemed appropriate for every single user, so that important stories are not somehow overlooked, while at the same time prioritizing those posts which have the potential to generate the highest user engagement (Owens et. al., 2016). Given the design choices behind a recommender algorithm such as the one employed by Facebook, an area of concern remains the extent to which these tend to create a closed-loop (or "bubble") in which users find themselves trapped in, with all the consequences deriving from this phenomenon. After all, the Facebook feed is where individuals spend a good part of their day, a true space of their daily reality, which cannot remain without impact on all other facets and dimensions of their lives. The identification and even avoidance of the potential negative outcomes of this phenomenon by trying to better understand the underlying workings of algorithms and design choices should be a real preoccupation of both researchers and engineers alike (Rader et al., 2015). It seems that the manner in which Facebook's algorithms are supposed to work - powerfully addictive to users, irresistible to advertisers – is by design, as illustrated in the numerous patents developed and registered by the company throughout its existence, patents aimed at

creating almost the equivalent of a rabbit hole for users' experience on the platform (Harris, 2021).

The concept of online bubbles, understood to mean the prioritisation by algorithms of that content which would seem of interest to users, while securing engagement on the platform, while at the same time hiding the content that may diverge or challenge existing views (Pariser, 2011) has become a growing concern in recent years as a real threat to contemporary society. This reality is mostly brought up in the socio-political context, accompanied by concepts such as polarization, misinformation and the hotly debated topic of 'fake news' (Solon, 2016). While bubbles mainly encapsulate users in a particular thought and idea universe, by extension, the same user could be viewed as a consumer entrapped in a finite universe of brands, products, services, experiences where choices are obvious and exposure to "new" or "different" rather limited. Filters tailored to a user's preference, past history, or connections can, at the same time, limit the variety of things to which we are exposed, thus affecting the way we think and learn. This reading of the bubbles presents us with a world dominated by an algorithmic will and suggests that there is very little left for us to do. At the same time, because algorithms are self-feeding animals incorporating newer and more data generated from past recommendations and user behaviour, there is a risk of creating a common experience across users where items and content benefiting from more data will be prioritized over less popular ones. In a sense, while some things may look new to individual users, the same things will be fewer and narrower in scope for all users combined (Fleder, Hosanagar, 2009).

In theory, the Internet, as a gigantic repository of data, should increase the possibilities of access to the most diverse data, as well as lead to an increase in the amount of information for all. Yet, our network interaction modes today have shown some restrictions in this universe of possibilities. Online bubbles are a real phenomenon which show how certain modes of interaction on the internet can lead us to be closed in very restricted and familiar universes instead of providing us with the experience of the unknown in order to discover it. At the same time, although algorithms are powerful tools in guiding interactions and choices, it is possible to affirm that the reception and appropriation of products is a complex social process, involving a continuous activity of interpretation and assimilation of significant content by individuals and groups. Thus, despite playing a key role in limiting exposure to different points of view, we can affirm that algorithms are not the only element with a role in filtering content and affecting individual agencies (Franco et. al., 2017).

3. Aims of the Research

We will now look at the results of a survey conducted in 2021 among Romanian Facebook users. The objective of this research was to uncover some of the attitudes, perceptions, and concerns that FB users might have in relation to their experience of browsing the daily Facebook news feed.

4. Research Method

For this research, 180 individuals were interviewed in Bucharest, arguably the most forward-looking and digitalized area in Romania. The sample was designed to be representative, taking into account the socio-demographic structure of the city's dwellers aged 20-65 years old. Given Facebook's penetration of 93% in urban areas in Romania (Spark Foundry, 2021), the sample ensures a margin of error of 3.73% at a 95% confidence level. Probabilistic sampling was applied with respondents being randomly selected in a multistratified approach, to account for the city's population structure in terms of age and gender groups. The survey was conducted using online structured interviews. Data collection was performed in July 2021.

5. Findings

The first piece of information we look at is users perceptions towards their news feed. As shown, more individuals agree that their Facebook news feed is overwhelming and that they waste a lot of time navigating all of it. This could be interpreted as a shortcoming of the algorithms behind these news feeds, the purpose of which is to curate, select, simplify, and focus the user experience.

Figure 1. Perceptions towards volume of news feed
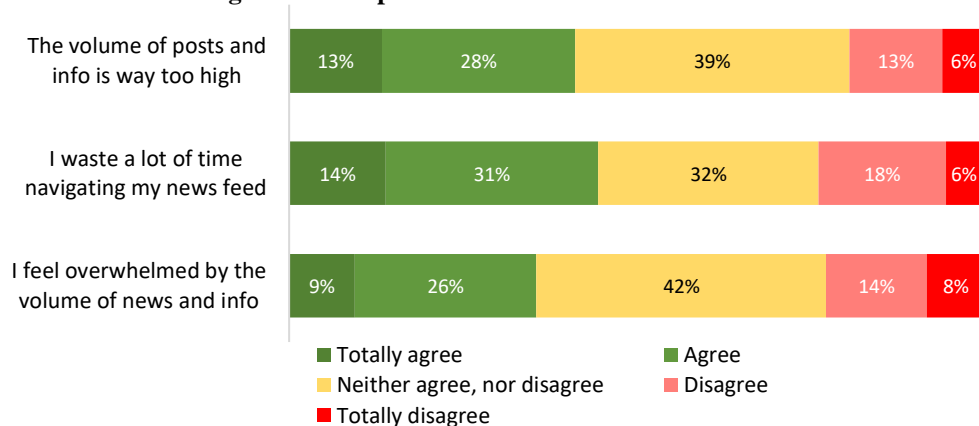
Source: author's own research and data processing.

When it comes to some of the benefits perceived by Facebook users, such as making them entertained or better informed (Chart 2), we see quite a few differences: opinions are rather split between those who agree and those who are rather neutral in terms of the news feed providing a means to relax and feel entertained. The percentages of agreement drop when it comes to obtaining a sense of being better informed as a result of browsing the news feed regularly.

Figure 2. Facebook feed - the positives
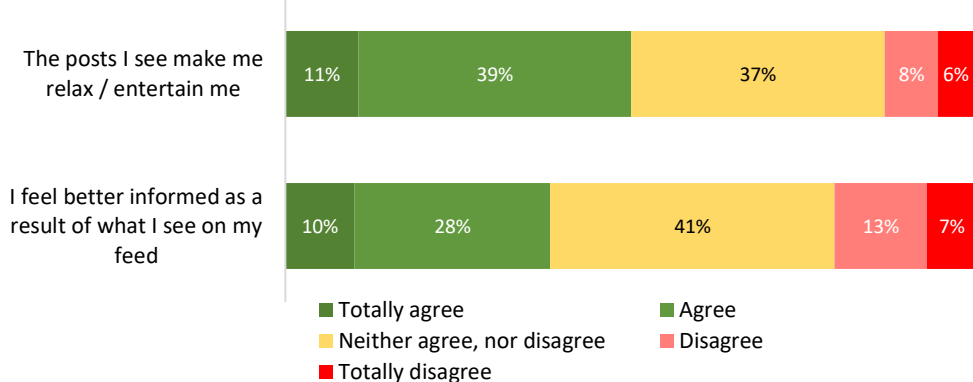
Source: author's own research and data processing.

At the other end of the spectrum, when probing for the potential negative experiences generated by their news feed (Chart 3), only a minority of respondents agree that their news feed creates a sense of anxiety in them, while most are rather undecided. However, in terms of the feeling that some of what they see in their news feed is rather false or wrong, a clear majority agrees that that is the case.

Figure 3. Facebook feed - the negatives
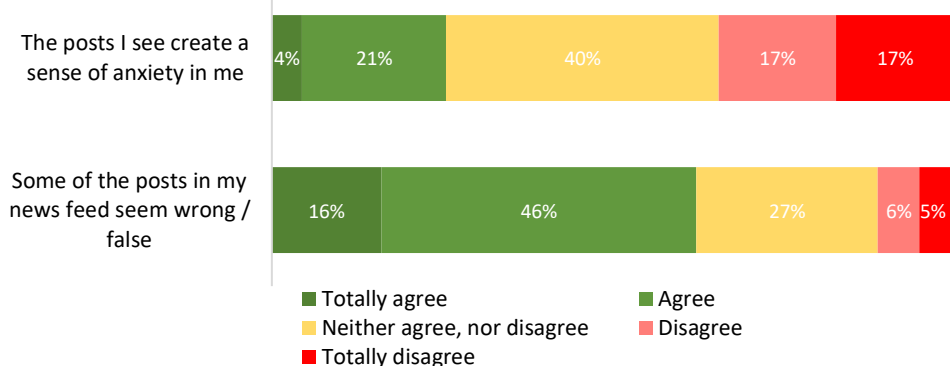
Source: author's own research and data processing.

On the topic of what kind of bubble effect the Facebook feed may create (Chart 4), users' opinions are both split and conflicted. A significant percentage cannot appreciate whether they miss or discover new products, things, or experiences thanks to what they see in their news feed. A similarly large percentage both agree that their news feed is keeping things away from them (the proverbial 'FOMO – fear of missing out') and at the same time allows them to discover new things – broadening their horizons.

Figure 4. Facebook feed – the bubble effect

I feel like I don't see all the posts I should in my feed	12%	31%	36%	14%	8%
I feel like I miss certain things because they are not shown in my feed	13%	29%	36%	13%	8%
I feel like I discover new things thanks to what I see in my feed	9%	39%	38%	8%	6%

■ Totally agree   ■ Agree
■ Neither agree, nor disagree   ■ Disagree
■ Totally disagree
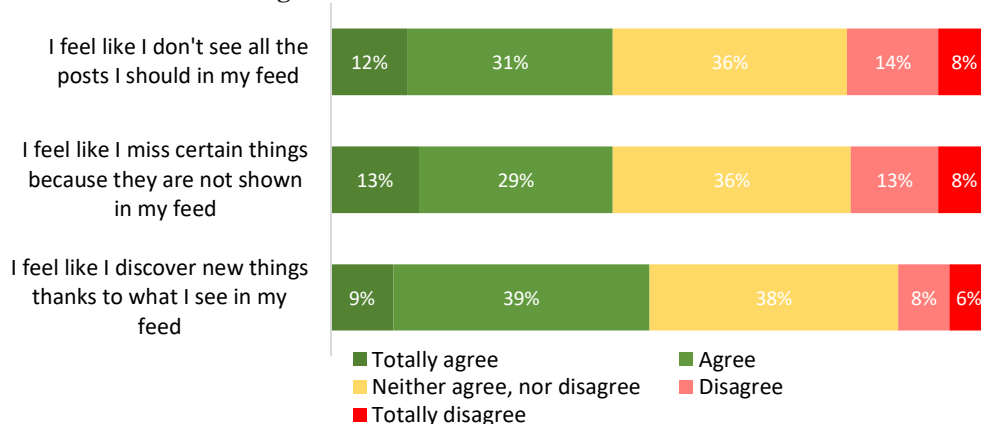
Source: author's own research and data processing.

Finally, on the topic of taking back control over their news feed (Chart 5), a clear majority across all age groups agree that they would like to have a higher degree of control over what their news feed displays. Surprisingly, it is the very youngest users who seem to be less inclined in having the option to exert some control over their feed.

Figure 5. I would like to have more control over the posts and info I see in my feed

37%
19%
3%
7%
34%

■ Totally agree   ■ Agree   ■ Neither agree, nor disagree   ■ Disagree   ■ Totally disagree
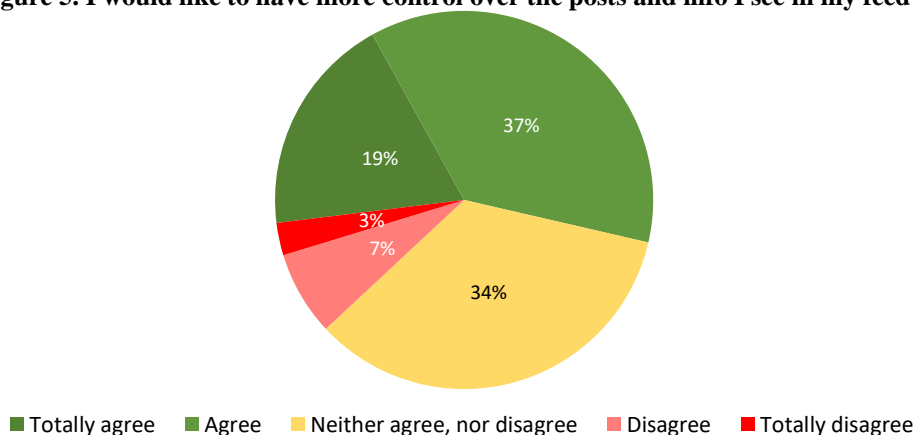
Source: author's own research and data processing.

6. Conclusions

In this paper, we looked at the current state of AI development, starting from the ongoing debate about how we define AI, followed by an overview of some of the most common current AI implementations with which individuals and consumers experience increasing levels of interaction, then looking at some of the challenges posed by AI at present and potential emerging threats in the future.

We then looked specifically at the most common form of AI-driven technology that individuals experience perhaps on a daily basis – the recommender algorithm – with a focus on its implementation in the Facebook news feed and the potential risk it poses for creating bubbles and encapsulating users in an echo chamber of their own thoughts, biases, experiences, but also product usage and discovery.

In the end, we looked at some of the findings of a 2021 survey among Romanian Facebook users to understand their perceptions toward, positive and negative experiences with, and the level of control they would like to have over their FB newsfeed.

The paper calls for further empirical research aimed at identifying and measuring the correlation and level of influence that the above-present dimensions of the user experience have on their cognitive states and the extent to which the filter bubbles and echo chambers that feed people's confirmation bias predispositions affect their ability to continue to learn and develop by opening their horizons and universes in which they manifest themselves as users, consumers, politically and socially active citizens. Such research and potential findings would be useful for both marketers, companies, advertisers, as well as authorities, in their efforts to create a better digital future for all.

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The Performance of Governmental Digital Platforms in Romania during the COVID-19 Pandemic

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Abstract

The development of user-friendly government platforms that can be easily accessed and provide important information on public matters became even more obvious during the COVID-19 pandemic, when public entities from all over the world faced the challenge of correctly informing the public on the situation by providing trustworthy sources. Apart from normal channels, such as TV, radio, and newspapers, the opportunity to use the Internet also arose, and the Romanian government together with an NGO developed various platforms that were designed to keep the public correctly informed and avoid fake news. This paper aimed to analyze how citizens used two of these platforms, 'cemafac.ro' and 'stirioficiale.ro' in order to gain a better understanding of how they performed during the COVID-19 crisis and provide some insight on how the users interacted with them. Among the results, we found that most of the visits came from smartphones and that there is a need to optimize the display of information so that users can access it more easily when needed.

Keywords: digitalization, digitization, e-government, COVID-19, public authorities, digital transformation.

JEL Classification: O52, M15, M21.

1. Introduction

Digital platforms are currently used by most types of organizations that want to streamline the transmission of information quickly and efficiently. This was also the case with the Romanian government during the COVID-19 lockdown in 2020, when it had to find solutions to correctly inform citizens on the pandemic, thus providing a place where citizens can get true information and circumvent fake news.

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In the case of informing the public, the Romanian government chose to collaborate with an NGO called Code for Romania, which aims to aid governmental entities with software solutions that benefit citizens. Through this collaboration, a number of software solutions were developed, and this article aims to analyze and compare the usage of two of the platforms, called cetrebuiesafac.ro and stirioficiale.ro:

- Stirioficiale.ro – The website's material is the official source of information for the public and media organizations on the situation created by the spread of the Coronavirus. This information contained on this platform was composed of press releases, links to other useful platforms, frequently asked questions, legislation, and sanitary conduct.
- Cemafac.ro – This platform is a website that contains suggested guidelines for contact, action, and conduct during the COVID-19 pandemic emergency scenario. It aims to educate the public about fundamental guidelines that the authorities prescribe in order for citizens to better manage the situation.

2. Literature Review

Discussions around digital transformation are becoming more and more common in the academic environment because this process not only improves operations, but can also greatly impact services and industries (Ivančić et al., 2019). Due to the rapidly changing private sector when it comes to this topic, the expectations of the public are also raised regarding the public sector (Mergel et al., 2019), a fact that also put a lot of pressure on the Romanian government regarding how it chose to communicate during the COVID crisis, which proved to emphasize the importance of the public sector's ability to tackle emergencies (Mazzucato, Kattel, 2020).

After the COVID-19 outbreak, the lockdown accelerated the adoption of digital solutions at an entirely unexpected rate (Budd et al., 2020; Paraschiv et al., 2022), opening up unexpected potential for scaling up alternative methods of conducting a social and economic existence. According to Hantrais et al. (2020), families have been shown to have become 'digital by default', as children were exposed to online risks and opportunities, while Alexopoulos et al. (2020) claim that people are turning more and more to digital platforms to aid their mental well-being.

Digital globalization is a new form of globalization (Schilirò, 2020). It brings significant adjustments to cross-border commerce, the flow of economic gains, and participation development. Ratten (2022) presents the ClickforVic government digital platform that was launched during the first 2020 lockdown in Melbourne, Australia, as a way for rural farmers to connect with urban consumers.

In the case of websites, there is a need to incorporate a lot of information, while also keeping pages simple, so that they can be easily navigated (Chen, 2020), which is a challenge, especially when it comes to developing websites containing important public information. This endeavor becomes even more complicated with the rapid rise of smartphone usage and access to websites through mobile phones (Rashid et al., 2020).

3. Methodology

This article aims to examine the official platforms "Stiri oficiale" and "Ce trebuie să fac", which were built by Code for Romania in collaboration with the Authority for the Digitalization of Romania, to see the usage of each of these two platforms by the public. The data that was of interest was the type of device used in order to access the websites, the countries from which it was accessed, rejection rate, pages per session, and average session duration.

In order to gather the information, we approached the Authority for the Digitalization of Romania and asked for the official data for the websites "www.stirioficiale.ro" and "cetrebuiesafac.ro." In the backend of these websites, a Google Analytics module was set up, so it could keep track of the number of people who visit the website and all of the public information that we required.

4. Results and Discussions

Taking each of the data sets into consideration, some trends were noticeable regarding each platform, which will be detailed in the following pages.

In the case of the "Stiri oficiale" platform, the most popular device for accessing it was the smartphone, with 78% of total visits coming from mobile devices, 20% coming from personal computers, and 2% from tablets.

Figure 1. No of users by device category stirioficiale.ro
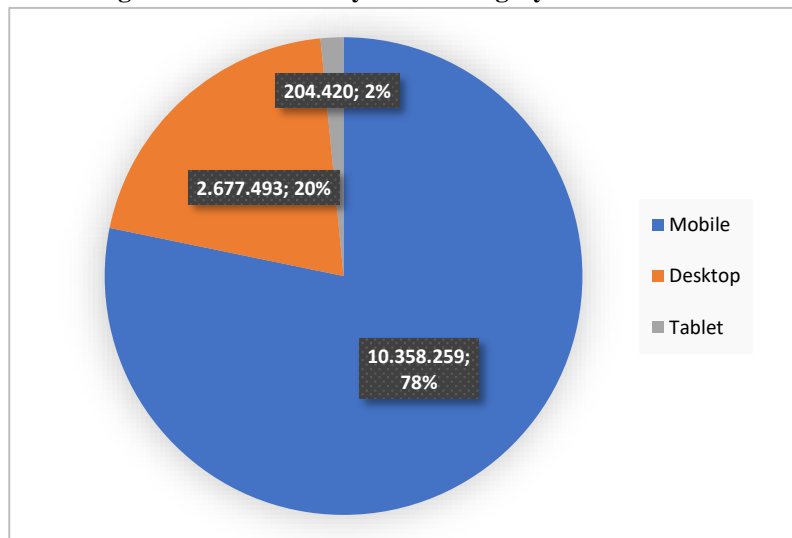
Source: Own representation based on data retrieved from the Authority for the Digitalization of Romania.

Table 1. Stirioficiale.ro digital platform

Device category	Users	Sessions	Bounce rate	Pages/session	Average session duration
Mobile	431.381	491.546	27,90%	4,39	113,75
Desktop	121.044	137.440	44,53%	2,71	97,54
Tablet	8.196	9.618	26,77%	5,02	152,76
Total	560.621	638.604	31,46%	4,04	110,85

Source: Own representation based on data retrieved from the Authority for the Digitalization of Romania.

Table 2. Cemafac.ro digital platform

Device category	Users	Sessions	Bounce rate	Pages/session	Average session duration
Mobile	10.358.259	23.228.861	60,17%	1,99	78,07
Desktop	2.677.493	8.069.890	46,28%	2,58	149,38
Tablet	204.420	548.417	51,04%	2,31	104,24
Total	13.240.172	31.847.168	56,49%	2,15	96,59

Source: Own representation based on data retrieved from the Authority for the Digitalization of Romania.

In the case of Stirioficiale.ro, the number of sessions (times the website was accessed) is more than double the number of users that have accessed the platform in the case of tablets and mobile phone visits, and almost triple in the case of personal computer visits. This would suggest that the citizens found the platform useful enough to warrant returning for more information. Although this type of data collection does not account for transfers from one device to the other or the number of users that returned to the website, it does help in providing an overview of how the platforms performed with regard to recurrent visits.

Figure 2. Evolution of sessions stirioficiale.ro
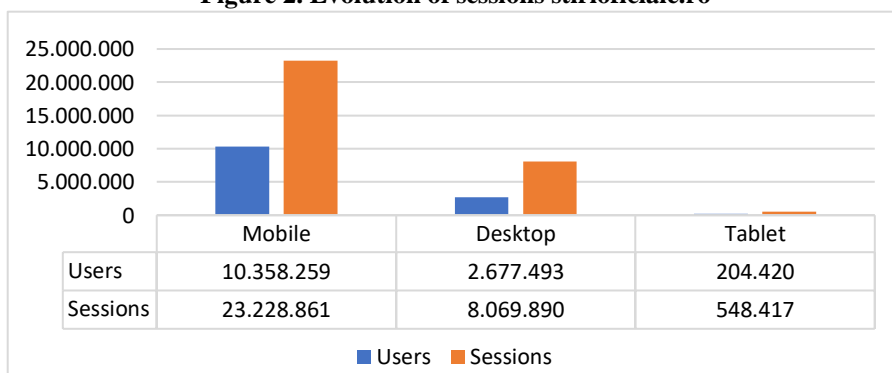
	Mobile	Desktop	Tablet
Users	10.358.259	2.677.493	204.420
Sessions	23.228.861	8.069.890	548.417

Source: Own representation based on data retrieved from the Authority for the Digitalization of Romania.

The bounce rates of the "Stiri oficiale" platform are significantly higher than the bounce rate of cemafac.ro, as seen in Table 3. The bounce rate is the number of users who viewed only the first page without performing any other action. In the case of "Stiri oficiale" the percentages could be explained by the fact that most of the relevant information is posted on the first page, without needing the users to access subsequent other pages.

Table 3. Bounce rates of stirioficiale.ro and cemafac.ro platforms

Device category	Stirioficiale.ro Bounce rate	Cemafac.ro Bounce rate
Mobile	60,17%	27,90%
Desktop	46,28%	44,53%
Tablet	51,04%	26,77%
Total	56,49%	31,46%

Source: Own representation based on data retrieved from the Authority for the Digitalization of Romania.

By comparing the performance of the two platforms, several differences could be observed.

A. As can be observed in Tables 1 and 2, the number of users and sessions on the cemafac.ro platform is significantly lower than that of stirioficiale.ro. This could be explained by the fact that stirioficiale.ro was more heavily marketed in the public space, both on the television and online, whereas cemafac.ro was mainly advertised on the stirioficiale.ro website. This would mean that most of the visits on cemafac.ro could be from stirioficiale.ro, however, this data was not available for analysis.

B. Unsurprisingly, the highest percentages of users accessing both websites were from Romania, but there were also a number of users from other countries, as can be seen in Table 4. This might account for Romanian citizens residing in those countries, wanting to find out information on restrictions or actions taken by the Romanian government regarding the COVID pandemic.

Table 4. Location of the users

Location	Cemafac.ro users	Cemafac.ro ratio	Stirioficiale.ro users	Stirioficiale.ro ratio
Romania	492.909	87,92%	11.156.403	84,26%
United Kingdom	11.336	2,02%	310.223	2,34%
Italy	10.600	1,89%	297.370	2,24%
Germany	8.998	1,60%	271.627	2,05%
Spain	4.091	0,72%	158.394	1,19%
Moldova	3.403	0,60%	117.450	0,88%
Belgium	3.212	0,57%	105.453	0,79%
France	3.191	0,56%	93.842	0,70%
Austria	2.530	0,451%	81.724	0,61%
Netherlands	2.487	0,44%	77.050	0,58%

Source: Own representation based on data retrieved from the Authority for the Digitalization of Romania.

C. When comparing the number of sessions and users on both platforms, there is a large difference between them regarding the returning number of users. While in the case of stirioficiale.ro there is a significantly high difference between the number of users and the number of sessions, with the latter being the largest, in the case of cemafac.ro, the difference is not significant in the case of cemafac.ro. This might suggest that users did not consider the information on cemafac.ro useful enough to warrant multiple visits to this website.

Figure 3. Number of sessions and users on stirioficiale.ro and cemafac.ro
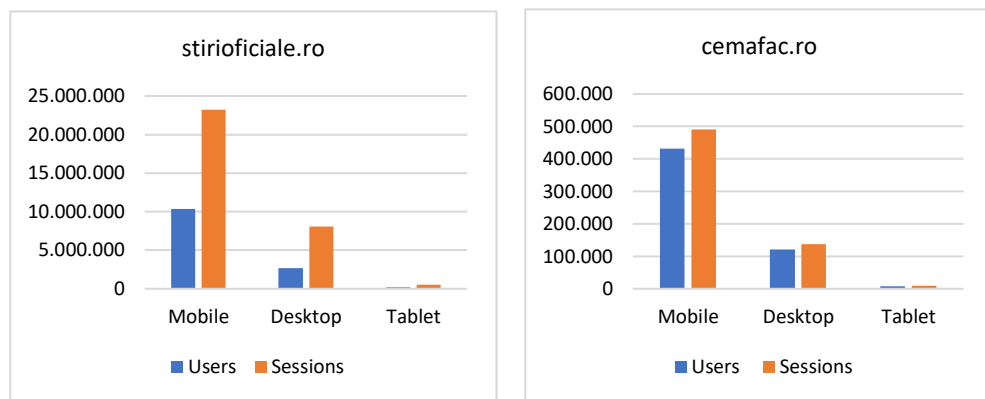
Source: Own representation based on data retrieved from the Authority for the Digitalization of Romania.

D. As can be seen in Figure 4, users accessed more pages per session in the case of cemafac.ro. This could be explained by the fact that stirioficiale.ro has all the information on the front page, whereas cemafac.ro has the information structured in multiple pages. This also explains the high bounce rate of stirioficiale.ro, the counter of which only goes up if users leave the site after looking at the home page.

Figure 4. Pages per session on stirioficiale.ro vs cemafac.ro
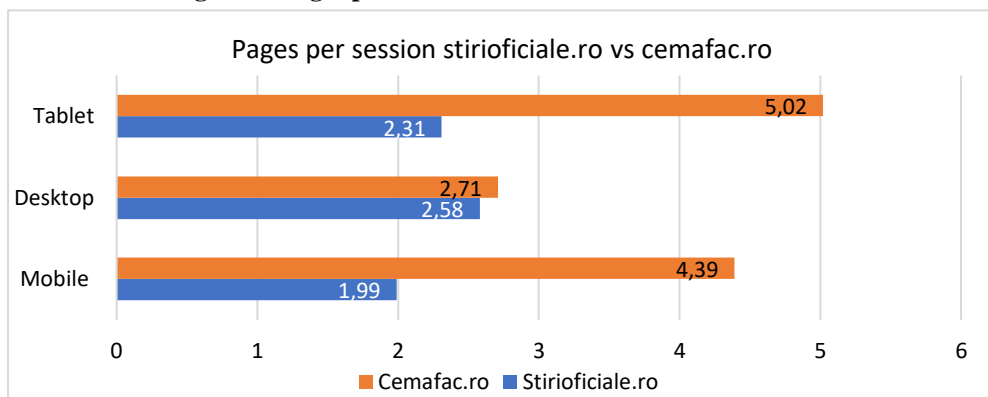
Source: Own representation based on data retrieved from the Authority for the Digitalization of Romania.

E. There is also a difference between the two platforms in terms of the average duration of the session, which can also be seen at the level of device used. In the case of mobile devices (smartphones and tablets) the sessions were longer on cemafac.ro, whereas in the case of personal computers, the longer sessions were on stiroficiale.ro. This could indicate the fact that the stirioficiale.ro is better designed for being accessed on personal computers, whereas the information on cemafac.ro is better adapted to mobile devices. The longer average session duration on stirioficiale.ro can also be due to the fact that if a user only accesses the home page and does not click on any button, Google analytics counts the session as being a bounce, with a duration of 0 (zero), which might significantly lower the average session duration of pages with high bounce rate.

Figure 5. Average session duration on stirioficiale.ro and cemafac.ro
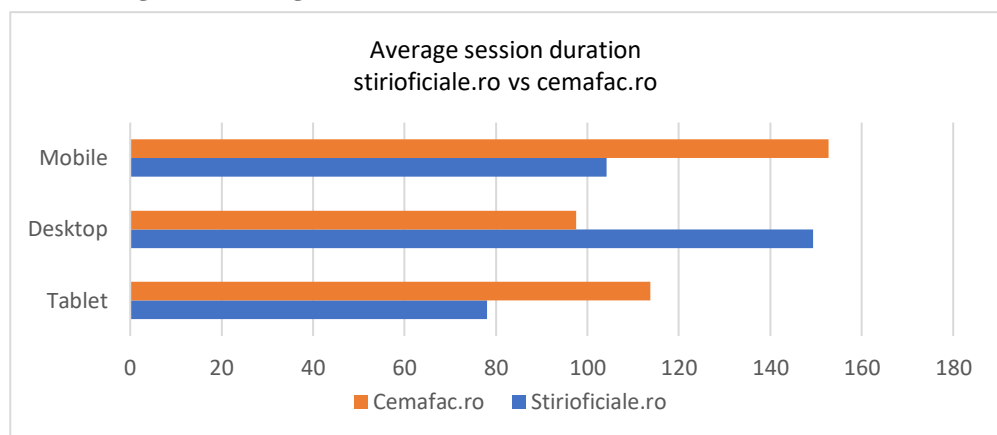
Source: Own representation based on data retrieved from the Authority
for the Digitalization of Romania.

5. Conclusion

Although the large number of users who accessed these two platforms suggests the fact that they were successful, there is a noticeable difference between them. The study suggests the fact that more citizens chose to use the stirioficiale.ro platform that has all of the information centralized and conveniently displayed on the front page. There is also a noticeable difference between the number of pages visited and the popularity of each platform. Even though there were more pages visited and longer sessions in the case of cemafac.ro, this did not predict the popularity of the platform, in comparison with the more widely used stirioficiale.ro platform. In the case of device used, there is a very large percentage of users that accessed the platforms on mobile devices (especially smartphones), which confirms the fact that more attention should be paid to how information platforms should be designed in order to better accommodate visits from smartphones and tablets.

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Online Teaching – Analysis and Solutions Instrumented by Quality Engineering Methods

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Abstract

Under current conditions, due to an unprecedented coronavirus pandemic, COVID-19, since the beginning of 2020, online education has become compulsory in most countries of the world. Classical face-to-face education has completely moved into the online environment, becoming distance learning. In this case, the danger of declining student performance is very high, especially in terms of the possibility of exam fraud. Our goal is to decipher the strengths but also the sensitive points of online education, from the student's point of view. To achieve the results, we used the tools and methodologies provided by Quality Engineering. These tools help clarify the issue, identify the most damaging trends, and design prevention methods. The main analysis tools of our research were: statistical evaluation of the answers provided by the students, SWOT analysis, Interrelationship Diagram and Quality Function Deployment diagram (QFD). The case studies concern the university environment, more precisely, the students of the Politehnica University of Bucharest and of the University of Bucharest.

Keywords: online university education, quality engineering tools, student performance, avoid fraud, false values.

JEL Classification: A20; C18; H12; H84; I23; O21; O35.

1. Introduction

It is important to distinguish between normal e-learning and emergency e-learning developed quickly and with the bare minimum of resources and little time due to the COVID-19 pandemic. Thus, the education of about 900 million students in the world was compromised: universities closed, Erasmus programs, and even

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exams and graduation sessions suspended. Universities have experienced in a very short time a very strong digital acceleration of their teaching processes, and certainly this can be seen as an added value, even when returning to university classrooms for frontal lessons. To interact with colleagues and teachers it is necessary to have a sufficiently stable internet connection and often the geographical configuration represents a limit. Among the reasons that push students to choose a particular university are: the right course, the availability of computers, the quality of the library facilities, the good reputation of teaching, the availability of "quiet" areas for self-study, and the friendly attitude toward students. A good educational alternative can be a blended mode, in which it is possible to alternate face-to-face activities with others online. After all, what matters is the teacher-student educational relationship, the love and the passion that the teacher is able to transmit in teaching, the students' ability to learn by falling in love with knowledge. This is what makes the difference between a good education and a teaching given only for official duty.

2. Problem Statement

The main factors that contribute to student satisfaction in online courses (Bollinger, 2004) are: teacher performance, communication, technology, course management, educational platforms, and interactivity. Student satisfaction must be at the heart of any teaching method and indicates whether the information and knowledge learned meet student expectations. According to Oduma et al. (2019), e-learning can help universities increase student satisfaction, even if face-to-face learning is perceived as more satisfying. However, online courses present a number of challenges: distance learners may never have visited the physical campus location, and may have difficulty establishing relationships with teachers and other students, etc. Scholars' views on online and conventional learning are contradictory. According to Fortune, Shifflett and Sibley (2006) there is lower overall satisfaction with online courses, Artz (2011) considers student satisfaction higher in attending online courses, while Lin et al. (2019) agree that there is no difference in student satisfaction between conventional and online courses. While Platt, Raile and Yu (2014) pointed out that students do not find online courses equivalent to traditional lessons, perceiving online courses as easier, Bali and Liu (2018), highlight that online learning is also somehow beneficial, even if perceived as lacking in social interaction and communication.

3. Research Questions / Aims of the Research

Our paper concerns the reality of Romania with an increasingly common culture suited to mass universities. Compared to innovative teaching experiences of other countries that already experiment with models based on the use of metaverse, Romania, due to its economic and social conditions, cannot in a short time take different paths from those currently in force. So, this contribution aims to deepen and interpret the experience lived by Romanian university students in the field of distance learning, in order to formulate some proposals to improve the sensitive

aspects of online teaching in a context of transformation and innovation of Higher Education.

4. Research Methods

We use statistical tools for analyzing the results collected from students through online questionnaires and managerial tools and methodologies provided by Quality Engineering. These tools allow clarifying the issue, sorting out the most harmful trends, and designing prevention methods. So, we use the following analysis tools: SWOT analysis, Interrelationship Diagram and Quality Function Deployment diagram (QFD). To determine the perception of students about online classes during the COVID-19 pandemic we developed a questionnaire of 20 questions. Questions have simple, multiple, Likert scale (1 = strongly disagree, 5 = strongly agree) or open answers. The questionnaire was distributed online on social networks to students from University of Bucharest (UB) and University Politehnica of Bucharest (UPB). The respondents to the questionnaire are mainly from the Faculty of Aerospace Engineering with about 1200 students from the Polytechnic University of Bucharest and from the Faculty of Administration and Business with about 2800 students from the University of Bucharest, where the authors of this research are tenured professors. The sample was formed of 462 respondents. Using SPSS, we performed an exploratory analysis of the questionnaire and tested some hypotheses.

5. Findings

The core purpose of our paper was to detect the problems met during the lockdown related to university teaching in undergraduate courses with technical direction from the Polytechnic of Bucharest (UPB) and humanities degree courses at the University of Bucharest (UB).

5.1 Exploratory Analysis of the Questionnaire

Most of the respondents, 73.1%, were female. About 94% of the respondents were 19-25 years old and almost 71% were from the urban area.

The online platforms used for online classes are: Moodle 28.7%, Zoom 15%, Google Classroom 13.2%, Microsoft Team 9.6%. In terms of teaching methods used during online classes, 70.7% said classical teaching using PPT, 13.2% video classes (voice over PPT), and 13.8% interactive teaching methods. The most used evaluation method was Google forms, 52.1%, followed by Microsoft forms, 26.3%, and Moodle, 7.2%. We had an open-ended question about why students trust or not the evaluation method. The majority, 89.2%, said they trust the professor so they trust the assessment method, many students said they liked getting the results instantly, and they are also confident that for multiple choice test the platform used in evaluation cannot make a mistake. Among those who did not trust the evaluation method, the majority said that the time for exam was not enough because the professors were afraid the students will cheat during the exam; also, the students said that during the online evaluation it is easier to cheat on the exam. Comparing the

responses received from students from UB and UPB for confidence in online evaluation, 9.09% students from UB and 20.83% students from UPB said they don't trust online evaluating methods.

In terms of problems encountered in online teaching, 43.7% declared internet connection, 30.5% the lack of motivation, 7.2% the poor ability to use online platforms. Most of the students said that the main advantage of online teaching is access to classes from the comfort of their home, 38.9%, so 29.3% do not waste time on their way to the faculty, 20.4% can do other activities during the online classes and 5.4% do not have to pay the rent. In terms of disadvantages of online classes, 44.3% declared lack of interaction with professors and colleagues, 24% direct communication with the professor and colleagues, 13.2% time spent in front of the computer, 5.4% loneliness, and 4.8% lack of practical application in the laboratory.

Figure 1 (a), shows student's perception of online classes and online evaluation. In the case of online classes, 28.14% of students prefer online and traditional classes alike, 25.75% prefer online classes more and 23.95% strongly agree that they prefer online classes more.

Figure 1. Student's perception about online teaching and evaluation

a) online teaching

Legend: score assigned by respondents on the 5-point Likert type scale, in % Strongly disagree/blue, Disagree/orange, Neither agree nor disagree/grey, Agree/yellow and Strongly agree/light blue

b) online evaluation
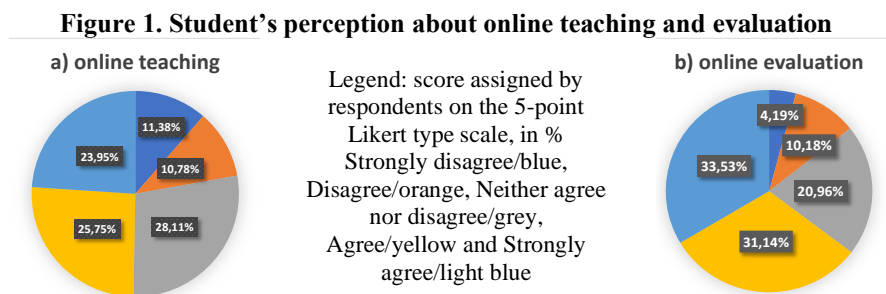
Source: The authors' own research based on the questionnaire.

In case of online evaluation, Figure 1 (b), 20.96% of students prefer the online and traditional evaluation equally, 31.14% said they agree they prefer online evaluation more, and 33.53% strongly agree they prefer online classes more.

In terms of efficiency of online classes compared to traditional ones (Figure 2), 16.77% said they strongly agree and 20.96% agree that online classes are more efficient. On the online evaluation compared to the traditional one, 24.55% said they strongly agree and 28.14% agree they strongly agree that online evaluation is more efficient than the traditional one. In case of an option to choose online classes and online evaluation in the future, 40.12% said they strongly agree, and 25.75% agreed they would prefer to choose online classes. Regarding the online evaluation compared to the traditional one, 20.96% agree and 16.77% strongly agree that they will choose online evaluation if possible in the future; nearly a quarter of students, 25.15% said they did not see any difference between these two types of evaluation. As for the overall perception on the attending online courses, 51.50% said it was rather positive and 14.37% said it was rather negative.

Figure 2. Efficiency of teaching methods and evaluation in case of online classes
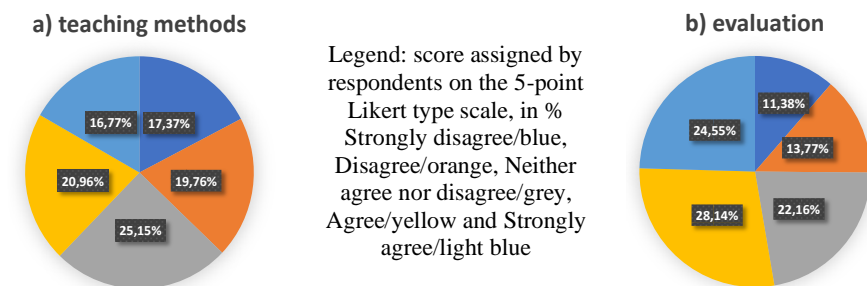
Source: The authors' own research based on the questionnaire.

5.2 Hypotheses Testing

In this part of the paper we tested some hypotheses to see if there is any difference of opinion between the UB and UPB students about online classes and evaluation. The hypotheses tested for this purpose are the following:

H0a	Compared to UPB' students, UB' students prefer online courses to traditional ones
H1a	Compared to UPB' students, UB' students don't prefer online courses to traditional ones
H0b	Compared to UPB' students, UB' students prefer online evaluation to traditional one
H1b	Compared to UPB' students, UB' students don't prefer online evaluation to traditional one
H0c	Compared to UPB' students, UB' students think that online teaching is more efficient than traditional teaching
H1c	Compared to UPB' students, UB' students don't think that online teaching is more efficient than traditional teaching
H0d	Compared to UPB' students, UB' students think that online evaluation is more efficient than traditional evaluation
H1d	Compared to UPB' students, UB' students don't think that online evaluation is more efficient than traditional evaluation
H0e	Compared to UPB' students, UB' students would like possibility to have online classes in the future
H1e	Compared to UPB' students, UB' students wouldn't like to have the possibility to obtain to online classes in the future
H0f	Compared to UPB' students, UB' students would like possibility to have online evaluation in the future
H1f	Compared to UPB' students, UB' students wouldn't like possibility to have online evaluation in the future

In this case with two populations, students from UB and UPB, we applied a t-test. If the p-value is less than the significant level 0.05 we will reject the null hypothesis. The results of this test are shown in Table 1. After applying the t-test, we obtained the following: compared to UPB' students, UB' students don't prefer online courses to traditional ones but prefer online evaluation to traditional one; compared to UPB' students, UB' students consider that online teaching and evaluation is more efficient

than traditional ones; compared to UPB' students, UB' students would not like to get an online classes in the future, but would like to get online evaluation in the future.

Table 1. Results for t-test used for hypothesis testing

Hypothesis	Mean in case of online teaching/ evaluation	Mean in case of traditional teaching/ evaluation	t-statistic	p-value	Null hypothesis is accepted
H0a	3.30	4	-2.52	0.012	False
H0b	3.37	3.87	-0.36	0.716	True
H0c	2.92	3.45	-1.82	0.069	True
H0d	3.40	3.41	-0.03	0.969	True
H0e	3.53	4.29	-2.69	0.007	False
H0f	3.82	4.12	-1.14	0.252	True

Source: The authors' elaboration.

5.3 Online Teaching: Pros and Cons from the Teachers' Side using SWOT Analysis

Our analysis regarding the period of pandemic, in which we had to teach and test exclusively online, was performed by us-teachers from UPB and UB to analyze the concrete situation encountered. In Figure 4 we built a SWOT analysis in which we highlighted the most important pros and cons from the point of view of teachers. According to Figure 3, we can consider as pro-online categories "Strengths" and "Opportunities" and against the topics gathered in the categories "Weaknesses" and especially "Threats".

Figure 3. SWOT – analysis from teachers' point of view; pros and cons

Source: The authors' elaboration.

We believe that the pro-online education arguments in the *Strengths* and *Opportunities* represent a clear and opportune way for the future of education in the world. These arguments show that online education is cost-effective, reduce costs for all involved, and save valuable time. Thus, the arguments of *Weaknesses* and,

above all, of *Threats*, require the urgent solutions in order not to affect the quality of higher education and not only. Some themes of these last two categories, such as *Lack of institutional support*; *Lack of necessary equipment for online activity*; *Lack of skill in using online platforms* and *Lack of practical applications*, have obvious solutions and can be solved immediately by educational institutions, with further allocation of attention and budget. Instead, the arguments as the *Possibility of test fraud*; *Corrupted evaluation due to unlimited online copy sources* and *Creation of false values*, require the development of new methods, not found in traditional education. Comparing the responses of two participating parties, we see that students are pro-exams online, unlike the teaching staff, who believe that online exam results may be false due to the widespread possibility of copying from the online environment, and because the students cannot be seen in what they consult during the exam. These false results can eventually lead to the launch of false values in society. Moreover, some graduates may access positions in society for which they are not well prepared and which will seriously affect society as a whole or, through the decisions they will take, in ignorance.

5.4 Some Proposal for Improving the Sensitive Aspects of Online Education using Specific Tools of Quality Engineering

To find solutions to the main "Weaknesses" and "Threats", we have constructed an Interrelation Diagram (Figure 4), in which the causes leading to the main threat "Creation of false values" are related on three levels.

Figure 4. Interrelationship Diagram for the basic problem of online exams
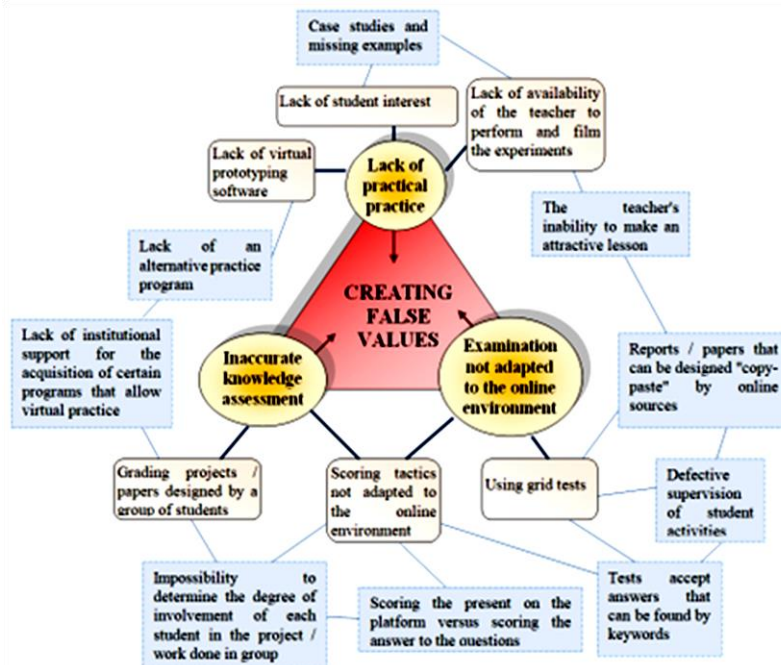
Source: The authors' elaboration.

The main causes leading to the delicate issue of the creation of false values in society (red triangle), resulting from a corrupt online exam due to unlimited copying possibilities, are written in a circle. The pink rectangle represents the second-degree cases, relative to the main cases, and in the blue rectangle the third-degree cases. By analyzing the cascade of causes that determine the main problem of the online exam and analyzing their interrelation, we can easily find solutions to the main problem. To the problem caused by "Lack of practical practice", it is easy to see that the solution would be for teachers to have the ability to film the laboratories/workshops and make the lessons attractive to students. But this can only be seen as possible with the full support of the educational institution, allocating special funds and specialized personnel for this newly created field. Regarding the issue "Examination not adapted to the online environment" and "Inaccurate knowledge assessment", it is clear from the diagram that the solutions should go towards more complex exams, avoiding grid tests and avoiding group projects, with more than 2 students.

Following this approach, the authors designed an analysis based on the Quality Function Deployment methodology. QFD – is the methodology that allows the translation of the beneficiary's wishes in technical and quality characteristics of the product, using the quality tool - matrix diagram, which in the literature is also called "House of Quality". We have adapted this specific quality engineering tool to the issue of exclusively online education, in order to find the best solutions to solve the most pressing problems highlighted above (Figure 5), and we have issued seven possible solutions to the most sensitive issues raised by online teaching.

Figure 5. The QFD tool applied to find the best solutions

Source: The authors' elaboration.

A cause can have several results and one result, several causes. The correlations according to the legend, demonstrated the following: Solution no. 1 - Testing with "essay" type subjects; avoid grid tests"; solution no.2 "Testing" flash "after each chapter taught" and solution no.4 "Various and attractive test subjects and applicable in the chosen field", respond very well to most of the problems raised (those on the left of the matrix), which required a corrupt evaluation of the possibility of unlimited copying from the online environment, but they also respond very well to the issue of loss of motivation and lack of practice. Frequent testing through essay-type tests trains and motivates the student, developing interest to subjects, and making connections between these. Solution no.3 "Courses based on several case studies solved" responds both to the first four problems raised by teaching in the online environment but successfully answers the problem "Loss of motivation" and "Lack of practical applications". This requires additional staff involved in proofreading and grading, and thus is quite difficult to manage even economically by the educational institution. Solutions no.5, 6 and 7 strongly depend on the involvement of the educational institution, both budgetary and with the use of qualified staff. In the second QFD matrix, called in the literature "the roof of the House of Quality", built above the first matrix, the compatibilities established between the solutions found were highlighted.

It is observed that the solutions found are perfectly correlated with each other and mutually enhance each other, but with one exception, they are economically sensitive. Solutions no. 1 and no. 2 are very helpful in problem solving, but unfortunately it involves additional effort on the part of both teaching staff and educational institutions. Therefore, teachers need to spend a lot of time to correcting non-grid tests, and they should devote even more time to "flash" tests after each chapter taught.

6. Conclusions

In this paper, we have carried out a comprehensive analysis of the unprecedented situation created by the pandemic, forcing educational institutions to adopt teaching exclusively online. In the first part, the positive and above all negative aspects of online education were analyzed. We explored the topic in the academic field to find the best ways to improve teaching exclusively online and the student-teacher relationship; more precisely, in the two universities where the authors are teachers, a questionnaire was launched among students, specially designed for the case study. At the macro level of the two Universities, the sample was not sufficiently representative of the student population given that the University of Bucharest has more than 30,000 students while the Politehnica University of Bucharest more than 25,000 and therefore this can be seen as a limitation to the study, while at the faculties' level the sample was large enough. The analysis of the responses received to the questionnaire, performed with specific statistical tools, highlighted the strengths, but also the sensitive points of online education, from the student's point of view.

To find the optimal solutions for a correct and attractive online teaching, we performed a new analysis using specific tools of quality engineering, also taking into account the opinions expressed by teachers. Therefore, we perform SWOT analysis that helps to create Interrelationship Diagram to better highlight the main problems related to online examination activities and consequent creation of false values. This diagram has been built on three levels, so that the remedies to solve these problems can be highlighted, and we designed seven solutions to these problems based on responses received from the students and teaching staff. To assess the extent to which these solutions respond to the identified problems, we used the QFD methodology and built a "house of quality" made up of two matrices. The basic matrix helps to study the degree of relationship of the solutions found with the problems highlighted by the interviews or by the analysis of questionnaire. The secondary matrix, "the roof of the quality house", highlights the affinity, which is created or not, between the solutions found and above all triggers an alarm signal if there is a negative correlation. This negative correlation requires finding another solution that satisfies the proposed purpose, without negative implications on the other solutions found. Our analysis and especially the solutions found can be useful for the possible step of higher education towards metaverse education.

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Entrepreneurial Traits in High School Students. Imprints of Erasmus Experiences

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Abstract

The present paper aims to analyse the effects of Erasmus programs on high school students in terms of their personal development, being oriented towards three main directions: understanding the motivations behind the application for Erasmus programs; identifying the expectations of the participants before the experience; acknowledging the benefits of participating in Erasmus programs, in strong correlation with the development of skills, with a particular focus on entrepreneurial traits. Based on qualitative research consisting of carrying out interviews with high school students who participated in Erasmus Mobility Programs between 2018 and 2020, the article outlines the benefits of such experiences, emphasizing the development of skills and competencies linked with their entrepreneurial traits. Important acquired and/or improved traits referred to: risk-taking, managerial skills, teamwork abilities, creative thinking, communication skills, motivation, optimism, and networking. The paper brings a novel approach to the scientific literature in terms of the investigated population, high school students from Romanian institutions, enriching at the same time the literature focused on the impact of Erasmus programs on their participants. From a more practical perspective, the paper promotes the positive impact of the Erasmus experience on high school students, aiming to raise awareness among them of the benefits derived from the involvement in this kind of programs.

Keywords: entrepreneurial traits, Erasmus program, high school students, development of skills, Romania, motivations.

JEL Classification: A20, I20.

1. Introduction

Erasmus represents the European Union program based on the promotion of education among young people or people who need greater cultural and educational support. This program has the purpose of helping young Europeans to evolve both

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personally and professionally, contributing to the development of participants' abilities and skills. (European Commission, 2021)

In the current context, highly marked by environmental degradation, post-pandemic challenges, and armed conflicts in different regions worldwide, there is an urgent need for young generations with strong values, oriented toward making the world a better place for them and for future generations. Furthermore, under the domination of major trends such as "sustainability" and "digitalization" (Francu, Grosu, 2020; Amicarelli et al., 2021; Aytekin et al., 2021; Popescu et al., 2022), people, especially the young generation, must be more aware of the results and implications of their actions, demonstrating an original, unconventional attitude and mentality toward minimizing their negative impacts on societies. A well-trained young generation, both in terms of their knowledge and skills, with entrepreneurial mindset, competencies, and traits oriented toward sustainable actions will play a crucial role in building and developing competitive societies. Not only should they become entrepreneurs, but they can manifest an entrepreneurial attitude at their jobs either in a public or private institution, or even when practicing a liberal profession. A strong education system, but also involvement in extracurricular activities, participation in Erasmus programs included, might bring an important contribution to the development of a competent young generation. Involvement in Erasmus programs is linked with increased skills and competencies (Iriondo, 2020; Soares, Mosquera, 2020), leading to the development of more conscious, better trained, and skilled people. Romania urgently needs such a young generation that might bring about the mentality shift it needs. Besides the already mentioned worldwide challenges, Romania is confronted, at the same time, with a strong emigration trend, especially of its highly skilled young adults (Petrescu, Bâc, Zgură, 2011; Grosu, Constantin, 2013; Grosu, Dinu, 2016), making it imperious to form a young generation with proper skills to contribute to a better Romania.

In such a context, the present paper aims to analyse the effects of Erasmus programs on the development of young high school students. Therefore, the paper is structured in six main parts, with introduction and conclusions included. The next section presents a series of aspects specific to the literature review, being followed by the outline of a series of methodological aspects and the main results of the research.

2. Problem Statement

The article approaches a topic that benefits from a vast scientific literature, generally composed of studies on how the Erasmus experience contributes to the personal and professional development of university students (Parey, Waldinger, 2011; Soares, Mosquera, 2020). In a more particular case, the literature on Romanian students focuses on different aspects such as mobility flows; Erasmus student experiences as tourists; values and benefits of their participation in mobility programs; intercultural adaptation; etc. (Salajan, Chiper, 2012; Udrea, 2012; Stroe et al., 2015; Tamaş, 2017; Marin-Pantelescu et al., 2022). However, when the nature of the subjects approached is narrowed down from university students to high school

students, the literature in the area is not so vast anymore. The novel approach in our paper consists exactly of the investigated subjects, more specifically high school students from Romania that benefited from Erasmus Mobility Programs.

Even if the effects of the Erasmus Mobility Program on each participant depend on many factors such as the institution from which the participants come, the community in which they live in, the financial state, etc. (Rodriguez Gonzalez, Bustillo Mesanza, Mariel, 2011), such programs mark the development of their participants, both from a personal and professional perspective. For example, career, adaptability, managerial, personal and teamwork skills, and employability are highly developed due to enrolment in Erasmus Mobility Programs (Soares and Mosquera, 2020). More specifically, skills highly corelated to entrepreneurial traits such as risk-taking, planning, networking, etc. (Salati Marcondes de Moraes, Sadao Iizuka, Pedro, 2018) are frequently encountered in former Erasmus participants.

The motivations and desire of young people to apply in one of the Erasmus programs represent another topic of interest for the paper. Motivations usually arise from students' desire to develop their language skills, to discover new cultures, and to interact with people (Botas, Huisman, 2013).

Another aspect presented in the scientific literature on which this article is based refers to the expectations of the students before the beginning of the program and how they were met during the program. Usually, the expectations of the students are completely exceeded at the end of the project (Jacobone, Moro, 2015).

3. Research Questions / Aims of the Research

The main aim of the paper is to analyse the effects of the Erasmus programs on high school students, especially in terms of their personal development, with a particular focus on entrepreneurial traits. From a more particular perspective, the paper focuses on the following three objectives:

- Analysis of the main drivers for high school students to participate in Erasmus Mobility Programs.
- Analysis of high school students' expectations about the Erasmus Mobility Program, before the experience.
- Analysis of the main skills and competencies, especially in the entrepreneurial area, acquired and/or developed by high school students after participating in Erasmus Mobility Programs.

4. Research Methods

Aiming to reach the established objectives, a qualitative research, based on carrying out semi-structured interviews with high school students that participated in Erasmus Mobility Programs, was developed in March 2021. The research was carried out on high school students from the "Mihail Kogălniceanu" Economics College in Focșani that participated in Erasmus Mobility Programs between 2018 and 2020. Seventeen teenagers who participated in Erasmus Mobility Programs during their high school studies were contacted. However, the interviews were

carried out only with six of them, as the others were highly reluctant to participate in the research, denying their participation. Considering confidentiality-related reasons, the identity of the respondents is not revealed. The 'findings' section is codified using codes from R1 to R6.

The interviews were based on an interview guide composed of 11 questions, developed according to the purpose and objectives of the research. The interviews were carried out via Zoom, these being in one-to-one format, lasting, on average, around 35 minutes. Only in two interviews did some small communication barriers occur due to disrupted factors such as pet noise or the sounds of other devices.

The results obtained from this research are presented in detail in the next section. Considering the qualitative nature of the research, it is worth emphasizing that the results are specific only to the interviewed high school students, generalization neither being aimed at, nor applicable.

5. Findings

The interviewed high school students participated between 2018 and 2020, in Erasmus Mobility Programs through internships and through active participation in activities related to environmental awareness and promotion of a healthy lifestyle by practicing sports activities. The basis of the mobilities in which the respondents participated consists of the exchange of experiences between several high school institutions in several European countries, such as Latvia, Bulgaria, Wales, and Spain, for a period of one or two weeks.

The main motivations of the interviewed high school students for their application to these Erasmus programs were related to the desire to have unique experiences, through which they will be able to acquire certain skills and competencies, especially English language skills. Their participation in a multicultural context was highly assessed as the main trigger for acquiring or developing new improved English communication skills. The opportunity to travel to a foreign country was another important reason why they chose to participate in Erasmus programs. For most of them, it was the first opportunity to be on their own, in a place where they no longer had the help of their parents, but a place where they could evolve and step outside of their comfort zone (*"The fact that I was able to visit a foreign country alone, without having my parents close, was a unique experience"* – *R2*). To participate in one of these projects, high school students needed courage to overcome their fears and cope with the experiences deriving from having contact with a new country; they were risk-takers. In that environment, their mother tongue was no longer relevant, and they had to adapt to these new experiences (*"One of the strengths I valued in the project was my courage. I went to a foreign country for the first time, on my own, without family or friends, where I had to manage and face all kinds of situations by myself"- R5*). Moreover, for some respondents, this was also a way of bonding with their colleagues *("I like to travel, to speak foreign languages. I like people, in general. That's why I chose to participate in this project with some of my friends." - R4*). Another reason for participating in the Erasmus projects was their desire to discover other cultures, to analyse the traditions of the host states, and

to understand in a broader manner the mentality and behaviour of the locals. The interviewed high school students wanted to observe the educational systems in the host countries, also, especially in comparison with the Romanian one (*"We saw different cultures, types of music, food, how to dance, and what traditions each state has. It was very interactive and fun."- R4*). As a general remark, an overall reason why the interviewed high school students applied for Erasmus Mobility Programs was not only to live a memorable experience, but also to evolve both personally and professionally, to participate in interactive activities and projects (*"Before leaving, I was hoping to have fun, to learn as much as possible, and when I arrived in Bulgaria, it was not just that I had fun and spent time with my friends, but also that I learned a lot of new things" – R4*).

The interviewed high school students did not have high expectations before the start of the project, as this was the first experience of this kind for all of them. All expectations were based on a unique experience, in which students were placed in an international context, in which they were constrained by circumstances to do more by themselves. High school students knew that they would communicate with other people in a language other than their mother tongue, but thought that it would be too much of a challenge and they would not be able to connect with students in those countries, given the circumstances in which they were placed. Therefore, they had the opportunity to discover how open-minded and friendly foreign students were, giving them the opportunity to acquire beautiful memories and unforgettable experiences (*"I wanted to strengthen my relationships with my friends and colleagues and make new ones, with whom I can create real connections and with whom I can still communicate even after the end of the project" – R1*). They wanted to discover other cultures, to feel what life was like among the locals and to walk in the shoes of a person living in that area. This way, they could improve their knowledge of the host country and to compare that culture with their origin one (*"I expected a new world, to communicate with different people, to learn about a culture that is in a way closer to us, but at the same time different from many points of view" – R3*). The interviewed high school students were very excited before the project and did not expect to participate in so many different and interesting activities (*"Before the start of the program I was excited. [...] I did not expect to visit different places every day, or to have such interesting and interactive activities" – R2*).

All these expectations were fulfilled, even exceeded. The reality of the mobilities compared to the expectations of those who participated was much more beautiful and completely satisfying. One of the things that impressed the respondents was the connection with the students from the host countries. They did not expect them to be so sociable and open to relations with foreign students, especially because they did not come from a country well known to all participants. The students from the other participating countries were very kind and friendly to the respondents, showing teamwork skills. That was because all the activities they performed were carried out in teams with students from different countries and no groups were set up per country, to avoid creating discomfort or causing no communication between the participants (*"I got along very well with everyone, I communicated with all the*

groups from the other countries that participated. They did not form small groups and collaborated on all activities with students from each country." – R6). In addition to the activities they carried out in the project, the interviewed high school students developed stronger relationships with the foreign students. For example, in their spare time, the students from the host countries carried out fun and interesting activities, on their own, which led to a smoother integration of the Romanian participants in the environment specific to the host country (*"What impressed me the most was the behaviour among young people in Bulgaria, different from that of Romanians. They do not take into account how close the relationship is with those around them or how well they know people. They make everyone feel welcome. I liked that people were open-minded and open to activities with us." – R4*).

Moreover, the respondents did not expect to have the opportunity to participate in activities such as cultural visits or admiring the surroundings (*"When we had a free day, our coordinating teacher took us on trips to important cities like Liverpool or Manchester, organizing visits to museums and zoos." – R1*). All respondents were pleasantly surprised to have the opportunity to participate in various interactive activities, not only activities in which their knowledge was consolidated but also activities in which they could relax and create close links with the other participants, this way developing their networking skills (*"The reality was not as I expected; it was much better than I thought it would be, because I thought it would be a very rigid program. I was expecting to spend more time in class, learning and sharing experiences, but I was pleasantly surprised that we also had the opportunity to visit places, to learn about them, both historically and culturally" – R5*). Another aspect that exceeded the expectations of the students was the level of knowledge they gained from this experience, as well as the degree of endowment of the host institutions. Given that the countries in which the participants carried out the activities are developed countries, the receiving institutions were benefitting from high-quality equipment, offering more opportunities for students, especially when compared with the institutions from which they were coming.

The main strengths of the program from the perspective of high school students were related to the development of communication and social skills. The fact that they interacted with many students of similar ages and nationalities helped them open up and be able to communicate more easily with those around them (*"I acquired important communication skills; even if my mobility was only for a week, given that I was in an international context, the circumstances forced me to get out of my comfort zone, even if I am quite shy. If you are an introvert and want to change something, an Erasmus project would be a great choice for this."-R4; "I was not as good at speaking English, but due to the international context in which I was placed, I managed to improve and expand my English vocabulary." – R5*). Along with social skills and openness to new relationships with people of other nationalities, which the high school students acquired during the program, they also developed teamwork skills. They were encouraged to work in teams, especially groups with students from each country (*"I developed teamwork skills, which I am not a fan of. In general, I was lonelier, I like working alone, but I had experiences*

who needed to make this compromise, to gather my strengths to work with my colleagues."– R2). Most high school students also managed to improve their self-confidence, gain some courage to experience more situations, and adapt to a new environment (*"Without this experience I was doubting myself, I could not speak English and not even speak in public. After the Erasmus project, I managed to gain confidence and I learned not to be afraid to participate in extracurricular activities" – R1*).

Additionally, public speaking skills, critical thinking, creative thinking, or organizational skills, were also developed in the case of the interviewed high school students. Due to the multitude of activities that the project made available to the participants, they managed to develop their creative and artistic side (*"I improved my skills, I was more organized with my own time and money, because I had a limited budget that we had to manage" – R3*).

In addition to skills and competencies, the interviewed high school students also improved their knowledge, related to both the specific topic of the mobility and the culture of the receiving country. The variety of activities they performed during the program, referring to the topic addressed in the project, was another strength of the participation in Erasmus programs.

Involvement in the Erasmus program positively marked the personal development of the interviewed high school students. Many entrepreneurial traits, especially in the soft skills area, were developed or improved, as presented in Figure 1.

Figure 1. Entrepreneurial traits of high school students, acquired or developed after the Erasmus experience

Source: developed by the authors.

Considering the general experience of mobility, the respondents want to participate in another Erasmus program, because they want to have as many memorable experiences as possible, to travel, and to observe as many cultures and traditions as possible. They consider the Erasmus projects to be a great opportunity for young high school students, and they encourage all those who have the opportunity to apply to do so. Some respondents said that it would be a great opportunity for them to participate in other types of Erasmus projects than the one in which they have participated. Projects on other topics for a longer period of time, as well as study programs for one semester or even one year, during the university degree, were highly mentioned as potential options for future applications.

6. Conclusions

The present research aimed to analyse the effects of Erasmus programs on high school students, especially in terms of their personal development, oriented toward three main directions: understanding the motivations behind the application for Erasmus programs; identifying participants' expectations before the experience; and acknowledging the benefits of participating in Erasmus programs, strongly in correlation with skills development, with a particular focus on entrepreneurial traits.

The motivations behind the application of the interviewed high school students to the Erasmus Mobility Programs were related to the desire to participate in extracurricular activities and the opportunity to be placed in a multicultural context in which, restricted by the circumstances, they can push their limits and improve themselves. The difference between the perspective of high school students before and after Erasmus mobility is considerable, because they did not expect the program to bring them such a large amount of information, and the way the activities are performed would be so varied and interesting. Given the complexity of the program and the opportunities it brings to the interviewed high school students, several positive aspects were observed in the research. The involvement in Erasmus mobilities strongly impacted the interviewees in a positive way, especially in terms of their personal development. Most of them managed to develop language and communication skills through interaction with other participants, as well as through the development of activities, due to the international context in which they were placed. They were given the opportunity to manage themselves in another country, where they could no longer receive help from parents or friends. In this sense, by placing them in these circumstances, young people managed to gain more self-confidence, teamwork skills, and even a better way of organizing both their time and resources.

To carry out the activities and complete the project in a more memorable way, high school students were advantaged by certain skills and competencies, such as the English level, which helped them better interact with foreign participants. In addition, their communicativeness, sociability, and creative skills helped them, because they needed to create better connections with other students to complete a unique and transformative exchange of experience.

The Erasmus experience was strongly perceived by all interviewed high school students as transformative, with positive marks on their personal development, directly contributing to the development of their entrepreneurial traits. All of the interviewed high school students strongly promote and encourage participation in such programs among other high school students, as well. Even they are willing to have other Erasmus experiences in the near future.

The present paper, even with a strong limitation, deriving from the nature of the employed research, related to the narrow sample of interviewees and their concentration in the same area of investigation (the same high school), has two major contributions, to both theory and practice. On the one hand, the paper adds value to the scientific literature by investigating an under-researched group of subjects, beneficiaries of Erasmus programs, respectively, high school students, most of the studies in the field being focused on university students. Furthermore, the area of investigation is also less studied. Through the investigation of Romanian high school students, the paper enriches the literature in the field. Additionally, the paper draws important starting points for future research, establishing the setup for developing quantitative pieces of research, representative at the national level, for a more complex and comprehensive approach to the investigated phenomenon. Considering the qualitative nature of the present research, the outlined results are specific only to the investigated sample, and their generalization is not applicable. However, the paper promotes, among other aspects, the positive impact of the Erasmus experience on high school students with the aim of raising awareness among them of the benefits derived from the participation in this program. From a practical perspective, the paper has the potential to give high school students a perspective on the worth of their involvement in Erasmus programs. At the same time, the paper might stimulate the motivation and desire of high school students to apply for Erasmus programs.

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The New Age of Metaverse and the Old School Universe: Business on the Edge of Final Frontiers

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Abstract

The advent of the Fourth Industrial Revolution and its (un)expected follow-ups continue to open up new dimensions of economic, political, and social interaction. The latest is the Metaverse, striving to become as real as our own world for those enmeshed in it. It can be described as an extended-reality-based space and is in the process of being conceived as an emerging/evolving frontier to be conquered as terrestrial space was and as outer space may one day be. The present article grapples with the intriguing question of whether the Metaverse will be a surrogate/refuge from a physically and socially pressing existence or a tool for/facilitator of the exploration of other frontiers – particularly, a substitute or a complement for the ever-glorified expansion into outer space? We contend that there is a degree of overlap between the envisaged Metaverse and man's endeavours toward Cosmos, in the context of resource scarcity, barriers of access, and the new functionalities of command, control, and coordination in mastering outer space as well as other challenging frontiers. Thus, the Metaverse implies, despite its apparent intangibility, scarce resources in terms of matter and energy, and may justify these allocations through new applications and functionalities related to space. Rather than representing an inward-looking frontier, it may enable us to look outward, propelling human aims for immersing into the physical Universe.

Keywords: Metaverse, outer space, technology, scarcity, sustainability.

JEL Classification: L86, N70, O33, Q56, R40.

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1. Introduction

One of the emblematic encounters between what would become the Metaverse and the incessant outer space quest happened in the recent past of the futuristic TV entertainment: the Star Trek's Holodeck. While some Sci-Fi gadgets from the famous series are current commonalities (e.g., mobile communicators, hand-held tablet computers), other advances will be featuring for a while on revolutionary to-do-lists (e.g., tractor beams, warp drives). The Holodeck appears to be a "work in progress" if we scrutinize it against the background of the contemporary Metaverse experiences. The former was a space in which, for recreational and reflective purposes, the inhabitants of the spaceship could interact with "realistic" historical characters in a very "tactile" (fully-sensorial) multi-parametrically programmable environment. The latter is an unfolding offshoot of the internet/cyberspace, blending artificial intelligence, computer graphics, and human-computer interface gimmicks.

Living in a world marred by the vicissitudes of scarcity and the vagaries of sociality, humankind constantly finds challenges/risks/opportunities related to the ascertainment of each and every "new frontier" during his expansionary existence. Initially, man "conquered" pieces of land as an immediate basis for habitat and harvest; then he "conquered" rivers and seas, restlessly moving in search of better stability; then he "conquered" skies and, thence, all the geosphere came under his command; then he "conquered" the electromagnetic fields, the basis of his IT&C-enhanced life; then he understood that his planetary "conquest" is eventually exhaustible and erodible, and the outer space may grant him not only answers to his cosmological conundrums, but avenues for his endurance on/outside Earth (minerals, energy). Or he might have found out as well that some inward, not outward, frontier is available: a somehow "virtual" one, able to economize the costs of his "too physical" existence.

This research presents a perspective that was not explicitly taken so far in the literature: the nature of the relation – trade-off or synergy? – between the development of the Metaverse and that of the space quest, as these economic areas represent "new frontiers" to be explored (e.g., to understand their peculiarities and assorted rules of conduct) and exploited (e.g., to produce wealth more sustainably and to distribute it more socially fair). The clarification of the connection between the allegedly "virtual" Metaverse (yet one needing serious material/energetic inputs, some acquirable from cosmic supplies) and the much more "physical" outer space (yet one needing complex simulations of extreme off-planet phenomena prior to effective deployment of space missions) is consequential for the future of the human species on many accounts, among which resource mastering and social networking. This article briefly screens this germane concern and signals some relevant cases.

2. Problem Statement

The purpose of this essay study is to analyse the crossroads of developing the inward new frontier of the Metaverse and the outward one of the space odyssey, given the reality of scarce resources (i.e., human, natural, financial or technological),

so sensitive to institutional designs (i.e., social habits/customs, norms/legislations). The stake is to observe the competing/conflicting features of this intercourse (viz., in terms of availability/sustainability of scarce resources, needed for the two routes) or, on the contrary, the eventually prevailing compatibilities/complementarities (viz., in terms of each side acting as a critical factor-of-production provider for the other).

Despite these realms first appearing in Sci-Fi works, with the Metaverse much younger than the cosmic imaginary (Boia, 1997), they both became "real estates". The Metaverse introduces the idea of another Universe, a virtual world which allows one to see and live things according to his/her imagination. Even if the concept existed in the area of video games for more than two decades – viz., Second Life, which hosted real banks and commercial deals –, it is starting to raise more and more awareness, nowadays, especially for the people who understand that it can be useful in every domain, from conducting medical procedures to organizing social events (Park, Kim, 2022; Stylianos, 2022). The space quest cannot remain alien to this.

There are many interpretations in defining the Metaverse, the most common one being related to the translation of the real world into a virtual counterpart. And although experts did not manage to establish a standard definition, most of them agreed with some key attributes that "a" Metaverse should possess (Kiong, 2022):

- Persistence – continuous operation, without pause or end date;
- Synchronousness and liveness – a real-world simulation that exists for everyone in real time;
- Multipresence – able to exist in different virtual worlds simultaneously;
- An economic system – the possibility to produce, sell, and buy digital assets, and to be rewarded and recognized as such;
- Coverage – in both virtual and physical worlds, in public and private networks, as well as in open and closed platforms;
- Interoperability – implementable between all the components of the digital world such as digital assets, data, and content;
- Diversity – created and populated by a wide range of social groups, like commercial or informal ones.

From the technical perspective, the Metaverse is a new generation of Internet applications which aims to integrate the interactive/immersive experiences offered by augmented reality technologies and blockchain-enabled economic solutions, in order to build a recreation of the real world. The key concepts that define and build the Metaverse are "avatars" and "extended reality". These two approach the most important traits of the real world: the human and the environment (Ning et al., 2021).

Economically, the Metaverse value chains are responsible for around USD 1 trillion: developers/creators of virtual platforms; traders, entertainers, advertisers; hardware providers of headsets, graphic chips, and omnidirectional treadmills (Figure 1). At the same time, the Metaverse is being subject to different potential evolutions, depending on how humans will adjust their subjective expectations to the objective rapports (of economic laws' nature) between the physical and the virtual (Figure 2).

**Figure 1. The "state"
of the Metaverse economy**
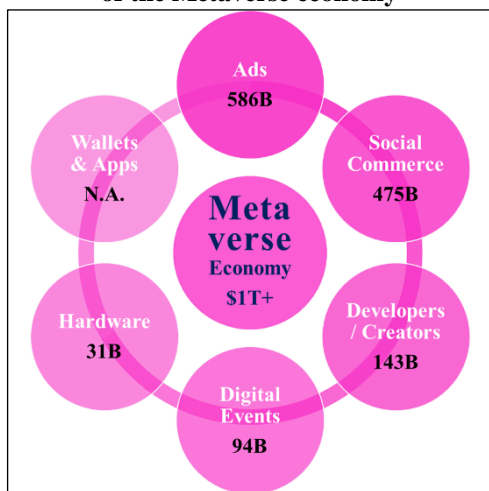
Source: own representation, data from
Palandrani, 2021.

**Figure 2. A "process"
of the Metaverse economy**
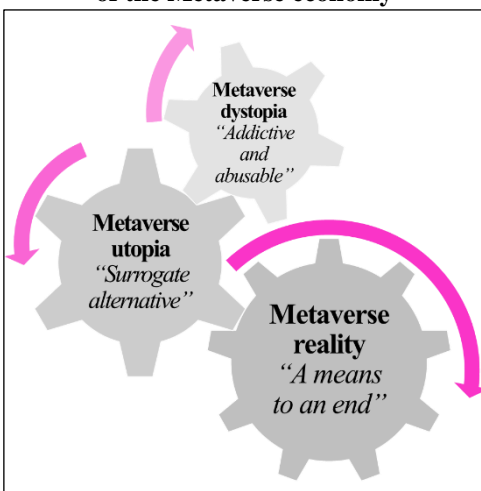
Source: own representation of original
problematization.

Far from the flamboyant "voyages of the starship Enterprise", the present space economy is "the full range of activities and the use of resources that create value and benefits for human beings in the course of exploring, researching, understanding, managing, and utilising space" (OECD, 2019). If being connected in worldwide networks, from a computer or a mobile phone, may seem a triviality today, this would not have been possible without the artificial satellites, giving us instantaneous communications, GPS guidance, 24h television broadcasts, weather forecasts (Becerra, Rodríguez, 2016), as many earthly benefits are space-related (Figure 3).

Beyond governments' primacy in popular imagery as well as in strategic designs, the vast benefits of the cosmic economy were brought to final consumers by the efforts of private enterprises. As in the case of the Internet, the state was only the trigger (Jora, Iacob, 2019). The modern space quest is usually split into three major phases (Sommariva, 2018):

- The first one, called the "inventions stage", occurred at the beginning of the twentieth century and included groundwork research with potential space use (including here Hermann Oberth, born in Sibiu and raised in Mediaș and Sighișoara, who was a rocketry pioneer);
- The second stage, between 1950 and 1970, comes with expanding innovations devoted to exploration projects, military concerns, and the first economic views seeing the Cosmos as a commercial sector having infrastructure development needs to be served through public goods;
- In the third stage, after the 1970s, the space economy grew rapidly (such as the satellite sector), culminating with the creation of "New Space" private companies like SpaceX, Virgin Galactic and Blue Origin that tackled the last bastions of state monopoly: launching goods and people.

The inherent complexity and the high operating costs kept the economy of the cosmic space mainly within the reach of the state agents (Launius, 2018; Pietroni, Biglardi, 2019). The excuse of the powerful spacefaring states in their reluctance to share their cosmic findings with the developing ones was their (in a sense legitimate) need to first capitalize on their previous resources deployed in extra-terrestrial exploration efforts, despite all the non-negligible networking benefits (Smith, 1988).

One may also wonder why some space-exploitation activities still look far-off: from manufacturing to mineral extraction, energy provision, and even agriculture – as a digression, we may see a "reversed sectoralization", meaning that the most basic economic activities on Earth seem the most remote in the outer space (Figure 4). Beyond cost reasons, such activities will be further delayed by the "socialist" ("res communis") view from the 1967/1979 international space treaties (Simberg, 2012).

Figure 3. The "state"
of the space economy
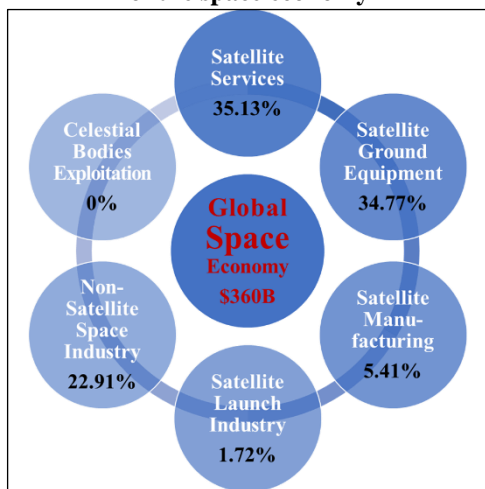
Source: own representation, data from Bryce, 2019.

Figure 4. A "process"
of the space economy
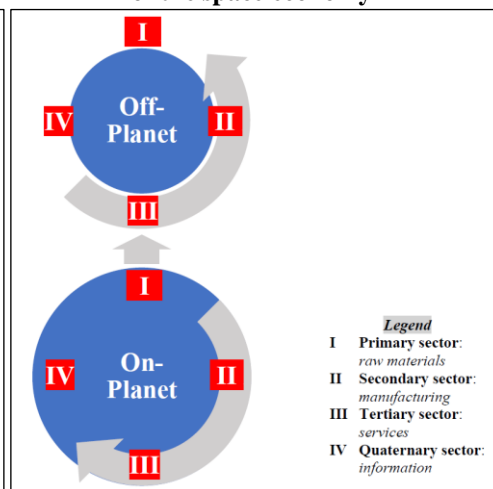
Source: own representation of original problematization.

3. Research Questions / Aims of the Research

The main research questions to which the present study aims to offer answers, bearing in mind that the complexity of evolutions pertaining to the subject matter and their disruptive character defy the use of mere extrapolations, are the following ones:

- Understanding that the Metaverse cannot be a self-sufficient world, for its users do rely heavily on physical supplies not only to develop it, but to live their own flesh-and-blood lives, is the outer space a reliable provider of critical resources?
- Also, conversely, is the Metaverse rather a secluded realm, an escape room from the hardships of traditional life (or a hidden trap?), or a lucrative, training ground that could prepare us for pushing forward existential (including space) frontiers?

- Which are some of the most notable aspects where both the Metaverse and the outer space will require us, humans, to carefully revisit our rules of social conduct (including "social contracts") in order to extract maximum benefits from the two?

4. Research Methods

The research team opted for a deliberately qualitative approach, noteworthy the exploratory character of the study deriving from its novel subject matter. This started with a review of the literature devoted to the technical-scientific and socio-economical aspects of the Metaverse and space exploration current developments. Then, historical analysis and prospective analysis were applied to (qualitative) data associated to the "megatrends"- and "game changers"-types of observed phenomena.

The authors consider that such a methodological approach, which may be considered austere as compared with more sophisticated toolkits for data mining and modelling (usable at later stages of the research), is both proper for the moment and substantially enhanced by the interdisciplinary character of the team that is made up of economists and engineers. The study of broad phenomena with the combined lenses of social sciences and technical sciences is fertile before, eventually, streamlining it.

5. Findings

The following arguments share a vision for a Metaverse and space paradigm advancing more or less in lockstep, although they are currently, more often than not, separate realms affected by their own challenges, risks, opportunities, and dynamics. The areas of overlaps and intersections are potentially very vast, and will only come to fruition in the following decades as capabilities are expanded, a critical mass of users is reached, and new applications are being developed, especially for enterprises.

5.1 "Pride" (in Spacefaring) and "Prejudice" (of Neglect)

One of the most obvious arguments in favour of synergy is that it is unlikely that the Metaverse can totally displace space exploration as an aspirational or positional good that feeds, at the very least, into the willingness of politicians to fund it and of billionaires to make their mark through it. Regardless of the ebb and flow of public and private interest in space, there is still a minimum politically viable investment to be made into it for the sake of scientific discovery. This argument is needlessly modest – the reality of the current profusion of space applications, as well as the heating up of a new Space Race as a dimension of competition between legacy and aspiring powers, guarantee that there will be a significant amount of attention paid to space even if the Metaverse becomes "the" interface between ordinary man and life.

5.2 Gamification as a Teaser and Tester in the Space Quest

It is quite possible/plausible that the Metaverse itself will inspire new generations with wanderlust and a fascination for space that will make the dynamics described above possible. An obvious tray of the Metaverse remains gaming, featuring a near limitless array of aesthetic varieties, some of which veer into Sci-Fi and into plausible simulations. Just like traditional gaming maintains a sizable niche of enthusiasts for realistic simulations of all types, from flying to farming, so too will the Metaverse enable new videogames and other experiences drawn from Cosmos and the enduring fascination of its fans. For instance, there is the X-Metaverse, a blockchain-based Star Wars game, where, as in the vast majority of alike products, the pleas for the "peaceful exploration of space" are secondary to warlike sensations.

5.3 From Edutainment to New Business Models for Space

Beyond simulation of space for entertainment and edutainment purposes, there are other potential contributions in the usage of the Metaverse, for instance in raising funds and designing new business models for space. Already, there are Metaverse games with NFT-based business models such as mars4.me that plan on investing a part of the proceeds into space and giving their players a stake through virtual land ownership (Guha, 2021). This might be a stretch of the imagination, but other outlandish models have been proposed in the past – at the dawn of social media, there was a (failed) plan to fund a Mars mission by turning it into a reality TV show. The interactivity, variation, and user choice of the Metaverse experience can make exotic business models viable in the fiefdoms of space exploration and exploitation.

5.4 Space, Earth's Future Minerals and Energy Purveyor

Space exploration and, then, exploitation may become a necessity for survival in the age of the Metaverse. We have the Sci-Fi standby of the insatiable appetite for new resources on the part of future societies, from the prosaic (various minerals) to the fantastic (deuterium for nuclear fusion). Adding the Metaverse to the global technological civilization in the making, with its necessary huge computing substrate, will likely raise the requirements for "rare earths" (eventually cheaper to mine and ship from the asteroids) and the consumption of energy. Depending on which evangelist of space quest one listens to, the future is either in solar power plants in space, harvesting the Sun's rays continuously and beaming the energy down to Earth, or in mining cosmic bodies for fuel for clean and safe fusion power plants.

5.5 Space-Related Tech to Assist Metaverse Functionalities

A straightforward contribution can also be made to the running of the Metaverse, with satellite communication systems acting as one of the main vectors for global exchanges of information in real time. Other applications include Earth Observation and remote sensing which may inform Metaverse-based simulations of various real world phenomena. Metaverse functioning relies on synced computer systems and databases in disparate corners of the world, and kept organized by the

synchronization services of the atomic clocks that are on-board global navigation satellite systems. SpaceX, Meta (ex-Facebook), and a few other players have drawn up plans for satellite mega-constellations that provide wireless Internet access to remote areas and other services that increase the potential ubiquity of the Metaverse.

5.6 Early Warning Mechanisms for Space-Related Threats

A Metaverse-oriented civilization needs to be reliable, including in the face of high impact low frequency events that may disrupt it with catastrophic results once it is sufficiently embedded in our lives and in our critical infrastructures. The space environment features a wide variety of general and specific risks and threats that require policies and actions to address. One example is the space debris threat to space systems requiring clean-up technology tests in orbit. Another is the impact of space weather, the variety of phenomena emanating from deep space or from our Sun, involving various forms of radiation and other charged particles with deleterious effects on technological systems, including the energy and information ones, be they orbital or terrestrial, that are engineered to make the ubiquitous Metaverse a reality.

The most well-known phenomenon is that of "solar storms" (Cannon, 2013), where the variability of solar activity leads to highs that include coronal flares, which can destroy satellites, short-circuit electricity grids, and even affect undersea cables. They geomagnetic phenomena are a significant threat to technological civilization, with costs estimated at trillions of dollars in direct damage per event. The mitigation of such risks and the growth of the resilience of our interconnected and digitalized world, which is moving toward the Metaverse, will require research into these space phenomena and system hardening, as well as investment into Space Situational Awareness, both in the proximity of our planet and near the Sun, in order to provide early warning so that management and mitigation measures to be promptly activated.

5.7 The Metaverse – A Tailored Tool for Space Exploration

There are already steps in this direction, with NASA reportedly initiating a thematic competition for amateur content developers to send in scenario simulations related to space exploration (Paleja, 2022). In the future, complex simulations will be possible, involving digital twins of man-made systems and accurate and very detailed simulations of the natural environment. The use of the Metaverse for training, for interfacing with space systems and for operating systems in orbit or beyond, directly or asynchronously, through planning interfaces, is foreseeable. This reduces the required presence of human beings in space, thereby reducing costs; yet, if one values human presence in space for its own sake, the efficiencies of remoteness are to the detriment of the very goal of reaching a critical mass of people in space.

It should also be borne in mind that the Metaverse is not just a tool for entertainment, despite the fact that it emerged in association with high-tech ludic habits, but also one for serious work, such as that related to industrial design and engineering. Already, aerospace companies are adopting Metaverse related technologies such as its endemic XR (extended reality) – the blending of MR (mixed

reality), VR (virtual reality) and AR (augmented reality) – to power better tools for the visualization and design of complex aerospace systems such as planes (Boeing being a first mover). Similar approaches may be used in the future to design spaceships and space stations, and to support the modelling and simulation required for safety and security purposes in an extremely hostile environment for human life.

6. Conclusions

This study of the envisageable trade-offs (less plausible) and synergies (more probable) has already inspired the authors to approach new research avenues, intensive in critical and creative thinking, as the present topic reverberates with current convoluted concerns, ranging from environmental (Iacob et al., 2019) to warfare disruptions (Sauer, 2017). These concluding remarks disclose some of them:

- If the Metaverse can displace space exploration as (primary) aspirational or positional good, then it might also contribute to the attainment of the UNESCO's SDG's, since it is implied that it should lower the costs of (many) physical activities. If so, future research will need to look at how the Metaverse can reduce public expenditure on space programs. We know that the governments acted as first-resort economic agent in space due to the latter's inherent complexity, high operating costs, huge risks, and lack of critical economic mass, and it may keep up being like this if the Metaverse will "hijack" the elite of private entrepreneurs.
- There is a true need to find out what are the real costs of increasing the potential/desirable ubiquity of the Metaverse. Are they worth it? Is a Metaverse worth it if it aggravates the living standards in real life? Can a Metaverse-oriented civilization be reliable? For instance, in May 2022, the digital currency Terra Luna fell by more than 90% in a matter of days. This is not the kind of sustainable economy sought after. Such disruptions might lead to catastrophic results not only for the Metaverse, but for the entire (real) economy. The alleged knowledge-based, technology-intensive economy had already experienced bubble bursts (dot.com).
- With the soaring costs of energy (coupled with all current environmental ambitions), one more factor to intensify price pressures would be undesirable. Moreover, a decarbonized energy future, based on renewables and battery storage, will require vast amounts of rare earths, prone to polluting and disrupting mining operations. A balance needs to be reached: the Metaverse (as consumer) and the outer space (as consumer, before being a provider) of critical material and energetic resources should be developed without endangering the proper existence/functioning of planet Earth, which will be, for centuries to come, the only habitat we can afford.

However, to end on a more hopeful note, if the Metaverse can offer scenario simulations that can better space exploration (inter alia), the complexity of it all might be worth it up to some point. The real question is how that point is determined, and whether it will be in the charge of (private) markets and price signals, or in that of governmental planners that orchestrate political/policy (often opaque!) trade-offs.

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Tourism in the COVID-19 Pandemic Era:
Good Practices within the European Union

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Abstract

   Tourism is an important activity worldwide, which makes an important contribution to the global GDP. The COVID-19 pandemic has severely affected the tourism sector at the global and regional level, perhaps even more than other sectors of activity. The European Union (EU) countries are among the most visited destinations in the world, but the COVID-19 pandemic has affected many of them. Despite the difficulties encountered during the pandemic, tourism in the EU countries has continued to survive in various ways. Making use of a quantitative approach, the article aims to identify what were the solutions found and put into practice for carrying out the touristic activity in the difficult conditions imposed by the pandemic. From the analysis of two hypotheses, which were validated, we conclude that: measures taken by the EU member states to reduce the spread of the SARS-CoV-2 virus have directly affected tourism contribution to exports, and travel restrictions imposed by the EU countries have negatively affected international tourist flows. In addition to this, examples of good practices that have supported tourism under the conditions of the pandemic are analysed.

Keywords: COVID-19 pandemic, tourism, travel restrictions, European Union, good practices.

JEL Classification: L80, L83, L88, Z33.

1. Introduction

   Tourism is one of the most dynamic activities, reaching in 2019 almost 1.5 billion international tourist arrivals and USD 1,468 billion in revenues (WTTC, 2021). At the same time, tourism is very sensitive to external factors that can seriously

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affect the evolution of international tourist arrivals. After the announcement of the outbreak of the COVID-19 pandemic on 11 March 2020, the rapid spread of the virus was immediately felt in tourism everywhere. Restrictions to prevent or slow the spread of the virus have led to the isolation of major tourist destinations. These measures have been rapidly adopted by more and more regions over a period of time, in line with the specific situation of each region (UNWTO, 2021a).

Europe has been among the regions most affected by the pandemic, with almost all the EU countries being forced to impose harsh isolation measures and travel restrictions since the pandemic was declared (Eurostat, 2021). At the beginning of the pandemic, among the EU countries most affected were Italy (Dorrucci et al., 2021) and Austria (Kreidl et al., 2020). The EU member states are among the most developed countries in the world, and mobility in these countries is very high. One of the factors that contributed to the spread of the virus was precisely this high mobility, in the context of globalization, but also the facilities related to free movement in the European space (Eurostat, 2021).

If in 2019, out of a total of 1,464 million tourists, almost half, 746.3 million (51%) arrived in Europe, of which 540.7 million arrived in EU countries, it can be said that the EU is the most important tourist region in the world, with 37% of international tourist arrivals (ECA, 2021). These statistics show how important tourism is for these countries, but also the fact that it is a preferred destination globally, not only regionally. Among the most favourite destinations in the world, in 2019 we find in the first places also EU countries, such as France, on the first place in international tourist arrivals, followed by Spain, on the second place, then Italy, on the fifth place, and Germany, on the ninth place (UNWTO, 2021b). A similar situation is found in tourism revenues.

The outbreak of the COVID-19 pandemic has changed this situation in a way that is hard to imagine. In 2020, world tourism faced the largest loss in the number of international tourists, -73%, registering only 400 million international tourists (UNWTO, 2022), out of which Europe received 59%, the EU countries being among the preferred ones, even in these conditions (177.9 million international tourists). Due to the numerous restrictions that were introduced at the beginning of 2020 and reintroduced in the autumn and winter of 2020 for different states, due to numerous pandemic waves, the consequences for tourism have been major (Eurostat, 2021). The year 2021 brought only a small increase in the number of international tourists, especially in the second half of the year. Thus, if in the entire 2021 there were 415 million international tourists, Europe received 279.8 million (representing 67% of the world total), out of which the majority of them, 203.9 million, were received by the EU countries (representing 73% of total arrivals in Europe) (UNWTO, 2022). The highest number of tourists was registered in Southern Europe (Mediterranean Europe), 33%, followed by Western Europe with 17%, then East-Central Europe and Northern Europe. Among the European countries with a high number of tourists and which are not in the EU-27 are the United Kingdom and the Russian Federation, the other European countries receiving a lower number of tourists.

The COVID-19 pandemic did not end at the beginning of 2022, even though throughout 2021 medical solutions appeared that were considered absolutely necessary for a return to a state of normalcy (pre-pandemic). The various variants of the virus, which appeared along the way, more or less dangerous, maintained the pandemic. If the Delta version of 2021 was very aggressive, the Omicron version proved to be less dangerous. This situation has made the restrictions less severe and has gradually begun to decrease in more and more countries. However, the end of 2021 continued to be under threat from the Omicron variant, which experienced a high spread rate (UNWTO, 2022).

With the rapid spread of the Omicron variant, another challenge has hit the EU – the aggression of the Russian Federation on Ukraine – which could prolong the end of the pandemic. Under these conditions, tourism in EU countries is facing new situations, such as the massive wave of refugees heading in the first phase to EU border countries (Baltic countries, Poland, Hungary, Romania, but also the Czech Republic and Slovakia). This wave of refugees can sustain the pandemic for a period of time, given the difficulty in managing the health situation in these conditions. In other words, the tourism of the EU countries will lose a significant number of tourists who came from the Russian Federation and Ukraine, in countries like Spain, Italy, Cyprus, Finland, Germany, etc. At the same time, these EU border countries are considered unsafe due to the war in Ukraine, and many trips to these countries will be cancelled, which is another blow to EU tourism.

The purpose of this paper is to present some of the measures taken by EU countries to support tourism during the health crisis and to relaunch tourism after the end of the pandemic, in order to return to a pre-pandemic situation. The approach used quantitative methods, through the empirical analysis of statistical data, combined with the analysis of documents concerning the measures taken by EU countries, in order to reduce the negative effects of the pandemic. The article introduces the context to which the subject is related, followed by a brief review of the literature, the presentation of research methods, results, and conclusions.

2. Problem Statement

The devastating effects that epidemics or pandemics have had on tourism have been addressed over time in numerous articles (Debashish, 2021; Papanikos, 2020). The impact of these health challenges has been felt intensely at the regional level. This time, humanity is facing the hardest test, and the economic losses are greater than during the great economic crises (Guridno, Guridno, 2020). Therefore, Duro et al. (2022) addresses tourism resilience in Spain, one of the most important tourist recipient countries. At the same time, governments, travel agencies, and the media have warned of the contagious risks of Sars-Cov-2 in an interconnected world, but these warnings have not been heeded, leading to undesirable effects in Spain (Moreno-Luna et al., 2021).

Another direction of research was to find solutions to support tourism under the conditions in which freedom of movement was restricted by a series of measures taken by each country, but also at the regional level. Close collaboration between the

public and private sectors during the pandemic can be a sustainable model that can also be applied in the tourism sector. Governments should play a key role in revitalizing the tourism sector through packages of financial incentives and subsidies (Debashish, 2021). In addition, in the process of relaunching tourism, the use of promotion tools through social media platforms would be very helpful.

Of particular importance during the lockdown were the alternative forms of the armchair tourism, in which people supplemented physical travel with virtual travel. Armchair tourism, even if it does not bring immediate benefits to tourism, has the role of preparing people for future journeys by providing them with the needed information for the journeys to follow through books, television, or the internet (Papathanassis, 2011; Mazanec et al., 2002). People can thus participate in visiting museums, shows, events, in a virtual environment, thus arousing curiosity and the desire to visit them physically. Although virtual reality (VR) technology has been implemented since the early 1990s also in tourism, especially in heritage sites, museums, and other attractions (Hudson et al., 2019), virtual tourism has been relatively low before the pandemic, but it became increasingly important during the pandemic (Bunghez, 2021), when people rejoiced that they could discover unique experiences with technology, as an alternative to real experiences. The tourism industry may soon bring new tourism experiences for those who cannot travel, such Žilina tourism metaverse, which may be a solution. This type of travel can help promote tourist destinations. Various industries, such as tourism, marketing, and education, recognize the metaverse as a new business model. The cultural tourism could be oriented towards the metaverse, thus opening new spaces of interest for this type of tourism (Um et al., 2022).

3. Aims of the Research

The purpose of this paper is to present some of the measures taken by EU countries to support tourism during the health crisis and the recovery after the end of the pandemic, in other words to return to a pre-pandemic situation.

In order to carry out this research, two hypotheses were formulated:

H1: The measures taken by the EU member states to overcome the economic and health crisis caused by the SARS-CoV-2 virus have directly influenced tourism exports;

H2: Travel restrictions imposed by EU countries to reduce the spread of the SARS-CoV-2 virus have negatively affected international tourist flows.

4. Research Methods

The method used is quantitative, through the empirical analysis of statistical data obtained from various specialized sources, such as UNWTO, WTTC, and Eurostat, from 2019 (pre-pandemic year), 2020 and 2021. The Statistical Program for the Social Sciences (SPSS) was used to demonstrate the correlation between the following variables: tourism exports and the number of anti-COVID-19 measures in each country. At the same, an analysis of documents prepared during the pandemic

by the European Commission (EC) or policies presented on the UNWTO website (2021c) by each country, which took into account measures to support the tourism sector, by developing a mix of policies, was performed.

5. Findings

5.1 Measures Taken by the EU Countries to Support Tourism during Pandemic

Initially, at the level of the EU countries, there were no unitary strategies to combat the effects of the pandemic, so each country has implemented its own strategies (Papanikos, 2020). On 13 May 2020, the EC adopted a comprehensive package of initiatives to enable a framework for resumption of activities following the first pandemic wave. Analysing the measures adopted by EU countries on the UNWTO (2021c), nine categories of measures were identified: fiscal policy, monetary policy, jobs and skills, marketing intelligence, public-private partnerships, restarting tourism, health and safety protocols, domestic tourism, and others. In our approach, we registered for each country the identified strategies. The results are presented in Figure 1.

Figure 1. Policies used to combat COVID- 19 effects in the EU countries (2020-2021)
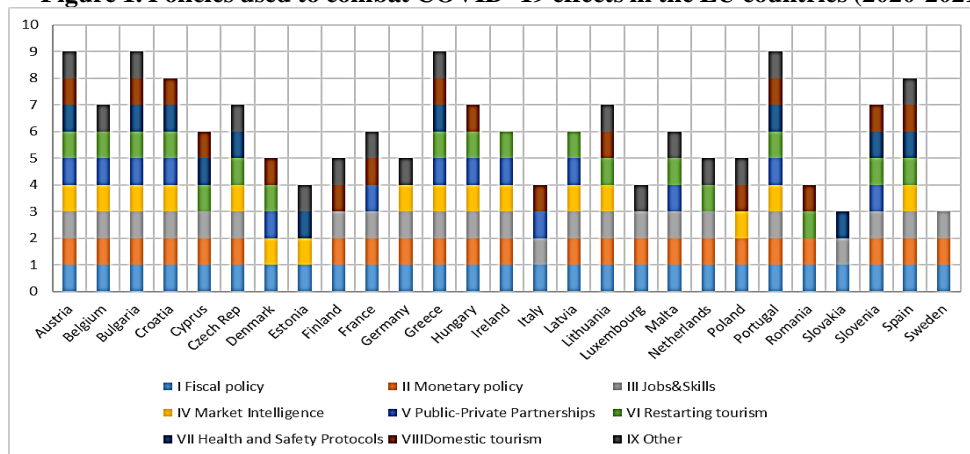
Source: Made by authors based on research, data provided by UNWTO, 2021c.

The analysis showed that four countries, namely Austria, Bulgaria, Greece, and Portugal, took measures that targeted all nine categories, whereas fewer types of measures were implemented in Slovakia and Sweden. At the end of 2021, the EC initiated actions to reduce the effects of the COVID-19 pandemic on the tourism sector (ECA, 2021).

In order to validate the first hypothesis (H1), which refers to the measures taken by EU member states to overcome the economic and health crisis generated by the SARS-CoV-2 virus, we tested the existence of a correlation between these measures and tourism exports to each EU country, using the SPSS.

**Table 1. Correlations between tourism contribution to exports
and the measures to boost tourism for the EU countries**

		Tourism contribution to exports	Measures to support travel and tourism
Tourism contribution to exports	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	27	
Measures to support travel and tourism	Pearson Correlation	,554**	1
	Sig. (2-tailed)	,003	
	N	27	27

**. Correlation is significant at the 0.01 level (2-tailed).
Source: Made by authors based on research.

A bivariate analysis was performed to test the assumption that measures against the effects of the COVID-19 pandemic have affected tourism revenues, in this case the tourism contribution to exports for the EU countries. According to the results (Table 1), the connection between the variables under analysis is of a direct nature and of moderate intensity (Pearson Correlation being equal to 0.554). Thus, we can say that the application of a wide range of measures against the effects of the COVID-19 pandemic has significantly influenced the tourist traffic. Based on these analyses, the first hypothesis (H1) was validated.

5.2 Travel Restrictions in the EU Countries during the Pandemic and the Consequences for Tourism

Another factor able to influence the practice of tourism was the one regarding the travel restrictions. The EC has issued guidelines on non-essential travel restrictions (COM, 2020), with the gradual restoration depending on epidemiological conditions. On 15 April 2020, the EC, in collaboration with the European Council, presented a joint European roadmap on lifting restrictions in the context of the COVID-19 pandemic.

Based on the data provided by UNWTO (2021a), we grouped the actions of the states into three broad categories, creating a matrix in which the following codes were assigned: 1 for complete closure (CC), 2 for partial closure (PC), and 3 for other measures (O) (quarantine/testing) in order to validate the second hypothesis (H2).

From the analysis, it is found that only two countries focused on only one type of restrictions (PC), the Netherlands and Sweden, while the rest applied at least two of the strategies (the most common CC and PC).

The graphical representation of the results is highlighted in Figure 2. Also, here we note that countries applied for the analysed period a combination of these restrictions with some exceptions.

Figure 2. Travel restrictions throughout April 2020 - November 2021 in the EU Countries
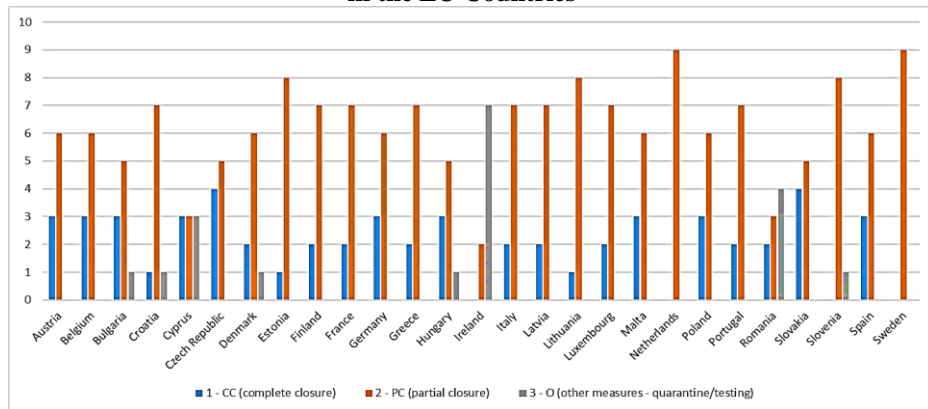
Source: Made by authors based on research, data provided by UNWTO, 2021a.

If at the beginning of the pandemic almost all EU countries relied on the CC, as the information about the pandemic evolved, so did the options for combating it. Figure 3 shows the impact of decisions on restrictions on the number of arrivals in the EU-27 member states.

Figure 3. Tourist arrivals in the EU countries in 2020 and 2021
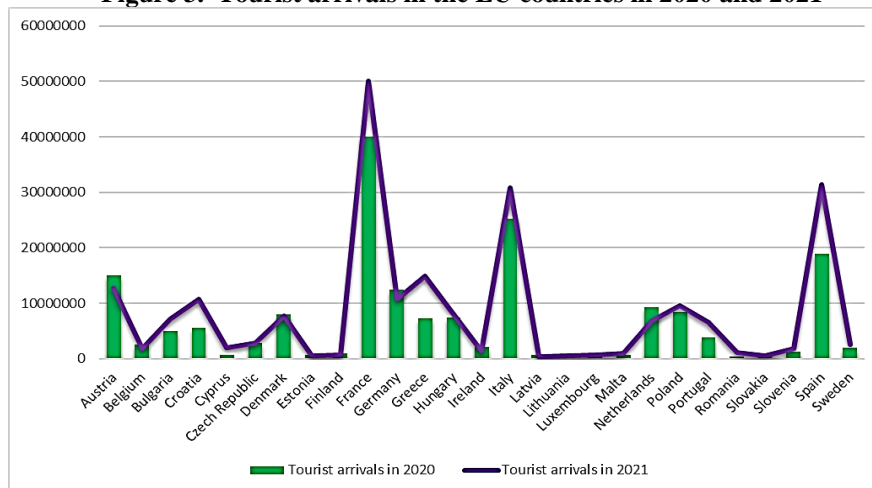
Source: Made by authors based on data provided by UNWTO, 2021a.

Based on data available on Our World in Data (2022a), we extracted the values for the COVID-19 Stringency Index for the EU-27 member states. This index is calculated on the basis of nine crisis response indicators generated by COVID-19, including the closure of schools, the closure of businesses, and the introduction of travel restrictions. In the case of each country, the index can take values from 0 to 100 (100 meaning the strictest measures). Two key periods in the evolution of the COVID-19 pandemic were considered, namely 21 January 2020 (correlated with the

beginning of the epidemic) and 22 February 2022 (date of research and relaxation of many restrictions). The results are highlighted in Figure 4.

Figure 4. COVID-19 Stringency Index for the EU countries
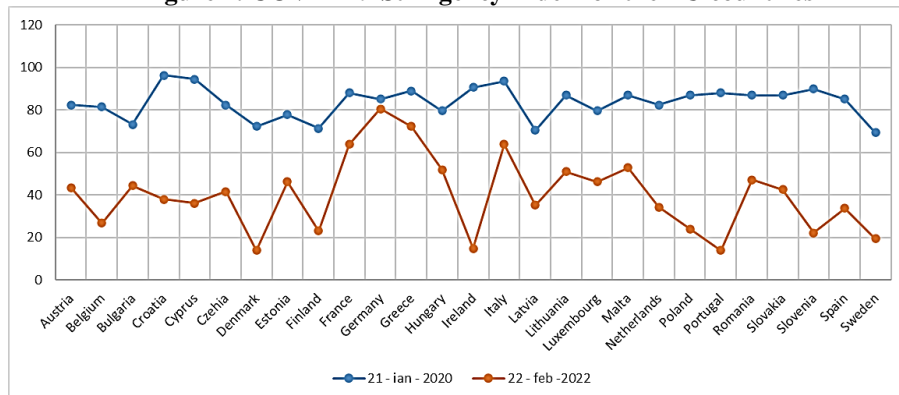
Source: Made by authors based on data provided by Our World in Data, 2022a.

Thus, analysing the two periods considered relevant for the evolution of the COVID-19 pandemic in the EU, significant differences are found in each country. There was a reduction in the intensity of the restrictions on the background of the sustained vaccination campaign promoted at the level of the EU, such in the cases of Denmark, Ireland and Portugal, where the population over 18 years of age vaccinated with the full scheme was 81%, 80%, and 90% (Our World in Data, 2022b). Overall, it can be stated that the restrictions have negatively influenced the flows of international tourists in the EU member states, fact highlighted by the COVID-19 Stringency Index, the number and type of restrictions imposed in each EU member state, and the evolution of the tourist arrivals indicator in 2020 and 2021, thus Hypothesis 2 (H2) being validated.

5.3 Examples of Good Practices for the EU Countries during the Pandemic

Many EU countries have made it a priority to restart tourism and promote domestic tourism. Domestic tourism has a large share in countries such as Germany, Romania, Finland, Belgium, France, and the Netherlands. This is also encouraged by the use of holiday vouchers, holiday cards, special discounts, or other measures designed to encourage domestic tourism. The most preferred places are the most isolated ones, which receive a smaller number of tourists, with camping-type accommodation, caravans or less crowded villas, as close as possible to nature. On this occasion, many EU countries made available for tourists sites where they could post impressions and images or movies, thus contributing to the presentation and popularization of lesser known but particularly attractive places, being incentivized through campaigns with awards, as in Denmark. Therefore, several countries offered virtual experiences during the pandemic, which would involve future tourists until

restrictions were lifted. The subsequent transformations in the tourism sector will be oriented towards the promotion of innovations and digital technologies, through the development of tourist services and products. This is an important goal of the EU, and Lithuania is one of the countries most interested in the digitization process. The COVID-19 pandemic has caused EU countries to pay close attention to health safety measures in accommodation, restaurants, or entertainment, with strong protocols on compliance with rules in tourist units, from hygiene measures to social restraint measures.

6. Conclusions

Restrictions to prevent or slow the spread of the virus have led to the isolation of major tourist destinations. In addition to travel restrictions, governments have also imposed restrictions on tourism businesses on how they operate, for reasons of health security, in some cases leading to their complete closure, most of them being lifted before the summer season. Thus, the two hypotheses taken into consideration were validated. Close collaboration between the public and private sectors during the pandemic can be a sustainable model that can also be applied in the tourism sector, with governments playing a key role in revitalizing the tourism sector through packages of financial incentives and subsidies.

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The "Perfect Storm" in the Global Automobile Industry: Scrapping the Old is the Road Ahead for the New?

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Abstract

The automobile manufacturing industry is confronted in 2022 with what could be called a "perfect storm". A mix of dramatic factors, each with potentially massive impact, is working toward a deep restructuring of this industry that may be qualified as unprecedented in the industry. The consequences of the COVID-19 pandemic, the greening of the economy, the global recession, as well as the political crises on the global stage are impacting both the auto supply chains but also the relationship between the auto manufacturers and their customers. Moreover, sector regulations are in a dynamic flow. Such a global context may lead to dramatic changes in the management and strategies of the companies from this industry and may reposition the competitors for the next long-term technology cycle in the industry. Maybe paradoxically, one of the public policies that could support in the industry in this process of transition is one of the most traditional in the industry, such as scrapping schemes.

Keywords: scrapping, automobile, supply chains, political risk, motor vehicle.

JEL Classification: H23, L62, P12.

1. Introduction

In 2022, the global automobile industry is facing one of the most challenging economic and political contexts it may have experienced during its entire existence. While such a statement may seem over-rated or exaggerated, there are at least five factors that massively impact the current situation. Each one of these factors may potentially be highly disruptive by itself and in isolation, but the resultant mix of them is leading to a unique situation.

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2. Problem Statement

It could be argued that the most important factors affecting the global automobile industry in 2022 are:

- the global recession and macroeconomic instability. As early as 2019, analysts were taking into consideration the probable occurrence of a significant macroeconomic restructuring as a result of monetary policies following the Global Financial Repression one decade before (2007-2008);

- the perceived climate crisis and the attempts by governments all over the world (both domestically but also coordinated at an international level) to „green" the economy. Such environmental challenges have led to a process of politically-induced transition towards more eco-friendly technologies;

- the technological revolution in the automobile technology. Independently of the environmental challenge, the automobile industry was facing a major technological shift most probably manifested in a gradual abandonment of the technology of internal combustion engine based on fossil fuels toward more efficient (and, incidentally, more environmentally friendly) technologies such as the use of biofuels in the internal combustion engine but most of the electric vehicle, the hydrogen engine, and others;

- the COVID-19 pandemics and its impact on supply chains. The global pandemic that started in 2020 and has developed for at least two years has determined the adoption of public policies not previously adopted at a national level by governments all over the world and especially in the Northern hemisphere (also the area of major developed economies in the world). Policy measures such as lockdowns, but also trade measures, have translated in the economic sphere in the temporary blocking of major international supply chains in a wide range of industries, among which the automobile industry was among the most impacted ones. This was particularly the case of the People's Republic of China (a country that adopted among the most radical measures in this respect), but also of the European Union;

- global political risk on the rise. Starting with the Donald Trump administration in the United States of America and its willingness to politically confront other major countries such as the People's Republic of China, but also even members of the European Union, and culminating with the war in Ukraine in 2022, the international political landscape has deteriorated significantly. The rise of economic sanctions as a preferred policy measure to deal with the relations between the Western countries and the Russian Federation, for example, has further impacted the international supply chains, as well as the business confidence.

Table 1. Factors affecting the global automobile industry

	Factor	Main impact	Preferred Form of Government Intervention
1	Global recession	decrease in the demand, increase in the cost of financing, erosion of working capital, so on	monetary policy, subsidies to producers, subsidies to the consumers, scrapping schemes

	Factor	Main impact	Preferred Form of Government Intervention
2	"Greening" of the economy	adoption of new legislation, standards and ecological targets, potential prohibition of certain activities in the future so on	carbon taxation, ecological standards, scrapping schemes, so on
3	Technological change	learning new technologies, implementing in new R&D, retooling the factories, restructuring and repositioning in the global supply chains (new partners, creating back-up supply chains, reformulating inventory management), so on	subsidizing R&D, facilitating startups, scrapping schemes (especially electric cars) so on
4	COVID-19 pandemics	restructuring and repositioning in the global supply chains (new partners, creating back-up supply chains, reformulating inventory management), experiencing tele-working, experiencing new forms of political risk, so on	lockdowns, vaccination campaigns, subsidies to consumers, subsidies to companies, so on
5	Global political risk	restructuring and repositioning in the global supply chains (new partners, creating back-up supply chains, reformulating inventory management), experiencing new forms of political risk, managing economic sanctions, so on	economic sanctions, trade boycotts, human rights prosecution, so on

Source: the authors, 2022.

3. From Crisis to Failure: Rapid Change as a New Type of "Market Failure"

The literature on "market failure" has emphasized that there are economic conditions under which the process of allocation of resources in an optimal way is disturbed (Bator, 1958). In consequence, private agents do not maximize general welfare through their profit-oriented activities. Governments are called to intervene by rearranging assets and reincentivizing activities toward other scenarios of allocations. But there is an implicit, market equilibrium assumption. That there is such an "optimum" scenario as long as the fundamental data are given: consumer needs, factors of production, knowledge and technology.

Any change in such market data changes the optimum point and induces disequilibrium that exists until the moment when the economic system reaches the new optimum. But such a process is not instant. It takes time, as fundamentally the structure of production has to be rearranged in terms of physical reconversion of

capital goods and consumer preferences have to internalize the new market supply. Fundamentally, such a rearrangement of the structure of production means downsizing certain production activities, setting up new business ventures that exploit the new knowledge and technology by implementing it into new products and services, and reconverting assets from the old structure of production towards the new structure of production.

Under the condition of perfect competition with knowledge parity between agents, such a process seems to be instant. However, in the real world this is not the case. Any such process of restructuring and reconversion of the structure of production means that entrepreneurs have to implement the new knowledge and technology into new business ventures (not necessarily new companies), invest, and start the process of production of the new products or services (or upgrade them). Such a process takes time as capital goods need a period of depreciation in order to allow entrepreneurs to record profits and be rewarded in this way for their right forecast.

This is the reason why the Austrian economist Joseph Schumpeter (2008) called "capitalism" a process of "creative destruction" as new ways of production mean the emergence of new structures of production (combination of factors of production) and the disappearance of the old ones.

Entrepreneurs need not only time in order to return their investments in capital goods but also a certain degree of risk that they are assuming. Any entrepreneur has to manifest a certain confidence that he / she will be able to take back the investment in the time horizon he / she calculated. No entrepreneur will ever take a decision to invest if he / she does not have such the confidence of the return of the investment. Lacking the confidence, such an entrepreneur will wait until the conditions of the market will allow him / her to make an informed forecast and bet on the possibility of getting the return of his / her investment.

Or, in a fast-changing technology environment associated with a fast-changing regulatory landscape that is a result of domestic and international political dynamics, such a confidence may be lost. Under such conditions, the current global economic context may be translated into the abstention from making long-term capital investments which, paradoxically, exactly inhibits the process of reconversion.

In consequence, a new type of "market failure" may emerge. This is the turbulent business environment where the fact changes in the environmental conditions of the market leads, *in abstracto*, to an impossibility of entrepreneurs to take decisions and to act. They are prevented from doing so by their lack of confidence that they have enough time at their disposal in order to get the return of their investments. As Smith and Cowing (1977) stated, "*that the rate of return constraint affects investment choices by reducing the implicit value of net investment to the regulated firm*".

4. A New Logic of Interventionism Has to Emerge in Time of Crisis: Reducing Uncertainty

In such a turbulent business environment with a fast pace of technology and exogenous political changes, the logic of public interventionism has to be adapted.

It should not be redistributive or re-allocative of existing welfare. It should be inducing stability in order to create welfare in the future. It should not provide subsidies but confidence, that is, a certain degree of predictability to allow private agents to make investments.

Public policies have already created the infrastructure on which markets are built and operate. They are the system of property rights, freedom of exchange, monetary system, tax system, and so on. The stability of such institutions provides the ability of entrepreneurs and market participants to calculate, plan and implement their business decisions. No entrepreneur can write a business plan, unless he / she has a certain confidence that the data that is used is reliable and the market conditions will remain broadly speaking stable.

Permanent turmoil until determine business decision markers to postpone investment till the moment that the conditions of the market seem to be more stable and allow for a certain forecast. So, this is not only a knowledge problem but also a political problem. The political problem is related to the outcome of the political process, which is regulation. Paradoxically, both challenges can be solved by political decision makers through multiple mechanisms.

It is obvious that there is a difference between nominal certainty and real certainty. For example, socialism as a political and economic system apparently determines certainty. Government planners made four- or five-year plans in which they stated how they would allocate resources at the level of the entire economy. All property was governmental and the prices were fixed by authority. Apparently, there were no losers or winners in the process of production. Everybody was a winner. In consequence, no "dynamics" were allowed as uncertainty and competition as a discovery proof was denied.

While this formal certainty was obvious and reassuring for some members of the society, the dynamics of the resource availability, consumer preferences, and technological ideas could not be prevented in any type of socialistic system. Such dynamics are natural, and while participants in the economic system can adjust to the resource and knowledge availability, the mismatch just grows in time. Moreover, the disincentives to rationalize resources and save are distorted and altered.

A market is an economic and political system where the uncertainty is accepted as natural and is considered to be the core disciplining mechanism for adjustment to the fundamentals of the market (Rothbard, 2009). Prices signal the demand and the supply for an economic good. Market participants adjust to such trends in order to be better positioned as compared to their competitors. But we should make a manifest difference between market uncertainty (related to knowledge, consumer preferences, entrepreneurship, etc.) and political uncertainty that lie at the premises of the market mechanism: changing regulation (including taxation), prohibiting certain economic behaviours or reallocating resources.

While the private economic agents should be endowed with the ability to understand the sector in which they operate and, in consequence, to forecast the dynamics of the market, they are less capable to understand the political process that has the outcome of changing regulations and the "rules of the game".

5. The Dilemma of How to Intervene in "Perfect Storms"? Scrapping Schemes

The current landscape of the automobile industry is really under unprecedented conditions. It is a critical challenge for any government that has to address this industry how to intervene. There are at least five factors that concur regarding the current context, which means that each measure or form of government intervention that should have dealt with that particular "failure" may be inefficient for the others. So in a complex situation like the one faced by the automobile industry, the dilemma is which policy measure should be chosen that may have a complex impact, preferably on each of the dimensions of the crisis. Using too many instruments and forms of intervention may translate into a cacophony of interventionism, which has complex but also contradictory effects.

As the third column of the table shows, scrapping schemes have been employed by different governments in order to reach different policy objectives. While simple as structure and implementation, they may become the policy choice for their complex impact at the level of the economy and environment. As Malechek and Melcer argued (2016), "*adopted in many core world economies, most notably in Germany, the U.S. and Japan. Two main goals of these schemes can be identified. First, to provide a support to the car industry by shifting future consumption to the present, which is particularly valuable in a recession, when there is an abundance of unemployed resources that can be put to work at low net economic cost ... Secondly, replacing old cars with high emissions by new ones should have brought about a positive ecological outcome ...*"

A scrapping scheme is a policy measure through which an owner of an old car is rewarded with a premium in the moment that he / she decides to scrap such a car. The scheme can stop at this point or continue by the use of the premium in the process of acquisition of a new car. In the second case (which is the most usual type of scrapping scheme), the scrapping of the old car means the acquisition of a new car.

While apparently very simple, the scheme explores at the same time two key challenges in the present economic landscape: the economic growth and the "greening of the economy".

There are not so many policy measures that support at the same time economic growth (exiting the recession) and protection of the environment. As a general norm, these two objectives are in contradiction in the traditional logic of industrialism. Paradoxically, scrapping schemes are among the policy measures that seem to support both objectives. Starting with what has been called the "UNOCAL scheme" in 1990 (implemented by the American energy company UNOCAL in the state of California) (Lucsko, 2016), the scrapping schemes have been adopted by several countries in the world (especially in the European Union as well as in other major economies in the world). Its popularity has been reached during the global financial crisis of 2007 – 2008, when especially European countries have adopted such schemes with a double dimension: exiting the recession and advancing towards the environmental objectives.

As mentioned by the European Conference of Transport Ministers (1999), "The main objectives of the schemes have usually been listed as follows:
- stimulating the national car industry and the national economy by boosting new car purchases;
- improving transport safety by introducing newer, safer vehicles;
- reducing car exhaust emissions".

Maybe paradoxically, there are no such policy measures that can address multiple objectives at the same time. So the scrapping schemes are among the unexpectedly simple in design but complex in impact contemporary public policies.

6. Conclusions

In a complex context of a crisis with multiple dimensions that could be qualified as a "perfect storm", the dilemma of the types of public policy to be adopted is high on the agenda. The global automobile industry experiences a unique set of circumstances that require a certain type of intervention from the part of governments that addresses in the same time multiple dimensions, unless a deep shock would damage the industry. Scrappage schemes are among the apparently simple forms of intervention but with a complex impact at least on economy and the environment.

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The Territorial Impact of Indebtedness: Sectoral Analysis in Slovak Environment

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Abstract

The structure of corporate financial sources is monitored using different indebtedness ratios. The proportion of own resources and debts affects the level of corporate financial stability. That is why the level of indebtedness should be analysed in enterprises and monitored to avoid any financial problems or distress. The primary goal of this paper is to analyze indebtedness in the Slovak environment using a sample of 15,716 enterprises from various sectors using the statistical classification of economic activities in the European Community (NACE classification) and to identify relationships between them. The study estimates the indebtedness by several indebtedness ratios (total indebtedness ratio, self-financing ratio, current indebtedness ratio, non-current indebtedness ratio, equity leverage ratio, and insolvency ratio) over a 5-year horizon (2015-2019). To meet the objective of the paper, the cluster analyses were applied using the squared Euclidean distance and the Ward´s method of the agglomeration. The results indicate that there are clusters of sectors with homogeneous patterns of indebtedness and thus with similar capital intensity levels.

Keywords: indebtedness, financial stability, cluster analysis.

JEL Classification: D22, G33, L25.

1. Introduction

Business performance is a key to the successful operation of a business and its long-term survival. A very important part is the financial analysis, which expresses the corporate performance, evaluates its goals, and sets the basis for further planning of target organizations. Every company is better off prevailing in financing its own resources over debts. Durana et al. (2021) state that the financial performance of companies is also affected by macroeconomic influences such as the global crisis or state intervention. As the financial stability of enterprises is also determined by

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internal factors, they should be carefully analysed, especially those factors which determine the level of indebtedness. Thus, the primary goal of the study is to analyze the level of indebtedness in the Slovak environment using a sample of 15,716 enterprises from various sectors and identify relationships between them, which may help identify sectors with homogeneous patterns of indebtedness and thus recognize which sectors are mostly stable and independent.

The paper is divided as follows: The Problem Statement section summarizes recent papers published in the field. The Aims of the research section sets the purpose of the paper, the methodological steps applied in the analysis are portrayed in the Research Methods. The results of the cluster analysis performed in the Slovak environment are presented and discussed in the Findings section.

2. Problem Statement

Monitoring the level of indebtedness in enterprises is an essential part of managerial activities when mapping the probability of potential financial risks (Campos and Cysne, 2021). The optimal capital structure does play an important role (Rowland et al., 2021) and also the typical debt limits for different countries (Butkus et al., 2021; Novak et al., 2021). Campos and Cysne (2021) studied debt limits for 18 emerging countries and found that there is no common debt limit for all of the countries. Markova and Svihlikova (2019) observed the situation in the Visegrad countries and found that indebtedness is also one of the crucial indicators of the monetary development of a country. The importance of the country-level factors in the process of over-indebtedness in Europe was also investigated in the study by Angel and Heitzmann (2015). Goncalves et al. (2020) investigated the impact of political cycles on corporate debt policy. They analysed some specific indebtedness indicators using the Wilcoxon test and cluster analysis and proved that there were no statistically significant differences in debt levels between political cycles.

The role of the micro and mezzo factors is also evident, as declared by Padmaja and Ali (2019) or Toederescu and Mocanu (2010). Devesa and Esteban (2011) proved the importance of solvency, liquidity, and asset structure when determining the level of indebtedness. Following the research of Ngo and Le (2021), the debt structure is significantly related to firm size, firm quality, liquidity, leverage, asset maturity, taxation, and macro-variables. The optimal level of the short- and long-term indebtedness of small and medium-sized enterprises in different sectors has been of interest to researchers for several years. Gomez and Cabarcas (2019) analysed the indebtedness level of the metalworking sector, highlighting the importance of business objectives and financial performance. Farcnik et al. (2015) noted the relevance of sector-specific performance and thus explored bonds between indebtedness and the tourism sector. The financing patterns and determinants of indebtedness in the manufacturing sector were measured by Majumdar (2014), who confirmed the importance of current liabilities in the process of debt financing. Culkova et al. (2018) evaluated the indebtedness in the selected economic sectors using corporate financial reports. The outputs of their research, measuring the level of total indebtedness, financial leverage, and insolvency ratios, proved that there are

some sectors with a high level of indebtedness in which future business activities can be significantly threatened. In their research, Manova et al. (2018) confirmed that the ability of an enterprise to develop in the market is strongly determined by its financial performance. Using the cluster analysis, they were able to cluster sectors according to selected financial parameters.

3. Research Questions / Aims of the Research

The quantification of the indebtedness is very important for all enterprises operating on the market to declare their stability, competitiveness, and sovereignty. Yang et al. (2015) revealed that there are specific factors influencing short- and long-term debts and that these factors are different between different sectors. They underlined the importance of investigating debt decisions of enterprises in all sectors. Thus, the fact that business entities and their debt levels should be consistently measured and evaluated was the main force to identify clusters of sectors with homogenous patterns of indebtedness and with similar capital intensity levels under specific economic conditions. Thus, the following hypothesis was set:

H1: There is a significant occurrence of homogenous patterns of indebtedness across the sectors in specific Slovak conditions.

4. Research Methods

To analyse the indebtedness level across the sectors, the Orbis database was used to build a dataset of 17,992 enterprises. The selected companies met the condition that the value of their total assets was at least € 300,000 in the period under review (2017-2019) to ensure that all enterprises in the dataset are in stable financial positions and have a similar economic background. After removing the not available and outlying values, a final sample of 15,716 Slovak enterprises was set.

Using the financial data of the analysed enterprises, the selected indebtedness ratios were calculated (total indebtedness ratio, self-financing ratio, current indebtedness ratio, non-current indebtedness ratio, equity leverage ratio, and insolvency ratio) over a 5-year horizon. Their descriptive statistics are summarized in Table 1.

With all the descriptive statistics for all ratios, the cluster analysis was run. The main task of this analysis is to find and identify homogeneous subgroups (clusters) of the monitored set of enterprises in different economic sectors (classified by NACE). In general, sectors within a cluster are similar based on a specific level of indebtedness, and at the same time, sectors in different clusters have different development of indebtedness ratios.

Table 1. Descriptive statistics of analysed indebtedness ratios

Ratio	mean	med.	st. dev.	min	max	coef. var.
total indebtedness ratio	0.6353	0.6547	0.3737	-0.0169	3.7872	0.5882
self-financing ratio	0.3647	0.3453	0.3737	-2.7872	1.0169	1.0245

Ratio	mean	med.	st. dev.	min	max	coef. var.
current indebtedness ratio	0.4553	0.4147	0.3379	-0.0478	3.4797	0.7422
non-current indebtedness ratio	0.1800	0.0595	0.2726	-0.0180	1.9905	1.5146
equity leverage ratio	6.2622	2.6811	29.946	-54.832	429.596	4.7820
insolvency ratio	2.7943	1.8417	2.6864	-0.2018	17.4097	0.9614

Note: TI total indebtedness ratio, SF self-financing ratio, CI current indebtedness ratio, NCI non-current indebtedness ratio, EL equity leverage ratio, INS insolvency ratio.
Source: By authors, based on research.

The principle of clustering is the computation of distances between objects. In the paper, the Ward´s method and the squared Euclidean distance were used. This type of distance is used if a progressively higher weight should be given to further objects:

$$d_{ij} = \sum_{k=1}^{K}(x_{ik} - x_{jk})^2 \tag{1}$$

where d_{ij} is the distance between objects, K is the number of quantitative variables, x_{ik} is the value of the k-th variable for the i-th object, x_{jk} is the value of the k-th variable for the j-th object. Ward's hierarchical agglomerative clustering method is based on an analysis of variance, i.e., the minimum growth of the sum of the squares deviates from the average by adding a new object to the cluster, which leads to the formation of clusters of similar shape and size. The clustered sectors are then portrayed in the dendrogram to reveal homogenous patterns of indebtedness across the sectors.

5. Findings

The results of the cluster analysis were used to find the sectors with similar levels of indebtedness, which were measured by selected indebtedness ratios. The dendrograms for each indebtedness ratio are presented in Figures 1a-f. It may be said that the outputs of the cluster analysis confirmed that there is a significant occurrence of sectors with similar indebtedness.

The total indebtedness ratio measures the ratio of total debt to total assets. The higher the level of equity, the higher the reserves for creditors in case of financial problems. Therefore, the interest of creditors is to minimize the debt levels, since the debt is cheaper compared to equity (Mrzyglod et al., 2021; Kovacova, Lazaroiu, 2021). The value of this indicator should not exceed 70 % (which is the optimal debt-to-total-assets ratio). The cluster analysis proved that the economic sectors can be divided into three groups based on their total indebtedness (Figure 1a). Exactly the same results can be observed for the self-financing ratio (Table 2), which measures the level of financial independence and stability of an enterprise (its value should not be less than 20-30%). Both these indicators determine the structure of corporate financial sources (their sum is 100%), and the clusters or economic sectors are the same (Figure 1b).

Figure 1. Dendrograms (indebtedness ratios)

a) total indebtednes sratio

b) self-financing ratio

c) current indebtedness ratio

d) non-current indebtedness ratio

e) equity leverage ratio

f) insolvency ratio
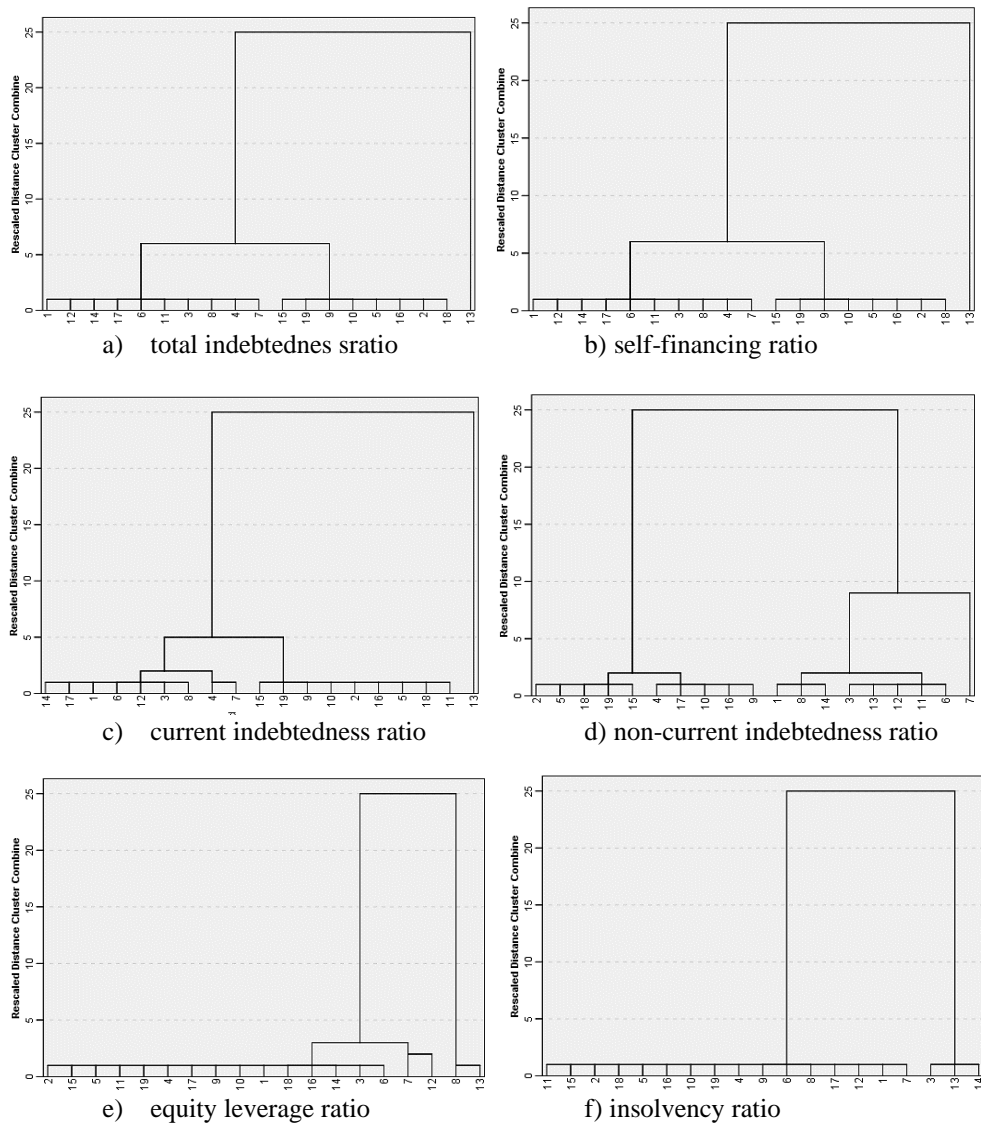
Note: Numbers on the horizontal axis indicate the sectors, i.e. 1 is for NACE A, 2 for B, 3 for C, 4 for D, 5 for E, 6 for F, 7 for G, 8 for H, 9 for I, 10 for J, 11 for K, 12 for L, 13 for M, 14 for N, 15 for O, 16 for P, 17 for Q, 18 for R, 19 for S.
Source: By authors, based on research.

Table 2. Clusters (total indebtedness and self-financing ratios)

Cluster	C1	C2	C3
Number of sectors	10	8	1
Economic activities (NACE codes)	A, C, D, F, G, H, K, L, N, Q	B, E, I, J, O, P, R, S	M

Source: by authors, based on research.

If the company uses debt capital to a large extent, it is appropriate to monitor the structure of debt in the form of partial indicators of the financial structure. Therefore, the current and noncurrent indebtedness ratios were computed. These indicators measure the ratio of current (noncurrent) liabilities to total assets. The optimal limits are generally not given, however, considering the non-current indebtedness, these debts represent a relatively convenient system of financing, as at the time of debt analysis, it is not necessary to meet full cash requirements. The clustering of NACE sectors according to the level of non-current indebtedness ratio is presented in Figure 1c, and it is evident that five homogeneous clusters were formed (Table 3).

Table 3. Clusters (non-current indebtedness ratio)

Cluster	C1	C2	C3	C4	C5
Number of sectors	5	5	3	5	1
Economic activities (NACE codes)	B, E, O, R, S	D, I, J, P, Q	A, H, N	C, F, K, L, M	G

Source: By authors, based on research.

Figure 1d records the clusters of economic activities in the Slovak environment by current indebtedness ratio. Four homogeneous groups were determined (Table 4).

Table 4. Clusters (current indebtedness ratio)

Cluster	C1	C2	C3	C4
Number of sectors	7	2	9	1
Economic activities (NACE codes)	A, C, F, H, L, N, Q	D, G	B, E, I, J, K, O, P, R, S	M

Source: By authors, based on research.

The equity leverage ratio indicates the share of a shareholder´s equity in total liabilities and evaluates how much leverage an enterprise is using. The higher the level of the ratio, the greater the risk to shareholders. The dendrogram (Figure 1e) specifies three clusters of NACE sectors by leverage ratio, Table 5.

The last indicator considered is the insolvency ratio, which monitors the ratio of total liabilities to total receivables. If the value of the ratio is higher than one, then primary insolvency is observed in an enterprise; otherwise, there is secondary insolvency (for values of the ratio that are lower than one). The agglomerative clustering method reveals only two clusters of economic sectors (Figure 1f). The first

cluster consists of three sectors (C, M, and N), the other analysed sectors form the second homogeneous subset.

Table 5. Clusters (equity leverage ratio)

Cluster	C1	C2	C3
Number of sectors	7	2	2
Economic activities (NACE codes)	A, B, C, D, E, F, I, J, K, N, O, P, Q, R, S	G, L	H, M

Source: By authors, based on research.

Thus, to summarize the findings and answer the research question, the outputs of the cluster analysis confirm the existence of homogenous patterns of indebtedness across the sectors in Slovak conditions. It was shown that the sectors A (Agriculture, forestry and fishing), C (Manufacturing), D (Electricity, gas, steam, and air conditioning supply), F (Construction), G (Wholesale and retail trade), H (Transport and storage), K (Financial and insurance activities), L (Real estate activities), N (Administrative and support service activities), and Q (Human health and social work activities) are usually grouped together (except for the non-current indebtedness ratio), so the level of indebtedness measured by the selected ratios is identical in these economic sectors. Almost all sectors belong to the tertiary sector, providing services for people, governments, and other industries. The tertiary sector is strongly influenced by consumer moods, per capita income, and the size of the welfare state (Wang et al., 2021), which may be the reason for a similar debt policy. Some specificities may be observed with sector M (Professional, scientific, and technical activities), which is usually alone in the cluster. These activities require a high level of education and provide users with highly specialized knowledge and practical experience, which may explain the heterogeneity of this economic section.

The cluster analysis has been used by a number of researchers to analyse debt policy by different factors (e.g., Goncalves et al., 2020; Bethlendi et al., 2019; Pocol et al., 2022). Campos and Cysne (2021) used cluster analysis to group emerging countries based on their debt limits. Their findings show that those countries whose debt-to-GDP ratio exceeded the given limits had problems with new loans to finance their debts or needed help from international institutions. Curea et al. (2020) investigated the performance of enterprises in Central and Eastern European countries. They studied the financial performance of enterprises using both hierarchical and nonhierarchical cluster analysis. Their findings show identical groups of enterprises with homogeneous attributes in financial performance. The study by Wortmann and Stahl (2016) also formed distinct clusters of enterprises in the European Union countries in terms of competitiveness, indebtedness, and economic performance. Suchanek et al. (2013) applied cluster analysis to divide enterprises into high and low performing groups based on their profitability, activity, indebtedness, and liquidity. As declared by Stryckova (2016), there are several differences in debt policy in industrial sectors, which were confirmed by the analyses of 15,716 Slovak enterprises.

6. Conclusions

Indebtedness indicators are used to monitor the structure of corporate financial resources. The share of equity and debt affects the financial stability of a company. A company with a high share of its own resources is stable and independent. However, the company is unstable with a low proportion of equity. Moreover, indebtedness may not only be a negative characteristic of the company, as its growth can contribute to its overall profitability and higher market value, but it also increases the risk of financial instability. The set of indebtedness indicators is very rich. Most of them express the financial structure of the company, i.e. about the composition of liabilities; others are used to assess the corporate ability to repay debt in terms of profit generation, but also cash flows. Therefore, the level of indebtedness in Slovak companies was analysed on a sample of representative indebtedness indicators (total indebtedness ration, self-financing ratio, current and non-current liability ratios, equity leverage ratio, and insolvency ratio) and clusters of sectors with homogenous patterns of indebtedness were determined using the Ward´s hierarchical agglomerative clustering method.

Despite the fact that the results help determine sectors with similar indebtedness levels and thus with similar capital intensity levels, there are some limitations of the study considering the environment in which the analysis was performed, the statistical methods used, as well as the computed ratios, which will be eliminated in future studies.

Acknowledgment

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New Access to Social Entrepreneurship following Academic Curricula and Research

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Abstract

The complexity of the integration process of Albania in the European Union, like other Western Balkan countries, includes problems with specific regard to the third sector. The fragility of the financial market and the failure to adapt the financing structure to the models of developed countries, condition the access of new graduates in social sciences to social entrepreneurship. Considering the concepts and scientific literature that refer to social enterprises in countries in development as responses to the absence of social interventions by non-governmental organizations, the private sector and the government, this paper aims to analyze the typological gaps of secondary level degree curricula in social sciences, with a particular focus on studies in social entrepreneurship and administration of social services. The selected quantitative research methods were combined with qualitative methods, in accordance with the exploratory and empirical type of the inquiring process. The question the research raises is: "What are the scientific domains of concepts in which university knowledge and practice base criteria that define social enterprises as distinct from associations, foundations, organizations, and other components of the third sector?" The conclusions help to understand the need for new influence after scientific research and academic discourse that will assist in reducing knowledge gaps by applying throughout the study practice in the field the significance of social enterprises as operational structures that create interventions against social issues.

Keywords: social entrepreneurship, third sector structures, university secondary level curricula.

JEL Classification: L31.

1. Introduction

This study follows third-sector concerns related to structural disorganization, improvisation and the scarcity of interventions against social issues, where in particular civil society organizations are perceived to have less impact in decision

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making. Following the view of Amerhauser and Kemp (2021) who state that "The Western Balkans is a difficult environment for CSOs to work", recently, public debates, as the efforts to influence the restoration of the third sector in Albania have been silent. Although the European integration perspective of the country is sensitive, statements from the European Commission reports with reference to government's lack of awareness to the role that third sector organizations and social enterprises need to play, lack of answers.

The main objective of the paper is to analyze this particular limitation of the size of the third sector components and its consequences for new graduates in social sciences, as well as the space and resources to access social entrepreneurship. The research on absences related to the secondary level curricula of university studies with profiles in social entrepreneurship and in the administration of social services continues with the request for a new academic influence towards a new dimension for the development of the third sector in Albania.

2. Problem Statement

Social value is a guiding concept of social entrepreneurship, rooted in the distinct domains between civil society organizations (CSOs) and social enterprises (SEs). Austin, Gutierrez, Ogliastri and Reficco (2006) compare CSOs and business-based social enterprises contribution in generating social value, by stating that "Whereas most CSOs focus entirely on producing goods or services aimed at some form of social betterment, a business-based social enterprise functions within a company's overall operations that are dedicated to social value creation" (Austin et al., 2006).

Following on from concepts of Shane and Venkataraman (2000), who see social entrepreneurship as "a process that includes: the identification of a specific social problem and a specific solution (or set of solutions) to address it" (Shane, Venkataraman, 2000), Jeffrey Robinson (2006) emphasises that "In developed nations, SE is on the rise because of the decline of the welfare state" (Robinson, 2006). The author continues and refers to "distrust of the NGO community, apathy within the private sector, and the impotence of the government to provide services to the people" (Robinson, 2006) as causes for the rise of social enterprises in nations in development.

The rise of new forms of social entrepreneurship in Albania as responses to the demand for innovation are blocked and cannot find ground within a still fragile economic market, where the third sector remains limited to a few civil society organizations and fewer social enterprises. According to Phillips, De Amicis and Lipparini (2016) there is "no legal definition for SEs in Albania" (Phillips et al., 2016). The authors state that there are "No official policy measures recognising social enterprise", and that "Negotiations toward official adoption of a draft law by the Parliament remain in their early stages" (Phillips et al., 2016). The authors refer to Technical Assistance for Civil Society Organisations (TACSO) survey of 2013 "which identified 80 organisations that fit the criteria for 'potential social enterprises'" (Phillips et al., 2016). The latest progress report published by the

European Commission (EC) in October 2021 once again expressed concern for the situation of the third sector in Albania, where in particular "Substantial efforts are needed to ensure meaningful and systematic consultations with civil society as part of an inclusive policy dialogue for reforms" (EC, 2021). Considering that the shortcomings in Albania's economic system and the absence of a clear governmental projection of assistance to social enterprises limit the access and involvement of new graduates in social entrepreneurship and the administration of social services in the sector, this paper calls for change, new access, and influence to third sector development in Albania on the basis of scientific empirical analyzes.

3. Research Questions / Aims of the Research

This paper presents the results of the research conducted in Albania in the period: April 2021-December 2021. The purpose of this research is to analyze the absences of the university secondary level degree curricula with profiles in social entrepreneurship and social services administration.

The questions the research raise are:

What are the scientific domains of concepts in which university knowledge and practice base criteria that define social enterprises as distinct from associations, foundations, organizations and other components of the third sector?

Which third sector structures are the most frequented by students studying for a master's degree with profile in social entrepreneurship and social services administration during university practice in the sector?

What is the knowledge provided through the secondary level curricula in financial resources, external environment social entrepreneurship at the sector level?

4. Research Methods

The research sample consisted of 418 master's degree students from three main Albanian public universities (n = 418). The age range of the respondents, randomly selected to participate in this research, is between 21 and 33 years old (Table 1). The aim of the research methodology used to design the study following social sciences researches (Creswell, 2012) was to collect data on the level of attendance of third sector structures by master's degree students with a profile of studies in social entrepreneurship and social services administration, during university practice in the sector.

Primary data were collected through questionnaires used for organizations, foundations, and social enterprises based in Albania and designed following the Kessler model (Kessler et al., 2002). Within four sections of the questionnaires open questions and two Likert scales (Croasmun, Ostrom, 2011) were designed to be instrumental in bringing to the analysis a sort of personal feeling and reflection on the commitment of master's degree students in upcoming interventions against social problems.

Table 1. Sample characteristics by gender and age group

Gender * Age							
			Age				Total
			21-23 years old	24-26 years old	27-30 years old	31-33 years old	
Gender	Male	Count	61	38	33	15	147
		% within Age	14.6%	9%	7.9%	3.5%	35%
	Female	Count	142	67	43	19	271
		% within Age	34%	16%	10.3%	4.5%	65%
Total		Count	203	105	76	34	418
		% within Age	49%	25%	18%	8%	100.0%

Source: A-Institute, 2021.

Secondary data were collected through contextual analysis (McTavish, Pirro, 1990) and semi-structured interviews (Matthews, Ross, 2010).

Contextual analysis focused on:

- Desk research/document review of existing second degree university courses with profiles in social entrepreneurship and administration of social services;
- Evaluation of the statements and reports of the European Commission;
- Observation/participation in the events organized by the Faculties of social sciences and the Department of social work and social policies next three main public universities based in Albania.

The interviewing process focused on:

- Semi-structured interviews with 168 local experts selected from researchers, academics, and representatives of social enterprises and civil society organizations based in Albania. The interviews were structured around two key themes: Sizing the level of collaboration of public universities with the third sector, and Assessing the access of master's degree students to third sector structures.

5. Findings

Data analysis showed that the level of participation through practice sessions in social enterprises and civil society organizations is limited. In the context of the curricula topics, assessment data showed that for 38% of the respondents "Community services" is the main topic on which curricula of master's degree studies with profile in the social services administration are based. Other topics are: "Supervision of social services provision" (24%) and "Advocacy" (20%). The least cited curricular topics are "Social Policy" (11%) and "Social Research" (7%) (Figure 1).

Figure 1. Master's degree curricula topics
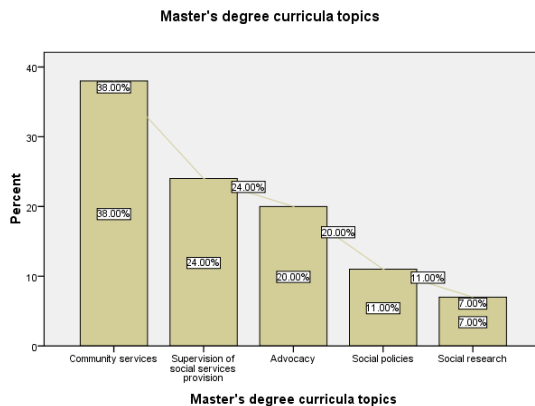
Source: A-Institute, 2021.

Access to knowledge and preparation for work is characterized by profound absences in specific curricula dedicated to social entrepreneurship and the administration of social services. For 32% of the respondents, the main social service in which they were mostly involved during practice sessions in the field is the "Institutional procedures". Other social services were provided following "Psychosocial counselling", "Education" and "Infrastructure restoration" (Figure 2).

Figure 2. Social services provided following practice in the field
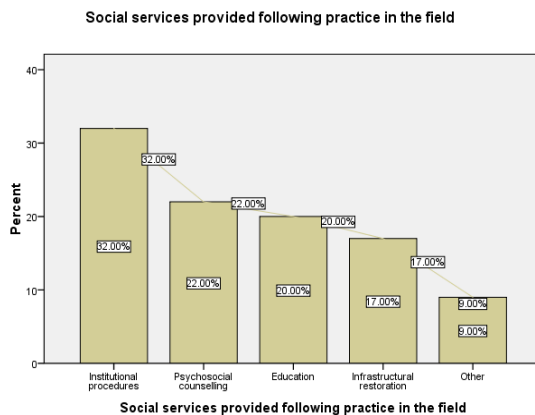
Source: A-Institute, 2021.

Continuing with the assessment of the knowledge of the components of the third sector, it emerges that 30% of the respondents consider "Social change" to be the main criterion that defines the statute of a social enterprise. 21% of the respondents consider "Positive impact on society" as the main criterion, while 10% of the respondents believe that "Support for individuals/families" is the criterion that defines the statute of a social enterprise (6% of the respondents indicated

"Community development" as their main criterion) (Figure 3). Due to lack of knowledge, 33% of the respondents did not answer this question.

Figure 3. Criterion for the status of a social enterprise
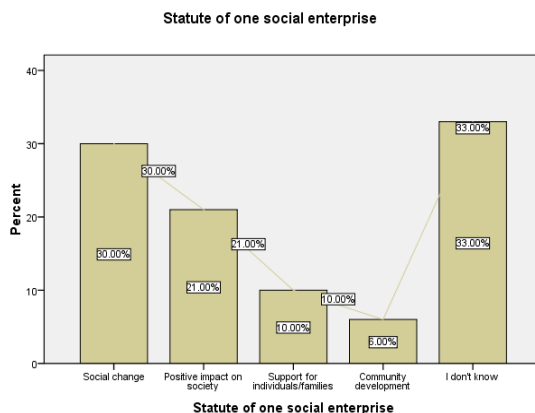
Source: A-Institute, 2021.

The analysis of the data shows that a major part of the respondents (58%) consider "Non-profit distribution" the main criterion that defines the statute of non-profit organizations (for 23% of the respondents the main criterion is "Private state" and for 19% of the interviewees the main criterion is "Private / non-governmental state").

The "Grassroots organizations" (26.7%) and "International organizations" (16.8%) were the most frequented third sector structures during practice sessions in the field (Figure 4).

Data showed that the majority of the respondents (55.4%) indicated the absence of practice sessions as a cause of the COVID-19 pandemic.

Figure 4. Type of organization mostly frequented during practice in the field
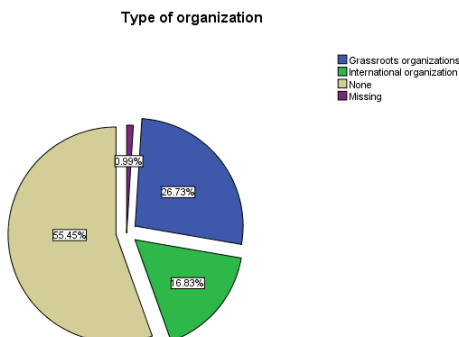
Source: A-Institute, 2021.

Risk analysis, trade demands, legal disposals were indicated as issues that most of the the interviewees (87.2%) are unaware of (Figure 5).

Figure 5. Knowledge in risk analyse, trade demands, legal disposals

Knowledge in risk analyse, trade demands, legal disposals
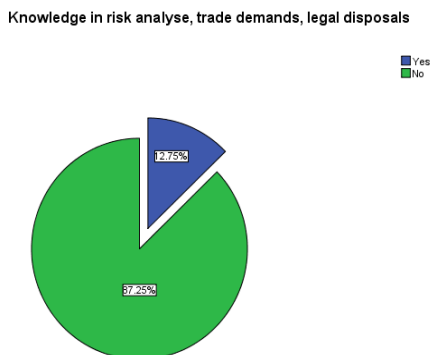
Source: A-Institute, 2021.

The data showed that respondents' lack knowledge in particularly in: "Financial resources" (39.2%), "Analysis of the external environment" (27.4%), "Sector issues and innovation" (21.5%) and "Legal disposals" (11.7%) (Figure 6).

Figure 6. Major gap of knowledge in risk analyze, trade demands, sector innovation

Assessment of major gap of knowledge in risk analyse, trade demands, sector issues and innovation
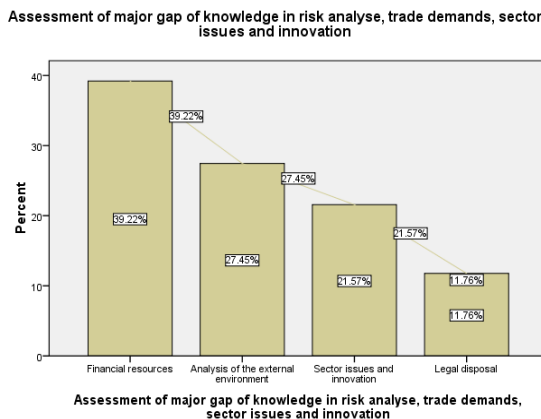
Source: A-Institute, 2021.

Comparative analysis with qualitative data collected from interviews with representatives of civil society organizations and social enterprises based in Albania suggests that from the group of respondents, who applied their university knowledge during practice sessions in the field, 27.7% had this experience following "Religious organizations".

Others have implemented the practice in "Community-based organizations" (23.7%), "Philanthropic organizations" (13.8%) and "Social enterprises" (6.9%) (Figure 7).

Figure 7. Statute of organization frequented
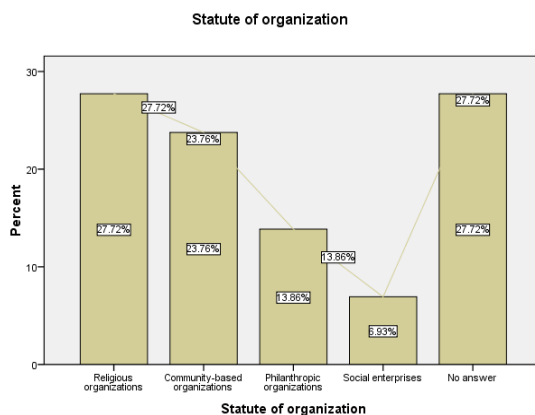
Source: A-Institute, 2021.

Comparing with the typology of organizations, the data showed that the "Grassroots organizations" were the primary resource of knowledge on risk analysis issues, trade demands and legal disposals (Table 2).

Table 2. Assessment of knowledge in risk analyse from practice in the field

Type of organization * Risk analyse, trade demands, legal disposals					
			Risk analyse, trade demands, legal disposals		Total
			Yes	No	
Type of organization	Grassroots organizations	Count	36	1	37
		% within Risk analyse, trade demands, legal disposals	57.1%	.3%	8.9%
	International organizations	Count	12	2	14
		% within Risk analyse, trade demands, legal disposals	19.0%	.6%	3.3%
	None	Count	15	352	367
		% within Risk analyse, trade demands, legal disposals	23.8%	99.2%	87.8%
Total		Count	63	355	418
		% within Risk analyse, trade demands, legal disposals	100.0%	100.0%	100.0%

Source: A-Institute, 2021.

6. Conclusions

The data analyses show that there is a contemporary scientific basis where the curricula of master's studies with profile in social entrepreneurship and social services administration are placed, but the scientific concepts are conveyed in a fragmentary way to students and there are not transferred as knowledge. One of the strongest impacts of the COVID-19 pandemic was on practice sessions in the field that did not follow an implementation methodology. Operational interventions in non-profit civil society organizations and social enterprises, where students of master's degree students have been engaged, either the comparative analysis or the contextual analysis show, lack of strategic planning on the analysis of risks, market demands, legal disposals and sector innovation. The collaboration that universities have with third sector structures is conditioned by the instability of the sector in terms of logistical changes, but also by the lack of a regulatory framework in terms of partnership.

The generalization of the data may be taken with concern due to the moderate reaching of those respondents, already graduates in social entrepreneurship and administration of social services in the secondary level of university education. In conclusion, the condition of a deeply damaged third sector in Albania is a constraint for the necessary social interventions against the impact of social problems through social enterprises. Following the results of the research, this paper calls for a new awareness at the academic level, where researchers and academics must contribute to the enrichment of university curricula with scientific concepts on social entrepreneurship, as well as in restoration of third sector perspectives.

Acknowledgment

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Soft Power or Hard Power,
Can the EU Have a Geopolitical Awakening?

Ștefan-Marian DUMITRU[1]

Abstract

The present study works to understand how the European Union has begun to develop a hard power dimension, as a shift in geopolitical doctrine, in reaction to the invasion of Ukraine by Russia. While initial measures were of an economic nature, via the enactment of the strictest economic sanctions ever observed, the EU has increasingly offered military aid by supplying armament to Ukraine, through the European Peace Facility, as well as through Member States donations. These early signs of a geopolitical awakening have long been expected. What remains to be seen is whether it is sustainable. The return of war to Europe has sparked an upsurge in security concerns and a sudden realisation that more must be done for defence. The conflict is reshaping the European security order, and the EU must take action to shore up its defence as well as its strategic, economic, political, and energetic position in the world. Thus, it is no surprise that at the March EU Summit in Versailles, the main topics of the reunion were defence and energy independence. Thus, in this article, I will work to better understand the geopolitical awakening of the EU, via the tools and partnerships it possesses as well as how Member States interests affect its development.

Keywords: EU, geopolitics, defence, sanctions, policy, NATO.

JEL Classification: F02, F51, F52, F53, F55.

1. Introduction

Historically, the European Union has focused on soft power as a means of exerting influence and bringing neighbours closer to its norms and values. With the help of action plans, trade agreements, funding agreements and other soft power tools, the EU has been projecting its values and norms to a debatable degree of success. Hard power has never been a doctrine utilised by the EU, it has always been the domain of its Member States. It is well known that geopolitical leverage has always been lacking in the EU's toolkit, drawing criticism for giving priority to

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financial instruments instead of geopolitical strategy. But the war in Ukraine, on the doorstep of Europe, seems to be a wake-up call for the soft-power loving Union. In a matter of days, the EU moved more swiftly than it had in 2 years of pandemic, with 5 sanctions packages passed within a week (European Commission, 2022). The trend is expected to continue as many European companies have moved to withdraw and stop investments in the Russian economy, with almost 500 companies taking such a move by the time of the writing of this article (Yale School of Management, 2022). The EU's unexpected openness and unity in utilising its economic weight as a tool against Russia is evidence of the growing sentiment within the EU that geopolitical action must be taken, even if the price is to be paid by the union itself, due to exploding energy prices.

Inside the European block, the Member States, together with the European Union, are enacting policies that will be able to mitigate the hardships brought on by sanctions on the lives of EU citizens. In Brussels, the Temporary Protection Directive, a policy enacted in 2001 but never used, was triggered (Citizens Information, 2022). This mechanism grants protection to Ukrainian refugees, such as medical assistance, access to education and the labour market, as well as residency rights. In support of the Ukrainian state, the EU announced a financial and humanitarian aid package, while moving to increase disinformation efforts through the Commission's East StratCom Task Force and suspending Russian media outlets (Jack, 2022).

On an even more important scale, the EU is developing into a security actor, capable of playing on the geopolitical board of chess, by using the European Peace Facility, which became operational in July 2021, as a measure to financially aid the Common Security and Defence Policy of the EU (European Council, 2022). The instrument is set to offer 500 million euro in equipment, armament, and defensive weapons to Ukraine. The EU's geopolitical awakening could not have happened without a shift in the policy of Germany, which, after decades of reluctance, has allocated a special fund, worth 100 billion euro, over the next four years for defence acquisitions and a permanent increase in its annual defence budget of 2% annually (Deutche Welle, 2022). Sweden, Romania, Latvia, Denmark, Poland, and the United Kingdom have also pledged an increase in defence expenditure between 2.5% and 3% annually (Mackenzi, 2022), and other EU and NATO states are expected to follow suit.

2. Problem Statement

The issue at hand is that the European Union is facing a geopolitical game, while lacking the experience in the field. So, will its effort be sustainable? The increases in defence spending by Member States are a crucial starting point, one which must be broadened at a European level. Member States thus began making use of the Permanent Structured Cooperation and the European Defence Fund, to guarantee that defence budgets are not spent in an uncoordinated manner, as well as encourage all Member States to achieve at least 2% GDP allocation to their defence budget, as per NATO requirements.

Becoming a geopolitical actor requires more than increasing defence spending. The defence structure framework of the EU already exists; it is only a question of utilising them. The Strategic Compass is a step in that direction, as it evokes the possibility of utilising article 44 of the TEU European (Defence Agency, 2022), which permits the EU to delegate the implementation of security tasks to a group of Member States that desire to act in the security and defence of the union. In this respect, the EU, NATO, and partner countries can use the multinational, rapid response military units, brought to life in 2003, but never utilised, the EU Battlegroups (External Action Service, 2022). Agreeing on leadership is always a challenge, but a necessary one, and the EU cannot hope to give a place at the geopolitical table if it does not do so. At the same time, a change in the manner in which the EU currently implements its neighbourhood policy must be made.

A new approach is necessary with respect to the Balkan countries, of which several have had candidate status for years, and negotiations have stalled, pushing them to seek partnerships with Russia and China. The EU's objective of building a "ring of friends" with Balkan countries and the Eastern Partnership as an alternative to membership to the EU, has been an unsuccessful endeavour. While it focused on fighting corruption and boosting economic and cultural links, it completely left out the security dimension. Countries such as Moldova and Georgia are fearful of falling victim to Russian aggression once again, and in this sense, the EU must provide support. Membership within the EU is unlikely for several years to come, but the Russian threat will mobilise the EU to add a security dimension to the neighbourhood policy (European Commission, 2022).

Preparing the EU for the geopolitical dimension will require a rethinking of the geoeconomics one. For Germany, the Nord Stream 2 pipeline was regarded as a purely economic project, without a political dimension (Eurocorps, 2022). It would seem that view or presentation of the project was flawed. Without sufficient fossil energy resources withing Europe, member States were obliged to accept dependence on Russian gas, of which 41% comes from (Șpaiuc, 2021). The war in Ukraine has put the spotlight on this weakness of the EU and accelerated the need to transition to the green energy sources sooner than envisioned (Simon, 2021). An unintended positive side-effect to an otherwise tragic period. Still, the fact remains that until new energy sources are built, the EU will have to diversify as well as continue to buy gas from the Russians. To this effect, on the 31ˢᵗ of March, Russia had a botched attempt to blackmail the EU into accepting payments for gas in rubbles, or otherwise see the pipelines close (Meredith, 2022). The bluff was initially called by the Europeans, showing that dependency on gas runs two ways (Corbeau, 2022). But dissent lingers within the EU, as the push to ban the import of Russian oil has been met with resistance, especially from Hungary, as well as Slovakia and Czechia, all of whom have managed to obtain an exemption to the ban, until 2024 (Emmott, Guarascio, Strupczewski, 2022).

3. Aims of the Research

The present research aims to analyse the state of the European Union's development of a hard power approach in international relations after decades of soft power doctrine. By analyzing Member States, as well as rival and partner countries interests, the paper aims to gage the geopolitical spectrum in Europe to assess whether the EU is working towards a new approach. The article aims to contribute to the perspective of the European Union as a developing hard power player at European level, while studying the interests of the main actors, in a manner which allows one to understand their objectives.

4. Research Methods

Political sciences express a tendency to utilise qualitative methods (Naji, Jawan, Redzuan, 2011). Under this line of thinking, the research methods utilised in this paper are of a qualitative nature, due to the nature of the subject, which relies on the analysis of agreements, strategies, policies, and actions of the European Union, its partners, and rivals. The literature has been reviewed from the perspective of qualitative research methods, with policies, statements, official documents, books on this topic as well as scientific articles having been reviewed.

The research approach utilized in the articles, combines various fields, such as economics, politics, European Union policies and laws, Member States policies, in order to accentuate the wide range of factors having an effect on the soft and hard power dimension of the EU. The cross-disciplinary view, while seemingly chaotic, ensures that several perspectives are taken into account, assuring an in-depth analysis of the topic as well as bringing valuable contributions to the research.

5. Findings

5.1 The Heart of the European Union Sets the Tone

The results of the literature review brought to light that political will is never guaranteed, due to ever shifting interests of Member States, and for the European Union's there are always efforts to be made to sustain political will at European level. The positions of France and Germany are considered the core of the European Union. The literature review has shed light on the dual approach these two countries have had with relation to Russia, while often criticising it for not respecting human rights, annexing Crimea in 2014 and the use of resources as a blackmail tool, they have also benefitted greatly by developing a partnership that assured cheap natural resources and markets for their products (Dodman, 2022). With the new conflict, the two countries have drawn many criticisms from the public, but also other European countries, for their incoherent approach regarding Russia. As a reaction to the shifting stance within Europe, in a hard power approach, Paris has acted by enhancing consultations with Eastern European partners, and by offering military assistance (SHAPE Public Affairs Office, 2022). Berlin has also been forced to re-evaluate its military stance, which historically it has underfunded for decades. It

began by increasing the defence budget to 2%, from 1.1%, and investing an extra 100 billion euro, in a 4-year period (Sheahan, Marsh, 2022) on top of that, in an effort to boost Germany's role in defending Europe. While these moves from the two most important European capitals are promising for unity and the geopolitical dimension of the EU, divisions still exist. One such division regards the leadership question. Should the EU develop its own military command infrastructure or remain under the umbrella of NATO. France, while supporting NATO commitments in Europe, by deploying troops to Romania and Estonia, is still a supporter of pushing for more European sovereignty and strengthening capabilities (SHAPE Public Affairs Office, 2022). On the flip side, the Member States which have the most geographical exposure to Russia: Romania, Poland, Scandinavian, and Baltic states have been staunch supporters of the security provided by NATO and the United States. Whilst France and Germany signal the beginning of and increase in military capability for Europe, others have also begun to follow suit, Poland announced a military modernisation plan, with the acquisition of 350 American made tanks, 450 south Korean tanks, as well as 35 F-35 fighter jets, and others; whilst Romania increased its military budget from 2% to 2.5% of GDP.

5.2 Russia, the Great Unifier

We observed that the immediate threat of Russian escalation put old debates on hold. Member States seem to be aware that the coordination of efforts is crucial at this time, and even countries that are usually weary in this aspect are shifting their stance. For example, Denmark announced a referendum in which it will be decided if they are to join the EU's Common Security and Defence Policy (The Guardian, 2022), from which it has currently opted-out. In the conferences on the position of Member States within from this summer, it has been declared that increased coordination efforts will be done while guaranteeing continued compatibility with NATO. And these capabilities are not limited to EU Member States, as the US, Norway, and Canada were invited to adhere to the EU PESCO project (European Defence Agency, 2022), aimed at increasing military mobility. Synergies are being built, a fact demonstrated by the joining of NATO Secretary General Jens Stoltenberg and foreign ministers from the UK, the US, and Canada, at the European Council meeting in Brussels (European Council, 2022). As well as the joining of the US President Joe Biden in the NATO meeting in Brussels, a first time for an US President (Klein, Liptak, Collins, Sullivan, 2022). The invasion of Ukraine has brought to light the preference of the US to empower European partners and share in the burden of defending security by deploying not only US force, but also more European ones.

5.3 Old Allies Remain Essential

The analysis has also observed that European countries remain committed to their existing alliances, and even seek to further develop them. The United States is a key element in the European Union's capability of becoming a real geopolitical actor,

as it has been pushing the EU to become a geo-economic arm of the NATO. The EU's geopolitical position, for the moment, seems to be dependent on the US and their approval in certain aspects. Germany and Eastern Europe are in this aspect, the most likely to wait for Washington's approval when making decisions, as they are more dependent on the US than most of the Member States. The planned shift in focus of the US toward the Pacific, due to the rise of China, has resulted in the creation of AUKUS, a NATO equivalent, meaning that the EU is likely to increase its role as an independent geopolitical actor not only due to the conflict in the region but as a necessity to supplement the US.

The United Kingdom remains a steadfast partner for the EU, in terms of defence (UK Ministry of Defence, 2022), even if post-Brexit animosities are still present. Since the beginning of the war, the UK has maintained itself as a reliable ally, through the deployment of troops in EU member states, assisting in air policing and the presence of UK ships in key areas of defence. While a formal security cooperation agreement between the EU and the UK is not to be expected or needed, cooperation will be developed via NATO. The UK remains present in other defence formats at European level, such as the Northern Defence Cooperation (Nordefco) and the European Intervention Initiative (Mills, 2019).

5.4 Who Shall Lead?

The key observation from the research is that the European Union has all the prerequisites for becoming a geopolitical actor, as well as the network of alliances to support its blooming position in the world, but continues to lack one important element, leadership.

An increase in defence spending is not enough to become a geopolitical, hard power actor, but it is a step in the right direction. The European Union has a long history in the defence industry and a well-developed infrastructure of collaboration between Member States (as the case of the Eurofighter Typhoon has shown). By factoring in the Strategic Compass, coupled with the infrastructural capabilities of the EU, there already exists an almost complete security framework for the EU, but no transnational leadership system. In this aspect, NATO can fill in the gaps, as a cooperative transnational system already exists, in which the EU Battlegroups can play a role. Deciding on the leadership of EU forces has always been a point of contention, and without it, the EU cannot hope to request a place at the geopolitical table. Using the framework of NATO would be a stepping stone in that direction, if not the easiest.

6. Conclusions

In this article, we worked to determine the intricate system through which the EU is developing into a security actor, thus observing that it is not by premeditated design, but due to need. What has also resulted is that the advance towards a hard power dimension has been underway, through the military infrastructure which has been under development for quite some time. Recent increases in investments and

defence budgets as well as common defence projects will only strengthen the existing framework. Added to these factors is the closer cooperation between Member States and their membership within NATO, thus creating most of the prerequisites for the EU to become a contender on the geopolitical map. It is particularly ironic that the war begun by Russia, as a bet on the divisions in Europe, has brought about the awakening of the EU's hard power dimension and the beginning of the development of a geopolitical identity. Investing and developing the military systems of the EU is a step in the right direction, but not enough. What we have observed is that the EU is still lacking in terms of true cooperation and a clear leadership system for the implementation of hard power policies. An intergovernmental system is required to allow a European military system to become efficient. And that is where the main issue stands, the partial renunciation of military sovereignty, which is seen as a founding pillar of national sovereignty and unity. While the Member States agree that more is needed, the manner in which it is to be accomplished eludes them. There are many hurdles left to surpass, and the leadership mechanism seems the toughest one, as national sentiment and old rivalries still play a role in the relations of members. The easiest solution, due to the pre-existing framework, remains NATO. But Europeans will likely desire, as France has stated in the past, to develop a parallel system for the common military capabilities, which would work with NATO, and reduce the influence of their American and British partners. It remains to be seen if the EU will develop into a geopolitical actor within its own framework, or within NATO. Regardless of the road it chooses to take, the development of a geopolitical identity and of a hard power dimension for the EU, is not only a necessity for its survival and relevance in the world, but a certainty.

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COVID-19 Pandemic and the Fourth Industrial Revolution: Opportunities to Shape a New Labour Market?

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Abstract

Today, COVID-19 and the Fourth Industrial Revolution have caused a double disruption to global jobs. The global unemployment rate increased by 20.48% in 2020 compared to 2019. The World Bank draws the conclusion that the increase in unemployment was mainly due to the emergence of the health crisis that affected the economy of countries around the world. The paper provides an overview of the most relevant changes in the actual labour market in the framework of COVID-19 and the Fourth Industrial Revolution challenges. According to the World Economic Forum, 50% of currently employed workers will need reskilling by 2025 to adapt to changes in the labour market. Furthermore, by 2025, 85 million jobs will disappear from the labour market because of the confrontation between human capital and machines, while 97 million new jobs will emerge. These jobs will emerge through a hybrid between human capital, machines, and algorithms. Examples of such jobs are DevOps engineers, Artificial Intelligence Specialist, and Digital Marketing Managers. The COVID-19 restrictions have led to numerous changes in the labour market, since a large part of the employed workforce had to work from home and learn to use digitalization. The global labour market has not recovered from this health crisis. A challenge for governments is to find solutions that can help economies anticipate skills gaps, manage pressures on workers, and map a path for a more innovative and resilient economy in the future. Governments, companies, and societies should cooperate in reskilling and upskilling the employed workers to provide modern education skills and proper jobs.

Keywords: COVID-19 pandemic, the fourth industrial revolution, new labour market.

JEL Classification: I15, I18, O14, O15, O33.

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1. Introduction

It is generally accepted that the flexibility of the labour market can be greatly influenced by many rigidities. Consequently, the future of the labour market is attracting considerable interest due to the current implications of the COVID-19 pandemic and the Fourth Industrial Revolution.

Moreover, it is widely considered today that the Coronavirus pandemic and the Fourth Industrial Revolution will cause multiple key changes to the labour market. The health crisis caused an increase in the unemployment rate, high disparities between people who worked from home and people whose jobs did not permit that, and income losses to companies and workers. In addition, companies have started to redesign their infrastructure and introduce a hybrid system at work.

When it comes to the Fourth Industrial Revolution or Industry 4.0, as it is otherwise called, the labour market is continuously adopting new innovative technologies. The Coronavirus pandemic accentuated the process of digitalization and automation due to the need to work from home during lockdowns. However, disruptions caused by both the health crisis and Industry 4.0 may cause in the future the disappearance of a large number of jobs. For this reason, the State's involvement is essential in reskilling and upskilling the existing workforce. A new perspective for a balanced future of work would be cooperation between policymakers, companies, and people.

This paper examines the impact of COVID-19 and the Fourth Industrial Revolution on the future of the labour market. Actual challenges could develop and redesign the world of work and shape a more competitive global labour market. Given these points, this study is expected to highlight the major implications of the current health crisis and Industry 4.0 on the field of work.

2. Problem Statement

The global labour market was severely affected by the outbreak of the COVID-19 pandemic that resulted in a global health crisis. The health crisis affected both the lives of people and the global economy. For this reason, more and more researchers began to investigate the future of the labour market, considering that COVID-19 and the Fourth Industrial Revolution could create new opportunities for the world of work.

The global unemployment rate increased by 20.48% in 2020 compared to the previous year (The World Bank, 2021). Furthermore, the highest global unemployment rate from 1991 to 2020 was recorded in 2020. Evidence shows that decreasing unemployment rates were caused by lockdowns and restrictions imposed in every country in the world during the health crisis (The World Bank, 2021). Moreover, a large number of workers have become unemployed or have temporarily entered into a non-paid period of inactivity. As a consequence, governments around the world attempted to overcome the socioeconomic impact of the Coronavirus pandemic and supported both businesses and employees through stimulus packages and policy measures (Ilsoe, Larsen, 2020; OECD, 2022).

The evolution of unemployment in the European Union between 1991 and 2020 highlights low unemployment rates during the periods 1993-1997 and 2009-2015. Following the course of economic history, the European labour market was heavily hit at the beginning of the 1990s by the industrial restructuring caused by the collapse of the Soviet Union, generating an increase in unemployment. In response to these challenges, employment became the first priority of the European Union, as mentioned in the Commission's white paper on 'Growth, competitiveness, and employment' (European Parliament, 2020). Unemployment also increased when the EU's economy was hardly hit by the global financial crisis of 2008. European statistics show that the outbreak of COVID-19 caused a reduction in overall employment (The World Bank, 2021). The highest unemployment rate from 1991 to 2020 was recorded in 2020. In September 2020, Spain, France, and Italy recorded the highest number of unemployed, compared to other EU countries. Spain is a European country that experiences long-term structural unemployment caused by a low share of industry in the national economy. The Spanish economy is mainly based on tourism and construction. In the case of France, the high number of unemployed persons is explained by an increased number of low-skilled persons and high unemployment among young and elderly people. Similarly, the large number of unemployed persons in Italy was primarily caused by high unemployment rates amongst young people and women.

Initially, the recovery of the labour market depended on vaccination coverage. Furthermore, the International Labour Organization (2021) pointed out in a recent report on COVID-19 and the world of work that fourteen vaccinated people were the equivalent of a newly created job. The alarming situation regarding the spread of COVID-19 is stable now since the countries increased the vaccination rate. However, many people consider the vaccination rate as a passport to freely circulate and travel throughout the world in the current period, since the situation caused by the Coronavirus pandemic has become more and more established.

The COVID-19 restrictions imposed by governments have transformed the labour market: work from home has become a better opportunity for people from different industries, traditional jobs were replaced with technology and artificial intelligence, and remote work paved the way for new job opportunities. Therefore, the COVID-19 pandemic and technological advancements can lead in the near future to the so-called 'jobs of tomorrow'. The World Economic Forum (2020) describes "jobs of tomorrow" as jobs created in new fields, with new occupations, or just the revolution of the existing occupations.

The flexibility of the labour market is particularly significant during global crises. If the labour market is flexible and not rigid, it increases the capacity of the country's economy to absorb shocks triggered by an economic or social crisis (Șerban, 2015). The rigidity of the labour market was a threat to most countries during the COVID-19 pandemic. Trends in the labour market during the health crisis highlight that worldwide companies and workforces experienced major challenges, such as digitalization or the transition process from classical work to a new type of work, work from home (Piroșcă et al., 2021; Scutariu et al., 2021; Zamfir, Aldea, 2020).

In the opinion of Vyas (2022), the COVID-19 pandemic accelerated significant changes in the labour market, such as increasing trends in digital transformation, diversification of hybrid work, return to office work, business changes related to infrastructure and labour mobility, the disappearance of traditional jobs with a low-skilled workforce and the rise of 'jobs of tomorrow', and the reinterpretation of work-life balance. However, a part of these variables existed before the outbreak of the Coronavirus pandemic. For example, the era of digital transformation has already been present in global markets. Countries that experienced high levels of digital skills attracted more companies interested in investing in the national business environment (Piroșcă et al., 2021).

Sanitary, economic, and technological disturbances shape the current labour market. According to Harari (2018), the current technological revolution will create new jobs in the future, based on artificial intelligence, machine learning, and big data. The situation is similar to the first industrial revolution, when the emergence of machine tools left many workers without a job and created new ones. The Israeli author also states that in more than twenty years the labour market could be characterised by the cooperation between artificial intelligence and the human brain.

The future labour market will inevitably include new models of businesses and new types of jobs. In the opinion of Briciu & Briciu (2020), in addition to new jobs, specialists should also focus their studies on the skills necessary for the new jobs. New skills are correlated with emotional, computational, and social intelligence, virtual working, design mentality, and media education. Consequently, existing skills will not be sufficient in the future, and people will have to have modern skills. This case will be difficult for the elderly since many of them do not have digital skills and do not understand the meaning of the Internet of Things.

The Coronavirus pandemic developed the e-commerce and automation sectors and accelerated the decisions of entrepreneurs to upgrade their businesses over the Internet. Additionally, remote work has become an opportunity for many workers to work from home and for companies to reshape their organizational management.

People and companies around the world will suffer or benefit from the transformation of the labour market due to changes caused by the COVID-19 pandemic and the Fourth Industrial Revolution. In this perspective, policymakers must support the transition process to a new labour market. People should accumulate new skills and prepare for new occupations, and companies should protect their current workforce.

3. Research Questions

The purpose of this work is to investigate the impact of the COVID-19 pandemic and the Fourth Industrial Revolution on the future labour market in order to have an overview of the current challenges occurring in the international markets. The research questions underline the changes that occur in the current labour market:
Q1. Will the COVID-19 pandemic create new jobs in the global labour market?
Q2. Has the COVID-19 pandemic accelerated the expansion of digital skills?
Q3. Has the Coronavirus pandemic reshaped remote work (RW)?
Q4. Will the Industry 4.0 will change future jobs?

4. Research Methods

This paper aims to examine the relevant theoretical background related to current challenges in the labour market and to perform an analysis of developments occurring in the labour market in the framework of COVID-19 and the challenges of the Fourth Industrial Revolution. In the second part of the work, future jobs, digitalization, and remote work were included in the analysis of the current labour market. For this purpose, the study used official statistics and databases from several institutions specialized in issues related to the labour market and Industry 4.0, such as the International Labour Organization, World Economic Forum, McKinsey Global Institute, European Commission, OECD, UNCTAD, and Statista.

5. Findings

Q1. Will the COVID-19 pandemic create new jobs in the global labour market?

The future of work after COVID-19 has started to be an exploration topic for recent conferences. Many researchers attempt to identify what the future labour market looks like and what types of jobs should people prepare for now.

Today, the global labour market is affected by the challenges created during the Coronavirus pandemic. The increasing use of digital technologies and digital learning may generate in the future the reskilling of the current workforce. According to McKinsey Global Institute (2021), people should now focus their skills on developing industries that will ensure them secure jobs in the future.

Figure 1. Developing industries in the post-Coronavirus pandemic scenario
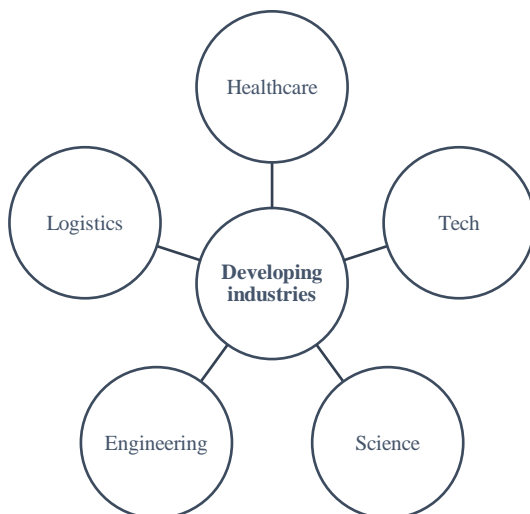
Source: Author projection based on McKinsey Global Institute, 2021.

OECD (2022) outlined that the health crisis will transform the labour market into a social crisis, as many inequalities between workers were created. Low-wage

workers were the most affected by the health crisis compared to high-wage workers that have had the opportunity to work from home. Policymakers and companies are the main actors that can support workers to reskill and adapt to a new labour market.

According to the Global Entrepreneurship Monitor (2022), the COVID-19 pandemic created both challenges and opportunities for entrepreneurs and employees. Entrepreneurs create employment, and changes in entrepreneurial activity will also create changes in employment. During the COVID-19 pandemic, many of the employees have identified new business opportunities that have transformed them into current entrepreneurs. On the other hand, an increased number of jobs started to be threatened by the innovative technologies that companies have implemented as a result of the measures and restrictions imposed in every state in the world. Moreover, companies started to change their organizational infrastructure, since remote work opened new work opportunities.

Q2. Has the COVID-19 pandemic accelerated the expansion of digital skills?

The digital economy is of particular interest to the European Union, since digital technologies open in the current period numerous opportunities for people and companies. The COVID-19 crisis has considerably increased the use of digital technologies because during the health crisis, worldwide workers had to work from home and young people attended online courses. Similarly, global Internet traffic exceeded Internet traffic in recent years (UNCTAD, 2021).

In terms of the worldwide digital population, approximately 65% of the global population are Internet users, according to Statista (2022b). In the post-Coronavirus scenario, the internet has become a key pillar in the transition process toward a digitalized economy. The highest number of internet users was recorded in China, India, and the USA.

In the United States, the digital economy recorded an increase in the last years, mainly during the Coronavirus pandemic (Bureau of Economic Analysis, 2022). Infrastructure, e-Commerce, and priced digital services are the main components included in the digital economy within the United States. Among these components, priced digital services register the highest gross output, and are followed by infrastructure and e-Commerce.

The digital economy in China has a long history, with the actual percentage of retail e-Commerce being more than 50% of total retail transactions (Wong, Wihardja, 2022). Moreover, China is the global leader in the Digital economy, particularly in the e-commerce field (McKinsey & Company, 2017). The COVID-19 pandemic increased digitalization in China and the level of economic growth (Frontiers in Public Health, 2022).

In the transition process toward a digital economy and society, the European Union integrated four variables to be fully fulfilled: (I) Digital skills (2) Digitalization of companies, (3) Sustainable digital infrastructure, and (4) Digitalization of public services (European Commission, 2021). According to the Digital Economy and Society Index of the European Commission (2021), the most digital four economies in the European Union are Denmark, Finland, Sweden,

and the Netherlands. The index included four dimensions related to human capital, connectivity, integration of digital technologies, and digital public services.

On the opposite side of the ranking were Romania, Bulgaria, Greece, and Poland. Statistics indicate significant discrepancies between European countries in terms of digital technologies and digital skills. Consequently, governments should make further investments in digitalization. Zamfir and Aldea (2020) pointed out in their study that a high level of digitalization depends on the educational level of individuals, and the more educated people are, the higher the level of the digital economy.

E-commerce has risen steeply during the health crisis due to distance restrictions and lockdowns all over the world. According to Statista (2022b), retail e-commerce increased by 47.35% in 2021 compared to 2019. Additionally, Statista's predictions reveal that retail e-Commerce will increase considerably by 2025.

Q3. Has the Coronavirus pandemic reshaped remote work (RW)?

The use of the Internet in the world allowed workers to carry out their jobs from home during the COVID-19 pandemic. In a post-COVID-19 pandemic scenario, will increase Internet usage significantly. The Internet transformed the labour market into a modern labour market and the situation was fostered by the health crisis. According to the Statista (2022) database, the highest number of Internet users is recorded in China, India, and the United States.

A large number of workers ended up working from home due to the social distancing measures introduced in all countries of the world (Eurostat, 2021). Moreover, the end of the health crisis raises questions concerning the number of jobs that can be performed from home. Dingel and Neiman (2020) stated that in the United States of America, approximately 37% of the jobs could be performed from home in 2020. In a post-COVID-19 pandemic scenario, Holgersen et al. (2021) highlight that 38% of the current jobs can be performed from home in Norway.

According to recent data concerning the US remote work trends (Statista, 2022a), before the COVID-19 pandemic, 17% of the workforce worked 5 days per week from home and 47% never worked from home. After the Coronavirus pandemic, 44% of the workforce started to work from home. In the European Union, 5.4% of workers used to work from home before the COVID-19 pandemic (European Commission, 2020). The most common industries where people worked from home were IT and communication services, business services, education, creative activities, and real estate.

The impact of the Coronavirus pandemic on the normal work-life balance of people can be noticed. Today, researchers attempt to design new models of hybrid work or remote work that will not decrease the productivity of the workers. However, governments and companies should implement measures that will optimize the transition process to productive work models.

Q4. Will the Industry 4.0 will change future jobs?

According to the World Economic Forum (2020), by 2025, 85 million jobs will disappear from the global labour market due to the conflict between human capital and machines, while 97 million new jobs will emerge. These jobs stand out through a hybrid between human capital, machines, and algorithms. For example, DevOps engineers, Artificial Intelligence specialists, and Digital Marketing managers are future jobs that people should prepare for. Engineering, cloud computing, data and artificial intelligence, and product development are innovative technologies that will be included in the future labour market.

Figure 2. Innovative technologies that companies will adopt by 2025
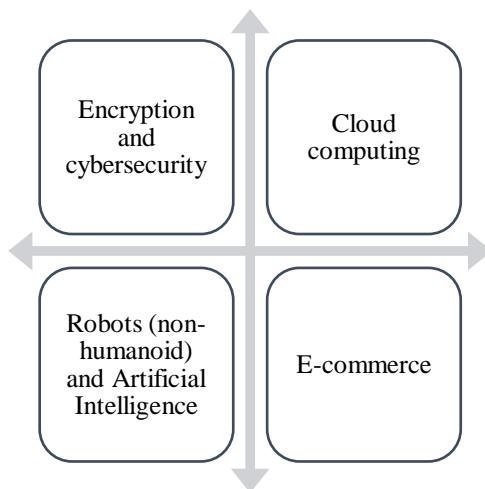
Source: Author projection based on the World Economic Forum, 2020.

During the COVID-19 crisis, e-Commerce began to be a major alternative that ensured the continuation of business activities in the online environment. Likewise, e-commerce created multiple opportunities for people to increase their online shopping activities. It follows from these circumstances the significance of the digital economy and digital skills. However, the evolution of e-Commerce is dependent on e-commerce policies (OECD, 2020).

McKinsey Global Institute (2021) noted that the COVID-19 pandemic accelerated the introduction of Artificial Intelligence and automation in worldwide companies as a result of COVID-19 restrictions related to workplace density. Companies will benefit from automated industrial processes, while workers will experience job losses caused by the fourth industrial revolution. The research also includes issues concerning future occupations in a post-Coronavirus scenario. According to their outcomes, occupations in the field of Internet, Artificial Intelligence, and health care will increase over the next ten years. Middle-wage occupations may slowly disappear in the future and be replaced by robots and revolutionary machines.

6. Conclusions

Overall, the results indicate that COVID-19 will create new jobs in the global labour market. Furthermore, the world's population will experience new jobs in innovative industries. Current employees could encounter the necessity of reskilling to survive in the future labour market. The COVID-19 pandemic accelerated the expansion of the digital economy within all countries of the world. Similarly, digital skills have become of great importance in the current period. The coronavirus pandemic increased the use of remote work in companies all over the world and could transform the future organization of businesses. Moreover, a large number of workers chose to work in the future from home or in a hybrid organization. The Fourth Industrial Revolution will change future jobs through new innovative industries that have increased in the last few years and during the COVID-19 pandemic. In conclusion, political players, international companies, and employees should cooperate to support the transition from traditional work to a new labour market.

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The Impact of a Liquidity Shock on the Economy and the Banking Sector through a Fire-Sale Mechanism[1]

Irina MIHAI[2]

Abstract

The paper analyses the impact of a systemic liquidity shock on the banking sector and the economy using a New Keynesian model with banks. The literature on dynamic stochastic general equilibrium models with the explicit banking sector is still in an early stage. The paper contributes to this literature by studying the liquidity shock transmission through a fire-sale mechanism that lowers banks' assets and triggers deposit withdrawals. The shock is transmitted to the economy as banks contract their lending supply, significantly reducing investment. The model includes financial frictions on how banks allocate financial resources to the economy (principal-agent frictions). The results show that the fire-sale mechanism is one of the most significant channels for shock transmission and amplification for the banking sector. The implications of the fire-sale shock are more severe for the banking sector than a negative shock on capital quality or productivity.

Keywords: fire-sale mechanism, banks' liquidity, DSGE.

JEL Classification: E51, F34, G21.

1. Introduction

Fire-sale is an important amplification mechanism for a systemic liquidity shock that could make a crisis worse (Diamond, Rajan, 2011). During a financial crisis, financial institutions might be unable to rollover their liabilities (mainly deposits in the case of commercial banks). Banks might be forced to sell part of their portfolios due to lack of liquidity, but at a substantial discount (fire-sale price). Due to the specific conditions during a liquidity crisis, the assets sold at the fire-sale price are usually of good quality. The Global Financial Crisis (GFC) provides a good example of such a crisis (Bernanke, 2010; Shleifer, Vishny, 2011).

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This paper studies the liquidity shock transmission through a fire-sale mechanism that lowers banks' assets and triggers deposit withdrawals in a DSGE framework. The shock impacts the economy as banks contract their lending supply, significantly reducing investments. This paper uses a New Keynesian DSGE model with the banking sector based on Gertler et al. (2020). The model includes financial friction in how banks allocate resources to the economy (principal-agent frictions). The literature on DSGE models on financial crises is still being developed, with significant improvements seen after the GFC (Christiano et al., 2018). The DSGE models provide a good framework for policy analysis despite its limitations.

This paper contributes to the literature on banks' liquidity risk and banking crises models (Gertler, Karadi, 2011; Gertler, Kiyotaki, 2015; Gertler et al., 2020) by disentangling the shock of banks' returns on loans into two distinct shocks: on capital quality and asset prices. The hypothesis that I test is that the main driver of banks' rapid deterioration of the financial stance following a shock is the fire-sale mechanism. In this paper, the capital quality shock is applied directly to the return on capital, while a different shock (named fire-sale shock) on asset prices, as opposed to Gertler et al. (2020), where the capital quality shock is on the banks' loan return. I calibrate the parameters using the data for the Romanian economy for the period 2006-2020 and the existing literature. The simulations show that the main transmission channel of a shock on banks' earnings from loans is through the fire-sale mechanism. This shock is more severe for the banking sector than a negative shock on capital quality or productivity. The impact is even higher if we include another financial friction on the inefficiency of direct household lending. In this model, when banks exit the credit market, the households step in to finance the economy but at a higher cost for selecting and monitoring projects funded. The results of this model extension are not presented in the paper due to lack of space.

The paper is organized as follows. Section 2 describes the DSGE model emphasizing the banking sector and the fire-sale mechanism. Section 3 presents the calibration of the model. Section 4 discusses the results of the simulations based on the baseline model. Section 5 concludes.

2. Model Main Features

The model is based on a New Keynesian DSGE model for a closed economy with price stickiness and a banking sector developed by Gertler et al. (2020). The model includes a self-fulfilling run framework similar to Cole and Kehoe (2000) and principal-agent friction similar to Gertler and Karadi (2011) and Gertler and Kiyotaki (2015). I study the impact of a fire sale mechanism after a liquidity shock on the banking sector and the economy.

The economy is financed mainly by the banking sector ($S_{B,t}$) and partially by households' through direct lending ($S_{H,t}$):

$$S_t = S_{B,t} + S_{H,t} \tag{1}$$

Similar to Gertler et al. (2020), a shock can occur on the quality of capital between the beginning and the end of a period:

$$K_{t+1} = \xi_{KQ,t+1} S_t \tag{2}$$

where K_{t+1} is the capital stock in the economy at the end of period t + 1 and S_t is the capital stock at the beginning of period t + 1 and $\xi_{KQ,t+1}$ is the capital quality shock.

2.1 Banking Sector Features

In the model, banks raise deposits from households at interest rate R_t and grant credit to companies at interest rate $R_{B,t}$. The assets against which banks lend to companies are $S_{B,t}$ at price Q_t. The bank's balance sheet constraint is:

$$Q_t S_{B,t} = D_t + N_t \tag{3}$$

Under normal conditions, a bank can survive each period with a probability (σ_B), while $(1 - \sigma_B)f$ new bankers enter the market with an initial net worth of e. Banks accumulate net worth after the initial endowment, $(1 - \sigma_B)fe$, by earning profit through lending at a higher interest rate than the interest rate paid on deposits. The net worth of the banking sector is described by:

$$N_t = \sigma_B[R_{B,t}Q_{t-1}S_{B,t-1} - R_t D_{t-1}] + (1 - \sigma_B)fe \tag{4}$$

The bankers maximize the expected value of banks' net worth until the bank exit the market. The bankers choose the projects the bank will finance. Still, they can also decide to redirect a part of their assets (θ) to other purposes (like risky investments that turn into nonperforming assets or paying extra bonuses or dividends to the bankers) - principal-agent financial friction, similar to Gertler et al. (2020).

2.2 Fire-Sale Mechanism

A bank commits to pay depositors the return R_t^* . Under specific conditions (for example, after a liquidity shock), a bank might not have enough funds to pay the deposits. Therefore, the return on deposits can be described as:

$$R_{t+1} = \begin{cases} R_{t+1}^* & \text{with probability } 1 - p_t \\ x_{t+1}R_{t+1}^* & \text{with probability } p_t \end{cases} \tag{5}$$

where x_{t+1} is the recovery rate of deposits at market prices:

$$x_{t+1} = \frac{[\xi_{KQ,t+1}Z_{t+1} + (1 - \delta)\xi_{FS,t+1}Q_{t+1}]S_{B,t}}{R_t^* D_t} < 1 \tag{6}$$

and $\xi_{KQ,t+1}$ is the capital quality shock that affects the real return on capital and $\xi_{FS,t+1}$ is the fire-sale shock. After a fire-sale event, the asset prices drop quickly and reduce the return on loans. A solvent bank that suffers such a shock might become

insolvent if the drop in the bank's profit is severe enough. Gertler et al. (2020) tests the fire sale mechanism by applying a single shock on the banks' return from lending.

The banks' franchise value also drops; the impact is amplified by the banks' leverage (Φ_t). Written as the Tobin rate (Ψ_t), the banks' franchise value is (see the Appendix for more details):

$$\Psi_t = E_t\left\{\Omega_{t+1}\left(\frac{[\xi_{KQ,t+1}Z_{t+1} + (1-\delta)\xi_{FS,t+1}Q_{t+1}]}{Q_t} - R_{t+1}\right)\right\}\Phi_t$$
$$+ E_t\{\Omega_{t+1}R_{t+1}\} \tag{7}$$

Under normal circumstances, the banks with higher leverage will earn more profit and have higher franchise value. However, the impact will be higher for levered banks when a shock occurs.

3. Model Parameters

I calibrate the parameters according to the existing literature and the Romanian economy for 2006-2020. The data sources are the National Bank of Romania and the National Institute of Statistics. The values used are presented in Table 1.

Table 1. Parameters of the baseline model

Parameter	Value	Description
Macroeconomic model		
β	0.987	Discount factor
ς_c	2.000	Risk aversion
ς_h	7.500	Inverse Frisch elasticity
α	0.550	Capital share
δ	0.049	Capital depreciation rate
ε	11	Elasticity of substitution
κ	4	Investment adjustment cost
ϱ	1000	Rotemberg (1982) price adjustment cost
ρ_π	1.500	Monetary policy response to inflation
ρ_y	0.125	Monetary policy response to output
G	0.466	Government expenditure
Banking sector		
θ	0.220	Share assets allocated to other purposes
σ_B	0.847	Probability of survival for a bank
Φ_{SS}	8	Banks' leverage in steady state
$spread_{SS}$	0.005	Banks' spread in steady state
e	0.011	Net worth of new banker
Shocks		
ρ_A	0.750	Persistence of technology shock
ρ_G	0.750	Persistence of government expenditure shock
ρ_{RP}	0.750	Persistence of risk premium shock
ρ_{KQ}	0.750	Persistence of capital quality shock
ρ_{FS}	0.750	Persistence of fire sale shock
σ_{shock}	0.050	Standard deviation of shocks

Source: Christiano et al. (2011), Copaciu et al. (2016), Gertler et al. (2020).

The households' discount factor (β) is set to 0.9866798 which corresponds to the average annual interest rate of 5.4% during the period analysed (or 1.35% quarterly). The capital share (α), the depreciation (δ) and the investment adjustment cost (κ) are set to 55%, 4.9% and 4 based on Copaciu et al. (2016). Inverse Frisch elasticity (ς_h) is set to 7.5 similar to Christiano et al. (2011) and Copaciu et al. (2016). For risk aversion (ς_c), Taylor rule parameters (ρ_π and ρ_y), elasticity of substitution across different input factors (ε), the Rotemberg (1982) price adjustment cost (ϱ) and Government expenditure (G), I follow Gertler et al. (2020). I also follow Gertler et al. (2020) for the banking sector parameters.

I simulate the model using the first-order perturbation method from Dynare v5.0 software. The model was initially based on the codes provided by Gertler et al. (2020). All the figures are created in Matlab using the policy functions estimated by Dynare.

4. Fire-Sale Shock Impact on the Banking Sector and the Economy

The fire-sale shock ($\xi_{FS,t+1}$) lowers the bank's inflows below the minimum level that would allow them to pay their depositors the promised returns. Therefore, the deposits recovery rate (x_{t+1}) drops quickly below 1, and depositors, aware of the bank's financial situation, withdraw their deposits even more. The bank is forced to sell part of its loan portfolio at a discounted price (fire-sale price), thus enforcing the downward spiral of asset prices. The results are presented in Figure 1.

Figure 1. The responses on different fire-sale shocks

(a) Deposits recovery rate

(b) Loan/Deposits adjusted for θ
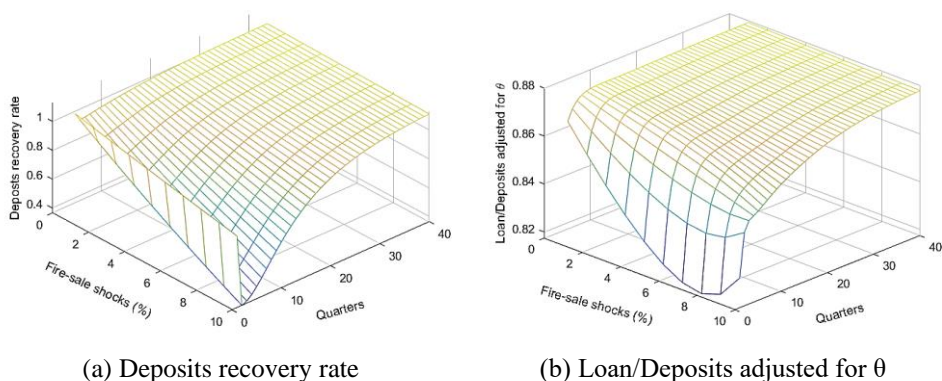
Source: Author's calculations.

I compare the impact on the fire-sale shock with the results on two other negative shocks calibrated with the same magnitude and persistence: capital quality and productivity. I consider a 5 percent decrease within a quarter with a relatively high persistence (the autoregressive coefficient is set to 0.75) for all the shocks analysed. Given that the model is solved using first-order approximation, the magnitude of the shocks does not affect the results (certainty equivalence). The impulse responses are presented in Figure 2.

The fire sale shock generates a more severe deterioration of banks' financial stance and triggers a deposit run than the other shocks studied, confirming the research hypothesis. The fire-sale shock also determines the most significant decline in investment compared to other shocks, while the impact on output, even if it is less severe, and is corrected more slowly. The impact of the fire-sale shock is larger for the banking sector, as it triggers important balance sheet adjustments as opposed to the capital quality shock that impacts only the return generated by the lending activity.

Figure 2. Banking sector and economy response to a fire-sale shock
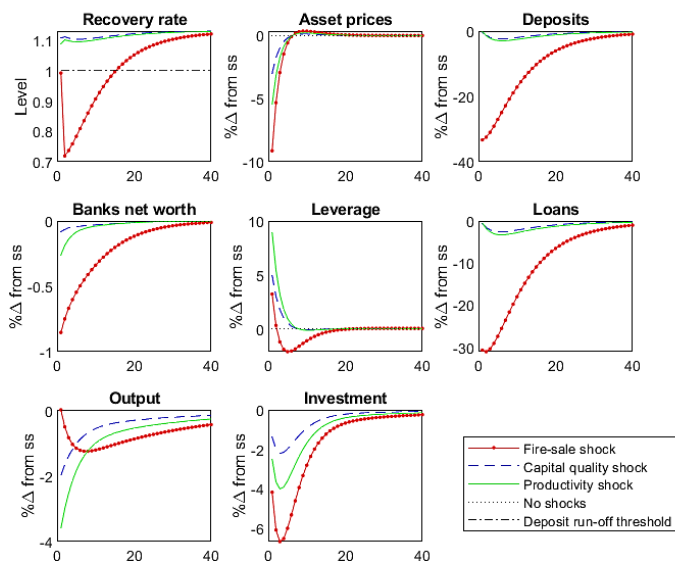
Source: Author's calculations.

The other two negative shocks (the capital quality and productivity shocks), although they generate a reduction in asset prices (but of a smaller magnitude), do not trigger significant changes in the banking sector. The only notable impact is on the leverage ratio due to asset price and banks' net worth declines.

Lastly, I combine the fire-sale shock ($\xi_{FS,t+1}$) with the capital quality shock ($\xi_{KQ,t+1}$). This loan return shock ($\xi_{LR,t+1}$) is similar to the capital quality shock used by Gertler and Kiyotaki (2015) and Gertler et al. (2020).

The response of the banking sector to the loan return shock is very similar to the one on asset prices (fire-sale shock), while the investment and economic growth impact are higher. This result shows that the fire-sale mechanism is an important shock transmission and amplification mechanism for the banking sector. The results are presented in Figure 3.

Figure 3. Banking sector and economy response to a loan return shock
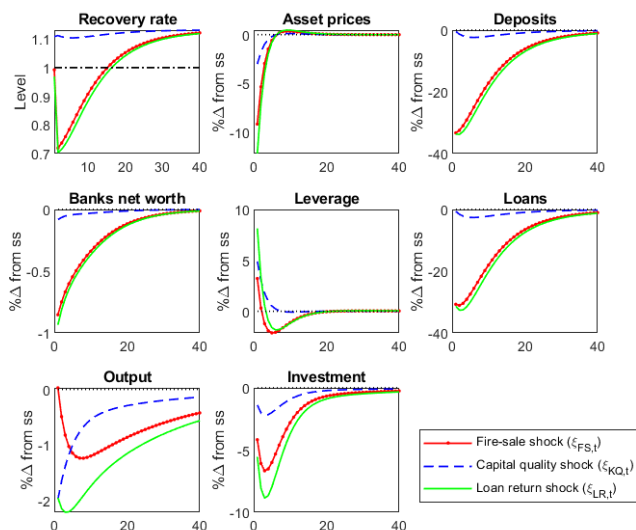
Source: Author's calculations.

These results are robust to changes in the calibrated parameters or to changes in the model features such as household consumption behaviour (for example, adding external habit formation) or investment dynamics. However, the model has some important limitations, the most important one being the uniform treatment of agents (homogenous agents).

5. Conclusions and Further Research

In this paper, I analyse the impact of a systemic liquidity shock on the banking sector and on the economy through a fire-sale mechanism. I use a New Keynesian DSGE model with a banking sector based on Gertler et al. (2020). The liquidity shock triggers a drop in asset prices that significantly impair the banks' profit and lowers investment and economic growth. The results show that the fire-sale mechanism is one of the most important channels for shock transmission and amplification in the banking sector.

Similar to Gertler et al. (2020), the model includes principal-agent financial friction, as bankers can divert a part of their banks' assets to other purposes (such as risky investments that turn into nonperforming assets or paying extra bonuses or dividends to the bankers). As opposed to Gertler et al. (2020), I look at the fire-sale shock directly applied to asset prices. I compare this shock to a macroeconomic one (productivity shock) and to a capital quality shock. The fire-sale shock generates a stronger reduction in banks' profit compared to negative shocks on capital quality and productivity. I also show that the banking sector's response to the loan return shock is mainly due to the fire-sale mechanism. This points to the importance of ex-ante prudential measures for banks' liquidity risk, as well as to the necessity

of developing instruments that would allow the central bank to intervene during liquidity crises to limit the occurrence of fire-sale events.

The model can be extended further by adding the macroprudential policy. For example, the model can be used to assess how banks respond to a fire-sale shock when under a macroprudential measure. Such a measure can, for example, require banks to hold a certain level of liquid assets, either by setting a simple limit or by using more complicated instruments like Liquidity Cover Ratio and Net Stable Funding Ratio.

In conclusion, studying the financial sector responding to shocks within a dynamic stochastic general equilibrium framework has its merits in helping policymakers have a better comprehension of the main shock transmission and amplification mechanisms, like fire-sale.

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Appendix – The baseline DSGE model

Households maximize their utility:

$$U_t = E_t \left\{ \sum_{\tau=t}^{\infty} \beta^{\tau-t} \left[\frac{C_\tau^{1-\varsigma_c}}{1-\varsigma_c} - \frac{H_\tau^{1+\varsigma_h}}{1+\varsigma_h} \right] \right\} \tag{8}$$

subject to the budgetary constraint:

$$
\begin{aligned}
C_t + D_t &+ Q_t S_{H,t} + B_t \\
&= w_t H_t - T_t + \Pi_t + R_t D_{t-1} + \frac{R_{t-1}^n}{\pi_t} B_{t-1} \\
&+ \left[\xi_{KQ,t} Z_t + (1-\delta)\xi_{FS,t} Q_t \right] S_{H,t-1}
\end{aligned}
\tag{9}
$$

There are three types of firms: companies that produce final goods, companies that produce intermediate goods, and companies that produce capital goods.

The firms producing intermediate goods operate in a monopolistic market. For this type of competitive market, the real wage is equal to the marginal increase in production given a unit increase of labour, and the real rent on capital is equal to the marginal increase in production given a unit increase of capital.

Each period, the firms adjust their prices according to Rotemberg (1982) with $\varrho > 0$ being the Rotemberg's parameter for cost adjusting prices ($\varrho = 0$ indicates fully flexible prices):

$$(\pi_t - 1)\pi_t = \frac{\varepsilon}{\varrho}\left(MC - \frac{\varepsilon-1}{\varepsilon} \right) + E_t \left[\Lambda_{t,t+1} \frac{Y_{t+1}}{Y_t} (\pi_{t+1} - 1)\pi_{t+1} \right] \tag{10}$$

The capital goods producers maximizing their profits similar to the ones described by Gerali et al. (2010) and Gambacorta and Signoretti (2014):

$$E_t \sum_{\tau=t}^{\infty} \Lambda_{t,\tau} \{ Q_\tau [S_\tau - (1-\delta)S_{\tau-1}] - I_\tau \} \tag{11}$$

where S_t is subject to the following dynamics with quadratic adjustment cost of investments:

$$S_t = (1-\delta)S_{t-1} + \left[1 - \frac{\kappa}{2}\left(\frac{I_t}{I_{t-1}} - 1 \right)^2 \right] I_t \tag{12}$$

where Q_t is the real price for capital goods, and κ is the parameter for the cost of adjusting investments.

I follow Gertler et al. (2020) and consider that the monetary policy sets the nominal interest rate $(R_{n,t})$ according to the Taylor rule:

$$R_{n,t} = \frac{1}{\beta} \pi_t{}^{\rho_\pi} \Theta_t{}^{\rho_y}, \quad \rho_\pi > 1 \tag{13}$$

where Θ_t is a measure of cyclical utilization of resources in the economy defined as the ratio between the steady-state markup and the current markup. In this model, the public sector is financing its consumption entirely through lump-sum taxes.

The model for the banking sector is similar to Gertler et al. (2020). Banks, as other types of agents in this model, are homogeneous. Each banker seeks to maximize the bank's value:

$$V_t = E_t\{\Lambda_{t,t+1}[(1-\sigma_B)N_{t+1} + \sigma_B V_{t+1}]\} \tag{14}$$

A bank can exit the market at time t with probability $1-\sigma_B$. In addition, bankers can decide to divert a part of the bank's assets (θ) to less profitable purposes. The necessary condition for a bank to continue to operate (considering that σ_B is high) is:

$$\theta Q_t S_{B,t} \le V_t \tag{15}$$

To simplify the optimization problem, I use two notations. One for the bank's Tobin rate $\left(\Psi_t = V_t/N_t\right)$ and another for the bank's leverage $\left(\Phi_t = Q_t S_{B,t}/N_t\right)$. The maximization problem for banks can be written as follows. The banker chooses the level of bank's leverage that maximizes the bank's value:

$$\Psi_t = \mu_{t+1}\Phi_t + \upsilon_{t+1} \tag{16}$$

where:

$$\mu_{t+1} = E_t\{\Omega_{t+1}(R_{B,t+1} - R_{t+1})\} \text{ and } \upsilon_{t+1} = E_t\{\Omega_{t+1}R_{t+1}\} \tag{17}$$

with:

$$\Omega_{t+1} = \Lambda_{t,t+1}[1 - \sigma_B + \sigma_B\Psi_{t+1}] \tag{18}$$

subject to:

$$\theta\Phi_t \le \mu_{t+1}\Phi_t + \upsilon_{t+1} \tag{19}$$

The model includes five exogenous shocks as follows: negative technology, capital quality, and asset prices (fire sale) shocks, and positive government expenditure and risk premium shocks.

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Globalization beyond the Pandemic:
Opportunities from a Great Reset

Mariia NEZHYVA[1*], Viktoriia MYSIUK[2], Olga ZAREMBA[3]

Abstract

The article discusses the state of global interconnectedness in trade and investment and to a lesser extent in information, travel, and migration. It provides insights on evolving trends that are shaping future globalization and how these shifts would impact global business and consumer markets. The article also highlights possible winners and losers from the current reset of globalization, as well as pinpoints arising opportunities, helping businesses build long-term strategies and win in the new global economic era. International trade and foreign direct investment growth have slowed down since the 2010s, on the back of shifting global demand, rising labor costs, technological advances, and other factors such as protectionism policy and changing consumer value. Global travel and migration have also been severely disrupted since the COVID-19 pandemic. Digital connectivity, meanwhile, becomes an important driver of global economic integration. The global economy is entering a new phase of globalization, as business efforts to reshuffle supply chains, digitalize, and enhance sustainability are reshaping the global manufacturing, trade, and investment landscape. The future globalization will become more people-centered and less geographically concentrated, as more countries would join the global value chains. Nevertheless, geopolitical risks and protectionism continue to pose a threat to global trade and investment. Economies with large internal markets, e-commerce, education services, high-tech companies, and local brands are likely the winners of the new globalization. Meanwhile, small and open economies may be under stress. Consumers may face higher product prices due to manufacturers' production relocation. The income gap between consumers in advanced and developing countries may also rise, creating a more fragmented global consumer market. In order to mitigate risks and better secure access to supplies and markets in the new global era, companies will need to accelerate digital transformation, focus on people and the planet, and diversify both their end-markets and the supply of raw materials, labor, and manufacturing across the value chains.

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JEL Classification: F15; M21.

1. Introduction

International trade and foreign direct investment growth have slowed down since the 2010s, on the back of shifting global demand, rising labour costs, technological advances and other factors such as protectionism policy and changing consumer value. Global travel and migration have also been severely disrupted since the COVID-19 pandemic. Digital connectivity, meanwhile, becomes an important driver of global economic integration.

The global economy is entering a new phase of globalisation, as business efforts to reshuffle supply chains, digitalise and enhance sustainability are reshaping the global manufacturing, trade and investment landscape. The future globalisation will become more people-centred and less geographically-concentrated, as more countries would join the global value chains. Nevertheless, geopolitical risks and protectionism continue to pose a threat to global trade and investment.

Economies with large internal markets, e-commerce, education services, high-tech companies and local brands are likely the winners of the new globalisation. Meanwhile, small and open economies may be under stress. Consumers may face higher product prices due to manufacturers' production relocation. The income gap between consumers in advanced and developing countries may also rise, creating a more fragmented global consumer market.

In order to mitigate risks and better secure access to supplies and markets in the new global era, companies will need to accelerate digital transformation, focus on people and the planet and diversify both their end-markets and the supply of raw materials, labour and manufacturing across the value chains.

2. Problem Statement

Issues related of globalization are of considerable interest in scientific and professional circles. Karpenko (2020) determines that the national security of each country is an important component in the system of international security as a whole, respectively, the presence of common interests will determine the directions of international cooperation of countries, and the development of integration cooperation between them. Popov and Popova (2019) explore three interrelated social processes: informatization, globalization, and multiculturalization. Kopytova and Fedorenko (2020) explore the information impact in the field of strategic management in the context of the philosophy of globalism. Pereguda (2020) investigates the impact of the coronavirus pandemic on the development of globalization processes. Kramchaninova and Vakhlakova (2021) explore that public expectations for political and economic cooperation in the field of national and global security require the government to make significant changes

and transform the view on important aspects of the organization of social, economic and political life of society, in accordance with global challenges. Bokov (2020) describes the theoretical foundations of globalization, the impact of globalization on the development of the national market, and problems in the system of functioning.

Bohun (2021) considers the phenomenon of globalization as an exogenous factor in the development of socio-economic systems. Turchak (2021) considers the globalization of society as one of the main factors in the formation of the latest business communicative discourse. Dyba and Dyba (2019) substantiate the place of globalization in the innovative process of development. Sharov (2020) explores economic globalization in the general theoretical and historical-philosophical context. Kravchuk and Yaroshik (2019) consider financial globalization, the factors of financial globalization, the main ways of measuring financial globalization, and the consequences of financial globalization, the threats of financial globalization, which have a very diverse nature of origin and can be transmitted through different transmission channels.

Morozova (2020) found that in the context of globalization of international information business, inequality of economic development has increased, which has intensified international competition and redistribution of spheres of political and economic influence in world markets. Tubolec and Tkalich (2019) explore international financial institutions, which together form the international financial infrastructure and the main actors of financial globalization; segments of the global financial market (global debt capital market, global stock market, other global financial markets (precious metals, real estate insurance), the global foreign exchange market). Bilorus et al. (2020) emphasize that the only criterion for a new course among the rapid waves of globalization can only be the unconditional priority of national interests over the group and personal interests of individual "centers" of political, economic, and financial power in the country and abroad.

3. Research Questions / Aims of the Research

The aim of the article is to study the assessment of the impact of the pandemic on the globalization.

4. Research Methods

The information base consisted of official data and periodicals. The methodological basis of the study: analysis and synthesis; systematic approach – theoretical and methodological foundations of the globalization; economic and statistical methods – analysis of data in the period of pandemic; monographic – the study of processes occurring on the globalization and pandemic; abstract-logical – formulation of conclusions and proposals.

5. Findings

Globalisation – the integration of the global economy through international trade, investment and migration – has much described the world development in the last few decades. Economies, companies, and consumers globally have benefited for years from globalisation, while also witnessed the risks and negative impacts it can bring.

Well before the COVID-19 pandemic, globalisation was already in the midst of a profound change, driven by technology, the rise of emerging economies, and increasing geopolitical uncertainties that boosted nationalism and protectionism. Global trade and multinational businesses have also been put under stricter scrutiny, as consumers increasingly request more transparent and socially responsible supply chains of goods and services.

COVID-19 has turbocharged the transformation of globalisation as it revealed the fragility of global connectivity, prompting countries and business to rethink their trade, investment, and operation policies. Globalization reset can be impacted by different factors (Figure 1).

Figure 1. Global FDI and M&A as % of GDP 2015-2020
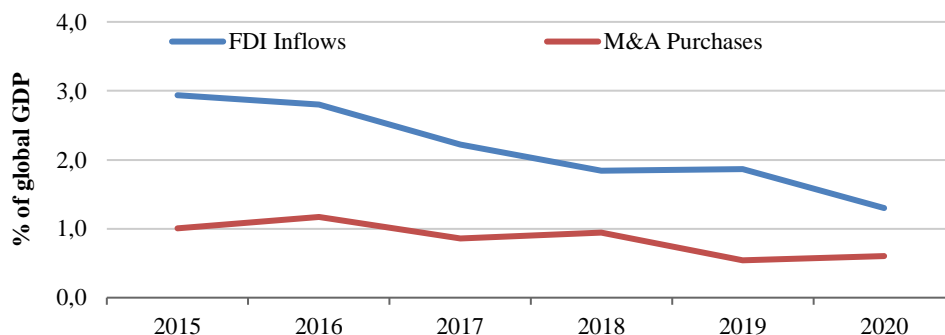
Source: Euromonitor International from trade sources, 2021.

As globalization is shifting, there will be new directions in the flow of goods, capital, data, and people globally. This will happen along with the shifts in global economic power, leading to changes not only in global supply chains and capital movement, but also in global migration and education. And like in the last periods of globalization, there will be potential winners and losers from this new wave of global connectivity.

With uncertainties on the rise, building resilience across the supply chains, markets, and operations is now high on the business agenda. In order to stay ahead of future changes, companies need to understand the factors shaping the global new business landscape. Identifying evolving trends and learning how these would transform the global manufacturing, trade, finance, and movement of people will help businesses to mitigate risks and secure better access to supplies and markets globally. International trade continues to expand robustly in absolute terms,

reflecting the ongoing high level of global trade connectivity. However, the proportion of international trade in relation to the global economy has declined significantly during the last decade. The trend is particularly noteworthy for emerging economies, as they become less dependent on external markets and their domestic consumption plays a more important role in economic growth. Overall, the decline in trade intensity reflects growing industrial maturity and rising consumption power in emerging and developing economies.

Meanwhile, emerging economies continue to enjoy increasing importance in global trade. Since the Global Financial Crisis in 2008/2009, China has already taken over the US to become the world's largest exporter and Germany to become the second largest importer in the US dollar terms. India, Mexico, and Russia are now also among the world's top exporters and importers.

Along with the rising power of China and other emerging markets in global trade and a slowdown in trade intensity, geopolitical risks in the form of populism, local sourcing and protectionism – as it manifests in Brexit in the UK, the US – China trade war and the Russia – Saudi Arabia spat over oil production – have resulted in tensions and threatened a reversal in global trade. In some countries, tariff and non-tariff barriers have risen again. COVID-19 accelerates this trend, as many countries now seek security in areas beyond food.

Even before the pandemic, global foreign direct investment (FDI) flows have already been gradually falling, due to rising labour costs in developing countries (which led to lower FDI returns), as well as to intensifying protectionism and nationalism which favour local investments. The COVID-19 pandemic had a heavy impact on global FDI flows as global economic activities were disrupted. Total FDI inflows dropped by 35% on a year-on-year basis in 2020. The decline was more severe in developed countries, which accounted for slightly more than half of the global fall. While this decrease resulted mainly from corporate restructuring and intrafirm financial flows, developing countries faced a decrease in FDI of only around 8%, thanks to steady flows in Asia. China recorded an increase of 6% in FDI inflows due to a smooth recovery from the pandemic.

While FDI outflows from the US remained stable, investment by Japanese companies – the largest outward investors in the past couple of years – decreased by as much as half, as large mergers and acquisitions (M&A) purchases were not repeated in 2020. The outward FDI from China, despite a 3% decline, remained high at USD133 billion in 2020, making China the largest investor globally.

Digital technology has become a key driver of the new globalization, enabling global innovation and productivity, connecting consumers and suppliers, and transferring information quickly. Digital advances have led to a spike in global internet traffic in the last two decades. B2B digital trade is growing fast, while B2C cross-border retailing is booming. The share of foreign e-commerce accounted for 10.7% of global total e-commerce in 2020, up from 6.9% in 2011 (Figure 2).

Global migration and travel are a symbol of the interconnected world that we live in. Greater people mobility has changed the face of economies, societies, labour, and consumer markets. Immigration was the main source of population

growth in developed countries, as it made up 67% of population growth in these countries between 2010 and 2020. Overall, global migration has fostered the global flows of ideas and innovation and helped boost income in low- and middle-income economies via remittances.

Figure 2. Global E-Commerce Growth: Foreign vs Domestic 2011-2020
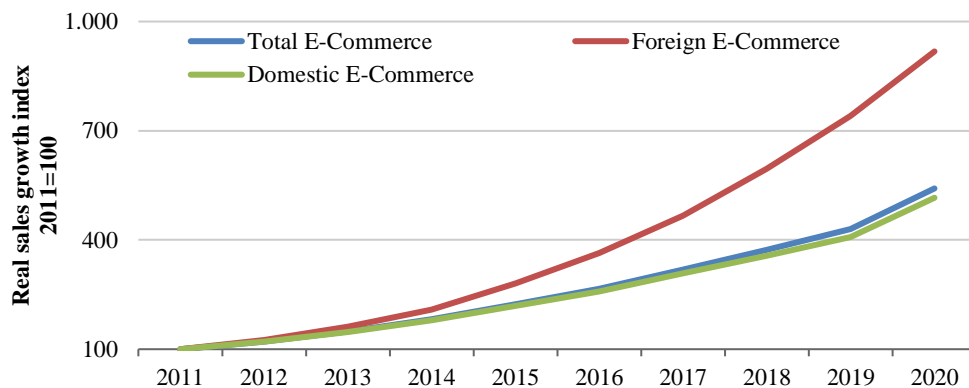
Source: Euromonitor International from trade sources, 2021.

Belove are listed evolving trends resetting globalization. With the objective to build supply chains that are more flexible to global disruptions, localisation is gaining a stronger momentum. This is especially unique for the apparel industry as it has traditionally focused on cost advantage. The commitment to diversify production and localise would boost the sustainability goals as supply chains would shorten, thus reducing carbon footprints (Figure 3).

Some of China's neighbours provide attractive alternatives as manufacturing locations, given their proximity and lower labour costs. Nevertheless, a lack of appropriate infrastructure or skilled labour are factors that may add costs to business relocation. The rise in e-commerce sales during the pandemic has triggered investments in development of automated distribution and fulfilment facilities. The development of these facilities is allowing businesses to reduce delivery time and add to efficiency in supply chains when consumer mobility is restricted while making the supply chains more efficient and reliable.

With consumers spending more time under home isolation, there has been an increase in the contribution of sales coming through the online channel. This has resulted in retailers focusing on expanding their warehousing capabilities to fulfill orders in time, thus smoothing the supply chain. Retailers will continue to invest in automated fulfilment/micro-fulfilment centres to stay ahead of the curve.

It has become apparent for business during the last decade that resilience in supply chains goes hand in hand with sustainability. Environmental, social, and governance (ESG) issues such as pollution or poor health and safety conditions,

represent systemic risks in the supply chain, which can directly impact global business and investors' reputation and profit.

Along with consumers' push for higher corporate environmental and social responsibility, global companies will need to enhance sustainable-business practices throughout their global supply chains. Companies will carry out greater due diligence on their suppliers, while countries have also reinforced their ESG criteria for investment projects in an effort to accomplish sustainable goals.

Figure 3. Evolving trends resetting globalization

Diversification
- Diversifying suppliers, production locations and markets to avoid excessive geographical concentration
- Nearshoring and reshoring to limit complexity/ interdependence in the supply chains and move closer to end-consumers
- The ongoing US-China decoupling risk accelerates diversification efforts

Digitalisation
- Leveraging technology to optimise manufacturing systems and shorten the supply chains
- Fostering cross-border e-commerce
- Enabling remote learning and working to benefit from the global talent and labour pool

Sustainability
- Embracing environmental, social and governance criteria across global value chains
- Growing investments in sustainable and carbon-neutral projects

Source: Developed by the authors on the basis of Euromonitor International
from trade sources, 2021.

Meanwhile, a global effort to fight climate change and to achieve the United Nation's Sustainable Development Goals (SDGs) will drive future investment demand into SDG and low-carbon projects. Rising global commodity prices is another strong push for more investments in resource-efficient technologies and solutions.

The future flows of capital are expected to be much driven by green, sustainable initiatives. The United Nations Conference on Trade and Development (UNCTAD) estimates that sustainability-dedicated investments – investment products targeting sustainable development-related themes or sectors – amounted to USD3.2 trillion in 2020, up more than 80% from 2019.

As global trade growth is likely to continue to slow down, income and productivity growth could decelerate, compared to the previous rise witnessed during the peak of globalisation in the 1990s and 2000s.

Increased trade could enhance productivity and thus per capita income via various channels including economies of scale, competition, and innovation. All of these positive effects of trade could be reversed with slower global trade growth, reducing productivity and average income gains. Some econometric models estimate that a 10% reduction in the volume of global trade would reduce global real GDP per capita by 2-7.5%.

Globalisation and trade growth can impact income inequality via the same channels through which trade boosts productivity: Greater specialisation of production across different locations, reallocation of production across firms or industries and greater competition create economic winners and losers inside industries and countries, with spill-over effects on workers and households' income (Figure 4).

Figure 4. Impact of globalization to business

Future globalisation	Impacts
• Global manufacturing and capital flows will become less geographically concentrated. More smaller countries will have the opportunities to join the global value chains. • Regional trade and regional supply chains will rise. • Global digital integration will continue to surge, with manufacturers, suppliers and consumers increasingly connected by technology. • ESG criteria will gain importance, making global investment more people-centric and sustainable.	• Diversification can lead to higher production costs and lower profit margins for firms. This can in turn result in inflation and higher prices for consumer goods and services. • Demand for automation will rise to offset labour shortages due to production relocation, and enhance productivity. • Trade slowdown will have mixed impacts on income distribution. Business will face a more fragmented global consumer market, while domestic consumer markets can become less unequal.

Source: Developed by the authors on the basis of Euromonitor International from trade sources, 2021.

Based on this tendency, there can be possible globalisation winners and losers.

I. *Possible winners:*

- *Economies:* Countries with large internal markets (e.g., China, India, and Turkey), low production costs, and adaptable economic systems are in a favourable position. Smaller frontier markets (e.g., Indonesia, Vietnam, the Philippines, Bangladesh, Sri Lanka, and Morocco) have immediate opportunities to enhance manufacturing capacity as alternative production hubs for China.

- *Sectors:* Higher-value-added industries including e-commerce, high-tech sectors (e.g., biotech, semiconductors, robotics, 3D manufacturing, and artificial intelligence) and green innovations (e.g., electric vehicles) will continue to thrive. The education sector will also expand due to demand for new skills and re-skilling.
- *Companies:* Businesses that can leverage global digital marketplaces continue to see advantages.
- *Brands:* Smaller, local brands will see growing opportunities among consumers in emerging and developing markets as their preference for local products grows.

II. *Possible losers:*

- Economies: Small, open economies could come under stress if protectionism heightens, since they are more dependent on external markets and external financing (eg several economies in Latin America and Africa).
- Sectors: On a country level, any sectors or industries in an economy that are heavily dependent on imports or exports can be at risk in case of any sudden change in trade relations/ policies or other disruptions.
- Companies: Large, multinational companies that move their supply chains to more expensive locations, or back to their home market, would likely suffer from lower profit margins in the medium term.
- Brands: Global brands are prone to geopolitical tensions and boycott risk. Also, they can lose shine if they fail to respond to local consumers' evolving values.

So, China and the developing world will be an increasingly important source of demand for advanced economies and the world. Digital platforms, logistics technologies, and data-processing techniques will be widely used to reduce cross-border transaction costs. Rising raw materials and food prices will continue to drive sustainable consumption and more investments in green solutions.

6. Conclusions

These investigations deal with the key takeaways for business to get opportunities from a Great Reset. There are three vectors we see possible opportunities. Building resilience and agility: as uncertainty is on the rise, companies should diversify their end-markets, distribution channels, and across the supply of raw materials, labour, and manufacturing; resilience often comes with a cost, so diversification measures need to be cost effective in the long term. Accelerating digital transformation: leveraging digital technology in manufacturing and distribution channels in order to reduce costs, shorten the supply chains and reach more consumers including those across borders; manufacturers in advanced economies can enhance automation to raise productivity and address labour shortages. Focusing on people and the planet: going green across the supply chains is essential for businesses to secure future growth and success, sustainability has a direct impact on company profitability and image; companies will need to put

people at their core and invest in human capital, helping employees build the skills for the jobs of the future.

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The High-Tech Exports of Romania during the Period 2013-2020. An Analysis of Their Evolution and Structure

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Abstract

The aim of this paper is a multiparameter analysis of the evolution and structure of Romanian high-tech exports compared to other member countries of the European Union and some emerging countries having a higher share of high-tech commodities in their exports. In the current paper, the authors propose a phenomenological research trying to capture the more significant aspects of the export sectors of Romania which involve a high intensity of R&D, according to the Standard International Trade Classification (SITC). The novelty resides in a recent and detailed picture of Romanian high-tech exports which could be used in order to determine the trend and potential of the essential flow components. Although the research is limited at a theoretical approach, it might be continued with identifying the exporters of high-tech manufactures and doing a stakeholder analysis. The research used the World Bank and Eurostat databases, the authors' findings confirming that Romania lags behind the most of developed and some emerging states. The gap can be caused by conjunctural factors, small public expenditures with research, development, and innovation, and the lack of stimulation and interest of private sector in making such investments. Moreover, the Romanian high-tech exports are highly dependent on the IT&C sector, which reveals both an important vulnerability in the context of the trade barriers which might raise for a sector and a big opportunity for restructuring the economy.

Keywords: high-tech exports, high-tech evolution, high-tech structure, Romanian trade, technological intensity.

JEL Classification: F14, F43.

1. Introduction

The external trade allows countries to acquire materials, finished goods or services which are either not available domestically or if producing them costs more than importing and also to capitalize on the comparative or competitive advantages

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they have, to promote entrepreneurship, to capitalize on the effects of economies of scale or the experience curve of indigenous producers. The dynamics of embedding high technology in goods and services, corroborated with the increasing of global demand of this kind of products, has led recently to an acceleration of the high-tech exports. The ability of developing countries to reach their full potential also depends on the volumes of their high-tech exports. The large share of high-tech exports in total exports of a country is among the most relevant signs of a high competitiveness of the respective economy (Gheorghe, 2018; Zaman et al., 2018).

The aim of this paper is the analysis of the structure and the evolution of the high-exports of Romania compared to other countries with high shares of high-tech exports in total exports. The paper is structured as follows: section 2, literature review, section 3, research methodology, section 4, findings and section 5, conclusions.

2. Literature Review

The growing competition on the international markets of less knowledge intensive products determines the exporting countries to align to the natural shift from a low level of technological intensity of productive processes towards a higher intensity, performing preferably high-tech exports in order to increase their market and profit shares. Globally, there are important differences in how well regions perform in terms of doing such type of exports. If the European Union (EU) states register a decrease of the share of high-tech exports in total exports from 17.4% in 2009 to 16.3% in 2018, in the case of the USA, the indicator decreased from 25.01% to 18.9% during the same period, the Asian countries record an important growth: South Korea from 32% to 36.4, Vietnam from 10.5% in 2009 to 41.4% in 2017 (Braja, Gemzik-Salwach, 2020). Regarding the structure of high-tech exports of EU countries, Braja, Gemzik-Salwach (2020) found out that, during the period 2008-2011 with only a few exceptions, namely Belgium, Croatia, Cyprus, Slovenia, where the pharmaceutical industry was the main high-tech exporting sector, all other countries relied on the export of electronics.

While the entire international economic community agrees that all countries seize an "export led growth" phenomenon, more and more studies lead to the conclusion that the composition and diversification of exports have a bigger impact on the economic growth than just the flows volumes. Burciu et al. (2020) compared the evolution of export structure and gross domestic product (GDP) per capita of Romania and Czech Republic, Hungary, Poland, and Slovakia and their findings demonstrate that the impact on the economic growth differs by component and also by country. Thus, a 1% increase in the absolute change of medium-tech manufactures (MTMs) exports led to a growth in GDP per capita of 0.45% in Hungary, 0.39% in Poland and Slovakia, 0.38% in Czechia, 0.35% in Romania and 1% in the change of high-tech manufactures (HTMs) export led to a growth in GDP per capita of 0.37% in Poland and Slovakia, 0.34% in Romania, 0.31% in Hungary and 0.3% in Czechia. These findings show that even if the high-tech exports still have the smallest share in the total exports of the selected countries, their impact on

the economic growth is almost similar to that of MTMs. The sustainability of the high-tech industry has also been proven in times of crisis, when it showed the highest growth rate among the EU countries compared to medium-tech or low-tech ones. In the EU-27, the average growth rate of high-tech exports during the period 2005-2015 was 3.3%, the highest rates recorded in Germany (6.6%), Czech Republic (5.4%), and Hungary (4.6%), Romania, recording one of the lowest growth rates for high-tech industry (1.7%). Therefore, the gap between the high-income countries and Romania, which has an upper-middle economy according to the World Bank data for 2020, increased during the period 2005-2011. However, Romania registered the highest growth rate of MTMs exports of all EU-27 states (12.7%), at the middle of 2000s their share in total exports exceeding the one of low-tech manufactures (LTMs) exports for the first time (Ekananda, Parlinggoman, 2017; Sandu, Ciocanel, 2014).

The study of Kheyfets, Chernova (2021) confirms that the endowment with technological factor encourages the economic growth through better allocation of resources, the share of innovations, and the high-tech exports increase. According to the authors' regression models, China ranks first in technological effectiveness followed by the USA and Japan, Brazil, Kazakhstan, Turkey, Ukraine and Mexico lag significantly behind Poland, Romania, and Bulgaria. However, the gaps are very large as China and the USA account for 90% of the market capitalization value of 70 largest digital platforms, 75% of the blockchain technologies patents, more than 75% of the global market share of public cloud computing, about 50% of world's spending in Internet of Things, 69% of supercomputers, or 36% of the total value of e-commerce.

As our research paper analyses the evolution of HTMs exports of Romania in a worldwide context and the weight of every sector incorporating high intensity of technology by means of most recent available data, it will offer an actual image of sustainability of the Romanian economy in terms of commercial outflows at global level, and it will illustrate whether there is a balanced structure or an unbalanced one.

3. Research Methods

In order to perform the analysis of the most recent evolution and structure of the high-tech exports of Romania, which is the stated goal of our study, we have tested the following hypotheses:

H1: An increasing share in exports of high-tech intensive commodities is closely correlated with the level of modernity of an economy and leads to the improvement of the exchange relationship with foreign countries and to the better positioning of Romania at the level of the economic picture of the European Union.

H2: The commodity structure of Romanian exports of highly technology-intensive products is asymmetric, but during the analyzed period some sustainable progress was registered.

The authors propose in the current paper a phenomenological research trying to capture the more significant aspects of the export sectors of Romania which

involve a high intensity of R&D, according to Standard International Trade Classification (SITC). The Eurostat database uses SITC Rev. 4 since 2007 while the World Bank, through the World Development Indicators (WDI), uses SITC Rev. 3, as per 1997 Thomas Hatzichronouglou's working paper, OECD. Both revisions classify the HTMs into the following sections:

- aerospace (aeroplane motors, other aircrafts, spacecraft and spacecraft launch vehicles, propellers, rotors and other parts, undercarriages and other parts, direction finding compasses, other navigational instruments and appliances;
- computers-office machines (computers, office machines, parts and accessories);
- electronics-telecommunications (sound and video apparatus, telecommunications equipment, circuit integrated boards, optical fibre cables, semiconductor devices and media, etc.);
- pharmacy (antibiotics, hormones and derivates, glycosides, glands, antisera, vaccines and other medicaments);
- scientific instruments (electrodiagnostic and radiological apparatus for medicine and surgery, cameras, contact lenses, measuring instruments and apparatus, orthopaedic appliances, optical fibres other than the above-mentioned ones);
- electrical machinery (electrical capacitors, machines, sound and visual signalling apparatus);
- chemistry (chemical products);
- non-electrical machinery (other gas turbines and parts, drilling, boring, grinding, sharpening, punching machines, other machines and apparatus);
- armaments (arms and ammunition).

The WDI and Eurostat data were processed in order to highlight a panel of most relevant 50 countries and calculate the yearly share of every section of Romanian high-tech exports in total exports. Aiming at continuing the work of Braja & Gemzik-Salwach (2020), the authors have grouped the exported volumes of computers-office machines and electronics-telecommunications between years 2013 and 2018, the most recent data provided by the Eurostat in April 2022.

4. Findings

From Table 1 we may observe a positive evolution of the share of high-tech exports in total manufactures exports of Romania, with a steady and continuous improvement. The indicator increased from 7.4% in 2013 to 11.9% in 2020 (which represents an increase of 60.8% on the 2013 value). The table also illustrates that except for the EU and North America, all regions and income categories registered increases of high-tech exports shares in manufactured exports, although not as notable as Romania. However, the Romanian high-tech exports share in total manufactures exports remains at a low level, its average being less than half of the total average share of all countries in the world, 59.8% of the EU average and even worse performance compared to Asian countries and North America (31.4% and 51.3%, respectively).

When comparing Romania with other groups of countries in terms of income level, its volumes of high-tech exports are way behind the ones of other countries except the low-income countries, the gap being very large. Thus, the Romanian high-tech exports average share represents 49.5% of the average share of high-income countries, 41.4% of the average share of upper-middle income countries, 46.2% of the average share of low & middle-income countries, and 200.3% of the average share of low-income countries. It is worth mentioning that Romania belongs to the upper-middle income according to the World Bank classification in 2020, following a very good performance in 2019, when for the first time Romania was in the high-income group of countries thanks to the higher volume of GDP per capita. Another interesting finding deriving from the table is that the East Asia & Pacific countries registered an important value of standard deviation – 3.6, which is very much resembling the one registered by Romania as proportional growth – 1.4, more than 10% of the average shares in both cases.

**Table 1. An international picture of weight of high-tech exports
in total manufactured exports during the period 2013-2018 (p.p.)**

Country / Group	2013	2014	2015	2016	2017	2018	2019	2020	Average	Std. deviation
Romania	7.4	8.4	9.4	10.4	9.8	10.1	11.1	11.9	9.8	1.4
World	18.9	18.9	19.9	20.0	20.5	20.4	20.7	22.2	20.2	1.1
European Union	16.4	16.5	17.2	17.5	16.0	15.6	16.2	16.1	16.4	0.6
East Asia & Pacific	28.2	27.2	28.0	28.0	33.9	34.4	33.9	35.7	31.2	3.6
North America	19.2	19.4	20.2	21.0	18.4	17.9	18.2	18.7	19.1	1.0
Latin America & Caribbean	13.5	13.3	13.9	14.8	14.6	14.3	14.1	15.0	14.2	0.6
High-income	18.5	18.6	19.5	19.7	20.1	20.0	20.2	21.7	19.8	1.0
Upper-middle income	23.1	22.7	24.0	23.8	23.8	23.8	23.6	24.8	23.7	0.6
Low & middle income	19.8	19.7	20.8	20.7	21.3	21.5	21.9	23.3	21.2	1.2
Low income	N/A	N/A	4.9	2.9	3.6	4.3	5.4	N/A	4.2	1.0

Source: Authors calculations based on World Development Indicators
[TX.VAL.TECH.MF.ZS], last update 15.02.2022, extracted on 28.03.2022.

The leading countries with highest shares of HTMs in manufactured exports during the period 2013-2020 belong to Asia and are situated far ahead from the followers. Philippines, Singapore, Malaysia record more than 50% average share of high-tech exports in total manufactured exports, followed by Vietnam with 38.09% (Figure 1). Among the countries with a more discreet performance compared to

Romania, we can find Albania (0.52%), Turkey (3.13%), Portugal (5.72%), Luxembourg (6.78%), Spain (7.12%), Italy (7.98%) or Finland (9.65%).

Figure 1. Share of high-tech exports in total manufactured exports (p.p., average 2013-2020)
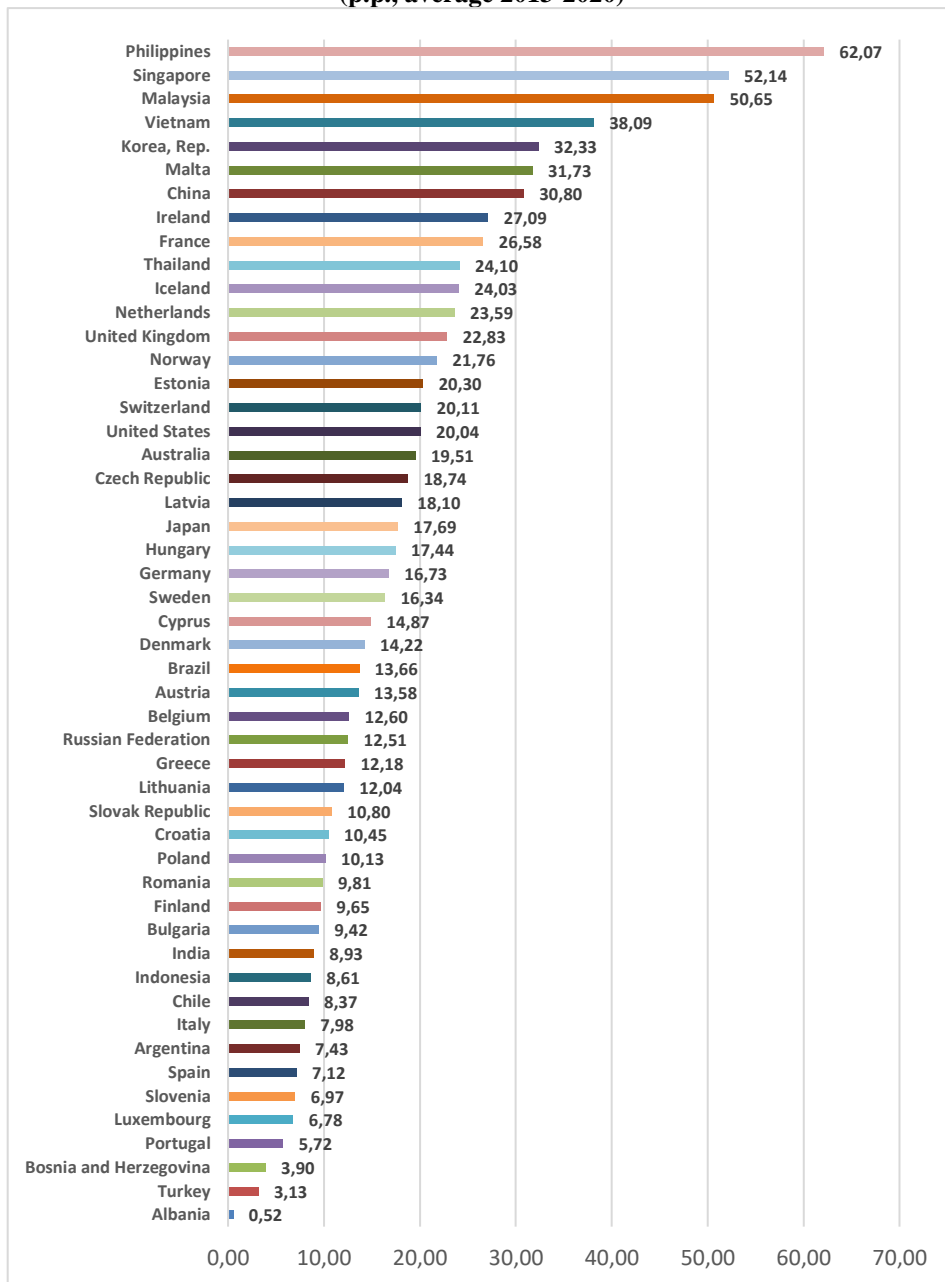
Source: Authors calculations based on World Development Indicators [TX.VAL.TECH.MF.ZS], last update 15.02.2022, extracted on 28.03.2022.

Table 2 illustrates a sinuous evolution of the IT&C share in HTMs of Romania: if its share in total high-tech exports recorded a maximum of 70.4% in 2015, it decreased to 65.9% in 2017 and increased again until 67% in 2018. Significant increases within the analysed period are recorded by the share of scientific instruments sector (82.3%), reaching an important value of 20.6% in 2018 and in case of chemistry, where we notice an increase of 30%. The sectors with a negative evolution of their weight in the total exports are the aerospace (a contraction of more than 300%), electrical machinery (a contraction of 71.9%), pharmacy (contraction of 71.4%) and non-electrical machinery (a contraction of 44%). The armament sector records insignificant volumes, decreasing to a share of only 0.1% of high-tech exports of Romania in 2018.

Table 2. Romanian high-tech sectors in total high-tech exports during the period 2013-2018

HTMs sector	2013	2014	2015	2016	2017	2018
Aerospace	3.7%	3.3%	2.2%	1.3%	1.5%	1.2%
Information Technology and Communications	68.7%	68.3%	70.4%	70.0%	65.9%	67.0%
Pharmacy	4.8%	4.1%	3.2%	2.7%	2.7%	2.8%
Scientific instruments	11.3%	13.0%	14.1%	16.2%	21.4%	20.6%
Electrical machinery	5.5%	5.4%	5.1%	4.9%	3.4%	3.2%
Chemistry	2.0%	2.2%	2.1%	2.0%	2.4%	2.6%
Non-electrical machinery	3.6%	3.4%	2.8%	2.7%	2.6%	2.5%
Armament	0.4%	0.4%	0.1%	0.2%	0.1%	0.1%

Source: Authors calculations based on Eurostat, [htec_trd_group4], last update 08.02.2021, extracted on 28.03.2022.

5. Conclusions

Starting from the scientific hypothesis and applying the research methodology, the authors found that the hypothesis H1 is partially confirmed as the share of HTMs in total exports or manufactured exports of Romania generally lags behind most developed or developing countries, and there are a few exceptions of countries with smaller shares of HTMs in their manufactured exports in our panel. Yet, the trend of high-tech exports of Romania is positive and encouraging, their share in manufactured exports reaching 11.9% in 2020. Moreover, if we add the value of MTMs, which are considered by some researchers the heartland of mature economies (Burciu et al., 2020), Romania performed very well, recording every year an important growth until 62.5% in 2019 (ranking 21st in the world), right after the USA with 63.6% and Malaysia 65.7% (The World Bank, 2022). This is a surprising improvement, since the lowest total recorded share of HTMs and MTMs in manufactured exports was only 21.8% in 1998.

The hypothesis H2 is confirmed as Romania changed its export structure from mainly low-tech products toward medium and high-tech output. The IT&C sector held the highest part of high-tech exports of Romania with an average of 69.4% in total high-tech exports during the period 2013-2018. We should also mention the fast growing share of scientific instruments in high-tech exports, which reached 20.6% in 2018. The very large share of IT&C sector reveals an important vulnerability of Romanian high-tech exports in the context of trade barriers which might be raised by other countries in order to protect their respective sector whereas it might be also a big opportunity for restructuring the Romanian economy. However, importing high-tech intensive products for a while and exporting semiconductors and other intermediary products could be an appropriate strategy which depends on the production capacity, external competition, and/or the international market evolution.

The ability of developing countries to reach the level of developed countries depends on the high-tech exports that these countries can make. Mehrara et al. (2017) identified the determinants of the high-tech exports evolution: the human capital (proxied by the index of gross tertiary education enrolment rate), the institutional quality index, the ratio of imports value to GDP (representing the trade openness) and GDP. Sandu & Ciocanel (2014) show that 1 percentage point increase in the R&D government expenses would lead to an increase of 8.23 p.p. in the share of high-tech exports in total exports after wo years and an increase of 1 p.p. in R&D made by the private sector would determine an increase in HTMs exports share of 9.17 p.p. The impact is even higher if a temporal lag of 5 years is considered, as 1 p.p. increase in public R&D is expected to lead to an increase of 14.42 p.p. in high-tech exports share and if the lag is extended until 7 years, the positive effect will reach 16.07 p.p. Therefore, the decision-making factors should prepare a set of medium and long-term measures and initiatives starting with stimulating the R&D expenses, improving the quality of education, and acquiring the equipment needed for producing goods with a high level of technological intensity, the final goal being the increase of volumes and share of high-tech exports in total exports.

Acknowledgement(s)

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Permanentizing Crisis: The Impact
on Current Turbulent Business Environment

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Abstract

We intend to explore the causes of the perceived process of permanentizing the occurrence of crisis in the current political and business discourse and the consequences of such a phenomenon on the business environment. We try to assess whether such a process is an objective result of the emergence of a turbulent business environment at the global level or an artificial result of developments in the political arena. We will explore the consequences of this trend and its relevance to business decision making.

Keywords: crisis, crisis management, interest rate, monetary policy, emergency politics.

JEL Classification: H12, G01, E43.

1. Introduction

The last period has witnessed an apparent process of the proliferation of crises. Recurrent, overlapping, and apparently unavoidable, such crises not only make headlines in the international and domestic mass media but also seem to dominate the agenda of policy makers around the world. Pandemics, wars, and climate change are just a few examples. As a consequence, it has been argued that the "*normal*" political process has been abandoned in favour of "*emergency*" politics. While this process seems to have origins fundamentally outside of the economic field, a potential powerful explanation may come, maybe paradoxically, exactly form the field of economics. It is a result of a decades-long process of de facto abolition of the interest rate by monetary authorities and a decades-old rise in the time preference both at the social level but particularly in the field of politics.

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2. Problem Statement

The idea that national emergencies challenge the way politics is usually undergone has a long tradition in political thought (Lobel, 1989). Even in ancient times, the occurrence of war translated into a different approach to politics and the way government was operated and public affairs were dealt with. War was the extreme event that allegedly forced governments to make appeal to extraordinary measures in order to deal with it that put into danger the survival of the state. In consequence, governments that faced such existential challenges had to choose between death and structural failure and measures that could be qualified as dramatic, including the restriction of citizen rights.

From the perspective of the political science, the survival of the state was put into balance with the protection of individual rights (Klieman, 1979). The Machiavellian approach, which has fundamentally lied at the core of any state during all ages, allowed the sacrifice of the latter in order to further the former. In modern political debates, the process of transformation of the representative democracy – that seemed to have won the competitive process between political systems – into an administrative state with no accountability has been perceived as the most challenging.

Meanwhile, the discussion on the impact of such a political framework on businesses is still at the level of exploration. There is still an area that economists seem to have largely avoided. This is relevant for the business environment, as the approach of business decision-makers has been "hand-to-mouth" and ad-hoc. The institutionalization of risk management and the formulation of certain crisis-management approaches did not dig into the area of systemic and structural crises. Risk management fundamentally assumes the continuity of the core elements of the economic infrastructure and political institutions. In the current environment, crisis management should question this assumption. So companies have to learn how to deal with crisis that changes the elements of the economic and political system they are operating in.

3. Research Questions

This research attempts to identify the type of reactions from the part of the private agents operating in a business environment who are facing the critical challenges of a political environment which is dealing with crisis that seem to be permanentized. What kind of decisions could be made in such a framework where governments are expected to deal on a permanent basis with crisis?

4. Research Methods

We will employ the theoretical framework as envisaged by economists such as Ludwig von Mises, Murray Rothbard, and Friedrich von Hayek in order to find the impact of the turbulence in the regulatory framework on the way the businesses are operating. The Austrian School of Economics, employing a logical-deductive approach in reasoning, starts from an a priori assumptions (which are empirically

validated) in order to identify universal causality relations between economic concepts and, in practice, economic phenomena (Hoppe, 2007). Very interestingly, the Austrian method is fundamentally abstract and a priori (such as mathematics) but can be employed in order to understand actual phenomena only in a speculative way, as any analyst employing such a theoretical method has to make judgments of relevance regarding the actual factors operating into the real economy. In other words, a good theory can be employed in a way that is irrelevant, and it could miss the realistic approach in explaining the real developments in the economy or society. This is the challenge of the relationship between theory and history as analysed by the Austrian economist Ludwig von Mises (von Mises, 1985).

5. The Rate of Interest in Society

Among the most challenging debates in economics as well as public policy is the misunderstanding of the concept of interest rate. The contemporary democracy has allowed for the progress of redistribution and socialization on multiple fronts, but among the most visible ones is the monetary policy. Besides the discussion related to the impact of monetary policy on business cycles and other macroeconomic phenomena, a very specific discussion can be opened about the impact of the fixing of the rate of interest by the monetary authorities.

The rate of interest in a society is not exclusively related to the capital market or to the monetary policy. As Ludwig von Mises argued, "*Interest is not merely interest on capital. Interest is not the specific income derived from the utilization of capital goods*" (von Mises, 1996, p. 524). This economist advanced the concept of "*originary interest*" as not being "*... specifically connected with any of the three classes of factors of production which the classical economists distinguished*". In fact, "*original interest is the ratio of the value assigned to want-satisfaction in the immediate future and the value assigned to want-satisfaction in remote periods of the future. It manifests itself in the market economy in the discount of future goods as against present goods*" (idem, p. 526).

Starting from the time preference expressed at a social level but also taking into consideration additional factors, a prevalent rate of interest emerges in any society. This is the rate of interest that allows the structure of production to expand in a natural way by producing economic goods that are required by consumers not only in terms of variety and preferences, but also in terms of gratification of the time preference (Rothbard, 2009).

Manipulation of the interest rates by the monetary authorities is an attempt to erase the scarcity of capital and artificially increase the level of welfare in society: "*The age-old disapprobation of interest has been fully revived by modern interventionism. It clings to the dogma that it is one of the foremost duties of good government to lower the rate of interest as far as possible or to abolish it altogether. All present-day governments are fanatically committed to an easy money policy*" (von Mises, 1996, p. 572).

The rate of interest that closes zero means two adverse impacts on the supply and demand of capital and investment: from a supply side, a zero interest rate means that

the cost of capital is close to zero and that longer-term investment projects become attractive for private investors. On the other hand, the same level of the interest rate means a totally different perspective from the part of consumers / the demand: such an easy access to consumption credit means that these market participants will advance their consumption from the future to the present. In consequence, a gross mismatch emerges between the two sides of the market: from a supply side perspective, lower interest interests mean that longer-term production projects become attractive. From the demand side perspective, the consumption is brought into the present and not allowed to be postponed in the future.

As von Mises pointed out, "*The loan market does not determine the rate of interest. It adjusts the rate of interest on loans to the rate of originary interest as manifested in the discount of future goods.*" (von Mises, 1996, p. 527). When monetary authorities decrease the official rate of interest, they alter the natural allocation of resources of society not only between goods but between the present and the future considering the relation between the rate of interest and the time preference of the society. It is a gross mistake to perceive that the manipulation of the rate of interest does have an impact only on the capital markets. In fact, it does have an impact on all the valuation in society of present goods against future goods in general. And among them, we could include also, in the political system of democracy, the political agendas and programs of reform not to speak of the morality and ethics at individual level in society (Hulsmann, 2008).

As a result of fixing the interest under the level of the "originary" rate leads in time to incentives that favour a higher time preference. Such a modified time preference would manifest itself on multiple fronts, including the support for redistributive public policies and direct gratification of consumers. Maybe paradoxically, the political environment prefers taking decisions that are oriented on the short term, highly redistributive toward "big numbers" and free from any principled approach. In consequence, the political discourse has adopted an apparent permanentization of crisis in public policies in order to reach such objectives. And fundamentally, this is also a result of the higher time preference of the consumers in their citizens' capacity.

6. Findings

Under such circumstances, business strategy faces critical decisions. The core challenge is that management and ownership have to "*make bets while the rules of the game are changing*" as the exogenous changes that companies cannot control or influence are critical for company survival. It could be argued that, in such times, the ability to understand complexity and experience of assigning "*relevance*" is becoming critical, as important as the operations and knowledge management. Maybe, in what could be termed as stable environments, the ability to cut costs, optimize supply chains, and outcompete other producers is critical. However, under turbulent business environments where the crises seem to be permanent, recurring, and overlapping, the ability to identify the path to follow is the most important aspect (Greenspan, 2007). And, in this respect, not only the knowledge of its own market

is important for companies, but the understanding of the political processes and developments in other sectors is paramount. Private decision makers must not only be strategic and tactic, they must also be "systemic".

North and Kumta (2018, p. 304) argue that there is a different approach between what they define as "*stable context*" and "*turbulent context*": "*In an environment that is characterised by unpredictable, varying and unexpected crisis situations, knowledge management encourages swift problem solving, permanent experimenting, and quick collective learning as well as living with mistakes*".

**Table 1. Differences between Knowledge Management
in Stable and Turbulent Contexts**

Knowledge management	
in stable context	**in turbulent context**
codify knowledge and document process	share tacit knowledge
build on experiences	develop ability to learn fast and "turbo problem-solving"
disseminate "Best Practices"	develop "Next Practices"
ensure knowledge transfer across employee generations	facilitate ad-hoc availability of knowledge

Source: North, Kumta, 2018.

They consider that "in *the future, organisations would need to carefully consider when it is worth the effort to make knowledge explicit and document it or whether it is more effective to switch over to creating collective implicit knowledge (process of socialisation) in rapidly changing situations*" (idem, p. 303).

There are also some sceptical perspectives on the idea that the contemporary moment is something new for the history of business and economics: "*In fact, the global economic map is always in a state of 'becoming'. It is always, in one sense, 'new', but it is never finished. Old geographies of production, distribution and consumption are continuously being disrupted and new geographies are continuously being created*" (Dicken, 2015, p. 14).

Meanwhile, the decrease in the rate of interest in society leads to what has been termed by Austrian economists as "*malinvesment*". As the stock of capital is fixed in a society (and as a result of past acts of savings), the decrease in the rate of interest leads to the choice of investment projects that maximizes the gains from "official rate" but do not maximize the social welfare. In such a situation, the economic calculation of private entrepreneurs is "*falsified*" as they do not get the right picture because of the artificially decreased interest rate. They choose to make longer-term investments that would be revealed later as being in disaccord with the preferences of the consumers. For a large number of producers, this relevance would come too late.

Such a perspective would mean that, indeed, times which are perceived as being "difficult", "crisis", and so on are present in every moment of the history. Maybe, in certain situations, the sense of novelty is a result exactly of the idea of every generation, which assumes, most probably, that its experience is unprecedented and novel one. Members of other generations may disagree. In fact, every moment,

is a challenging moment and entrepreneurs have to deal with it as being special and not as the others.

7. Conclusions

The current economic and political environment seems to have adopted a discourse in which crises are becoming a permanent feature of public policy. Among other reasons, the monetary policy of undervalued interest rates had its own contribution to this outcome. It could be argued that contemporary politics is a result of "higher time preference" at the level of society. In such an environment, businesses have to conduct operations not only facing operating, financial, or other types of risks but also systemic, structural crises that have the potential to alter the fundamental institutional premises on which economy works. Knowledge management is maybe among the most important tools in this respect and business leaders have to learn how to use tacit knowledge in order to develop abilities to learn fast and "turbo" solve the problems.

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An Analysis of e-Commerce Development in Vietnam and Policy Implications for Business after COVID-19

Le Thanh TUNG[1]

Abstract

The paper aims to clarify the development of e-commerce in Vietnam, an emerging economy in Southeast Asia. The survey data for the analysis was carried out by the Vietnam e-Commerce and Digital Economy Agency included 4466 enterprises. The study period is two years, from 2019 to 2020. Employing the thematic analysis approach, the study results reveal that e-commerce has been popularly applied in many business activities. E-commerce has helped businesses stabilize supply chains to cope with strict social distancing measures to fight the epidemic. Besides, a large number of companies confirm that e-commerce is necessary for faster business recovery in the post-COVID-19 pandemic era. The result also confirms that e-commerce continues to play an important role in helping enterprises advance to a new normal status in business in the next years. The study has some contributions when highlighting the critical role of e-commerce not only during the outbreak of the pandemic, but also regarding business recovery in the coming time.

Keywords: e-commerce, business recovery, business strategy, business transformation, digitalization.

JEL Classification: D12, D47, F13.

1. Introduction

Globalization is increasing and helps to connect countries closely in trade activities, especially through e-commerce. Industry revolution 4.0 with artificial intelligence (AI) and the Internet of Things (IoT) is creating a boom for the development of e-commerce in all countries worldwide. The recent statistics from the world's leading website for e-commerce, Statista.com, showed that as much as 4,280 billion USD in goods and services were traded globally through e-commerce in 2020. The transaction value through the form of e-commerce in 2020 also increased sharply by 27.5% compared to 2019 (Statista, 2020). In the next years, the growth momentum of global e-commerce is expected to continue to be in the

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double digits. The revenue from e-commerce has continued to increase during the COVID-19 pandemic (Kawasaki et al., 2021). This process will be propelled by the dynamic areas such as Southeast Asia which has an expanding high-income class. Then, the global growth of e-commerce will be expected to significantly change over the next few years (Statista, 2020). Because of the huge potential demands, new markets are emerging, and existing markets also have opportunities for further expansion.

Vietnam was ranked as the 25ᵗʰ largest market for e-commerce transactions with total revenue was 8 billion USD in 2021, an increase of 24% compared to 2020 (EcommerceDB, 2022). This country also has a dynamic business environment with potential and high benefits for investors (Tung, Binh, 2021). The outbreak of the COVID-19 pandemic is also a big boost for the promotion of e-commerce development in developing countries with fast economic growth, such as Vietnam. Although this economy suffered from the negative effects of social distancing measures to combat the epidemic (Thanh, Tung, 2022), it is a period when e-commerce has made robust strides in Vietnam. The statistic from EcommerceDB. (2022) shows that the biggest companies in the Vietnamese e-commerce market are thegioididong.com, fptshop.com.vn, shopee.vn, dienmayxanh.com, and cellphones (EcommerceDB, 2022). The expansion of e-commerce in Vietnam is predicted to continue over the next few years, as expected by the Statista Digital Market Outlook (Statista, 2020). The report indicates that the annual growth rate for the next four years can be reached at 7%. Besides, the statistics of the Vietnam e-Commerce and Digital Economy Agency (VEDEA) show that there were 41% of the population have purchased online at least one product in 2021 (VEDEA, 2021).

Table 1. Size of the retail e-commerce market in Vietnam, 2016-2020

Statistical indicators	2016	2017	2018	2019	2020
Number of online customers (millions of people)	32.7	33.6	39.9	44.8	49.3
Average online purchase value per person (USD)	170	186	202	225	240
Percentage of retail e-commerce revenue to total the economy's retail (%)	3.0	3.6	4.2	4.9	5.5
Percentage of people using the Internet in total population (%)	54	58	60	66	70

Source: VEDEA, 2021.

In order to create a legal environment for the development of e-commerce in Vietnam, policymakers have established consistent solutions to support the sustainable development of e-commerce. These solutions have helped to maintain a rapid growth momentum of the e-commerce market during the two years of the COVID-19 pandemic. The Vietnamese companies continuously recorded a strong growth rate in both the percentage of people using the Internet as well as the number of consumers shopping online and the value of their purchases. The statistics of

VEDEA (2021) are estimated that the number of consumers shopping online in 2020 is about 49.3 million people with an average shopping value of about 240 USD per person. The percentage of Internet users participating in online shopping in 2020 in Vietnam accounted for 88%, while in 2019 it was 77%. The payment for online shopping is popular in cash, but in 2020 this kind of payment has decreased from 86% to 78% of the total payment in the market. Additionally, the report notes that the percentage of payments via e-wallets and credit, debit, and scratch cards has a positive step compared to the previous year. In addition, the online shopping value of each user in 2020 also increased higher than in 2019. During the COVID-19 pandemic, around 57% of consumers confirmed they ordered the products in e-commerce channels. As a result, e-commerce revenue in Vietnam increased sharply. In 2016, the value was only 5 billion USD, by 2019 it has doubled when reaching over 10 billion USD, and in 2020 the revenue was 11.8 billion USD (VEDEA, 2021).

This paper aims to identify the development of e-commerce in Vietnam, an Asian emerging economy (Tung, 2019), in recent years, especially in 2020 when the market faced the outbreak of the COVID-19 pandemic. The study has two contributions to the current literature. First, by using a national survey with a large number of e-commerce enterprises, the study result is helpful for exploring the perspective development of e-commerce in a highly profitable market such as Vietnam in the COVID-19 pandemic. Second, the study result suggests valuable practical implications for both managers in companies and policy-makers to enhance the efficiency of this kind of business in the future.

The structure of the paper includes five sections. Section 2 is a review of related studies. The methodology and data source are shown in Section 3. The study results of the paper are presented in Section 4. Finally, Section 5 includes a conclusion and some managerial implications.

2. Problem Statement

E-commerce is a purchase activity done on the Internet (by computer, mobile, smartphone, or tablet) (Einav et al., 2014). On the other hand, e-commerce is popularly understood as a process of buying and selling tangible products and services made by online tools (Utami et al., 2021).

Gregory et al. (2019) consider the interaction between e-commerce and exporting performance. The study confirms that specialized e-commerce marketing capabilities directly increase the degree of distribution and communication efficiency of companies. Then, this variable enhances export venture market performance. Adam et al. (2020) focus on the relationship between e-commerce) adoption at a global level and customer activities. The results show that national e-commerce adoption has been affected by some factors such as information technological access, political and regulatory environment, and human resource development.

Li et al. (2020) explore that mobile e-commerce retailing applications can significantly increase online purchase efficiency and support system improvement. Therefore, the applications of mobile apps in e-commerce retailing affect the online

shopping behaviour of consumers. Ocloo et al. (2020) found that some elements, such as perceived desirability, organization's readiness, and competitive pressure, had a positive effect on the e-commerce adoption levels of companies.

Kawasaki et al. (2021) investigate the impact of e-commerce on consumers' psychological intentions with comparison before and after the COVID-19 outbreak. The study result confirms that the consumers recognize e-commerce's usefulness, therefore, they consider e-commerce as an important channel for purchasing products. On the other hand, the customers' attitudes toward e-commerce have been significantly improved by the COVID-19 pandemic outbreak because they tried to avoid the virus in the context of following social distancing policies.

Orji et al. (2021) analysis of the impact of e-commerce adoption on firm performance. The study results indicate that technical elements are the highest-ranked and imply that e-commerce adoption had a strongly linked interaction with the financial and operational benefits of the companies. The study highlighted a roadmap for information technology adoption in a health pandemic to improve the competitiveness level of companies in global value chains.

Cheba et al. (2021) show that the e-commerce market has expanded quickly, especially in large cities. The study focused on the relationships between some main elements that have potential effects on sustainable e-commerce development in cities. There are several indicators included: e-commerce drivers, measurement of the e-commerce market in cities, and effect level of the development of the e-commerce market in cities on the environment.

Haji (2021) highlights the important role that e-commerce plays in international trade worldwide, especially in some emerging economies such as Brazil, Russia, India, China, and South Africa (BRICS group). The study reveals that e-commerce is an effective tool for fast, inclusive, and sustainable economic growth, as well as for increasing the living standards and reducing the poverty rate. Tolstoy et al. (2021) note that e-commerce is a huge chance for small and medium enterprises (SMEs) to expand their businesses in the global digitalization process.

In overview, based on a fast assessment of recent study results, the e-commerce development is much varied and is dependent on the social-economic characteristics of the country. Besides, the previous study results on e-commerce development are quite complex; however, the information of this new kind of transaction is quite valuable for both managers in companies and policy-makers in the public areas. Furthermore, to the best of our knowledge, there is no evidence focused only on the e-commerce development using an updated database in Vietnam, especially in the case of the outbreak of the COVID-19 pandemic. Therefore, this study tries to fill this empirical research gap in the current literature.

3. Research Methods

Faced with uncertain prospects caused by the COVID-19 pandemic, different perspectives help to have a variety of flexible and good solutions. The thematic analysis approach (Braun et al., 2018) is a good approach to decomposing themes, events, and potential happenings in the Vietnamese e-commerce market and

establishing the future development paths. The comparative research method (Esser, Vliegenthart, 2017) is applied to discuss the current trends of e-commerce development in Vietnam. Descriptive statistical analysis (Mann, 2006) and graphing techniques are used to analyse the statistics of the survey done by VEDEA (2021).

The data used in this paper was sourced from the White Paper of the Vietnam e-Commerce 2020 conducted by the Vietnam e-Commerce and Digital Economy Agency (VEDEA). The survey was carried out in 2021 with the participation of 4466 enterprises in Vietnam. The study period of the survey is two years, from 2019 to 2020. The data was collected in the form of directly filling out the questionnaire. The statistics in the sample are presented in the table below.

Table 2. Characteristics of the study sample

Characteristic	Number	%
Owner of the enterprises		
State enterprise	268	6
Private enterprise	3975	89
Foreign enterprise	223	5
Size of the enterprises		
Small and medium enterprise (SMEs)	4019	90
Large enterprise	447	10
Business sector of the enterprises		
Commerce	1027	23
Service	893	20
Construction	670	15
Mining and Manufactory	357	8
Logistics	313	7
Agriculture	313	7
Tourism and Hospitality	179	4
Communication and Information	134	3
Science and Technology	89	2
Others	491	11
Total number of observations	**4466**	**100**

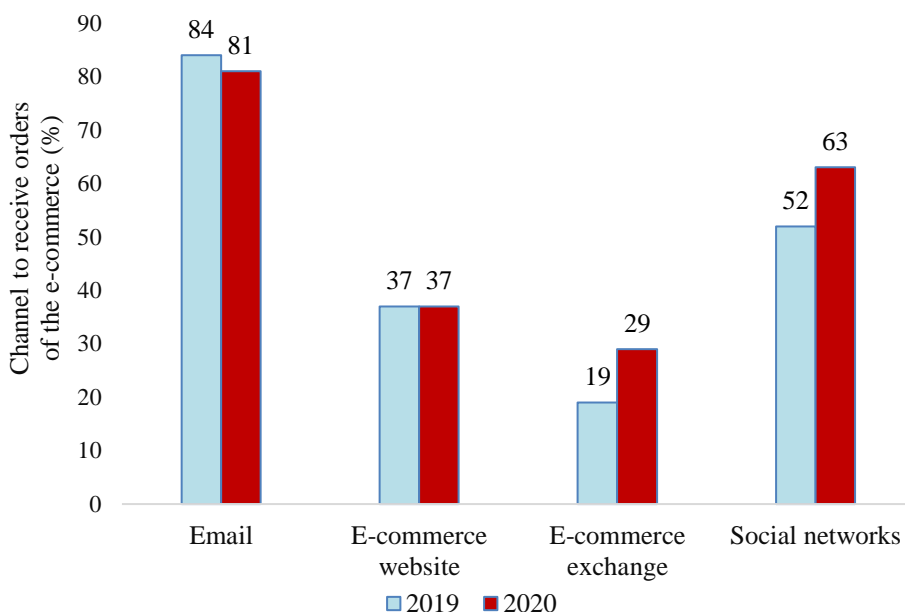*Source:* Calculated from data of the VEDEA, 2021.

4. Findings

4.1 Channel for Receiving Order of e-Commerce

The survey shows that enterprises have used email as a popular communication channel of e-commerce when 84% of businesses used this tool to receive orders in

2019 but this rate has decreased to 81% in 2020 (Figure 1). Email is a useful tool in the office environment, but this tool has many limitations in supporting e-commerce activities where the high diversity of information and images is a mandatory requirement. The analysis result also revealed that businesses have employed social networks as an efficient tool to support the receipt from orders of the e-commerce channel. In detail, 52% of businesses said they used social networks in e-commerce activities in 2019, however, this number has significantly increased to 63% in 2020. Therefore, in the context of the COVID-19 pandemic outbreak, social networks have played an important role in the connectivity between enterprises and customers.

Figure 1. Channels to receive the e-commerce order

Source: Calculated from data of the VEDEA, 2021.

In addition, e-commerce websites also play a high positive role when 37% of businesses confirmed that they received orders through this channel. However, this rate has not changed in 2020. The evidence shows that customers still raise their searching and purchase behavior through business websites. Notably, there is a marked increase in the receipt of orders through e-commerce exchanges, from 19% in 2019 to 29% in 2020. Thus, centralized e-commerce channels are playing an increasingly important part in markets.

The survey also reveals that some types of products have been traded through e-commerce channels at the highest frequency (Figure 2). It is useful information for companies to prepare goods and services through e-commerce. 17.9% of businesses said that electronic devices are products supplied that they provide

to the e-commerce market. Followed by some items such as food (16.6%), computer service (9.8%), clothes (9.7%), housing service (9.1%) and travel and hospitality (4.7%). The survey indicates that companies need to step up the diversification of products to bring flexible choices to consumers by using e-commerce in the coming time.

Figure 2. Types of products transacted through e-commerce channels
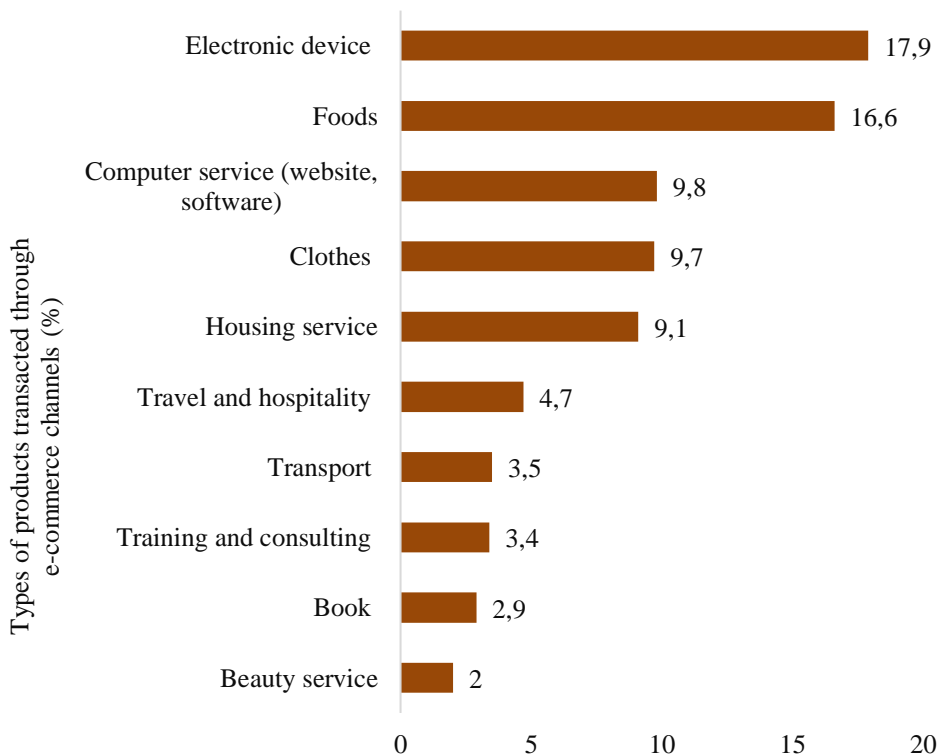
Source: Calculated from data of the VEDEA (2021)

4.2 Promoting for the e-Commerce Channel at Companies

Promotional activities for promoting e-commerce channels are very important in the context of increasing competition in the market. Advertising is often a costly activity in the e-commerce field.

The analysis shows that this activity is prioritized by companies with promotion channels via social networks (49% of enterprises in 2019 and 53% of enterprises in 2020), online newspapers (24 in 2019 and 25% in 2020), and the app-store (14% of businesses apply in 2019 and 17% in 2020).

Figure 3. Promote for the e-commerce channel
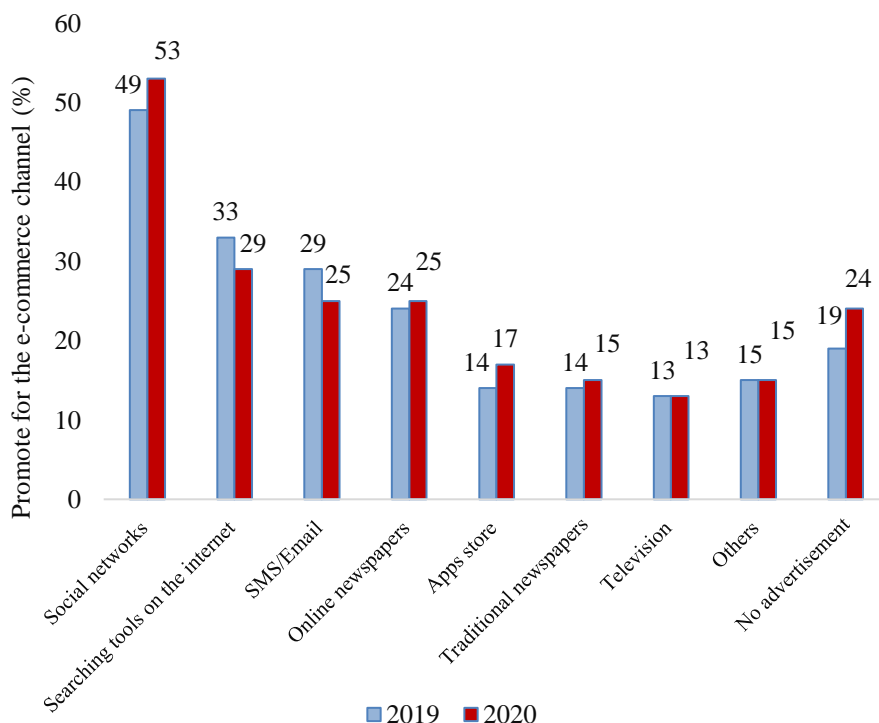
Source: Calculated from data of the VEDEA. 2021.

Figure 4. The proportion of costs of e-commerce
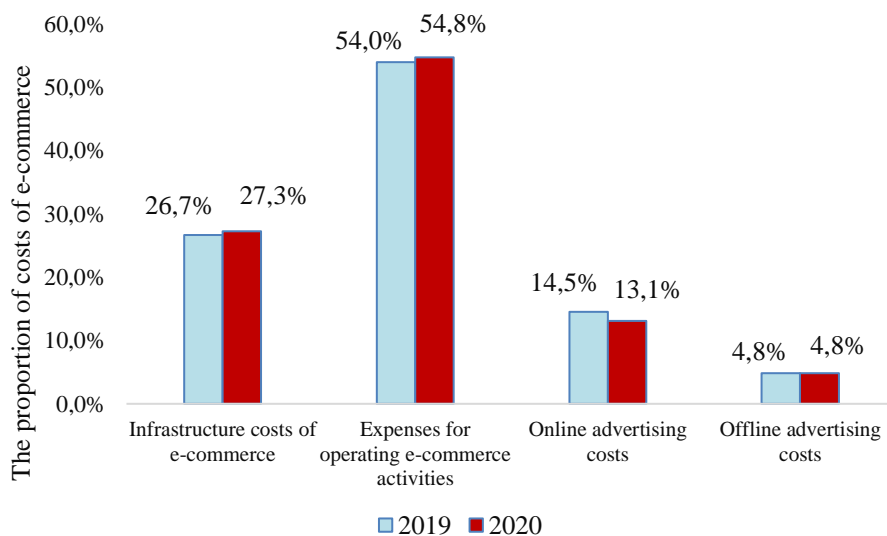
Source: Calculated from data of the VEDEA, 2021.

However, advertising activities for e-commerce channels tended to decrease in most types when the COVID-19 pandemic had a huge negative impact on the performance of companies. Specifically, the forms of advertising on search tools on the Internet and SMS/email have significantly decreased. In addition, the percentage of businesses that did not run any advertising activities has increased; specifically, in detail, 19% of enterprises confirmed that they did not conduct advertising activities in 2019 but in 2020 the number was changed to 24%.

Figure 5. Advertising cost for e-commerce channel
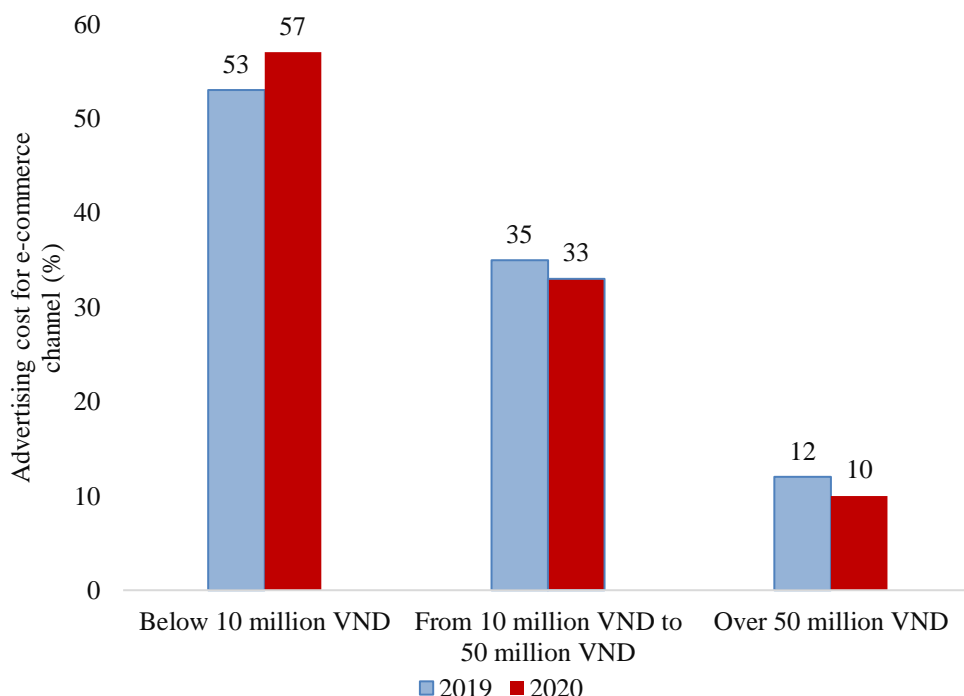
Source: Calculated from data of the VEDEA, 2021.

The cost of operating e-commerce activities is useful information obtained from the survey. The data analysis shows that companies confirm that the cost of operating e-commerce activities is the highest, followed by infrastructure for e-commerce activities and online advertising. The evidence also suggests that businesses spend relatively little on advertising e-commerce channels through offline tools such as newspapers.

Spending on advertising activities for the field of e-commerce has also been promoted by companies in recent years.100% of the companies in the survey sample said that they have spent on promotional activities for e-commerce channels. However, companies' expenditure on advertising for e-commerce activities is still low when 53% of companies spent less than 10 million VND (approximately 450 USD) in 2019, and up to 57% of companies spend in this range in 2020. Obviously,

in the context of the COVID-19 pandemic, when many business fields faced huge losses, companies have tended to cut costs and save resources for surviving and overcoming the difficult periods of the outbreak of the pandemic.

The statistics from the survey still show that e-commerce is an important area for companies to run their business. The maintenance of advertising expenditures for e-commerce is clear evidence that e-commerce is one of the core activities to help businesses operate during the COVID-19 pandemic in Vietnam.

4.3 The Efficiency of e-Commerce during the COVID-19 Pandemic

One of the most critical questions asked in the survey was about the opinion of business leaders on the effectiveness of e-commerce activities in 2020. The question "How does the efficiency of e-commerce during the COVID-19 pandemic?" was used to collect the information. The statistical analysis confirms that 96% of business leaders answered that e-commerce activities are effective. Specifically, up to 24% responded at a high-efficiency level, 58% said that the efficiency was moderate, and 14% rated it as low efficiency. The survey shows that only 4% of businesses rate e-commerce as an ineffective tool.

Figure 6. The efficiency of e-commerce during the COVID-19 pandemic
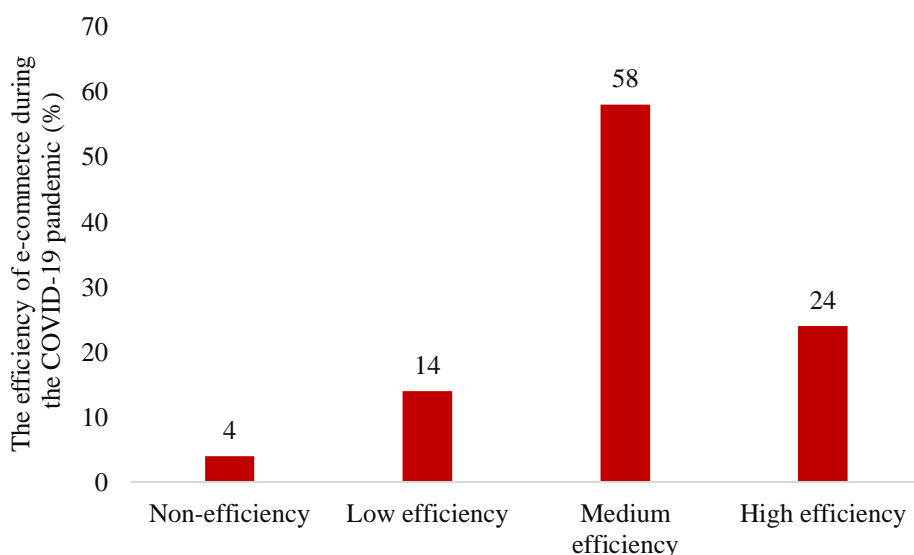
Source: Calculated from data of the VEDEA, 2021.

The survey confirmed that e-commerce activities have been effective in helping the business community overcome difficulties caused by the outbreak of the COVID-19 pandemic. E-commerce was an effective connection between businesses and consumers in the market in 2020. Besides, in order to explore the effectiveness of e-commerce through a number of operating channels, the question "How does the effectiveness of e-commerce through this channel (social

networks/E-commerce website/E-commerce mobi-phone/E-commerce exchange)?"
is used to extract this information.

Figure 7. The effectiveness of e-commerce through some channels
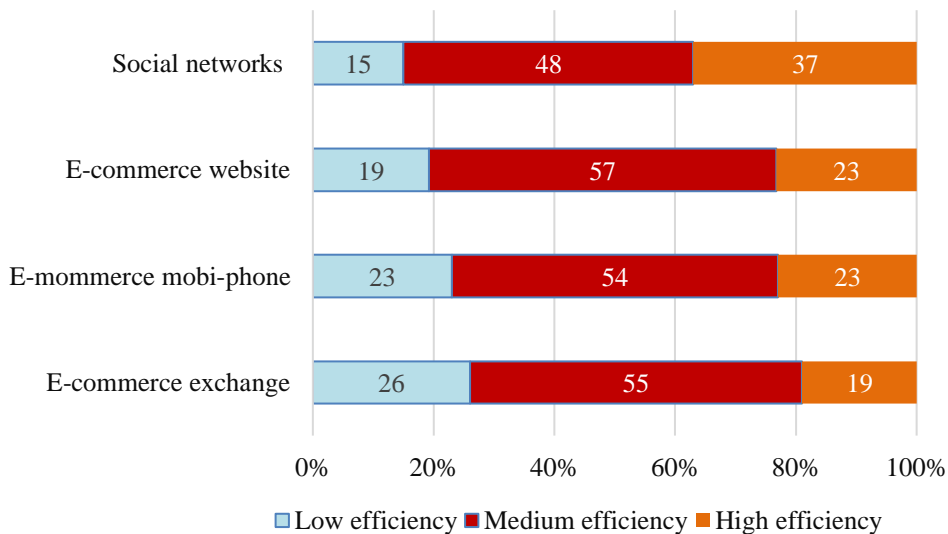
Source: Calculated from data of the VEDEA, 2021.

The analysis shows that social networks are the most effective e-commerce channel when up to 37% of businesses confirmed a high efficiency level, 48% ranked at medium efficiency. Ranked second is the website, this e-commerce channel received a 23% high-efficiency rating and a 57% average rating. Besides, the mobile-phone is a useful channel for e-commerce when up to 23% rate at high efficiency and 54% rate at medium efficiency level. The e-commerce exchange had 19% high efficiency rating and 19% average efficiency. Thus, the survey result continues to confirm that promoting e-commerce is an important business strategy in the coming time.

4.4 Challenges for the e-Commerce Development

The challenges of e-commerce operations are also useful information received from the survey. These challenges may become barriers to the development of this type of business in the near future. The leaders of companies need to focus their resources on overcoming these challenges to promote the effectiveness of e-commerce. The questionnaire was conducted with a Likert scale consisting of 3 levels, 0: No challenge, 1: moderate challenge, and 2: major challenge. Then, the mean indicator index of this survey criteria is calculated and shown in Figure 8.

Figure 8. Challenges for the e-commerce development
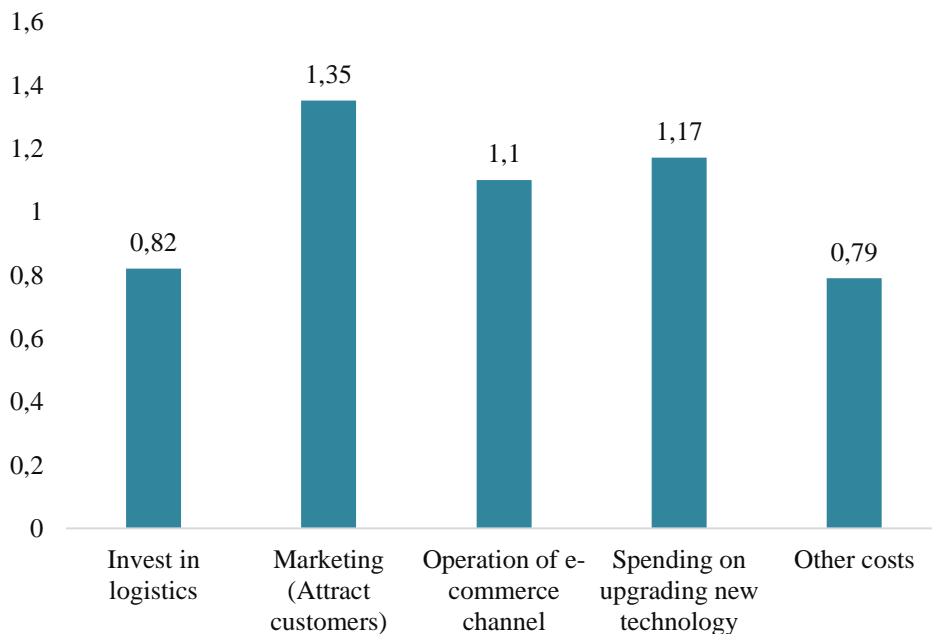
Source: Calculated from data of the VEDEA, 2021.

The statistical analysis shows that companies consider that the biggest challenges in promoting the development of commerce are marketing (to attract the new customers), spending on new technology, and costs for supply chain operation, respectively. On the other hand, businesses insist that logistics and other costs of e-commerce are not challenges for promoting this type of business in the near future.

5. Conclusion

The purpose of this paper is to explore the development of e-commerce in Vietnam. The study database is taken from the survey conducted by the Vietnam e-Commerce and Digital Economy Agency (VEDEA, 2021) with 4466 enterprises. The target period of the survey is two years 2019 and 2020. The study result has revealed that e-commerce has played an important role in promoting business in Vietnam by increasing the connection between companies and customers in the market. The development of e-commerce is expected to be much stronger in Vietnam in the coming time. There are a large number of companies announced that e-commerce is effective for businesses, but the costs related to e-commerce operation are also challenges in the coming time.

There are some managerial implications drawn from the results of this study. First, leaders of companies need to spend more resources on e-commerce activities in the coming time because the level of competition in the market will increase. Companies must consider e-commerce development as one of the core elements of

their business strategy in the post-COVID-19 pandemic. Second, businesses need to continuously improve product quality and service quality because these are key points affecting consumer purchase behavior, as well as increasing customer loyalty. Third, companies should continue to promote themselves through social networks and online newspapers. These platforms will provide businesses with the necessary tools to contact customers, thereby helping to increase the access number to e-commerce sites, then increase sales. Fourth, investment in upgrading technology infrastructure is necessary (both software and hardware infrastructure) in order to ensure the safety of customer information and transactions, contributing to improving buyers' confidence in online purchase activities. On the other hand, policymakers need urgent policies to upgrade the national information infrastructure system and complete regulations in laws related to e-commerce. National incentive and support policies (e.g., allowance credit funds) are needed for developing this type of business in Vietnam in the near future.

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The Influence of Augmented Reality on Purchase and Repurchase Intention in the Fashion Industry

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Abstract

Augmented Reality allows for the real-time application of simulated computer-generated visual elements to the physical world. The exponential development of businesses and emerging technology is combining to create a scenario in which marketing must adapt to changes on a regular basis. The major purpose of the current research is to investigate how AR technology could be used as a sales and marketing strategy for businesses. With an experimental methodology, this study objectively addresses the research gap in the Fashion Industry by measuring the influence of AR on consumer purchase and repurchase intention in the Fashion Industry. In this study, we adopted a quantitative approach, including an online questionnaire with a Likert scale. Generation Y, as the digital natives, was chosen as a good target population for the experimental investigation of the effects of AR apps on purchase and repurchase intention. To carry out the statistical analysis SPSS 17.1 was used to assess the correlation between the defined variables. Finally, the findings of this study are crucial in understanding if shopping-oriented Augmented Reality applications are more enjoyable and useful to purchase than their Internet equivalents.

Keywords: Augmented Reality, Virtual Reality, Interactive Technology, Customer Perception, Purchase Intention.

JEL Classification: M31.

Introduction

The exponential growth of businesses, along with emerging technology, is resulting in a scenario in which marketing must adapt to changes on a regular basis.

While marketing campaigns have been thoroughly examined and are directly targeted to traditional tactics, the addition of various methods focused on technical

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innovations makes it possible to sell new goods more interactively (Tardan et. al,, 2017). New advancements and ideas focused on virtual reality – VR – have been created at the technical level, allowing users to immerse themselves in virtual real-time environments with the help of computer systems (Klempous et al., 2017). Furthermore, technological advancements in digital displays, motion sensors, computer vision, and computation have fueled the exponential growth of VR technologies in marketing. These advances have made VR even more immersive and appealing to consumers. Although the gaming industry has seen the most comprehensive innovations to date, medicine, education, travel, entertainment, and marketing are all significant fields of application. Additionally, With the growth of smart device applications, augmented reality (AR) has been created as an interactive tool in the marketing context, with a growing variety of uses in business. The potential of augmented reality to cover the physical environment with virtual features, such as images and information that may interact with the physical environment in real-time, opens up new possibilities for content delivery to users. As a result, augmented reality has the potential to alter consumer activities such as product and information searches (Javornik, 2016). With the increased use of augmented reality in recent years, there is a need to better understand its application in consumer psychology.

Thus, encouraging marketing in accordance with virtual reality in an application that will provide the user with convenience and ease when trying to order, with personalized and interactive focus, in the desired virtual context; making it much easier to adjust and change the desired features using a Smartphone or tablet (Yaoyuneyong et al., 2016; Zhang et al., 2000). As a result, the fashion industry is considered to be a case study where the use of the mentioned application for marketing growth becomes important.

2. Problem Statement

Despite previous AR analyses, the majority of the studies focused on perceptions, motives, or responses to the AR app rather than broad brand-related outcome variables (Javornik, 2016). Scholz and Smith (2016) created a strategic technique for managers to use when developing AR campaigns. They discovered that building effective AR networks required a comprehensive understanding of how people interact with AR technologies (BCG, 2018). While few studies have looked into the fundamental mechanisms of AR (e.g., Huang, Hsu Liu, 2014), Scholz and Duffy (2018) have shown that consumers integrate AR apps into their personal space and self-awareness, and Hilken et al. (2017) have shown that AR apps can influence purchasing and word-of-mouth actions by increasing decision comfort and both hedonic and utilitarian incentives.

Additionally, fashion retail companies are combining Virtual Reality with digital marketing technologies to reach customers in an immersive and unique way that digital marketing lacks before adoption. Digital marketing, by its very nature, was not very successful in building interaction. However, the convergence of the two marketing strategies has improved digital engagement and the way consumers view

apparel items. Traditional marketing practices, along with digital marketing, have made a magnificent contribution to building brand recognition among consumers.

Thus, the integration of digital marketing technologies with AR likely changed traditional ways of marketing by allowing consumers to try goods using tools such as virtual testing rooms and AR shopping applications before purchasing fashion items. In line with this, Kim and Cheeyong (2015) emphasized the importance of creativity in the marketing industry and how it benefits the fashion retail industry. For a long time, the fashion retail business has been looking for changes in the realm of fashion marketing. It will help customers to observe models in the display of fashion products on their smartphones because of the combination of digital marketing and virtual reality technologies and will have a completely new shopping experience.

3. Research Questions / Aims of the Research

The key research questions that we set out to answer are:

RQ$_1$) What is the current condition of AR awareness and practical application in the marketing world and among people?

RQ$_2$) In the fashion industry, does the quality of AR applications affect customers' purchase and repurchase intentions?

RQ$_3$) In the fashion industry, does customer satisfaction influence purchase and repurchase intentions?

To answer these questions, we propose a customer-centered methodological structure, to give insights into consumer marketing applications and trends in academic AR research. As a result, the goal of this research is to assess the impact of augmented reality on customer purchasing and repurchasing behavior in the fashion industry, as well as how businesses utilize this feature in online sales.

4. Research Methods

The current study is a deductive-quantitative study in which the hypotheses regarding the impact of the application of AR apps on the purchase and repurchase intention of customers in the fashion industry have been tested. Moreover, the collected data were analyzed quantitatively to determine the associations between the study variables. The selected research framework was a survey, within which the research questions were addressed, and the hypotheses were tested.

The target population in this study was Generation Y in Italy and the responses were gathered from October to December year 2020. A simple random sampling has been chosen for the current study. Because the participants and cultural context of this study differed from those of previous studies, the researcher designed a questionnaire to collect the information needed for the study rather than using existing instruments. An extensive review of the literature and scales used in different educational backgrounds guided the development of the questionnaire (Gressard, Loyd, 1986). We then decided to see if augmented reality apps could replace the role of in-store shopping. The respondents indicated their preferences on

a 5-point Likert scale (Strongly disagree to Strongly agree). A panel of experts evaluated the questionnaire's validity. Three specialists (Professors of Digital Technology and Innovation Management, as well as Marketing) and four survey design professionals made up the panel. Cronbach's alpha was used to verify the scales' reliability. Cronbach's reliability coefficients (alpha values) for the scales were more than 0.744, indicating a stable scale (Nunnally, 1978). The questionnaire was translated into Italian and then back into English to ensure its suitability for the participants. The questionnaire was accompanied by a letter of recruitment and a letter of informed consent, as per Dillman's (1978) instructions. From the 27th to the 29th of October, 2020, an online questionnaire was distributed. A total of 119 questionnaire responses had been gathered from the participants by the 17th of November. The response rate was high enough to prevent the survey from being distributed again. Because there was a lack of research to answer our research questions, primary data had to be acquired (Ghauri, Grnhaug, 2005). It reflects the original data gathered by researchers in order to obtain the information required for the analysis (Saunders et al., 2007).

The goal of this study is to see how well our independent variables, such as Innovation, AR Quality, and Consumer Satisfaction, correlate with our dependent variables, Purchasing and Purchase Intention. We use the SPSS 17.1 software to create a bivariate model to investigate the relationship between them. In order to determine statistical significance, a level of 0.01 was chosen. After data gathering, the impact on dependent variables should be evaluated. The variables of each group were tested for normality distribution and, as can be seen, the results show that the distribution of data is not normal because the significance level is less than 0.01.

5. Findings

According to the descriptive statistics, 43.7 % of the respondents are male and 48.7 % are females. Also, 29.4 % of the respondents belong to groups aged 18-24 years old and 38% of the respondents have a Bachelor's degree. Also, the correlations between the variables were looked at to gain first insights into the relationships of the variables. As the variables are normally distributed, the correlations were assessed with Spearman's correlation. The correlation between variables indicates both the direction and the strength of the relationship (Pallant, 2005).

To investigate if and how the AR shopping experience can affect customers' purchase and repurchase intention, a set of research questions was developed and must now be addressed.

RQ1: What is the actual state of awareness and realistic application of AR in marketing academies?

Generation Y is viewed as a significant category by marketers since it is broad and has significant purchasing power (Parment, 2013). Digital natives are members of this generation, and 71% of them own mobile devices such as smartphones or tablets (Rowinski, 2012). Furthermore, according to Barkley (2011), much of this

group is early adopters and hence more likely to accept Virtual Reality. Furthermore, the findings of our study were consistent with his research. As a result, the new generation Y is more enthusiastic about using them in the fashion sector.

RQ2: Does the quality of augmented reality applications affect customers' purchase intention in the Fashion Industry?

Yes, the results of our research suggest that the ease of use of AR applications in the fashion industry has a positive impact on customers' purchase and repurchase intentions. As a result, the findings suggest that an engaging AR application can impact users' purchasing intentions and potentially turn them into buying consumers, rather than just being a fun novelty.

RQ3: Does customer satisfaction after using AR affect the purchase and repurchase intention in the fashion industry?

Yes, the significance of correlation shows that there is an important correlation between these two factors which must not be underestimated.

6. Conclusions

The current study highlighted the significance of augmented reality in shaping online consumers' perceptions of purchase and repurchase intention as acceptable items. To this end, the current study used innovation, AR app quality, and customer satisfaction as independent variables, as well as purchase and repurchase intention as dependent variables, to see if these two factors can influence the relationship between AR and purchasing intention in the fashion industry. Consumer purchase and repurchase intentions have been found to be influenced by augmented reality. According to the findings, AR can influence consumer purchasing behavior and increase purchasing intentions since customers can acquire a full picture of a product a brand offers, including full details, sizes, attractions, use, and drawbacks. The customer must be technologically knowledgeable in order to use smartphones and applications. Because smart devices and applications are user-friendly and compatible, familiarity is not difficult to achieve.

Currently, there is much discussion in organizations regarding the importance of utilizing technology and promoting organizational offerings in the marketing campaign (Laroche et al., 2013) and how social technology influences customer buying intention towards a specific brand (Wang et al., 2015). In this specific situation, there is a desperate need to investigate the different means of technological innovation that can impact purchasing decisions (Saboo et al., 2016). In addition, Javornik (2016) emphasized the importance of technology innovation, such as augmented reality, in understanding brand development. The current study's purpose is to fill these gaps in the literature through an experimental approach (Carmigniani et al., 2011; Javornik, 2014; Javornik, 2016). Customers' purchasing intentions are influenced by augmented reality, especially those who are literate and interested in employing cutting-edge technology (Song, Zinkhan, 2008). The study has proven and suggested a strategic step for firms that are repositioning themselves through

technological advancements and are experiencing decreased sales because of strong competition. Repositioning brands can assist businesses in gaining a fair market share and a lump sum profit. Such activities can affect not just online purchase habits, but also develop a word-of-mouth marketing strategy. Previous research has found that augmented reality has a beneficial impact on purchasing intent (Rese et al., 2014; Jung et al., 2016). In order to gain a profitable market share, marketing managers need to develop strategies that allow them to readily attract customers for their businesses.

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Importance of Information in the Risk Management Process

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Abstract

Risk management is a systematic process for optimizing resources in accordance with the organizational policy of risk management. In the risk management process, information on potential risks should be documented and structured, thus facilitating decision-making for their proper treatment. Risk management must be integrated into day-to-day activities through defined roles and responsibilities in all areas of activity. The identification, analysis, and evaluation of risks must be reviewed periodically or when the situation requires it: when changing the business model of the organization, at any adjustment of the organizational structure and activities or working procedures within the organization, when changing information processing technologies, to major changes in the system, following incidents, following the application of risk controls. Risk management helps to include risk management issues in management practices and to make decisions throughout the life cycle of activities. Risk management can help maximize overall results, if carried out in an integrated manner, in areas such as: controlling the consequences of operational risks generated by information systems; management, costs, and planning of information systems activities. The main objective of the study is to analyze the information related to the main risk assessment methods and to manage the risk management process.

Keywords: information, risk, management, objectives, evaluation.

JEL Classification: M15.

1. Introduction

All economic organizations, no matter how big or small, face internal and external factors that create uncertainties about their ability to achieve their own goals. The effect of this uncertainty is the risk, which is inherent in all activities. The reduction of barriers and accelerated technical progress lead to major developments

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in terms of security and stability of systems. In addition, in such a dynamic world, where the degree of uncertainty is constantly increasing, risk management associated with the activities of organizations requires a good knowledge of the context through timely and good quality information. The success of organizations operating in different areas of economic and social life depends on the ability of managers to know the environment in which they operate, but also anticipate future events, based on the analysis of present information. Information is the sector that is getting increasingly important. There is a tendency to move sources from the area of productive activities to the sphere of use of intelligence.

Risk management must operate in a management structure that provides the fundamentals and organizational arrangements that will incorporate it throughout the organization at all levels. The risk management structure helps the organization manage risks effectively, by applying the risk management process, at different levels and in specific organizational contexts. Risk management, as an important component of strategic management, is intended to address the appropriate risk response, using various methods and analytical and operational means to identify, prioritize, and adopt appropriate measures to avoid losses and achieve the organization's objectives. At the strategic level, it is important for the manager to identify, through intelligence analysis, the potential risks to which the organization is exposed, so that the decision achieves the intended purpose. The correct evaluation of the context, the realization of the appropriate scenarios, and the prediction of the result that will be obtained following the decision constitute the main performance criterion according to which it should be evaluated.

The process of risk identification is the initial stage in the risk management process. Its goal is to identify all potential sources of risk in order to remove or lessen the likelihood of their occurring, as well as the impacts or impact they may have. The risk is related to uncertainty and is associated with a probability of materialization. The risk is not certain and does not refer to a difficult problem that has already materialized. Risks must be identified and managed at any level where it is perceived that there may be consequences in relation to the achievement of the organization's objectives.

Risk management is an important means by which an efficient internal management control system is implemented. Risk management includes identifying and assessing risks, as well as identifying and implementing risk responses in order to reduce the likelihood of risks materializing, as well as the consequences that come from the materialization of risks. Risk identification is a continuous activity that allows the company to relate to the process of change and adaptation, according to effective risk management.

Each employee must understand the value and importance of the risk management process in the current activity, as well as the ramifications it may have on accomplishing the organization's goals. In order to manage risk effectively and to avoid an excessive and uncontrolled volume of risks, it is important that any organization manages the risks that really affect its objectives. It is necessary to provide an information framework to make known to all staff the risk management

process by creating a section on the organization's intranet in which experiences are learned and communicated to those who can benefit from them.

The risk management process has a special importance and a high impact on the achievement of the objectives of any organization and requires adequate protection regarding the access and provision of information to unauthorized persons from the external environment.

2. Problem Statement

In the process of identifying risks, the objectives and activities that contribute to their realization are always taken into account. For a proper identification of risks, it is absolutely necessary to have a document, containing the objectives assumed at the level of the organization (Fayol, 2005). This can be a management plan, a strategic plan that includes general objectives, and specific objectives, activities that contribute to achieving the objectives (Hull, 2006). Each organization must define its general objectives in close accordance with the mission of the organization, the achievement of which is carried out in conditions of efficiency, effectiveness, and economy (Sims, Bias, 2019).

After identifying the objectives and related activities, we will move on to the next stage, identifying vulnerabilities (internal / organizational weaknesses, which may cause risks) and threats (coming from outside the organization). The number of hazards rises in direct proportion to the organization's complexity and the number of operations carried out to attain the goals (Jorion, 2011). Risks need to be identified at all levels, where it is perceived that there are consequences for achieving the objectives and problem-solving measures can be taken. An identified risk can impact several objectives of the organization with different degrees of impact.

Depending on the degree of maturity of the organization, risk identification can be in one of two phases (Penza, Bansal, 2000):

1) Risk identification in the initial phase – specific to newly established organizations, without a history in terms of risk management or without a very well developed risk management;

2) Permanent risk identification – specific to organizations that have developed a coherent and consolidated system of internal managerial control and implicit risk management.

Risk identification is not a strictly objective process but depends very much on the perception of those involved. The identified risks must be grouped; the grouping of risks is done according to the perception and needs of the organization. Risk grouping in an organization (risk exposure) leads to its risk profile (Saunders, 2019). It is unique from the perspective of the objectives, the activities carried out, and the general context. Risk identification and assessment is a specific attribute of each organization. The risk profile provides an overview, including the general, documented, and prioritized assessment of the range of specific risks facing the organization (Down, 2012). The impact of risks on the objectives is not what defines them. Impact is a result of how the materialization of a risk affects those objectives,

not a risk. The main factors that can influence the external risk environment and that each organization must take into account are (Holton, 2013):

- Laws and regulations – each organization must identify those laws and regulations, based on which they operate and which define the limits of action of the organization;
- Modification / updating of the objectives of the management program - in some situations, the treatment of some risks by the managers is influenced by the financial decisions;
- Sometimes, the decrease of capital – affects the attraction / maintenance / facilitation of staff training courses.

An important role in the risk management process is the risk assessment. The risk assessment is performed following a type of risk response in an order of priority and represents the subsequent stage of risk identification. The process of risk assessment stages (Saunders, 2019):

- calculating the likelihood of dangers materializing;
- evaluating the impact on objectives/activities in the event of risk materialization;
- risk exposure assessment – probability and impact in combination.

The purpose of risk assessment consists in: establishing a hierarchy of identified risks and, depending on risk tolerance, establishing the most appropriate risk management measures (Greene, 2020). Risk tolerance is the amount of risk that an organization is prepared to tolerate or is willing to expose at some point in situations where risk may be an opportunity or threat (Greuning, Bratanovic, 2004). Once the risks have been discovered and assessed, as well as the tolerance level, the type of risk response for each risk must be determined (strategy adopted). In this way, it is determined whether risks can be managed or not.

The response to the question: Why is risk management necessary? is the decision-making dilemma from which we begin our study strategy. As a result, the goal of this article is to examine information on the most common risk assessment methodologies and how to effectively manage the risk management process.

3. Aims of the Research

The research's goal is to analyze information on the main methods of risk assessment and the management approach that corresponds to the risk management process. Several evaluation methodologies were highlighted in the analysis of the firms that were the topic of the research study, providing a foundation for a more in-depth examination of the risk management concept:

1) MEHARI Method (MEthode Harmonisee d`Analyse de Risques Informatique): covers the phases corresponding to the identification, estimation, respectively, treatment, or acceptance of the risk. The method applies both qualitative and quantitative tools, using a database of risk situations that the analyzed system may face. Methodological support is a computer application that allows calculations, simulations, and optimizations.

2) The method of risk matrices: Predominantly quantitative, it analyzes separately the four basic components of the critical infrastructure: physical, functional

(procedural), informational, and human (serving staff). It operates with the model of the relationship between the threats-vulnerabilities pairs, based on which the risk matrix is built.

3) OCTAVE method (Operationally Critical Threat, Asset and Vulnerability Evaluation): addresses both organizational and technological issues, necessary to ensure the security of critical infrastructure, in a continuous evaluation process. OCTAVE as the probability of occurring a loss caused by the absence or inadequacy of prevention methods, and the implementation of the Security Plan as a protection strategy, through control over assets or processes, in the form of a list of mandatory activities.

4) VAR method: it is a mixed method, both qualitative and quantitative risk assessment. It starts by identifying the most drastic effects that the production of security risks could have on the organization.

The data was collected using a questionnaire, which is a quantitatively organized research method, between November 2020 and February 2021. A total of 523 valid questionnaires were obtained, with each questionnaire taking about 20 minutes to complete. The research study involved company managers from four fields of activity in Romania: IT, energy, automotive, production.

4. Research Methods

The multicriteria decision-making processes that we used in the research of the maximum utility technique pose challenges of supporting economic decision-making in the modeled socio-economic universe (Morgan, 2020).

The procedures for imitating the rational mode of decision-making are, in more or less elaborate forms, the conceptual essence of models. Modeling aims to make the most of the information base scientifically, and procedures for imitating the rational mode of decision-making are, in more or less elaborate forms, the conceptual essence of models. The global utility method's steps are as follows (Morgan, 2020):

Step 1. Create a utility matrix using elements, $i = 1, ..., r$ and $j = 1, ..., n$.

The equation is used to calculate each element of the matrix for the maximum criterion:

$$x_{ij} = u_{ij} = \frac{x_{ij} - x_{i\min}}{x_{i\max} - x_{i\min}} \tag{1}$$

and for each minimal requirement with expression:

$$x_{ij} = u_{ij} = \frac{x_{i\max} - x_{ij}}{x_{i\max} - x_{i\min}} \tag{2}$$

where:

x_{ij} = the value of indicator i associated with indicator j;

$x_{i\max}$ = the minimum value of indicator i;

$x_{i\min}$ = the maximum value of the indicator i.

Step 2. Calculate the overall utility for each project as the sum of the products in the utility matrix element (the project's column vector) and the important coefficient for each indicator.

$$UG_j = \sum_{i=1}^{r} \alpha_i u_{ij}, where \sum_{i=1}^{r} \alpha_i = 1 \tag{3}$$

Step 3. Choose the project that corresponds to the maximum global utility.

$$\max\{UG_j\} \Rightarrow V_j \quad j = 1, ..., n \tag{4}$$

For the division of some choice Vi variations (n variant) and the selection of the best one by considering many criteria of appreciation (Cj, j = 1, ..., n) and the global utility at the same time. The multi-attribute problem is about finding the best mix of traits (variant characteristics).

This entails converting all numerical quantities a_{ij} (in related units of measure) and qualitative features into utilities u_{ij}, i.e., numerical values in the range [0, 1]. The independence of the criterion is a fundamental assumption in the weighted sum method's correct function. The optimal option is indicated by the greatest of the synthesis utilities.

5. Findings

Table 1 presents the informational basis of the study, respectively, the share of importance that managers give to each method of risk assessment.

Table 1. Importance of evaluation methods related to the field of activity

MODELS OF RISK ASSESSMENT	FIELD OF ACTIVITY			
	IT % (v1)	ENERGY % (v2)	AUTOMOTIVE % (v3)	PRODUCTION % (v4)
MEHARI method C_1	16.45	22.35	27.50	12.50
Risk matrix method C_2	10.55	15.15	11.90	23.61
OCTAVE method C_3	8.90	13.25	9.80	10.54
VAR method C_4	23.45	16.00	11.82	23.55

Source: Based on the information gathered by the authors.

The resulting results indicate that managers first take into account the VAR (C4) valuation method - its ultimate goal being to achieve an optimal balance between the assumed level of risks and the expenses necessary to minimize them, and in the last instance managers take into account the OCTAVE Method (C3) – Figure 1.

Figure 1. The share of evaluation methods
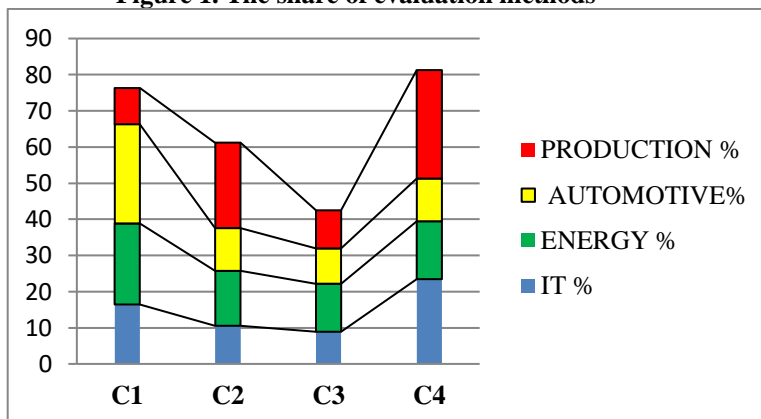
Source: Based on the information gathered by the authors.

Going through the calculation algorithm involved:

Step 1 – building the unit matrix with the elements x_{ij} Figure 2.

Figure 2. The matrix of units

$$\begin{bmatrix} 0.26 & 0,66 & 1,00 & 0,00 \\ 1,00 & 0,65 & 0,90 & 0,00 \\ 0,00 & 1,00 & 0,21 & 0,38 \\ 0,99 & 0,36 & 0,00 & 1,00 \end{bmatrix}$$

Source: Based on the information gathered by the authors.

Step 2 – Calculation of global utilities for each field of activity (Tabel 2):

Table 2. Results of the calculation of global units

GLOBAL UTILITY	RESULT
IT	2.25
ENERGY	2.66
AUTOMOTIVE	2.10
PRODUCTION	1.38

Source: Based on the information gathered by the authors.

Step 3 – Table 2 shows the calculation of global utilities, the highest global utility of companies in the field of ENERGY.

As a result of using the formula for calculating the maximum global utilities technique, it can be determined that ENERGY firms have the best understanding of risk management.

6. Conclusions

In today's organization, you have to take responsibility for information because it is your main working tool. But most do not know how to use it. Few know how to interpret information. In most cases, managers ignore the risk management process, as well as the risks associated with the security of the organization. In general, activities that are not directly quantifiable and for which a level of profit generated cannot be directly presented, tend to be ignored by senior management, which is why risk management activities require awareness-raising, both among the managers of the organization and at the level of employees. There is also a fear that these projects will highlight inconsistencies and shortcomings in the management of the security system. Although a high level of security may seem costly, the lack of adequate security will certainly prove catastrophic in the long run for the organization.

In this sense, we propose some rules associated with risk identification:

- the difficult problems that have already materialized should not be ignored - these can be potential risks in the future, if the organization acts in the same circumstances;
- those problems that will surely materialize, should not be identified as risks. These are not risks, but certainties. Certainties are managed and usually involve resource allocations, changes in objectives, changes in strategy;
- risks have a cause and effect; there is a cause and effect of the materialization of risk. The cause is a favorable context for the occurrence of the risk. The effect is the impact of the materialization of the risk;
- a distinction must be made between inherent risk and residual risk. The inherent risk is the specific risk, related to the achievement of the objective, without risk management measures being taken, while the residual risk is that risk that remains after the risk response has been established and implemented. Residual risk is the expression of the fact that the inherent risks cannot be fully controlled. No matter how much action is taken, uncertainty cannot be removed.

Regardless of the method used, the information on risk management control measures must ensure an acceptable level of risk, so that it is within the accepted tolerance limit. The process of managing information related to risk management requires the involvement of all employees, both those with management positions and those with executive responsibilities, by establishing clear responsibilities at the level of all organizational and decision-making structures. In the risk information management process, both management and executive staff must:

- understands how and how the risks affect the organization (identification of the risk and its evaluation);
- obtains information about risks – the sources and factors that generate it;
- allocate adequate resources for risk management;
- analyze the effects of risks by assigning responsibilities;
- disseminate good practices and inform all departments about the possibilities for risk reduction.

For the efficient management of the risk management process, it is necessary to have:

a) a structure with attributions in risk management;

b) a risk management officer at the level of each department at the first management level (risk manager);

c) a system procedure regarding risk management.

A broad response to the topic of why risk management is required. It is triggered by the realization that there are uncertainties regarding the nature of the threats to attaining the objectives, as well as the nature of the opportunities, in both the organization and the environment in which it operates. Any manager must deal with the issue of managing threats, because failing to meet their objectives would disqualify them, or failing to take advantage of chances for the benefit of the firm would demonstrate their efficiency. If uncertainty is a constant companion, then how we respond to it must also be a constant concern.

In conclusion, a risk analysis on the information used cannot completely eliminate the risk, but can give the management of an organization the ability to:

1) decide whether or not the risk is acceptable;

2) knows the consequences of the decision, both positive and negative;

3) reduce risks through control measures.

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Challenges for a Digital Sustainable Supply Chain in a Circular Economy Context

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Abstract

The aim of this paper is to distinguish the main challenges Romanian companies face in implementing a sustainable digital supply chain. This issue is seen through the lens of the need to address the principles of the circular economy. In this regard, the paper also examines the extent to which managers are aware of the principles of the circular economy and the extent to which the organization aims to identify ways to make the transition from the linear economy to the circular economy. We start from the premise that today the implementation of a sustainable digital supply chain requires the ability to access, analyze, and manage large volumes of data with the support of a robust information architecture. We expect the results to prove that although the managers of the Romanian companies included in our study show a fairly high level of knowledge of the principles of the circular economy and want to address concrete steps in this direction, the implementation of a digital sustainable supply chain, necessary for this transition, brings economic, technical, and IT security challenges.

Keywords: digital supply chain, circular economy, sustainability, digitization.

JEL Classification: Q56, M11.

1. Introduction

The growing population of the planet, the booming global economies, and the visibly improved lifestyle of people have caused a dramatic increase in the volume of natural resources exploited. Studies have shown that the demand for most natural resources has grown steadily (Preston and Herron, 2016; Popescu et al., 2017). For these reasons, global organizations feel the pressure of serious operational challenges, especially at the strategic level. Obviously, this constant and growing

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demand for natural resources has led to shortages of certain material resources, which translates into higher costs for organizations to provide material resources, which further converge towards the realization of less sustainable products / services.

For the most part, we find organizations that rely solely on the traditional model of the linear economy, while the conventional approach to the reuse and recycling of used materials is neither cost-effective nor reduced in terms of reducing material resources (Kumar et al., 2021). Fang and Zhang (2018) pointed out that global supply chains, in particular, feel the pressure of regulatory institutions to increase the level of sustainability, especially on the operational side of the supply chain. At the same time, technology has become one of the most important drivers of a sustainable operational organization (Wamba, Queiroz, 2020). Therefore, organizations should closely monitor these technological developments in order to carry out their operational activities in accordance with environmental requirements, but also at a reasonable cost level.

Several previous studies have indicated that there are a number of links between technology and sustainable operational activities (Jabbour et al., 2020; Bag et al., 2020). However, we note that the level of analysis of barriers and challenges for sustainable operations in the context of the circular economy and the digitization of sustainable supply chains has not been pursued. Kumar et al. (2021) argues that most studies to date have examined separately the challenges of adopting the principles of the circular economy and the use of Industry 4.0 specific technologies, which we believe have the ability to form the basis for enabling digital sustainable supply chains. Today, the digitization of supply chains is a major strategic topic of interest for both the academic community and practitioners (Ageron et al., 2020), while certain organizational, technological, and strategic barriers stand in the way of this digitization. Therefore, our study aims to distinguish the main challenges Romanian companies face in implementing a sustainable digital supply chain in the era of circular economy, especially in the context in which a sustainable supply chain not only has the potential to contribute to the well-being of the population, but also manages to reduce costs, increase market performance both downstream and upstream, increase sales and profit margins of organizations, as some studies show (Younis et al., 2016; Cankaya, Sezen, 2018).

2. Setting the Context Based on the Literature Review

The age of Industry 4.0 and the circular economy pose a number of challenges for organizations in terms of their ability to take advantage of the opportunities that lie ahead to achieve, maintain, and develop a certain level of sustainability. Lack of skilled labour, inefficient regulations and legislation, and long-term investment objectives are just some of the challenges in implementing Industry 4.0, following the principles of the circular economy in terms of sustainability (Kumar et al., 2021). The problems that arise are both strategic and economically when it comes to the financing capacity of such initiatives.

2.1 Industry 4.0 and the Circular Economy

Both Industry 4.0 and the circular economy are two main topics of discussion when it comes to industrial research. On the one hand, Industry 4.0 involves a series of technologies that ultimately lead to success in digitizing the operational activities of organizations (Ghobakhloo, 2020). The Internet of Things (IoT) has made it easier for companies to collect and manage big data. However, there are a number of difficulties in maintaining a high level of operational sustainability due to a lack of an integrated approach to Industry 4.0 specific technologies and circular economy principles (Ozkan-Ozen et al., 2020). Implementing these technologies requires a skilled workforce with expertise (Vrchota et al., 2019). The circular economy starts from the premise that nothing is lost because the waste that the organization produces has the capacity to be used as a resource within the same organization or by others. Geissdoerfer et al. (2017) define the circular economy as a regenerative system in which material inputs, as well as waste, emission, and energy leakage, are aimed at being minimized by slowing, closing, and narrowing material and energy loops. Long-term design, maintenance, repair, reuse, remanufacturing, refurbishment, and recycling can all help." By ensuring better transparency of information between supply chain parties, supply chain digitalization will assist in eliminating uncertainty. Furthermore, automation of the supply process can greatly reduce the time required for the supply cycle and contribute to resource optimization, enabling capacity growth to meet the needs of the circular economy (Bunea, 2021).

From a perspective of the benefits that can be brought to environmental elements, some studies (Manavalan, Jayakrishna, 2019) have indicated that the interdependence between the concept of circular economy and the sustainability of supply chains is beneficial. In addition, investing in technology means increased operational efficiency that supports a smoother transition to so-called circular supply chains. However, the main issue here remains the major investment required, which for young industries remains a challenge, but in the long run, from a strategic point of view, and not only can we witness enhanced sustainability. Government policies aimed at sustainability and encouraging the use of digital technologies are the main motivating factors for organizations in moving to the circular economy, in line with the standards and requirements of industry 4.0 (Manavalan, Jayakrishna, 2019).

2.2 Issues in the Digital Supply Chain

Supply chain-specific networks can be enabled by information technology, which ensures efficient collaboration by transmitting useful information within supply chains. However, an adverse effect may be that certain protection barriers specific to traditional supply chains are reduced or even removed (Zhang et al., 2019). The barriers we refer to have traditionally separated supply chains from what we call cyberattacks because they were not connected to the Internet and therefore exposed. The benefits of an Internet connection are well known but not without risks, as it allows for exposure to many external and internal risks in the systems used in the supply chain. In this way, potential cybercriminals can exploit these vulnerabilities.

Another issue of digitalization of supply chains may be issues related to trust between supply chain partners, but especially between these partners and other third parties (Niemann et al., 2019). Additionally, inefficient processing of data in supply chains, as well as their storage, raises certain risks because valuable information leaks can occur. Furthermore, Zhang et al. (2019) suggest that trust does not necessarily mean security in the supply chain and that security does not necessarily mean trust.

Regarding the process of transforming a traditional supply chain that involves the transition to sustainable supply chain management, we should be aware that the latter requires high initial investments for companies and also requires a strategic vision, so long-term in terms of sustainability and less of a short-term vision, which presupposes rather economic objectives (Hasanova, Romanovs, 2020). This causes some problems, especially when the organization's strategy is one that focuses on the idea of cost leadership. Some studies (Pereseina et al., 2014) have shown that focusing on reducing production costs creates the main problems in the implementation of expensive technologies. However, we believe that the low-cost strategy is not a cheap strategy, and as long as the implementation of some technologies increases the operational efficiency of the organization, it can assume higher costs in the short term, and companies will benefit from these investments in the long run without changing the strategic positioning. For example, the implementation of an environmental management system involves a significant initial cost, but the long-term benefits will outweigh the installation costs (Hasanova, Romanovs, 2020).

Furthermore, some studies (Sajjad et al., 2015) indicate that the level of openness of managers about the adoption of sustainable technologies is an influencing factor in terms of commitment to their implementation. From this point of view, the level of openness of the organization's management regarding the digitization of supply chains and adherence to the principles of the circular economy is, in fact, the trigger for such an effort, especially at the strategic level.

Therefore, the premise from which we started this study is that previous studies have shown how the digital supply chain positively influences the sustainability of the organization and facilitates the transition to the circular economy, but the approach is not without challenges. Therefore, we chose to contribute to the literature by studying the main challenges of Romanian companies in this regard.

3. Methodology

The purpose of this research is to identify the major obstacles Romanian businesses face in developing a digitally sustainable supply chain. This problem is viewed through the prism of the necessity to engage in the principles of the circular economy. In this regard, the article investigates whether managers are aware of the circular economy's concepts and whether the organization is attempting to develop strategies to make the transition from a linear to a circular economy.

To achieve our goal, we used the survey as a research method and the questionnaire as a research tool. The population for the survey was based only on

large companies from Romania. According to the European Commission (2015), a large company is defined as having more than 50 million EUR as annual turnover and also more than 250 employees. We opted to study only large companies because we considered that their stage of development and available resources will allow those companies to engage in the implementation of sustainable digital supply chain procedures while considering the idea of circular economy. The questionnaire was distributed to managers of organizations operating in Romania via email addresses as part of a larger research approach. In this way we managed to obtain 85 valid answers, which was the sample of this research with a response rate of 18,24% which is to be considered acceptable due to COVID-19 pandemic restrictions and because the companies were part of various fields of activity.

To get an idea of the composition of the research sample, we can say that most of the managers surveyed had the function of production manager, financial manager, respectively, sales manager. Also, the main fields of activity of the organizations they are part of were: (i) retail sale of parts and accessories for motor vehicles; (ii) furniture production; (iii) fabrication of other plastic products; (iv) fabrication of milling products.

The variables used for this research, whose results are presented in this article, are shown in Table 1.

Table 1. Description of variables with references

Variable	Content	References
Technical Challenges	Lack of Internet; Information storage capacity; Technical expertise.	Jabbour et al., 2020; Kumar et al., 2021; Vrchota et al., 2019.
Security Challenges	Confidentiality of sensitive business data; Exposure to cyber-attacks.	Jabbour et al., 2020; Zhang et al., 2019; Niemann et al., 2019.
Economic Challenges	Cost of investment; Long payback time; Government law and regulation.	Jabbour et al., 2020; Hasanova, Romanovs, 2020.
Circular Economy Openness	The extent to which managers are aware of the principles of the circular economy; The extent to which the organization aims to identify ways to make the transition from a "linear economy" to a "circular economy"	Sajjad et al., 2015; Ștefănică et al., 2020; Elia et al. (2017).

Source: Authors based on research.

4. Results and Discussion

The results obtained from the application of the questionnaire indicated that, at the level of the entire research sample, the main challenges in implementing a sustainable and digitized supply chain, which involves the ability to access, analyse and manage large volumes of data through a robust information architecture, are technical challenges, security challenges, and economic challenges.

In terms of technical challenges, the results of the investigation indicated that the lack of the Internet is not a problem, as all the organizations surveyed have stable and fast internet connections. Also, the storage capacity of the information was not a problem. All respondents indicated that lack of technical expertise is the main technical barrier to implementing a sustainable digital supply chain, which should consider the principles of the circular economy. These results are similar to those of the study by Vrchota et al. (2019), whose results suggested that the implementation of these technologies, specific to Industry 4.0, requires a skilled workforce with experience.

Regarding security challenges, 40% of the respondents believe that an important barrier is the confidentiality of sensitive business data. Managers are afraid to share valuable internal information with other members of the supply chain, especially with third parties. These results support the study by Niemann et al. (2019), which identified that another issue of supply chain digitization may be related to trust issues between supply chain partners, but especially between these partners and other third parties. In a proportion of more than 60%, the managers surveyed consider that exposure to cyber-attacks is a danger, as the internet connection significantly increases the exposure of supply chains to such attacks. This result reinforces the argument of Zhang et al. (2019), namely that certain security barriers specific to traditional supply chains are reduced or even removed with their internet connection, thus becoming more vulnerable to cyberattacks.

When it comes to economic challenges, 20% of the respondents consider the costs of implementing and supporting such a supply chain to be too high, while 80% of the managers surveyed consider the return on investment to be too long for the financial possibilities of the organization. This result reinforces the argument of the study by Hasanova, Romanovs (2020), which suggests that in terms of the process of transforming a traditional supply chain involving the transition to sustainable supply chain management, we should be aware that the latter requires a high initial investment for companies.

Regarding the level of openness of managers in terms of the circular economy, we analysed the extent to which managers are aware of the principles of the circular economy and the extent to which the organization aims to identify ways to make the transition from "linear economy" to" circular economy ". The results indicated that the managers surveyed are aware of the principles of the circular economy and to some extent want to make the transition from the linear to the circular economy, as indicated by the Likert scale used with values from 1 to 5, where 1 – to a very small extent and 5 – to a very large extent, the results obtained being 3.2 and 2.8 respectively. Sajjad et al. (2015) indicated that the level of openness of managers regarding the adoption of sustainable technologies is a factor of influence in terms of commitment to their implementation.

Going by this premise through the answers of our respondents, we can see that managers show a rather high level of openness towards sustainable circular economy principles and have a fairly high commitment to their implementation. However, technical, security, and economic barriers seem to be the ones that still stand in the

way of this transition, and that is why our efforts should focus on identifying ways to overcome them. Kirchherr et al. (2018), however, identified other barriers regarding circular economy at the level of the European Union, such as cultural barriers and lack of interest and awareness on the customer side. Therefore, future studies should also embrace these perspectives besides technical, security, and economic challenges.

Figure 1 illustrates the results of the extent to which managers are aware of the principles of the circular economy and the extent to which the organization aims to identify ways to make the transition from a "linear economy" to a "circular economy" by position. Thus, we can observe that, in terms of the level of awareness in terms of the principles of the circular economy, both the financial manager, production manager and sales manager recorded similar scores, with the mention that sales managers recorded a slightly higher score.

When it comes to their perception of the organization's goals and desire to move from the classic to the circular business model, there are significant differences. The highest score is recorded by production managers, followed by financial managers, and then sales managers with the lowest score. Perhaps production managers are the ones who better understand and perceive the benefits of this type of transition, while financial and sales managers may face pressure from shareholders to keep costs low, respectively, from customers who demand lower prices and flexible offers.

Figure 1. Circular economy knowledge and openness depending on position
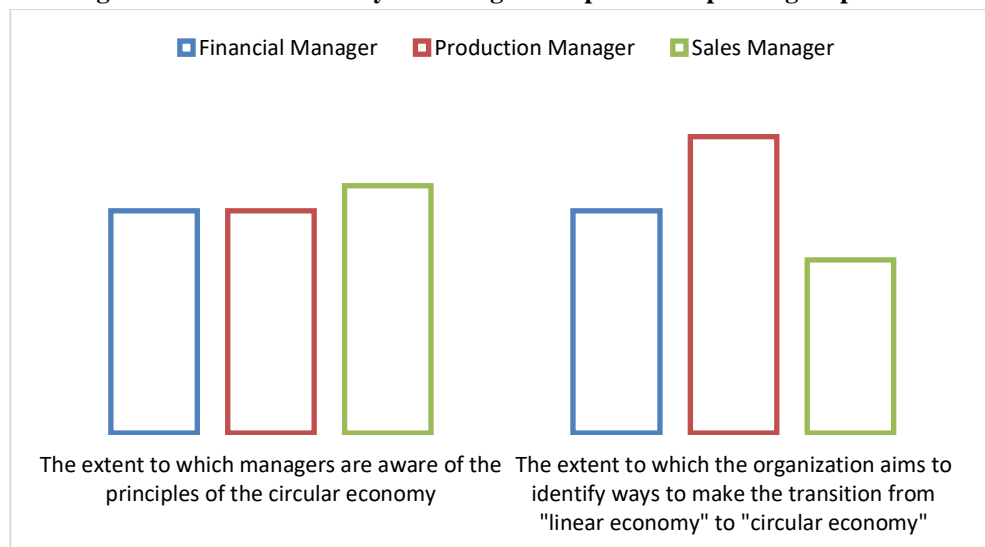
Source: Authors based on research results.

In this way, our work contributes to the enrichment of the existing literature by making available for comparison results from Romania. We believe that these results are particularly valuable in terms of a future aggregate analysis of the European

Union member states in terms of the barriers and challenges facing organizations in the transition to digital sustainable supply chains and the circular economy.

5. Conclusions

The objective of the paper was to distinguish the main challenges Romanian companies face in implementing a sustainable digital supply chain in the era of circular economy. We believe that this has been achieved by identifying the main barriers that were of a technical, security, and economic nature, namely: lack of technical expertise, confidentiality of sensitive commercial data, exposure to cyber-attacks, costs of implementing and supporting such a supply chain that are perceived as too high, as well as the duration of the return on investment. Thus, by identifying these challenges, we will formulate in the following paragraphs a series of recommendations for managers, and we will mention a series of policy implications that can support such a transition.

In terms of recommendations with managerial implications, we believe that training programs are needed to gain the technical expertise needed to digitize the supply chain. Managers can also use partnerships with other members of the supply chain to acquire this know-how, based on a relational attitude and not just a simple transactional relationship. This involves integrating processes and fostering a culture of mutual trust, which would reduce the lack of trust in the risk of leaking information that is considered confidential and create closed-loop systems to protect from cyber-attacks. Furthermore, we believe that the costs of implementing and supporting the digitization of supply chains in a sustainable economic context should be seen as short-term effects with long-term benefits through a coherent strategic vision of these benefits of a sustainable economy. The investment effort is also significant, so supply chain partners could support each other, as the digitalization of the supply chain and its sustainability will benefit all members in the sense of better communication, better management, and more efficient stocks, which will bring long-term cost and waste reductions.

In terms of policy implications, we recommend that governments design programs to support corporate finance to converge with national and global environmental objectives, whether we are talking about national funds or, for example, EU-funded grants. Governments could also help reduce the risk of cyberattack by creating structures to identify and sanction such behaviour.

Therefore, this article opens the way for researchers to analyse in detail ways to overcome identified challenges on the five levels resulting from this research: lack of technical expertise, confidentiality of sensitive commercial data, exposure to cyber-attacks, costs of implementing and supporting such supply chain perceived as too high, and the long payback time. Moreover, another future research idea resulting from this paper is to analyse in an aggregated way the main barriers and challenges facing organizations in the member states of the European Union regarding the sustainable digital supply chain in the context of the circular economy. In this way, we can identify the contributions that each member state can make to achieve the common sustainability goals.

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Building a Model of a "Living Organization" as a Response to the Challenges of the Industrial Revolution 4.0

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Abstract

Today's entrepreneurs face several significant provocations related to the speed and depth of change and with it, the complexity of developing a business model that meets new realities. The changes taking place in the modern business environment are called the Fourth Industrial Revolution. The author of the term, Klaus Schwab, names several components of this phenomenon: the digitalization of business, the growing role of artificial intelligence, the widespread use of Big Date, the merger of cloud computing. An obvious question arises about building a fundamentally new business model that can adapt to a constantly changing environment. In this context, he considers it appropriate to use the concept of "living organization", formulated by many scientists (Tom Peters, Peter Senge, Norman Wolfe, etc.), which, like a living organism, adapts to changes and organically perceives new elements of the system. Clarification of the elements of a "living organization" and what are the prospects for its construction in the enterprises of the Republic of Moldova is the main goal of this study.

The main methods of this study are: comparative analysis and synthesis of scientific literature in the field of the presented topics, analysis of statistical data presented in international and national publications, as well as empirical analysis of the research object, namely, conducting a survey of personnel of small and medium-sized enterprises in the Republic of Moldova. The main contribution of the article is to develop recommendations in the field of organizational change management for the sector of small and medium enterprises of the Republic of Moldova in order to adapt to the challenges caused by the trends of the Fourth Industrial Revolution.

Keywords: the Fourth Industrial Revolution, change management, change model, living organization.

JEL Classification: M19, O30, O14.

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1. Introduction

Today, much attention is paid to changing the management paradigm, moving to a new stage in the development of society and business. Significant changes in the environment include involved participants and change the internal environment of the organization: the behavior of managers, planning systems, organizational structure, and fundamental changes in motivational mechanisms, processes, and types of orderly control. They should not obey those functions that successfully operated many years ago. They are being replaced by other, more appropriate, and more relevant approaches and models which, like the modern environment, are significantly different from the previous ones.

Given the complexity of functioning in the current conditions, many companies are in a difficult position, on the one hand, the influence of the external environment inevitably forces changes in management, on the other hand, limited resources and a specific understanding of the direction of change, the model of change, slows down the transition process, and thereby and all business activities.

2. Problem Statement

Successful companies are constantly undergoing processes of organizational change. These are changes in technology, organizational structure, changes in business processes, culture, products, business reorientation, etc. Small and medium-sized enterprises (SMEs) in this sense have fewer opportunities, on the one hand, they have fewer financial resources, staff do not always have the appropriate level of knowledge, a lack of staff affects the implementation of various additional functions that are not related to the main activity, which complicates the work and leads to great dependence on some members of the team. However, these are more flexible companies, not so constrained by the formal organizational structure and bureaucratic principles, which are quicker to carry out organizational changes or reorientation to a new type of activity. Therefore, the problem of transition is quite difficult for this category of organizations.

3. Research Questions / Aims of the Research

Thus, the purpose of this study is to substantiate the conceptual vision of a new type of organization, given the prevailing conditions, namely, in the context of the Industrial Revolution 4.0. To achieve this goal, we developed the following tasks, which were implemented in the areas of research:

- Justification of the factors associated with the modern business environment, called the Industrial Revolution 4.0;
- Analysis of global trends related to Industrialization 4.0;
- Synthesis of scientific literature in the field of organizational change management;
- Analysis of the problems of SMEs in the Republic of Moldova in the context of the modern business environment;

- Conducting research aimed at developing a model for the functioning of SMEs in the Republic of Moldova.

4. Research Methods

This study is carried out with the aim of implementing a post-doctoral research on the topic: "Creating the organizational change management model for small and medium enterprises through the challenges of Industrialization 4.0", within the framework of the project numbered 22.00208.0807.10/PD I. This project includes research on the main features of Industrialization 4.0, the impact on the SME sector of the Republic of Moldova, and the development of Change management models for this type of enterprise. This study represents the results of the first and second parts of the project exactly:
- theoretical research of the fundamental concepts, related to the challenges of Industrialization 4.0, change management, innovation management;
- the specifics of the functioning of SMEs , carrying out a synthesis of concepts, a comparative analysis of approaches, and justifying one's own vision on the processes of organizational change;
- the first stage of empirical research (questioning SME staff).
  Thus, the research methods are:
- *In the initial stage of the research*, the "Work Break-down Structure" (WBS) method is used, which involves decomposition of work, grouping of project elements, activity-oriented and task-oriented, which organizes and defines the overall goal of the project.

  Thus, this study aims to substantiate the conclusions for building a model of a "living organization" as a response to the challenges of the modern environment. Work decomposition will contribute to this goal. Namely, a review of the existing conceptual models of change management, substantiation of the characteristics of the external environment, conducting a survey of the personnel of enterprises involved in the pilot project, and formulating conclusions.
- *The next stage* - theoretical research, specifically we refer to research in the field of organizational change management, Industrialization 4.0, innovations, specifics of the functioning of the SME sector. The methods of analysis and synthesis are used due to their successful combination; we propose the systemic vision of the selected subject.
- *In the empirical research part*, we use the following methods: observation, experiment, and modelling. To identify the processes to which SMEs in the Republic of Moldova are subjected, a statistical study was performed using the method of graphical analysis. A sociological study will be used to identify the problems and draw conclusions, using the respondents' questioning. The study was conducted in the period January-February 2022. 46 representatives of various enterprises operating on the territory of the Republic of Moldova were interviewed. Of these, 30 enterprises belong to the SME sector, or 65.2% and 16

belong to large enterprises. Representatives from various levels of government participated in the survey.

Limitations of the study: the subject of the study is a promising model of business organization, the possibility of its implementation in the analyzed enterprises. The object of the study is the 46 enterprises included in the pilot project, namely, employees of these enterprises. The respondents are employees of various levels: 32.6% of managers and 67.4% of subordinates. Of the total number of managers - 26.3% - representatives of the highest level and 73.7% - the average. Only the answers to which the respondents agreed were taken into account. The survey was conducted according to an individual methodology developed by the author of the work.

5. Findings

5.1 Modern Environment Challenges

The concept of the Fourth Industrial Revolution was born in 2016. Its author, Klaus Schwab, founder and chairman of the World Economic Forum, under this term combines a very multifaceted concept that characterizes trends that have emerged around the world, and are not only related to the world of business, or industrial enterprises, as it might seem at first glance. The concept itself is much broader and deeper.

The term Fourth Industrial Revolution is a collective description of the changes that occur in all systems and is associated with the massive spread of a number of new technologies. Like the previous three, it "opens a new chapter in the development of mankind." Despite the fact that these technologies originate from the digital systems laid down during the Third Industrial Revolution, they differ significantly from the previous wave of innovations; in addition, technologies and ideas that are not yet known to us will play a huge role in the near future.

These technologies include artificial intelligence, robotics, additive manufacturing (3D printing), biotechnology and neurotechnology, virtual and augmented reality, and advanced materials. An important note that Schwab makes: new technologies are not just a continuation of the digital revolution, their fundamental difference is that they are able to destroy even today's digital systems and create completely new sources of value (Schwab, 2019).

The next important aspect of modern changes is the speed of their spread; many researchers talk about its exponentiality (Schwab, 2018; Siebel, 2019; Blommaert, Broek, 2017). Consequently, the faster they spread and reproduce themselves, the faster companies will need to adapt to these changes and look for an adequate business model (Blommaert, Broek, 2017).

One of the latest books in this series, Factories of the Future: Manager's Guide to Industry 4.0, sets out to change existing business models and the benefits that come with future models: speed, accuracy, long-term predictability, and consideration of a wide variety of scenarios (Can Baran Ünal, 2022).

Significant changes in the entire global system of functioning of business and society are described by the study of Enis Yakut, who draws attention to the multilateral influence of Industrialization 4.0. At the micro level: changing approaches in management, marketing, supply, and technology. In the macro-environment: business globalization processes, socio-cultural changes, sustainable development, etc. (Yakut, 2022).

According to K. Schwab, "technologies become part of us" (Schwab, 2018). According to Statista, more than 130 million homes today have more than one smart device. Researchers expect that number to nearly triple in five years to reach 335 million. Additionally, it is assumed that by 2023 global spending on IoT products will reach $1.1 trillion a year (Armstrong, 2022). Figure 1 presents data on the availability of various smart devices for 2022 and forecast values for 2027.

Figure 1. Actual and projected number of smart home devices in the world (in millions of units)
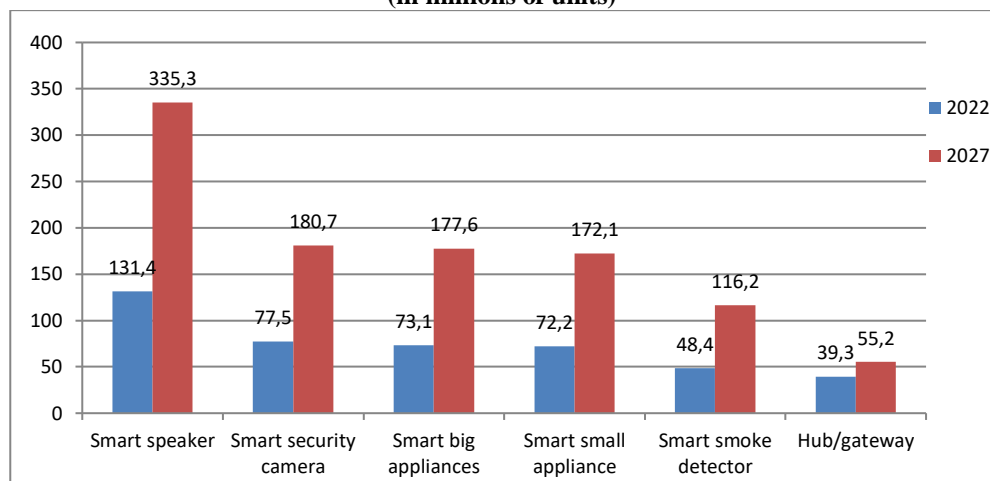
Source: Adapted from Statista, 2022.

The assumption of the possibility of implanting virtual reality devices into the human body and even the brain leads the author to a serious problem of our time: where is the line between man and machine? What does it mean to be human? We, in turn, ask ourselves: how to manage such organizations in which, perhaps, the main processes will be carried out with the help of artificial intelligence? And, in general, what should be the management of the new era? In addition, given the object of study, the issue of a model for carrying out organizational changes in the current conditions is acute.

Obviously, the main issue facing society arises from concerns about the alleged connection with the introduction of new technologies and the replacement of manual labour by machines. At the same time, it must be taken into account that all areas of activity are serviceable, and secondly, with the advent of technology, among employees, more free time is released for creative work, learning new things, doing what they love. Therefore, using data from Gartner's statistical research, we arrive at

outliers in which two-thirds of the respondents tend to believe that some of their work was done with the help of artificial intelligence (Figure 2).

Although the survey was conducted among US workers, we tend to share the view that more and more employees are striving to replace routine processes with the work of artificial intelligence. This diagram shows the growing awareness among employees of the importance and effectiveness of using modern technologies. This should serve as a favourable factor in their perception. Considering that one of the most important problems in the implementation of organizational changes is the resistance of personnel, this factor is of paramount importance in carrying out major transformations associated with the Fourth Industrial Revolution.

Figure 2. Share of US workers that would want AI to completely take over the following tasks
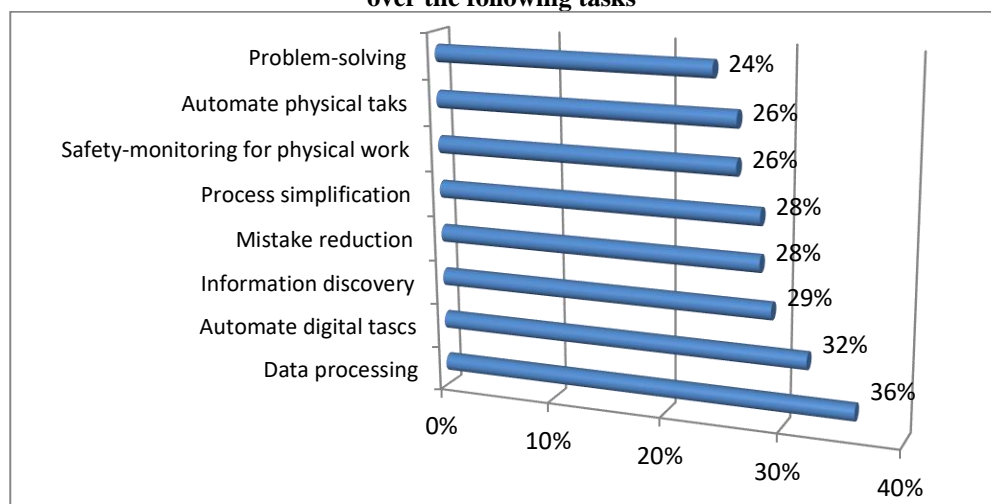
Source: Adapted from Statista, 2022.

The next sharply worthwhile initiative of the Fourth Industrial Revolution is the increase in inequality associated with the monopolization of the power of some companies (according to experts, today Google controls almost 90% of the global contextual advertising market, Facebook – 77% of mobile social network traffic) (Schwab, 2019). Such a superiority will further distinguish large global companies from the general mass. Of course, similar inequalities, according to Schwab, can undermine social cohesion, which can have an extremely negative impact on public sentiment. These opportunities may adversely affect the SME sector, which is already adopting modern technologies, and in particular the Internet of things, 6 times less than large companies today. A recent study by a group of authors in the application of technologies of the Fourth Industrial Revolution once again shows the challenges that SMEs face on the path of transformation. The authors clearly show how much the enterprises of this sector lag behind large enterprises, taking into account a large number of reasons. At the same time, researchers are considering in

detail the mechanisms for introducing Industrialization 4.0 technologies, taking into account the specifics of objects (Matt Dominik, Modrak, 2021).

In this context, it may be a favourable moment that many technologies are becoming more accessible, and even people with modest incomes use the Internet, smartphones and other means of communication, 3D printing, and some biotechnologies are also gaining accessibility.

Figure 3. Changing interest of SME owners in processes related to technologies of the Fourth Industrial Revolution (comparison of 2019 and 2021)
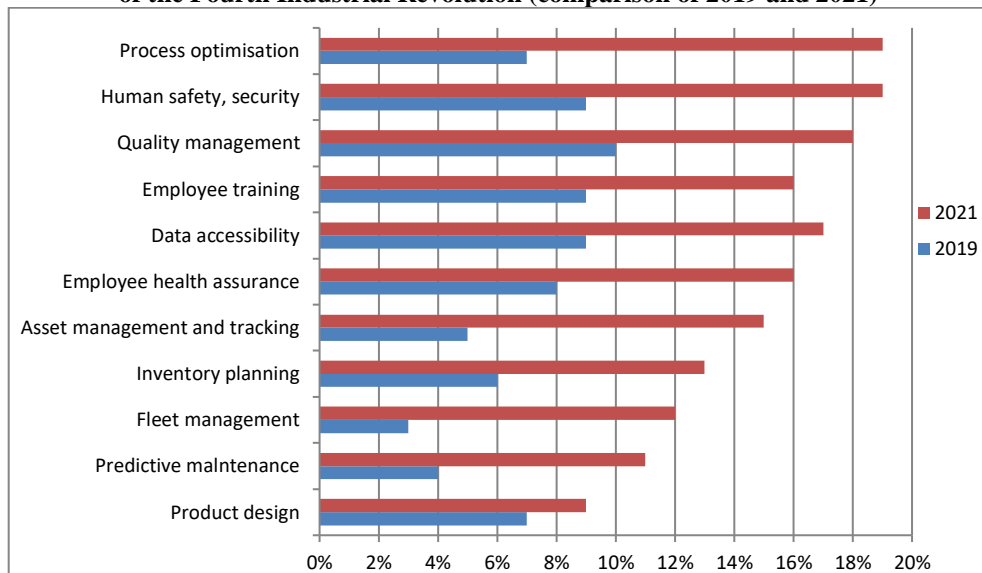
Source: Adapted from World Economic Forum, 2021.

At the same time, data from various studies testify to the growing interest in modern technologies. For example, studies conducted and presented within the framework of the World Economic Forum in order to establish trends in the development of SMEs under the influence of the COVID-19 pandemic indicate an increase in interest among SME owners in modern technologies (Merritt et al., 2021). It is obvious that the pandemic has accelerated the processes of digitalization and changed the attitude toward advanced technologies (Figure 3).

Understanding that the digitization of many processes is inevitable, without it the future of most companies is impossible, freeing up funds for business reorientation will help save time, which is so necessary in today's rapidly changing environment and gain a competitive advantage. In addition, SMEs need to develop a model for making much-needed changes, taking into account the specifics of the internal and external environment.

5.2 Directions of Organizational Change Management

The challenges provoked by the processes of Industrialization 4.0 and described in the previous part of the work clearly suggest that it is pointless to act according to the management model that was effective in previous eras. But, at the same time, many companies are trying to stay afloat today, using the old management model. One of the most significant features of the Fourth Industrial Revolution is the growth of processes at an exponential rate, which is fraught with a complete blocking of the management model if it is not changed in time.

The conceptual model of the organization as a Machine is no longer valid in principle. It assumes the clarity of procedures and the certainty of the environment; these characteristics, today, have outlived their usefulness. Therefore, companies planning to operate in complex and unpredictable conditions need to radically revise their way of operating, and, above all, change the "organizational metaphor".

Given the high likelihood that technology dominates most organizational processes, companies should focus on exceptional human qualities and the social component of organizations. Quoting Andrew McAfee and Erik Brynjolfson "the ability to work effectively with the emotional states and social motives of people will remain an exclusively human skill for a long time", while they give credit to the machine, believing that "when making decisions, forecasting, diagnosing, the computer will decide the leading role" (McAfee and Erik Brynjolfson, 2017).

Agreeing with this understanding, we add that any organization is a socio-technical system, that is, it is a combination of social, technical, and technological processes. Both systems are interdependent; changes in one system are necessarily reflected by changes in the other subsystem. Thus, the technologies of Industrialization 4.0 naturally affect social processes: culture, relationships, responsibilities, the essence of the activity of each performer, the management style, and the qualifications of employees are changing. Of course, given the complexity of many processes and the digitization of routine activities, the requirements for personnel will increase; this will concern qualifications and competence, as well as emotional intelligence, teamwork, creativity, etc.

In addition, in modern economic conditions, a huge role is given to the value-oriented approach. The limitations of the previous model, or metaphor, based on the activity of the organization as a machine, were due to the lack of consideration of this factor. Today, all scientists who study change (Peter Senge, Klaus Schwab, Andrew McAfee and Erik Brynjolfson, Norman Wolf and others), talk about taking into account the value factor.

Most of them lead us to a metaphor that characterizes an organization as a living organism. In such an organization, everything happens as in the human body. Scientists often compare organizational subsystems with human organs: individual employees with the cells of the body, teams that implement certain functions are comparable to the organs of the human body, the human skeleton is an organizational structure, etc. (Norman Wolfe, 2011).

As an organism, the company is influenced by energy fields, the primary of which will be the energy of the deep purpose (Soulful Purpose). Soulful Purpose is a powerful force that attracts the necessary energy structures to fulfil the mission. The main source of energy within the framework of this concept is people who, while expanding their capabilities, also increase organizational energy. Of course, any modern organization tries to direct its efforts in such a way that they lead to a synergy effect. In the context of the Living Organization concept, a synergistic effect can be achieved through teamwork. This intersects with Peter Senge's concept of a "learning organization", that is, a company in which employees constantly improve their level of education, there is a common goal and joint actions, a non-trivial way of thinking is encouraged, and the leader is an inspirer and motivator (Senge, 1990).

More recent research suggests the need to combine soft and hard skills in building the business model of the future. So, N. Accialini confirms this in the 4th part of his study: "Requirements and skills in demand", where he pays great attention to "soft" skills, such as change management, creativity, risk management skills, etc. (Accialini, 2022).

Other researchers, J. Nicholson and R. Murrey, are also calling on company managers to rethink conventional management and leadership practices towards a social concept called Human Operating Systems. In such a system, the greatest emphasis is on team leadership and cross-functional teams, which are the key to success. This system, in its essence, also resembles the "living" or "learning" organization, which is discussed below (Nicholson, Murrey, 2021).

Therefore, representing this concept figuratively, we note that everything starts with people and is transformed into goods and services provided to society. In addition, processes, the financial system and management, as well as direct and feedback between all elements, are integral parts of the model. Of great importance in such a model is the level of interest, involvement, and participation of all employees, who, like the organs of any organism, are of paramount importance. It is logical to imagine that the transition to management focused on the perception of the organization as a living organism will provide companies with adaptability and success in the long term.

5.3 Readiness to Accept the Concept of a Living Organization by the Enterprises of the Republic of Moldova

The complexity of taking into account all factors of the external and internal environment implies the use of such a behaviour model that can self-organize and adequately respond to the challenges of the external environment, as well as pay attention to the value component, which can only be realized when applying the concept of a Living Organization.

We emphasize that in the course of this study, we focused on the SME sector due to the extreme importance of this segment: at the beginning of 2021, the number of SMEs amounted to 57,247 units, which is 98.6% of the total number of enterprises. Of which micro-enterprises 85.4% (or 44547 units), small – 10.9% (5780 units), medium – 2.3% (1299 units). Enterprises in this sector create about 60.1% of jobs,

as well as their contribution to the formation of the GNP of Moldova is about 48% (according to the data of the National Bureau of Statistics at the end of 2020).

In the context of studying the scientific literature on this topic, we come to the conclusion that the concept of the Living Organization is closely related to the Learning Organization, according to the terminology of Peter Senge (which is confirmed, in particular, by Norman Wolfe). Therefore, in this context, consider the fundamental elements of both theories.

Table 1. Correspondence of concepts in the concepts of the Living Organization and the Learning Organization (developed by the author based on the results of the study)

Main component	Living Organization (by Norman Wolfe)	Learning Organization (by Peter Senge)
1. People	Key characteristics in organizational interaction: personal skills, interpersonal skills technical skills	Emphasis on personal improvement (the difference between what is and a personal vision of the future). Learning the art of creating "creative tension" between dream and reality
2. Teams, group interaction	Relate to the field of relationships, a key property of leaders is the ability to form teams and stimulate interaction between individuals and groups	Through team interaction, learning - opening access to collective thinking, synergistic effect
3. Leadership	Leaders perform the vital functions of stimulating, directing, and coordinating the flow of energy within the company, motivate and inspire	Leaders are key figures in all organizational processes. An "ecological" approach to leadership is used as the interaction of various actions of leaders and organizational forces.
4. Business models	Everything starts with people and transforms into goods and services offered to society. Integral parts of the model - organizational structure, information flow, culture, norms and rules	Any model is built on system thinking. It is based on the dynamics of complex systems. An organization is a product of the thinking and actions of its members.
5. Organizational development	Increasing the level of interest, involvement, and participation of employees, creating an additional source of energy in the company as a whole, leads to "magic" results.	It is necessary to enable people to take part in new activities, thus they will develop a sustainable ability to change; this will be reflected in the results of the enterprise in the form of increased diversity, enthusiasm, innovation, and talent.

Source: Elaborated by author.

Considering the main components of the Learning Organization, in the course of the study, we will highlight some of its components, which, in our opinion, are key in understanding the possibility of the transition of SMEs to a new functioning model. So, one of the most important factors of the model are people, with their needs, abilities, and experiences. Their behaviour is influenced by a huge number of factors, in particular, the management style that prevails in the organization.

The researchers come down to the fact that it should be systematic, with the use of coaching, the staff should have the opportunity to express themselves; in this sense, creativity and initiative should be supported by the absence of fear of criticism. Let us present for comparison the leadership models used today in the organizations under study.

Figure 4. The values of the current and preferred leadership style noted by the employees of the enterprises under study
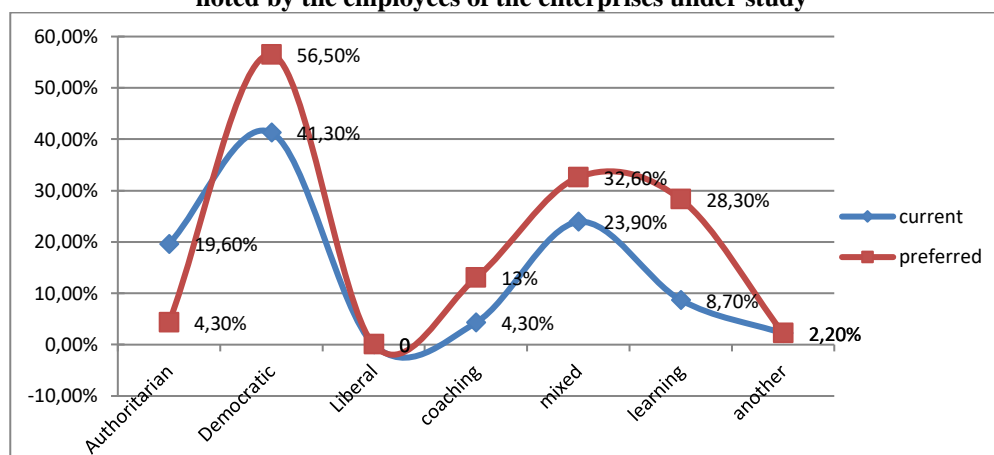
Source: Elaborated by author.

The graph shows discrepancies in the preferred and real management style; at the same time, the majority of respondents lean towards the democratic style and consider it the most used in enterprises, which, in our opinion, is a favourable factor. At the same time, we note a relatively small percentage of respondents who noted the style of management with the use of coaching – in reality, the current one – only 4.3% of cases, and preferably 13%. It should be noted that the main component in building a Living or Learning Organization is the leadership style, which includes such characteristics as coaching, training, and teamwork orientation. As can be seen from the diagram, the authoritarian style is used, 19.6% of enterprises adhere to it, and for 4.3% of respondents it is preferable. This indicates the existence of a traditional approach to managing an organization, which slows down the processes of building a Living Organization.

When characterizing team interaction, the majority of employees believe that team interaction is necessary – 87% of respondents give preference to team work, noting at the same time that their activities are mainly aimed at individual work –

67%, about what percentage of working time is spent in commands are shown in the following diagram:

Figure 5. Percentage of time spent in team work (according to respondents)
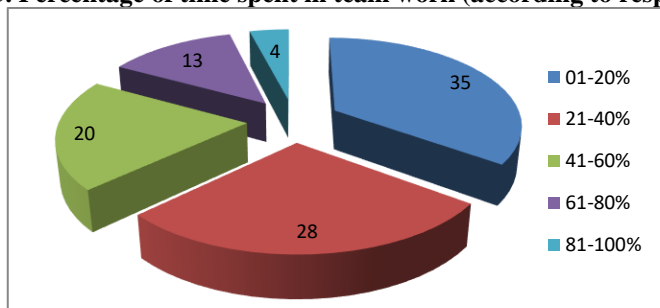
Source: Elaborated by author.

As the figure shows, only a small percentage of employees spend in team interaction: only 4% of employees note that they devote 80-100% of their time to teamwork, and the majority of employees note that less than 50% of the total working time is involved. This is contrary to the concept of learning, or living organization, in which all participants in the activity are an integral system, and the key to successful activity is the power of interaction, thereby obtaining a synergy effect and, as a result, increasing the efficiency of the organization.

When exploring the features of building business models, it is necessary to pay tribute to all elements of the business system (processes, technologies, people, structures, and corporate culture). As part of this study, we asked the respondents if there were organizational changes in their companies and what elements of the system they were associated with. We believe that this question logically represents the concept of a living organization in the context of its organic adaptation to ongoing changes. The responses of the respondents were distributed as follows (Figure 6).

Figure 6. Types of changes carried out by the studied companies over the past 3-5 years
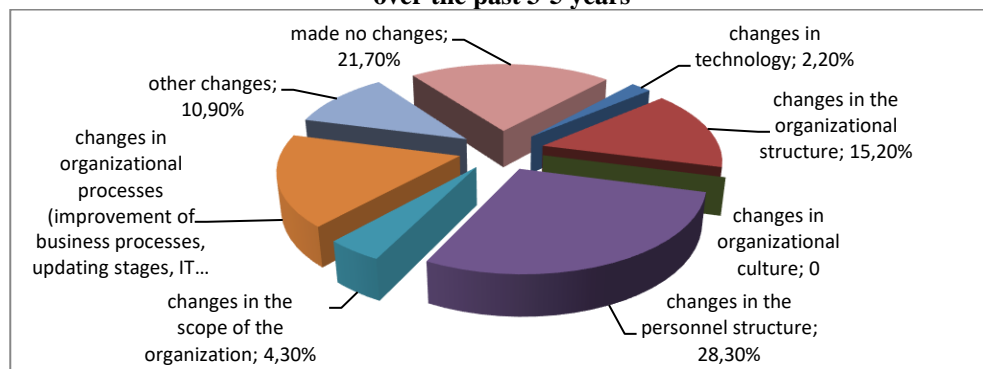
Source: Elaborated by author.

The diagram shows that in 21.7% of the companies no organizational changes were carried out at all, which, in our opinion, is unacceptable, taking into account the peculiarities of the functioning environment. In addition, of those enterprises that carried out transformations, not a single company carried out changes in organizational culture, which indicates a lack of understanding of the importance of this element of the business model. Most of the changes, namely 28.3%, were made in the composition and structure of the staff, which, in our opinion, is associated with a partial reduction in staff during the quarantine period associated with the COVID-19 pandemic.

On the issue of emphasis in organizational development, the majority of respondents tend to believe that employees should be involved in the decision-making process, regarding the strategy of change: 73.9% of the staff believe that a mixed approach should be used in relation to the initiation of changes, that is, the right to initiation can come both from the bottom-up and from the top-down. In addition, 69.5% of the respondents share the need to involve employees in decision-making processes. Note that, for a learning organization, this percentage is small since in organizations of this type, all personnel, without exception, participate in the decision-making process, are free to express themselves, and are not afraid of criticism.

6. Conclusions

Realizing the main goal and objectives of this study, we will justify the logical conclusions.

Based on the results of the study, it can be said with confidence that modern organizations are faced with a number of challenges that have gained maximum scope and extraordinary speed.

The concept of the Fourth Industrial Revolution is much deeper than it might seem at first glance. The emergence of technologies that revolutionize the entire human existence naturally affects management processes. The features of management during this period are associated with unpredictability, so building any static model that assumes the usual interconnection of elements does not seem logical. In this context, it seems most relevant to use the concept of a Living or Learning Organization, which will naturally respond to all the challenges and provocations of the environment.

Artificial intelligence and digitalization technologies are already gaining a leading position in many areas. This is due to their incomparable advantage in the field of efficiency, speed, and error-free. But, at the same time, technologies should develop and act for the benefit of human society, facilitate work, reduce costs, free up time for creative processes, and spiritual development.

Thus, in a Living Organization, the technical and social components should be organically combined. Since for the Republic of Moldova the dominant number of enterprises belongs to the SME sector, this study is devoted to identifying the directions for the development of enterprises in this sector in a complex environment that is emerging under the influence of Revolution 4.0 technologies.

The study shows that in many cases, enterprises have not yet developed a clear understanding of the need for changes (in 21.7% of cases, organizational changes have not been carried out in any direction for 3-5 years), many organizations still use an authoritarian leadership style (19.6%), team interaction is not always seen as a factor in successful organizational activity (only 17% of employees spend 61-100% of their working time through team interaction). These and other features of the activities of SMEs testify to the predominance of the traditional, bureaucratic approach to management, which for the most part is not appropriate when it comes to changes of this kind.

Of course, the difficulties in transformations of this kind are also associated with objective factors: financial difficulties that have worsened during the pandemic and, at the moment, political instability; inflationary processes that affect the performance of organizations, increased competition, etc. At the same time, the correct organization of many processes, the introduction of modern technologies that significantly increase the efficiency of business processes, as well as the formation of a new type of organization, are integral success factors for SMEs in a complex and undefined environment.

Acknowledgment

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The Perception of Use of Social Media and Online Pharmacies by Lebanese Pharmacists: A Quantitative Study

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Abstract

As the use of online platforms and digitalization is increasing, the use of social media by pharmacists and the adoption of online pharmacy has been a trend worldwide. To date, limited data is available on Lebanese pharmacists and their use of social media and online pharmacies as platforms to improve engagement with patients. This research aims to study the Lebanese pharmacists' perception of the use of social media platforms and online pharmacies. A quantitative study was conducted by distributing a survey to 250 pharmacists. The results showed that pharmacists are willing to use social media more than owning an online pharmacy, although both have a financial advantage and improve patients' satisfaction, where pharmacists questioned the misuse of online medications, the risk of marketing prescription-only products, and the existence of illegal pharmacies. Moreover, social media was perceived to improve the communication with patients and provide the necessary medical knowledge.

Keywords: Online pharmacies, pharmacist, social media, patients, marketing.

JEL Classification: M31.

1. Introduction

An expected 2.4 billion people overall used the Internet in 2011. This expanding utilization of the Internet and its connected advances has empowered the ascent of web-based media stages, counting Facebook, Twitter, MySpace, and Google+. All things considered, these kinds of intuitive frameworks are also known as Web 2.0 (Mackely, Liang, 2013). Digital marketing demands the use of Internet portals to market products and services, yet, in addition including ads, cell phones, and other computerized media (Nikolov et al., 2021).

The pharmacy area is not resistant to inescapable digitalization. Developments, like robots, have disturbed the drug store practice (Peltoniemi et al., 2021). Pharmacies are utilizing leaflets and posters to showcase a specific medication or

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health topic. They likewise include the drug specialist or an individual from the drug store group giving of their time and aptitude to help patients. Social media marketing offers pharmacists imaginative chances to associate with patients and further upgrade their wellbeing (Kayyali, Crilly, 2016). Social media marketing is considered one of the techniques utilized by businesses to familiarize their customers with their products and build a customer pool with which they can engage and interact (Nikolov et al., 2021).

Another significant component influencing the pharmacy sector is the online pharmacy. An online drug store is an organization that sells drugs, prescription-only and non-prescription medications, by means of web-based requesting and mail delivery (Orizio et al., 2011). Online drug stores are using various types of innovation to expand and upgrade their webpage usefulness, for example, video real time on wellbeing subjects and portable applications and text updates for requesting rehash solutions (Gray, 2011).

The purpose of this paper is to study the Lebanese pharmacists' perception of the use of online marketing, mainly social media and online pharmacies, to market medication and health information to patients. The research will highlight the importance of social media marketing and online pharmacies in engaging with patients, servicing them, and building relationships with various customers to overcome intensive competition.

As limited research is available to point out the importance of use of online pharmacies and social media by Lebanese pharmacies and pharmacists' perception of the use of online marketing, this paper will help researchers and pharmacist build an idea about the integrating of online channels, improve their marketing strategies, and initiate their business growth.

2. Problem Statement

2.1 Social Media Use by Pharmacies

As social media is becoming a popular tool, pharmacists and patients are adopting it for the purpose of education, where pharmacists will observe social media as a speedy and advantageous tool to monitor patients' wellbeing and support the extensive public with medical advice (Kayyali, Crilly, 2016).

According to Ibrahim et al. (2020), a survey in the UAE on 267 respondents; 150 patients and 117 pharmacists; showed that 61.5% of the pharmacists use social media as a communication tool and 52.1% of these pharmacists use it to answer patients' questions. Among the most tools used to communicate with patients, 74.4% used WhatsApp followed by Email (41%), Facebook (37.60%), and Instagram (18.80%). Moreover, 51.3% believe that social media should be regularly adopted by pharmacies and 65% stated that social media enhances patients' health information. Furthermore, 77.3% of the patients revealed that they use social media to explore medical data related to their diseases and medications, 52% stated that getting to wellbeing related data ought to be allowed yet with close checking, while 44.7% said that it ought to continuously be allowed. Additionally, 60.7% of patients

prefer to use Instagram as a communication tool followed by WhatsApp (26.70%), Twitter (24%), and Facebook (22%).

A survey distributed to 273 pharmacists in Alberta by Barry & Pearson (2015) showed that of 226 pharmacists who use social media, 61.1% use it for professional purposes. Barriers to social media use was perceived to be professional accountability (47.6%), no benefit of using social media (35.5%), and lack of time (30%). Furthermore, 25.1% stated that they will use social networks professionally in the future.

According to a study conducted on a total of 1000 pharmacies in the Republic of North Macedonia, 18 of the pharmacies have an active website, 535 of the pharmacies use a personal website to provide information to patients, 670 use Facebook, 236 use Instagram, 520 have a Facebook account and a website, and 330 pharmacies use none of the digital tools (Nikolov et al., 2021).

According to Lombardo et al. (2019), a questionnaire on 668 community pharmacists conveyed that 41.8% of the pharmacist use social media, 82.4% use Facebook and 6% use Google⁺.

2.2 Online Pharmacies

Online pharmacies have many advantages, from selling medications and other healthcare products to providing medical data (Gray, 2011).

According to a literature review on 193 articles focusing on online pharmacies marketing proscription-only products, Orizio et al. (2011) revealed that the main concern with online pharmacies is the misuse of medications and the negative effect it will have on the patient-physician relationship as patients will be able to get their drugs online without appropriate consultation. On the other hand, not posting drug information for patients will minimize awareness and the patients will not be aware of the side effects or contraindication of a certain drug. Thus, pharmacists are responsible for posting information regarding the risks or adverse events of using a certain brand.

According to Ndem et al. (2019), a survey on 60 community pharmacists in Nigeria showed that 92% consider online pharmacies as a way to promote pharmaceutical care, 73% are willing to offer the service, 68% believe that online pharmacies are convenient to patients, and 80% are concerned with counterfeit medications.

A questionnaire targeting 338 community pharmacies in Europe indicated that 50.6% have a website and of these 39.3% use their website as an online pharmacy (2.3% use it for prescription-only and OTC products, 54.9% for other products, and 38.3% for all kinds of products) (Lombardo et al., 2019). Table 1 represents some of the studies done on social media use by pharmacies and the use of online pharmacies.

Table 1. Previous Studies on Social Media and Online Pharmacies

Author (year)	Topic
Fittler et al. (2018), Abanmy et al. (2017), Yang et al. (2001), Gurău (2005), Roblek et al. (2018), Büttner et al. (2005)	Online pharmacies
Antheunis et al. (2013), Cutts et al. (2014), Benetoli et al. (2017), Moorhead et al. (2013)	Social media use by pharmacies

Source: Extracted from Literature.

3. Research Questions

Studies supporting the perception of use of digital tools by pharmacies in Lebanon are still not appropriately researched. To support the market with more data, this paper will answer the below research questions:

Q1: What is the pharmacist perception of the use of social media as a marketing tool for their pharmacies?

Q2: What is the pharmacist perception of the use of online pharmacies?

4. Research Methods

Primary and secondary data was collected to measure the pharmacist perception of the use of social media and online pharmacies to boost their business growth. Secondary data was collected from scientific articles through accessing different databases and resources, while the primary data was collected through distributing a questionnaire to 250 pharmacists in Lebanon between December 15, 2021 and January 31, 2022. The survey was established through Google forms and distributed through email and WhatsApp. As respondents voluntarily chose to participate in filling the questionnaire, the sampling technique is considered a non-probability sampling. After collecting the data, a descriptive statistical analysis was conducted. The questionnaire included 15 questions covering demographic information and questions regarding the pharmacists' perception of the use of social media and online pharmacies for professional purposes.

5. Findings

From the 250 pharmacists who participated in the survey, 110 respondents were males and 140 were females. In addition, most of the respondents were between the age of 35-54 years old (Table 2).

Table 2. Gender, Age, and Experience

Gender	Male	44%
	Female	56%
Age	25-34 years	16%
	35-44 years	36%
	45-54 years	30%
	Above 55 years	18%
Experience	0-9 years	30%
	10-19 years	16%
	20-29 years	34%
	30 and above	20%

Source: Author's development.

According to Figure 1, for professional purposes, 39.2% of the pharmacists use WhatsApp, 9.2% use Instagram, 14.4% use Facebook, 3.2% have a TikTok account, less than 1% have an online pharmacy and 33.2% do not use any of the online platforms.

Figure 1. Online platforms used professionally by pharmacists
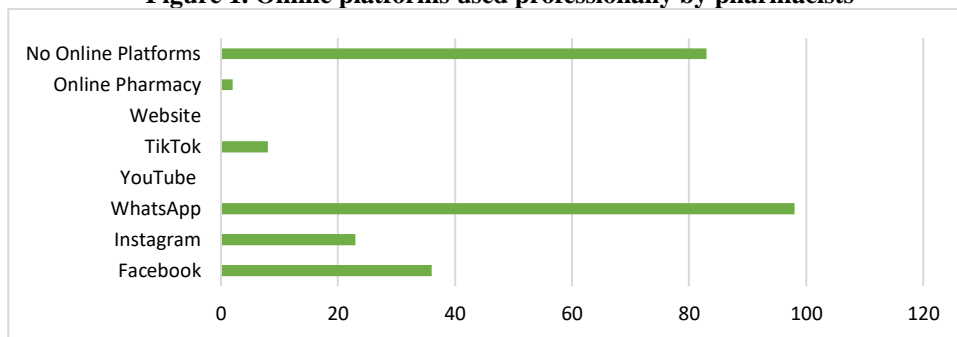
Source: Author's development.

According to Figure 2, 40% of the pharmacists strongly agree that patients' use of social media will help them gain medical knowledge, 55% agree, and 5% were neutral. On the other hand, 33% of the pharmacists strongly agree that social media enhances communication between the pharmacist and the patient, 51% agree, and 16% were neutral.

Figure 2. Advantage of social media
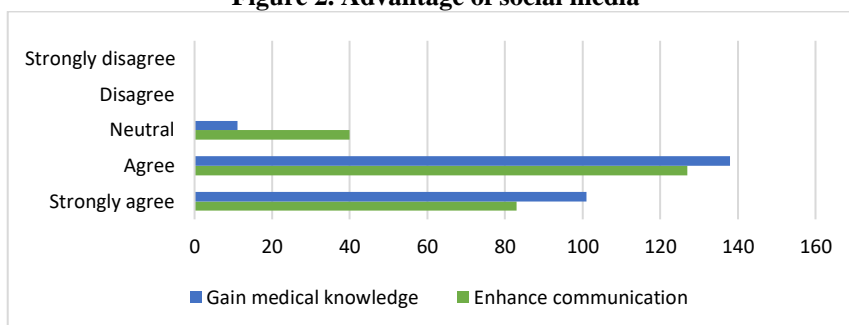
Source: Author's development.

As shown in Figure 3, 40% strongly agree to use social media in the future, 55% agree, and only 5% were neutral.

Figure 3. Pharmacists' perception of the use of social media in the future
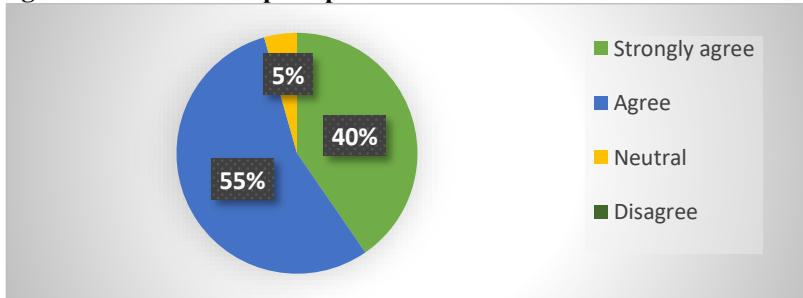
Source: Author's development.

According to Figure 4, 31% of the pharmacists strongly agree that online pharmacies affect positively the financial status of the pharmacy, 63% agree and 6% were neutral. However, 21% of the pharmacists strongly agree that social media affects positively the financial status of the pharmacy, 42% agree, 28% were neutral, while 9% disagree.

Figure 4. Financial effect of online pharmacies and social media
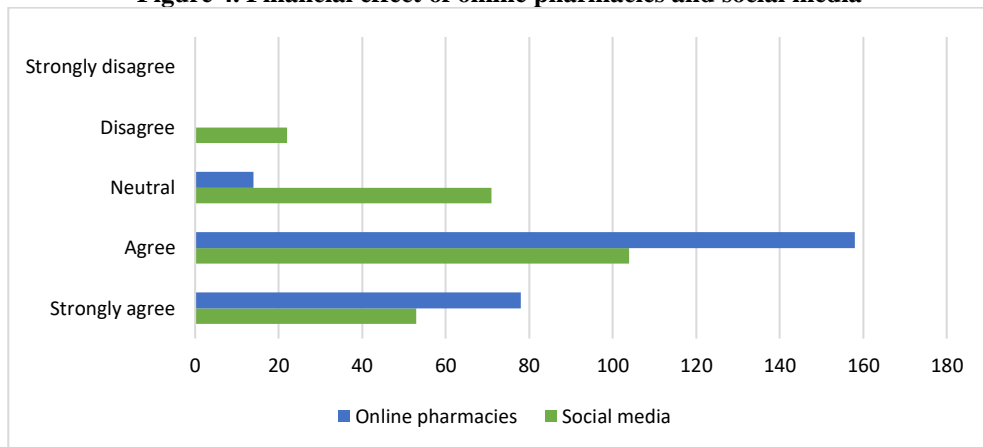
Source: Author's development.

According to Figure 5, 31% of the pharmacists strongly agree with marketing OTC products online, 63% agree, and 6% were neutral. Regarding marketing prescription-only products online, 6% of the pharmacists agree, 22% were neutral, 55% disagree and 17% strongly disagree.

Figure 5. Pharmacists' perception of marketing OTC and prescription-only
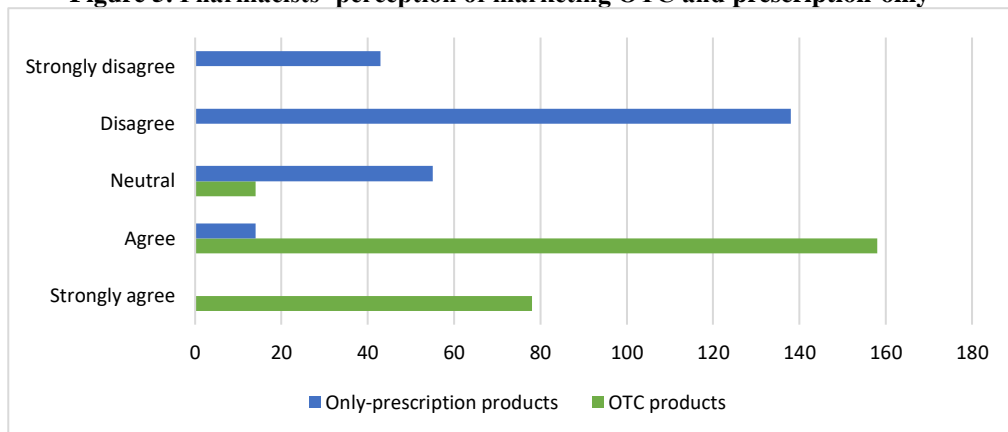
Source: Author's development.

71% of the Lebanese pharmacists strongly agree that they are concerned with illegal online pharmacies and 29% agree (Figure 6).

Figure 6. Pharmacists concern with illegal online pharmacies
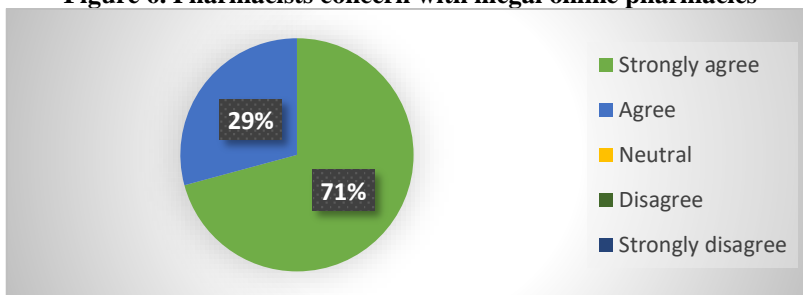
Source: Author's development.

According to Figure 7, 7% of the pharmacists agree that online pharmacies are difficult to apply, 29% were neutral while 52% disagree and 12% strongly disagree. In addition, 28% agree that they are concerned with the misuse of online medications, 66% agree, and 6% were neutral.

Figure 7. Pharmacists' perception of the disadvantages of online pharmacies
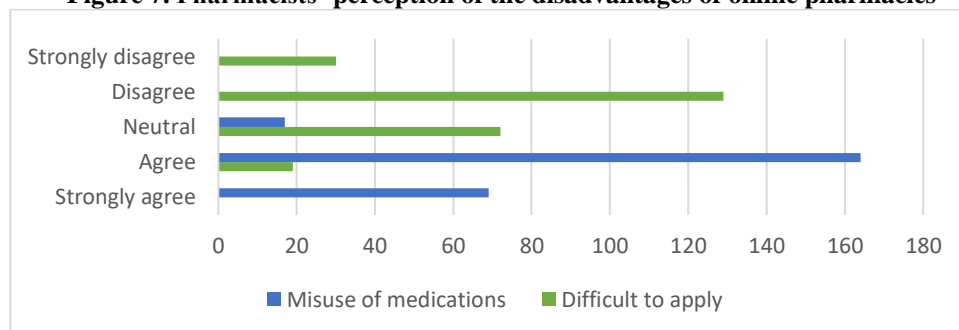
Source: Author's development.

Referring to figure 8, 14% agree to own an online pharmacy, 32% were neutral, 45% disagree, and 9% strongly disagree.

Figure 8. Pharmacists' future consideration of owning an online pharmacy
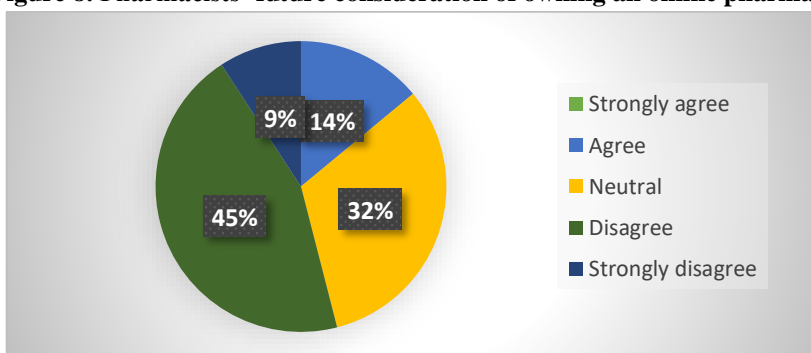
Source: Author's development.

According to Figure 9, 16% of the pharmacists strongly agree that online tools are satisfactory to patients, 69% agree, and 15% were neutral.

Figure 9. Online tool perceived to be satisfactory to patients
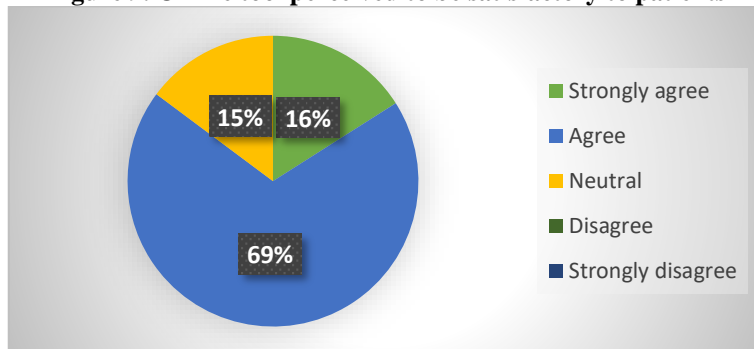
Source: Author's development.

6. Conclusions

When investigating the Lebanese pharmacists' perception of the use of social media as a marketing tool, it was shown that WhatsApp was the major tool used followed by Facebook and Instagram. Moreover, answering the first research question, most of the pharmacists are intending to use social media more frequently as they consider it an effective tool in supporting the pharmacy financially and in communicating and educating patients as shown by Nikolov et al. (2021). Although 33.2% of the pharmacists still did not use any online platform; however, most of the people use at least one of the social media platforms and they usually search for any information they need to know. Therefore, patients will gain more medical knowledge if pharmacists post health-related data to educate patients about medications.

Online pharmacies are still not a trend in Lebanon, where of the 250 pharmacists, only 1% owned an online pharmacy although most of them agree that it will improve the financial status of the pharmacy. Despite that pharmacists perceive that online pharmacies are easy to apply; however, they were concerned with the existence of illegal pharmacies and the misuse of the drugs where most pharmacists did not support the marketing of prescription-only products and supported more the marketing of OTC products. This result was approved by Lombardo et al. (2019). These concerns and whilst pharmacists agree that online platforms increase patient satisfaction; on the other hand, pharmacists prefer not to own an online pharmacy in an attempt to control drug prescriptions and dispensing of medications and to use social media as an awareness tool to educate patients, and this answers the second research question.

Oppositely, the limitations of the study lie in Lebanon's economic situation that can impose an unfair competition and affects pharmacists' opinion in owning an online pharmacy or paying for social media marketing. In addition, most of the participants were above 35 years and, usually, younger people tend to use more

online platforms than older people, keeping in mind that pharmacists possess more medical knowledge than technological knowledge.

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Quality Management in Health Services – Theoretical Perspectives

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Abstract

Improving the health of the population is the primary goal of medical activity. Health services include all categories of personnel, financial capital, equipment, medical instruments, medical supplies, and computer systems, which are used to provide health care that aims to improve, maintain, or restore the health of the population. The quality of health services is a complex of factors, and at the level of the health unit may include specific objectives: ensuring patient satisfaction, involvement of a competent human resource, ensuring the economic and financial balance of the unit, using the quality system in health activities. The management of public and private hospitals must be concerned with the continuous evaluation of the quality of the services provided, and the optimization of the quality should be the result of a feedback from the service users. This paper aims to investigate the quality management in health services from a theoretical perspective and to evaluate the results of previous studies on this topic. The results can help health care decision makers and it can contribute to future applied research that follows this direction.

Keywords: health care, medical services, quality management, quality attributes, patient satisfaction.

JEL Classification: I12, I14, M12.

1. Introduction

The quality of medical services is an activity of great importance for managers, patients, and the bodies that ensure the payment of medical services, to the same extent. The health sector has a high consumption of financial resources that lead to high costs for the whole society and whose causes can be: obsolete medical equipment, considerable differences in the performance of practice between hospitals, unequal access to health services, patient dissatisfaction with services received, long waiting time for access to health services (Berman, 1995; Correia, Dussault, Pontes, 2015).

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It is important for the patient to have quality and safe medical services. The hospital wants to provide quality services that build trust for patients and the community (Berry, 2019), although it can be challenging for managers to put innovation into practice and turn an abstract idea into tangible, significant activities (Dima, 2020). Medical staff want the opportunity to demonstrate their experience in a supportive work environment, and insurers and authorities want quality medical services to be provided, standards to be introduced, and procedures and protocols to be followed, favouring increased patient satisfaction.

2. Literature Review

According to the World Health Organization, the quality of the services received by the patient in the healthcare process represents the totality of the diagnostic and therapeutic processes provided for the best result, at the lowest cost and with the lowest risk, which would favour the patient's satisfaction regarding the procedures received and the contacts with the medical staff of the respective health unit (Syed et al., 2018).

In the chain of quality of health services, there are key points of managerial control that allow systematic active and passive feedback in the systemic thinking and are the basis for continuous quality improvement. Active feedback can be obtained through activities to periodically assess the satisfaction of inpatients, regarding the quality of services provided by the health unit and which can initiate a new cycle of change in managerial activities, in favour of the patient.

An important indicator of the quality of health services is patient satisfaction, and from a management point of view, effectiveness is highlighted in the achievement of objectives, and efficiency is represented by the lowest volume of resources used to achieve objectives. According to the WHO, the performance of health units can also be represented by the following: meeting the needs of the population, the qualification of medical staff, placing the patient at the centre of the medical system, and patient safety (Carayon, Wood, 2009; Classen et al., 2021). Healthcare facilities are helped to use best practices in hospitals through a theoretical model of hospital performance developed by the World Health Organization (WHO) – Performance Assessment Tool for Quality Improvement in Hospitals (PATH) (WHO, 2007).

At the European level, since 1997 the Council of Europe has made recommendations for the implementation of quality improvement models in healthcare, and in 1999 good practice guidelines were published to ensure efficient and effective healthcare. The essential elements of the performance of the health units consist in: the use of standardization, of the statistical indicators of the managerial performance, as well as the accommodation conditions, the level of the infections associated with the medical act, and the available technologies.

The performance of a hospital, the user's expectations are defined with the help of hospital standards, and to these are added the structure and processes that take place in the health unit and must ensure quality care, treatment and services, safe services, and adequate to patient expectations. The standard is, in fact, the expected value of the service in question or the level to which it is intended, in relation to the

elements of analysis of the health unit. The development of standards applied in health facilities is done in accordance with the international principles enunciated by ISQua (International Society for Quality in Health Care). The application of standards allows hospitals to improve the quality and performance of their services, which is also necessary for their reporting to the whole healthcare system.

For a health system to be effective, it is necessary for the people involved in the management of the health units to evaluate the performance and to draw up strategies that will favour better results (Campos, Reich, 2019). The concept of performance in the idea of the WHO is built on three fundamental pillars (WHO, 2007):

1. improving health - is the most important principle of the health system and translates into improving health and reducing inequalities in the population, in terms of access to health services.
2. increasing the capacity to provide medical services, correlated with the wishes of the population, which includes respect for the person (respect for human dignity, confidentiality) and patient orientation (providing the necessary care as soon as possible, the possibility to choose the service provider);
3. ensuring the fairness of the financial contribution.

Gakidou, Murray, and Frenck proposed a general framework for understanding the performance of health systems (Gakidou, Murray, Frenk, 2001). Since 2000, there has been a report recording data on how to provide healthcare in those countries, which are in the annexes to the World Health Report. The evaluation of the performance of the health systems is made by the ratio between the achievement of the three basic goals and the endowment and capital of the health unit, and the performance materializes in the examination of the way in which the medical assistance was provided and the patient's satisfaction depending on the resources used.

Improving the health of the population is the primary goal of medical activity (Lee, Porter, 2013) and must be correlated with both the average level of health and the distribution of health inequalities in the population. The increase of the response capacity, of the health system to the expectations of the population, is the second objective; in this sense, people must also take into account the inequalities in distribution and the differences related to social, economic, and demographic factors.

The provision of health care must be done independently of the financial contribution of the individual (Cohen, Flood, 2022), the contribution should reflect the difference between rich and poor, in terms of disposable income after meeting basic needs. According to Gakidou, Murray, and Frenck (2001), the way in which healthcare is provided in each country is a political decision, and the level of capital invested in health can lead to a quantification of the performance of the whole system.

3. Research Methodology

The main objective of the present empirical research is to investigate the quality management in health services from a theoretical perspective and to evaluate the results of previous studies on this topic. Therefore, qualitative research was selected

and in this direction. Various case studies and textual analysis of journal articles, books, and reports that address the issue were analysed. Thus, the secondary objectives of this paper are the following:

- (O1) investigating the main aspects of the healthcare system performance from a theoretical point of view;
- (O2) analysing the quality management and highlighting the main attributes of quality;
- (O3) presenting the relationship between users and health care providers from the quality and performance achievement perspective.

The results of this research may be the foundation of future actions for health care decision makers, or it can contribute to future applied research that follows this direction.

4. Quality Management

Schneider and Palmer (2002) describe quality as: "providing accessible and fair services, at an optimal professional level, taking into account the available resources and obtaining user adherence and satisfaction." A study by Donabedian (2005) concluded that "the need to assess quality with a focus on understanding the healthcare process itself" should be replaced.

In a more modern sense, quality has been considered to be the degree to which the health service increases the probability of the expected outcome of health (Fallon, 2002). The definition given to quality by the ISO 8402/1995 standard is: the totality of the characteristics of an entity, which gives it the ability to meet the known and potential needs of the user. Or, quality is the satisfaction of users' needs through solutions of an optimal technical level and at an affordable price. Quality is considered a fundamental condition that helps public and private organizations to remain competitive (Dobrin et al., 2015).

The graphic representation of quality can be done using a triangle whose components are: management (leadership), work team, or quality team and problem-solving tools. The quality team and the tools are at the base of the triangle because they are the components in the daily relationship with the user, and the management is at the top of the triangle because without his contribution quality assurance would not be possible, according to Figure 1.

Figure 1. The quality triangle
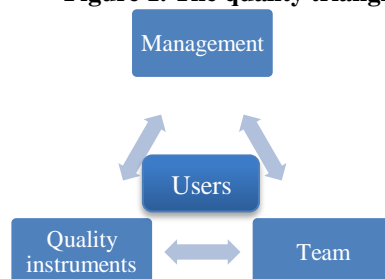
Source: Author, based on literature review.

5. Attributes of Quality

The attributes of quality in the health system are (Bowers, Swan, Koehler, 1994; Venkateswaran, 2019):

1. Professional competence: which in medical staff is reflected in their technical, administrative and interpersonal communication skills; in carrying out their activity, the medical staff offers both technical support, involving clinical, diagnostic, and curative services, as well as the maintenance of the relationship with the patient.
2. The accessibility of the service is highlighted by the absence of barriers of any kind (geographical, economic, social, linguistic, and cultural) to health services. Accessibility is described by three elements: economic costs, degree of access to the service (geographical, access to information), acceptability: cultural, linguistic, and racial. Accessibility is correlated with the number of health units, with their structure that is in line with the needs of the population, with the presence of qualified staff and the existence of appropriate equipment.
3. The effectiveness of a rule or procedure is also very important for the service or rule to be applied correctly and to produce positive results, for its realization it is necessary to have adequate training and thorough knowledge that must be taken into account.
4. User satisfaction is given by the way in which health services meet the needs of the population, patient satisfaction depends on solving his problem, the treatment received and the degree of empathy with which the service is provided, and the care received.
5. The efficient use of available resources is important so that the patient and the community receive the necessary care. Efficiency is demonstrated when professionals use time, materials, funds, and information in order to produce as many services and quality as possible. Efficiency means reducing the number of low-quality treatments, which result from incorrect diagnoses or the application of poor standards, as they are a waste of resources.

It is also important for each employee to know the processes in which he or she participates, to have the correct data collection and the transmission of information so as to participate in the change processes initiated. Addressability to health services has several implications, it depends on several factors (Dumitrache et al., 2016), the most important being the quality of services provided to the population; then there are the costs of these services, correlated with the legislation governing the provision of healthcare. Other factors that influence addressability are: the level of culture, schooling, and level of health education of the population.

The patient has the right to free address in terms of healthcare. Patients have certain preferences, when they go to the health units, they can be in accordance with certain aspects: they choose a health unit where they have been treated and received the best care, it is the unit closest to home, and it is the unit where was guided.

6. The Relationship between Users and Health Care Providers

The needs of the user are met by correlating the quality tools with the management and work team of the respective organization. The literature describes the following types of needs of users (Kaufman, Rojas, Mayer, 1993): existing needs, felt needs, needs that produce demand, needs that stimulate the use of health services. They are not necessarily curative. Through its requests, the user produces demand, which must be satisfied even if they have variable chances of success, it is correlated with the offer of services and their quality, ability to pay, access from a geographical point of view.

There is always a part of the needs that is not met, despite the large number of services. This may be due to the fact that the supply does not meet the demand (misdiagnosis or poor quality of services). In this situation, there is also the system of alternative health services: certain healers, family or self-medication, they will respond to those needs that are not met by the formal system.

It is found that not all health services are used, although there are expressed needs of users, this may be due to the low quality of a service which will lead to the perception of the low quality of those services and which is increasing among users. According to Voorhees, Brady and Horowitz (2006), "every dissatisfied user will tell about his experience to 11 more people, while one satisfied, only 3 people".

As an example, in the literature (Lee et al., 2010) it has been found that patient dissatisfaction comes from: increased waiting time, for a percentage of 19.3% of cases, staff is not always present at the scheduled time, in 15% of cases, the absence doctor, in 13.4% of cases, the application of incorrect treatment, in 9.4% of cases and a high cost of medical services for 3.1% of cases.

In order to increase the quality of the services, the user's problems and needs must be closely known, using fast and efficient techniques, so that the services provided can respond exactly to the user's problems. These indirect techniques used as quality tools to determine needs are correlated with the source of the information. Another category can be direct observation techniques with which to analyse the health problems of the population and analyse the use of services by it. Another option is consensus techniques, which select important issues for both users and health services. Elements for quality assurance in a health unit will be found in the mission and vision of the health unit, in a solid quality improvement program, in the existence of professional standards that apply in the health unit, and an external evaluation of the unit that ensures medical services.

For the evaluation of the quality and performance of health systems, for the verification of the performance of the activity to achieve a specific objective, indicators are used which are tools associated with the operational procedures (Kruk, Freedman, 2008). The indicators are: structure (assess the extent to which patients can receive appropriate and timely health care), process (represent the totality of events that occurred during the care), and outcome (are the clinical results, the final effects of medical services).

Examples of structural indicators:
- availability of equipment (endoscopes) for investigations provided in the protocol / number of patients, for which the protocol is required / month, year;
- availability of the drug X, according to the protocol / inpatients / month, year. Examples of process indicators:
- number of interclinical consultations / number of patients with the same main diagnosis;
- number of specific tests / hospitalized patient;
- number of adverse reactions, incidents / in X patients treated. Examples of result indicators:
- improved number of outpatients / total number of outpatients;
- number of deaths / total number of hospitalized patients.

For each operational procedure developed, in order to monitor it, the indicators associated with the activity performed will be identified, indicators that measure the degree of compliance with the procedure. Improving the individual performance of the members of the organization leads to an increase in the performance of the organization, all this is achieved through a good management of human resources and personnel management (Papa et al., 2018). It is important for the success of the organization to hire adequately trained staff, in sufficient numbers in the right place and at the right time, and also the existence of a human resources planning process (Potcovaru, Girneata, 2015).

Staff performance evaluation is a very important aspect of human resources, and in order to be effective, it must be tailored to each position, be practical, have clear evaluation criteria, and contain valid, reliable measures, and be managed by competent persons.

7. Patient Satisfaction

Patient satisfaction is an important measure of the performance of the organization in which the care process takes place and is combined with the conditions in the health unit, with the experience and professionalism of the medical staff, and with the material endowment (Al-Abri, Al-Balushi, 2014). Patient satisfaction can be interpreted as a level of patient satisfaction with the care provided. According to expectations theory, satisfaction is the correlation between what the patient wants and the extent to which his desire has been satisfied, but it is necessary to know the needs of patients (Verbeek et al., 2004).

Patients' expectations are different, they can be correlated with: age, pathology, socio-cultural, demographic, and professional characteristics. There are the following categories of patients' expectations: those related to the endowment of the health unit, psychosocial needs due to hospitalization (the patient is anxious because he was disconnected from his family environment), material and intellectual needs.

Elements of performance most often cited by patients are: the effectiveness of care, the adequacy of care, the availability of care, the timeliness of care, the quality of care, the continuity of care, the safety of care, the effectiveness of care, respect, and goodwill on the part of the provider. From the patient's point of view, there are

aspects of satisfaction that must be taken into account, such as: medical care and communication; food and accommodation facilities; the atmosphere in the health unit, the care provided by nurses, and the organization of visits. In the literature, components of the aspects of satisfaction are described as the following: humanism, information, quality of care, competence, patient satisfaction, treatment administration, etc. (Hermann, Long, Trotta, 2019; Hu et al., 2019).

It was also found that there is a direct proportional relationship between providing respect for the patient, providing more information, and the patient's participation in the treatment process and increasing his satisfaction. Patient satisfaction is also influenced by technical equipment, so hospital managers must ensure a high standard of technical equipment. Accessibility refers to the physical location and facilities provided, the availability of equipment, scheduling, and access to healthcare (Ng, Luk, 2019).

In order to improve patient satisfaction, it is necessary to maintain high standards of hygiene and cleanliness, to develop the skills and abilities of the staff. The attitude of the medical staff and especially of the doctor is very important to the patient. This has been demonstrated in a study by whose results led to the conclusion that patients consider their primary care physician the one who cares most about them, respectively, the resident physician, and the satisfaction with the physician was 90% (Dalia, Schiffman, 2010). Similar studies were conducted in Greece (Matis, Birbilis, Chrysou, 2009) which assessed the satisfaction of hospitalized patients and their questioning of medical services, accommodation conditions, nutrition, and staff attitudes. A comparative study was conducted between hospitalized patients in Poland and Greece and found that men were more satisfied with the quality of care provided by doctors compared to women participating in the study. Elderly patients were the most satisfied with the care of nurses, and the period of hospital stay is negatively correlated with the overall satisfaction of the patient (Raftopoulos, Theodosopoulou, Nikolaos, 2007).

The patient is an important part of the care process; he must understand what a certain procedure or intervention consists of, for the acceptance of which he must give his consent.

Analysing the health ranking of countries according to the Statista Research Department report published in 2022 based on data available in 2021 (Figure 2), it can be seen that the first three countries are: Japan, Singapore, and South Korea. This ranking shows the degree to which people are healthy and have access to the resources required to maintain good health, including mortality rates, sickness and risk factors, health outcomes, and healthcare systems. Therefore, the three countries have the best healthcare systems in the world, pay great attention to the health of their citizens, and have the most satisfied patients.

Figure 2. Health and health systems ranking of countries (2021)

Country	Score
Japan	86.6
Singapore	86.1
South Korea	84.1
Norway	84
Taiwan, China	83.4
Israel	82.8
China	82.8
Iceland	82.3
Netherlands	82.2
Sweden	82.1
Malta	81.7
Luxembourg	81.5
Switzerland	81.5
Finland	81.4
Hong Kong	81.3
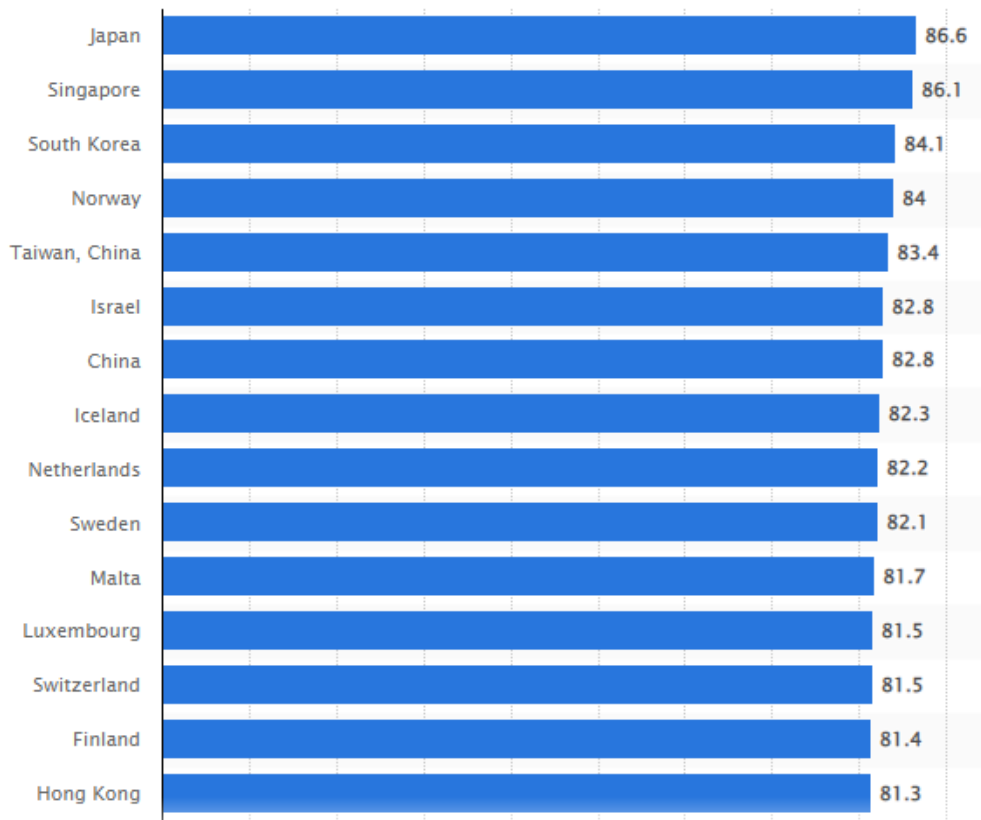
Source: https://www.statista.com/statistics/1290168/health-index-of-countries-worldwide-by-health-index-score/.

8. Conclusions

Previous studies in the literature have shown that the patient is more satisfied when the healthcare provider provides more information, gives him respect, when ensuring the patient's participation in the treatment process. Patient satisfaction is also influenced by the technical equipment, accessibility to services, and availability of equipment, hygiene, comfort, and infrastructure of the health unit.

Another issue, which affects patient satisfaction and has been observed in some studies, is the waiting time for access to healthcare. Longer waiting times were associated with lower patient satisfaction, however, the actual time spent by the physician with the patient was the strongest predictor of patient satisfaction. The decrease in satisfaction associated with long waiting times is substantially reduced with the increase in time spent with the doctor. Another study correlated the waiting time with patient satisfaction and the recommendation for other patients of the respective unit, and the results were that minimizing waiting times in the clinic may improve patient satisfaction but may not affect their likelihood of recommending the clinic to other patients as well.

The endowment of the health units is a reflection of the managerial activity, and the perception of the patients about this can be easily influenced if there is a constant preoccupation for the implementation of the quality standards in the hospital.

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Particularities of Leadership and Motivation in Healthcare Organizations

Yasmin A MOBASHER[1]

Abstract

Health care systems are designed to provide citizens with adequate services to protect their health, according to their regularly assessed needs. Hospital-level leadership is a challenge in any country and health system, especially in an economic crisis and in the context of recent developments and health care reforms. Leadership in the hospital has special features, which are related to the specifics of the medical activity carried out and the evolution of models and styles that prove their effectiveness, playing a major role in the success of these organizations in today's competitive environment. Motivation is essential in any public or private organization but a difficult condition to manage to achieve performance in the workplace. The motivation of medical staff is related to the specifics of a country and region, with important socio-cultural differences. Good hospital managers are able to anticipate important staffing needs to motivate people accordingly. The current empirical research aims to investigate the peculiarities of leadership and motivation in healthcare organizations. The conclusions of this article could help health care decision makers channel their actions towards attracting the best specialists, equipment, and resources to the hospital and achieving motivation and professional satisfaction of the medical staff which is vital to any performant hospital.

Keywords: leadership, motivation, healthcare, job satisfaction, motivational factors.

JEL Classification: I12, J24.

1. Introduction

The motivating factor is essential in any organization and institution, regardless of field, level, or size. In order to motivate people, managers need to know what their main values and needs are, and then to understand what motivates employees to adopt a certain attitude and develop behaviours that will achieve the desired result or achieve the pursued goal in different contexts (Breaugh, Ritz, Alfes, 2018). The literature in the field has developed accordingly, especially theories and studies on

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staff motivation (De Simone, 2015; Rahbi, Khalid, Khan, 2017; Lohmann et al., 2018) despite the difficulty of measurement, and the concept of motivation in and for work has changed over time. People's motivations are diverse and different, but regarding work motivation, there are: financial and non-financial, each with its own importance.

Leadership in the field of health care services has been little approached in research that deals with the subject in terms of the complexity of hospital-type organizations (Hartley, Benington, 2010; Hahn, Gil Lapetra, 2019). There are certain trends in the global approach of health leaders and professionals, especially in terms of their motivations and leadership styles. Researchers in the field emphasize the overwhelming importance of the human health factor (Potcovaru, Girneata, 2015), especially physicians, in the quality of services provided and the effects of these services on patients. This influence involves the specificity of the health services market, respectively, of the main phenomena that shape it so differently: the strategic importance of human health and implicitly of the health sector, the very personal character of health care, high specialization of providers, information asymmetry, demand-induced supply, agency relationship, clinical risk associated with services (especially hospital services), moral hazard, adverse selection, presence of merits and externalities, market failure.

2. Literature Review

Leadership enjoys a growing interest in politics, business, the press, online, and academia. The value that the great leaders of the world attach to the image, attitude, way of presenting and addressing the public, the messages they convey, the charisma, the way they exercise their power and, implicitly, the advice they receive for to enjoy popularity, recognition, influence, achievement of goals, and even domination cannot be ignored. Therefore, the number of theories, research, and publications and events on leadership topics is relevant. The vision of the concept of leadership can differ significantly by addressing its personal characteristics – charisma, intelligence (including emotional), determination, extraversion, fluency, integrity, and more, or through the process of direct interaction between the leader and his followers, increasing and availability (Northouse, 2013).

Relevant research on scientific publications on this topic from 1900-2020 identified more than 200 different definitions of leadership. From the multitude of definitions of the concept, it can be concluded that genuine leadership is the ability, desire, and strength to mobilize, influence, and coordinate a group of people around achieving a common goal, project, including personal example.

The management literature signals performance issues at the level of organizations due to the fact that they adopt a certain frame of reference that can make them inflexible to consider other approaches and other solutions. The much faster pace at which new medical services are being developed requires the integration of patients' needs and the participation of some of them from design to implementation and validation of results. The importance of consultative processes is critical to success, and from this perspective a solution can be the development of

new services, with the support of interdisciplinary teams involving medical experts, various stakeholders, and patients. Solutions whose design and implementation have been made with the participation of stakeholders are more likely to be accepted and effective as they already integrate their needs.

A wide range of researchers believe that the motivation of individuals, including the motivation to work, involves a considerable degree of subjectivism and variability, even for the same person at different stages of life and personal and professional development, and is therefore difficult to measure, to be compared, and evaluated. Many authors have considered three defining elements of motivation, according to which they analyse this concept and related theories, and namely: direction, effort, and persistence (Armstrong, 2009; Robbins, Judge, 2013).

Musringudin, Akbar and Karnati (2017) considered motivation to be an essential but difficult condition to manage in order to achieve performance in the workplace, along with other aspects - individual skills and environmental factors. The human resources approach supports the idea that people naturally like to participate, work, and make their own contribution to the workplace, one that matters, which has led many contemporary employers to invest, e.g., in a better and more appropriate organization of the work environment, to value their own human capital, and to take more into account the needs of people both as employees and as individuals. These authors also emphasized the complexity of the structure of motivation, as in Herzberg's theory: motivational factors that fuel and determine job satisfaction – recognition, fulfilment through professional activity itself, self-definition by profession – especially in the medical field, responsibility, promotion , growth and development; and the "hygienic factors" that affect job satisfaction fuel dissatisfaction with it – job stability, payroll, supervision or control, working conditions and environment, labour relations, company policies (Musringudin, Akbar, Karnati, 2017).

Robbins and Judge stressed the importance of elements such as job description and proper design, job design, which positively influences job satisfaction and thus the performance of each person, as well as the appropriate rewards to stimulate motivation and job satisfaction (Robbins, Judge, 2012). According to the Job Characteristics Model, developed by Hackman and Oldham, in order to achieve the expected results at work with a high level of professional satisfaction, the job description and organization must take into account the characteristics and combination of the following elements: range of skills, competencies, and abilities of the employee; the identity of the traced task, the significance of the task or activity; work autonomy; providing feedback (Taylor, 2015). Consequently, job redesign can be successful through professional recognition, diversification, rotation, participation in decision-making - participatory management, and flexible work arrangements. Examples in this direction could be: agreeing on a flexible work schedule for employees; job-sharing, respectively, sharing a job with full-time in two part-time positions held by two people, ensuring the best possible communication between the parties, teleworking, working remotely from the headquarters of the organization, including at home for certain tasks, activities or at certain times, etc.

Financial rewards should take into account both individual and organizational results and performance, as well as the use of applicable incentives, such as bonuses, bonuses, benefits, and merits (Robbins et al., 2013).

As motivation and job satisfaction are fundamental, logical, collaborative, and behavioural, they should be best understood, considered, and evaluated over time by managers, in order to ensure a win-win relationship for both stakeholders: by improving the motivation of employees, the organization achieves better performance, and individuals reach a better coverage and satisfaction of their personal needs, having the satisfaction of doing a good, useful, and appreciated job. Motivation is seen as a process of allocating efforts and resources to maximize the satisfaction of organizational and individual needs, based on five interconnected components: actions, results, effects, evaluations, and satisfaction. Consequently, improving motivation requires ability, anticipation, adequate resources available, adequate authority or autonomy given to employees, specific work strategies, measurement, monitoring, and evaluation (Pritchard, Ashwood, 2008).

3. Research Methodology

The current empirical research aims to investigate the peculiarities of leadership and motivation in healthcare organizations. In order to reach this objective, qualitative research was employed and a great variety of case studies and journal articles, books and reports in this field were carefully analysed, and the main results were summarised and presented in the following sections of the paper. The main objectives of the research are:
- To investigate the research findings in the field of leadership and motivation in any type of organizations;
- To analyse the main peculiarities of motivation in the healthcare system;
- To highlight the peculiarities of leadership in the healthcare system;

The conclusions of this article could help health care decision makers channel their actions towards attracting the best specialists, equipment, and resources to the hospital and achieving motivation and professional satisfaction of the medical staff which is vital to any performant hospital.

4. Particularities of Motivation in the Healthcare System

The motivation of medical staff is related to the specifics of a country and region, with important socio-cultural differences. Proper motivation of hospital medical staff is a prerequisite for: avoiding fluctuations and shortages of doctors and nurses, providing good quality medical services, achieving high levels of patient satisfaction with the care received, improving performance, and image organization - valuable advantages in a competitive market, where the patient usually follows the doctor, and the money follows the patient.

In the case of clinical or university hospitals, which are very special, elite organizations, certain specific measures facilitate both professional motivation and good leadership, namely: encouraging interdisciplinary medical collaboration,

stimulating teaching and clinical research activities while providing health and care services taking full advantage of specialization, sharing knowledge and skills to achieve outstanding performance and excellence, contributing to staff self-updating including by acquiring essential leadership skills, staff participation in decision making, transition from organization to model a modern, flexible, and adaptable model (Brand, Walker, 2021).

Good hospital managers are able to anticipate important staffing needs to motivate people accordingly (DiPietro, Condly, 2007). It is necessary that the financial and non-financial rewards be addressed and cover the needs of the people, because otherwise their motivation is not realized. The quantitative performance indicators of the hospital, and the degree of patient satisfaction are influenced by the motivation of the staff (Johansen, Sowa, 2019), motivation that must be measured periodically by appropriate specific means. Job satisfaction and motivation are reflected in the relationships between employees, employees and management, and employees and hospital patients, respectively. In the personal-patient relationship, it will be reflected in the time and attention dedicated to the patient and his needs, communication and information, collaboration, treatment compliance and treatment conditions for a prompt, good and lasting success, follow-up and supervision, feedback, respect, politeness, understanding and empathy.

5. Particularities of Leadership in the Healthcare System

Hospital-level leadership is a challenge in any country and health system, especially in the current post-economic crisis and in the context of recent developments and health care reforms. But the tools and models of leadership in the hospital field involve a great diversity. Although the literature provides relevant information in describing and analysing the typology of leaders, especially in the political and industrial area, given the particularities of the hospital services market, for this research it is necessary to study and apply specific models and tools or with applicability in health.

Some authors emphasize changing the role of hospitals and their governance accordingly, considering that hospital leaders, through their knowledge, specific experience, and effective action, are the main cause of the success of these organizations, despite various funding mechanisms and market difficulties, in the context of frequent market changes and globalization (Saltman, Durán, Dubois, 2011).

Decision-making by highly effective health care leaders involves, in principle, several key features and elements: evaluating the best approach, analysing the decision, the quality of good judgment, keeping track of time, acting with integrity and consistency, personal development. At the same time, there are challenges at the level of these leaders, especially related to: the fear of making wrong decisions and, especially, of recognizing when this still happens, the unavailability to take too many risks, the lack or difficulty the use of good, sound decision-making methods, over-analysis and deliberation in decision-making, overconfidence (Wolff et al., 2020).

Mitchell and Boak propose five interesting qualities that would shape a dynamic leadership considered for the future in the health field, in which the promising leader: a) is an interested independent thinker who understands the emerging market of medical services; b) is passionate about knowing and covering the needs and expectations of the patient-client; 3) is able to represent an agent of change in the respective health organization; 4) has the ability and skills to motivate and inspire people; 5) leads a flexible, progress-oriented, high-quality organization (Mitchell, Boak, 2009).

According to Cragg and Spurgeon (2018), an exceptional leader in the clinical field has certain characteristics: he/she is a visionary who lives according to his/her own beliefs; cultivates self-awareness; he/she is defined by high emotional intelligence; he/she does not communicate at random even under the rule of emotions, but has a vision of communication, being at the same time a good listener who provides feedback and guides others; he/she does very well in dealing with people; he/she energizes people, creating and developing teams; he/she gains the loyalty and trust of others by generating informal power, building consensus, making decisions, determining results, mastering duties and responsibilities, stimulating creativity and cultivating adaptability.

The elements that make an exceptional leader can be defined as competencies because:

- Many good healthcare leaders want to be truly authentic for a very good reason: to make a difference for patients, their families, and the community they serve as a result of the medical services they receive;
- Most health leaders do not have many mentors, except in medicine (not as leaders), do not participate in leadership courses or training programs, and therefore do not have the opportunity to develop the necessary skills and abilities, even if they are native;
- Physicians are, by definition, leaders in teams where they work and especially for their patients, and in a time of "talent war", leaders need to know how to evaluate other leaders in terms of skills, abilities, and competencies, especially those they hire.

The leader who lives according to his own values and beliefs, proves that he can always take a stand according to them, even if his popularity or recognition will be affected, he remains comfortable in difficult situations and will face difficult challenges with self-confidence, which is very inspiring for those around him. Usually, the leader does not live according to his own stated beliefs when: he has ambiguities and internal conflicts; professionally, he disconnects from his own beliefs; obsessively pursues his own goals and interests, using his hierarchical position for personal fulfilment; considers his own perspectives and beliefs to be the only good and right ones, ignoring or even forbidding others; he ends up preferring the obedient, he cannot stand criticism; he becomes too moralistic.

Gunderman warns that health care leaders must have a deep understanding of physicians' financial and non-financial motivation, and promote their professional development accordingly (Gunderman, 2009). Otherwise, the performance of

doctors will be far from potential; thus, patients and, indirectly, their relatives, will suffer.

An edifying argument is the visible effects of the demotivation of medical staff in the European countries of the former socialist bloc - Semasko-type health systems, which have transitioned with great difficulty to other forms of organization and financing, with still poor results compared to developed and characterized nations. From this point of view, the latest data indicate Romania as the first place in the world in the migration of doctors, estimating that, after the revolution and until now, about a third of Romanian doctors have gone abroad.

In an attempt to promote the development of leadership in the field of health, West and his collaborators started from its specificity, considering that the leaders to be appreciated prioritize the following: safety; high quality and care with respect and compassion for the patient, whose needs and feelings matter; motivating, appreciating, supporting and empowering staff; encouraging teamwork, responsible professional collaboration; transparency in solving problems, learning from mistakes; prevention of errors and serious incidents; promoting innovation and progress (West et al., 2015).

6. Conclusions

The performance of the medical system is influenced by elements of the social context such as: patients – individuals, groups, communities, institutional framework, processes, etc. Human health is a major, vital component of individual well-being, happiness, and individual, community, and social progress. Without being healthy, people cannot even cope with ordinary everyday activities or roles, while the current significant information, economic, and global challenges are becoming insurmountable. Health systems, and in particular health care systems, are designed to provide citizens with adequate resources, services, products, and programs to protect, promote, maintain, monitor, improve, restore, or rehabilitate their health, according to their regularly assessed needs.

Leadership in the hospital has special features, which are related to the specifics of the medical activity carried out and the evolution of models and styles that prove their effectiveness, playing a major role in the success of these organizations in today's competitive environment, marked by a series of challenges. A good leader will create the premises for attracting the best specialists, equipment, and resources to the hospital, but he will also create the right atmosphere and ensure the support of the team so that people want to work together, day by day, in this organization despite adversity.

Financial motivation is necessary but not sufficient for doctors and nurses in hospitals, and the motivation and professional satisfaction of medical teams can be positively influenced by: ensuring a modern medical equipment as efficient as possible; improving working conditions and environment, safety, and psychological comfort; completing the hospital's medical teams for the highest possible level of occupancy, so that patients are as well served as possible and staff are not overloaded, stressed, tired, and exposed to errors; encouraging and supporting staff

to regularly attend specific continuing education courses and activities provided by the best experts in the field, at national, European or international level; giving up authoritarianism and adopting a modern, flexible, participatory leadership style appropriate to the organization, specific activities and team; knowing the needs of the staff, valuing each individual employee, his professional and human recognition; ensuring an atmosphere of trust, understanding, mutual respect (not unilateral), collaboration and support in the hospital; regular evaluation of staff professional satisfaction and improvement of the situation according to the identified problems and causes, respectively to the staff proposals; constant participation in studies, research and development projects carried out.

Adequate regular study of the motivation and satisfaction of hospital staff allows one to know the opinion and suggestions of employees about: working conditions, problems and shortcomings, perception of interactions and inter-relationships in the organization, internal and external changes that affected their hospital activity, various other issues that employees do not always have the opportunity or intention to pass on to the hospital management. It is very useful that the reasons for dissatisfaction and the proposals mentioned by employees are always analysed and taken into account to improve the situation. On the other hand, it is necessary that the information obtained from the staff be correlated with the results of the study of the opinion of the patients on the services received in the hospital during the same period. If the motivation and professional satisfaction of the hospital staff do not become a permanent and real, tangible concern of the management, people will feel ignored, unsupported, undervalued, and consequently will not perform to the fullest and will even tend to leave the organization. Asking for feedback and consulting with the hospital team in making important decisions costs nothing but is an advantage for good leaders.

The motivation and professional satisfaction of the medical staff is vital to the hospital and is supported by: ensuring very good medical equipment, good working conditions, safety and comfort environment; sufficient medical staff, sustained, remunerated to the maximum, continuous professional development; modern leadership style, participatory, flexible, rewarding; atmospheres of trust, collaboration, understanding, respect; participation in research and development projects.

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Sustainable and Blended Solutions for NGOs to Face COVID's Challenges and Interconnected Crisis

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Abstract

The COVID-19 pandemic has triggered an existential set of complex interconnected crises that affect companies, communities, organizations, and institutions all over the world. This crisis highlighted the importance of innovation, collaboration, and partnerships. Collective wisdom and knowledge are key factors for communities that are expressing their high willingness to collaborate in order to find the best solutions together. The main goal of this paper is to analyse the NGOs' possible solutions to face the COVID-19 crisis challenges in the context of a turbulent international environment. The research methodology follows a step-by-step approach including: Literature review (step 1); a brief analysis of case studies illustrating the COVID's influence on NGOs on the international level (step 2); Qualitative research based on telephone interviews with NGO leaders that shared the problems they had to face during COVID (step 3); Mapping the solutions adopted during the COVID crisis (step 4). As a main result, our research offers a map of possible solutions that might be used by NGOs to face crisis, but also other similar situations. One of the most interesting results is the importance of mobilizing NGOs to work together, to collaborate, and to realize that together they can better overcome certain obstacles. Our paper has a potential original value providing a relatively new and fresh perspective on solutions that might be applied by NGOs in order to face COVID challenges and complex set of interconnected crises. As a main conclusion, our paper illustrates that a valid solution to manage to face crises is to join hands for collaborations and sustainable partnerships.

Keywords: NGOs, collaboration, collective wisdom and solidarity, COVID crisis.

JEL Classification: A12, L31.

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1. Introduction

The COVID-19 crisis pandemic and the measures taken to stop it generated one of the largest and deepest downturns in economic activity in the European Union. This paper analyses the NGO's response to COVID-19 in the context of a dramatically changing international environment, which is characterized as a VUCA world (volatility, uncertainty, complexity, and ambiguity). The main research questions (RQ) refer to how the crisis has affected the Romanian NGOs (RQ1) and, correspondingly, to what would be the future possible solutions (RQ2). The impact of the pandemic has varied dramatically across different sectors. It has at the same time a complex social, economic and multidimensional impact as it refers not only to a health crisis but also to a complex human values crisis. During the COVID-19 crisis, the NGOs have to change their strategies and re-establishing their priorities. Our paper analyses the main aspects that influenced the activities of NGOs.

The research methodology involved a step-by-step approach. *The first step* is to analyses the global aspects of the influence of the COVID-19 crisis within NGOs. *The second step* is about a comparative analysis between some word surveys regarding the impact of pandemic for the NGOs. *The third step* consists of identifying the impact within the Romanian NGOs based on a qualitative analysis applying interviews and discussions with leaders from various NGOs, who expressed their points of view on issues that have positively or negatively influenced the environment during the COVID crisis. Finally, *in the fourth step,* we provide an outline including a possible set of sustainable solutions that might be applied by NGOs in the future. Our research highlighted that solidarity, transparency, trust, and cooperation are crucial in order to better face complex crisis and challenges.

2. Problem Statement

The COVID crisis has pushed the world economy into a depression with potentially profound consequences and historic levels of unemployment and inequalities. At the same time, *the United Nations Strategic Development Goal 8* indicated that every country has to apply multiple ways to support public, private, and civic sectors collaborations (United Nations, 2020). More than ever before, we need solidarity, hope, and cooperation to see this crisis through together. This ability to find quick, effective, and efficient answers to face the complex problems can be seen as their common denominator. (Le Got, 2022) The COVID-19 crisis risks overturning decades of progress in the fight against poverty and further increasing already high levels of inequality within and between countries.

One of the most affected economic sectors is the NGOs sector. This sector is particularly subject to a lack of financial reserves to pay for fixed costs (especially wages, salaries, etc.) and office rents, but, at the same time, faces a number of difficulties in terms of the nature of the activities/services they produce. The COVID pandemic has forced NGOs to develop more flexible workplace models and to accelerate digital transformation. The NGOs are the links between civil society and institutions.

They are one of the most important actors in our society. The NGOs provide numerous examples of positive actions providing concrete solutions for the most disadvantaged ones. The COVID-19 crisis has also affected the young people mostly in terms of online education that has disrupted learning methods. Education is not only a fundamental human right; it is a right that directly affects all other rights. When education systems do not work properly, peace, prosperity, and the whole society is no longer functioning well. (Le Got, 2022). Recent innovations have shown promising prospects, but these changes can only be sustainable if no one is left behind. The crisis pushed NGOs to innovate, adapt, and modernize in order to implement tools and methods to scale the COVID-19 effects.

The diversity of NGOs activities is a great advantage, especially for their leaders who have to adapt and find better solutions for each problem. We believe that NGO leaders can find more innovative solutions to the problems they face, and these solutions can become practical guides for corporate leaders.

3. Research Questions and Main Goal of the Paper

The research questions (RQ) of this study are: how NGOs' activities have been affected by the COVID crisis (RQ1) and what solutions they have found to overcome this crisis (RQ2). This paper analyses the NGO's response to the COVID-19 crisis against the backdrop of a dramatically changing international environment. We focus on the identification of a viable set of possible solutions and drawing a map, which will help the NGO leaders to act in difficult/complex situations. The research's main goal is to identify the solutions that NGOs have found in response to the crisis in COVID. The specific objectives are designed on the basis of a step-by-step approach. *On the first step,* we had analysed some case studies of international NGOs influenced by COVID crisis. *On the second step,* we focus on the identification of the problems faced by NGOs during the COVID-19 crisis. *The third step* concerns the process of finding solutions that might be adopted by NGOs in order to overcome the COVID-19 crisis.

4. Research Methods

The research methodology is based on a *step by step* approach including four steps. *Step 1:* Literature review; *Step 2.* Case studies analysis of COVID-19's impact on international NGOs; *Step 3:* Romanian NGO research based on a qualitative analysis consisting of telephone interviews (made in the first part of 2022, the end of month January) with several NGO leaders from Romania who shared the problems they faced during the COVID-19 crisis and what solutions they found to manage; *Step 4:* Mapping the solutions found by NGOs in managing problems during the COVID-19 crisis.

5. Case Studies

5.1 Impact of COVID-19 on African Civil Society Organizations, 2020

This research report is the first of its kind to look exclusively at the impact of the COVID-19 on Africa. It is based on a survey conducted by the African NGOs and EPIC-Africa between 29 April and 15 May 2020. These results are based on feedback received from 1.015 CSOs in 44 African countries that participated in the survey. Despite the enormous impact of COVID-19 on their operations, African CSOs are actively contributing to the fight against the pandemic at national and continental levels. The type of organization that was included in this research is illustrated in the figure below, Figure 1.

Figure 1. Type of organisations
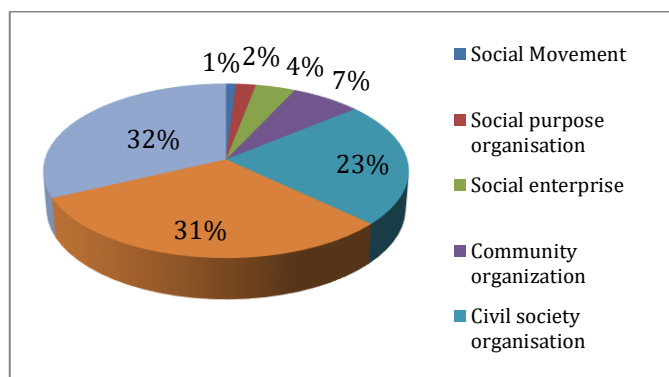
Source: Designed by authors based on the information from the study "Impact of COVID-19 on African civil society organizations (CSOs)".

In the figure above, we can see that the largest number of respondents is represented by NGOs. This study shows that the impact of the COVID-19 crisis has been felt in financing, operations, and activities. The general impact is reflected in Figure 2.

Figure 2. The impact of the COVID-19

Source: Designed by authors based on the information from the study "Impact of COVID-19 on African civil society organizations (CSOs)".

The future impact is represented in the Figure 3.

Figure 3. The future impact of the COVID-19

Source: Designed by authors based on the information from the study "Impact of COVID-19 on African civil society organizations (CSOs)".

Other immediate effects noted by the participants include: the reduction of the staff numbers, increased workload, uncertainty about the future, and managing the consequences, such as increased domestic violence. Survey participants identified several specific challenges related to remote working: not everyone has a computer or an Internet connection, or the nature of our work does not lend itself to working from home. The results of the study suggest also some solutions on cost reduction, for example: cut or cancel of activities, reduced or cancelled travel, staff dismissal, employment freeze, reducing wages and working hours, increased use of volunteers, contract renegotiation (rent and insurance). Another important aspect is that partnerships were formed during the pandemic, as shown in Figure 4.
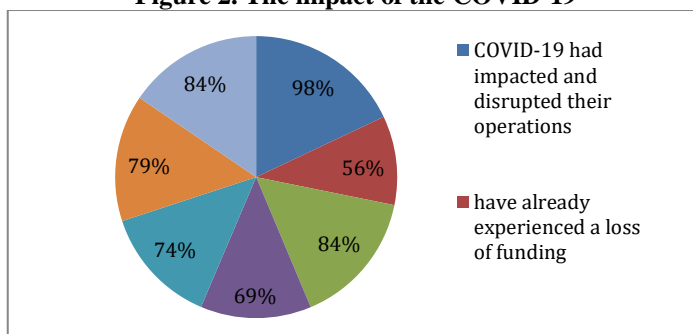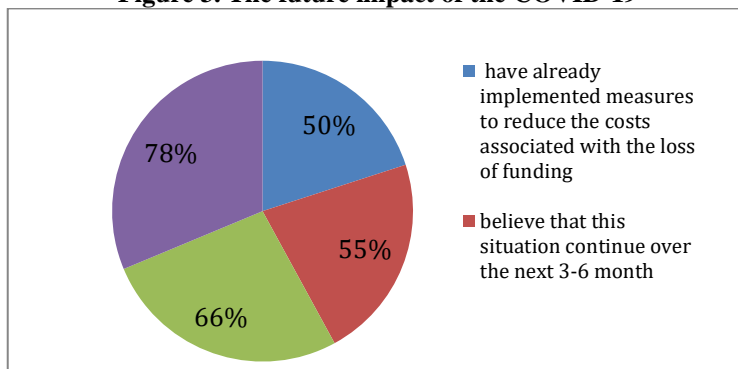
Figure 4. The main partnerships
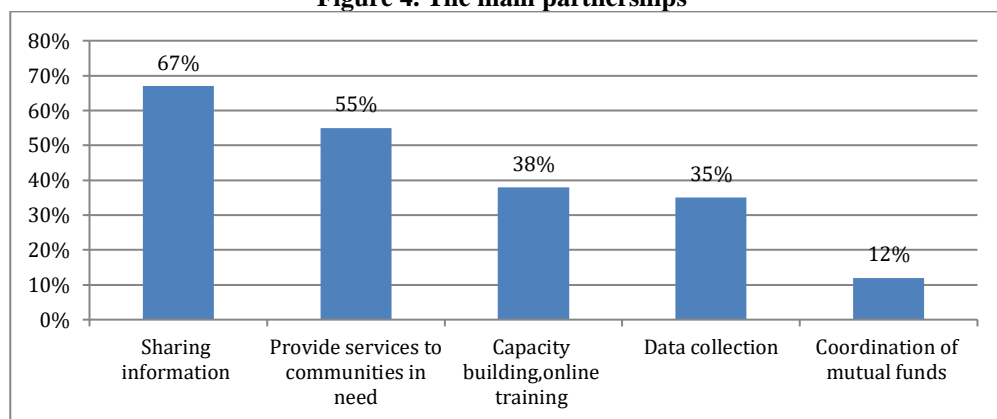
Source: Designed by authors based on the information from the study "Impact of COVID-19 on African civil society organizations (CSOs)".

The local civil society organizations (CSOs) have played a key role in the fight against the COVID-19 at the national level (77.22% of the participants felt that). In terms of government involvement, 71.58% of participants felt that governments failed to recognize or use CSO skills, expertise, and networks in the fight against COVID-19. The 83.95% of participants collaborate with other CSOs at national level in several areas, sharing information and providing services to those most in need. In fact, 45.06% of the participants felt that the pandemic will strengthen the strength and agility of the sector. Only time will tell whether this optimism will lead to tangible change, but this trend demonstrates the resilience and adaptability found in many African CSOs.

5.2 The Impact of the Crisis COVID-19 on the 2020 Budgets of International Solidarity NGOs – Summary Survey

During December-February 2020, *Coordination SUD* by France implemented a summary survey among its member NGOs. The objective of which was to assess the impact of the COVID-19 crisis on NGO resources and budgets in 2020. The overall survey analysis was structured in four stages: generic information about NGOs, information on their resources since 2020, information on other types of difficulties they may have faced (cash flow, hiring suspension), and information on the use of public support (Coordination SUD, 2021). The overall impact of the COVID-19 crisis was variable depending on the respondent NGOs. Regarding the impact of the COVID-19's 2020 NGO budget, we can see the data in Figure 5.

Figure 5. The COVID-19's impact of the NGO budget
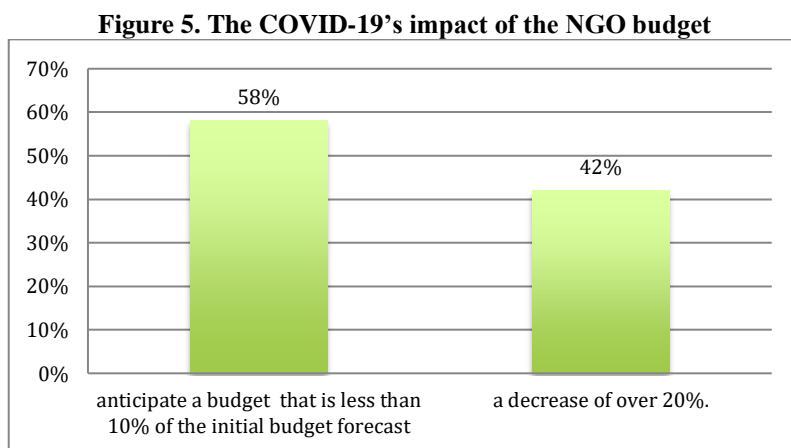
Source: Designed by authors based on the information from the study "The impact of the crisis COVID-19 on the 2020 budgets of international solidarity NGOs".

One of the important questions is whether the NGOs most affected by the COVID-19 crisis are those considered small, medium, and large NGOs. Indeed, between 40% and 45% of responding organizations in these categories anticipate a 10-40% decrease in overall resources. In comparison, none of the very large NGO respondents anticipate a decrease in overall resources.

In the case of small and very small NGOs, there is a significant decrease in private institutional resources or resources from income-generating activities. The impact on other resources of medium and large NGOs depends mainly on the types of activities they carry out. The analysis shows that very large NGOs are targeted in 2020 and most of them have seen a small decrease in resources. The impact of the COVID-19 crisis on the human resources of respondent organisations was different. Only 12% of the responding organisations had to fire staff. The study shows that of all the resources available to NGOs, public resources were the most affected by the decreases, especially among small and medium-sized NGOs. Overall, the measures implemented by the state have worked well, especially the working-time reduction programmers, which have been in high demand. The survey shows that the impact of the crisis is expected to be long-lasting and that some "compensation" effect is to be expected in the coming months and years.

5.3 Impact of COVID-19 on Geneva – Based NGOs

Non-governmental organisations (NGOs) are a key component of Geneva International, alongside international organisations (IOs) and Member States' diplomatic representations. This study is interesting to analyse because it presents dates one year after the start of the pandemic. The survey was conducted in March 2021 and included 470 Geneva-based international NGOs. Most NGOs are small and medium-sized entities (SMEs), compared to very large United Nations (UN) agencies and related organizations. The activity of NGOs is varied. Half of the respondents are active in human rights and humanitarian affairs. The others are active in health, peace, labour, environment, and security.

Figure 6. Main sector of activities
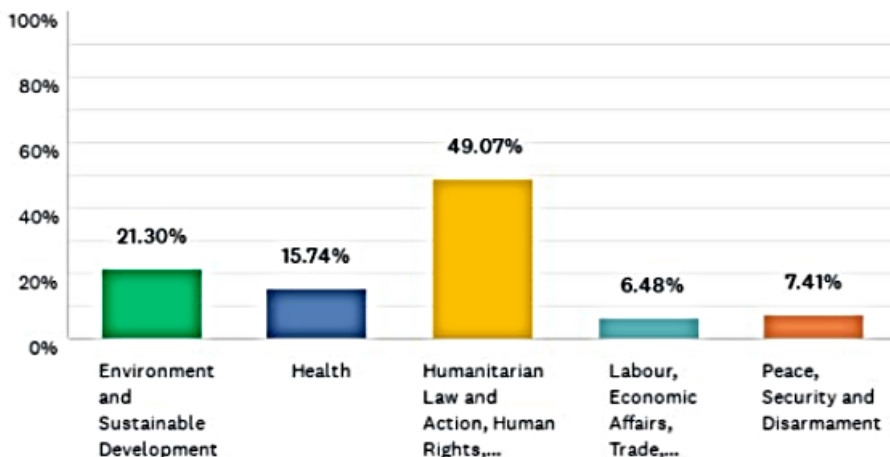
Source: Survey Impact of COVID-19 on Geneva –based NGOs.

One year after the start of the pandemic crisis, 97% of NGOs continue to be affected by the COVID-19 crisis. 38% of the respondents report that the impact of

COVID-19 on their operations has been severe. In response to the crisis, almost 70% of NGOs had to significantly adapt their programs, including the online environment, and 45% have implemented new programs, especially COVID-19. The figure below shows the impact of the pandemic on the organization's operations.

Figure. 7 The impact pandemic on the organization's operations
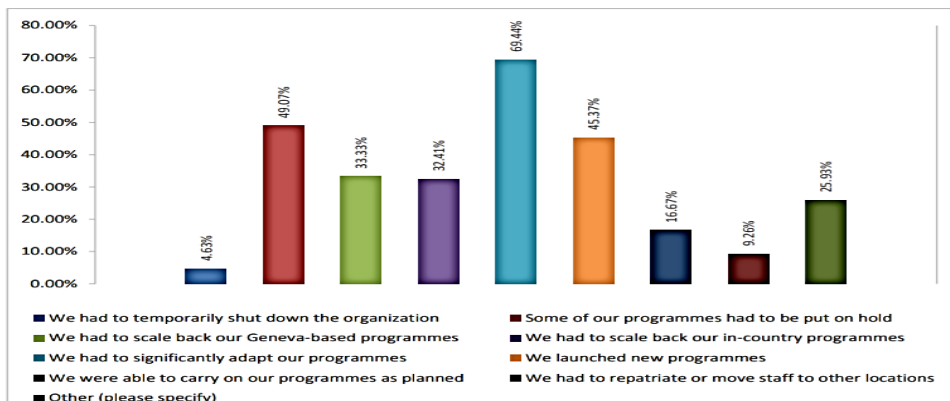
Source: Survey Impact of COVID-19 on Geneva – based NGOs.

In terms of the impact on the functioning of NGO activities, there has been a movement of activities online. Online meetings have been organized with limited possibilities for interaction. A number of respondents indicated that these aspects of working online made it difficult to build relationships and trust and were concerned that this could, in turn, affect their ability to make an impact.

5.4 Voice of the Romanian NGOs – React to the COVID-19 Crisis

In our research to see the influence of the COVID-19 crisis on NGOs, we did not apply a specific type of questionnaire but chose a free discussion in which the NGO manager explained the specific situation of his NGO. In Romania, the response of the NGOs to the COVID-19 crisis was very different, depending on the specifics of each NGO. We held discussions with NGO managers working in the fields of history, culture, theatre, education, and teaching. An important aspect of our research is the discussion with the manager who developed a support and collaboration platform that brings together over 100 NGOs (medical, social, educational, etc.), volunteers, companies, and individual donors. The telephone interviews took place in early 2022.

The first discussion was with the manager of a history NGO. In the field of historical research, the pandemic period was a difficult time. The nature of this work does not lend itself to remote work. The NGO's projects are more like educational projects, but occasionally implemented, depending on funding found. Their NGO's activities have decreased a lot in the last 3 years. As for future solutions, the manager told us that they see no realistic solution other than for the pandemic to pass.

The next discussion was with the manager of an NGO working in the field of theatres. The COVID-19 crisis has had a major impact on the sector. In particular, it has affected artists financially.

The manager told us that many of the freelance actors have left the profession. Regarding the shows, they were impossible to stage during the pandemic period. The NGO theatre manager told us that at the same time the COVID-19 crisis had psychological effects: sadness, depression intervened.

The most important discussion we had was with the manager who has developed a platform of support and collaboration that brings together over a hundred NGOs. The impact of the COVID-19 crisis has been different for each NGO. The results of the online collaboration platform were amazing; in times of crisis, each NGO posted what they needed, what they had extra, creating strong and useful links for all. Collaboration and solidarity have been the key to the survival of NGOs. During this period, therapy activities have stopped being face-to-face; some have moved online and others have stopped entirely.

The main conclusion is that only cooperation and collaboration are the keys to success in NGOs. Online is an opportunity for some NGOs, but there are activities that require face-to-face interaction, activities without which NGOs cannot exist. In terms of the benefits of online activities, during this period, online promotion has facilitated the identification of more potential beneficiaries of their NGOs.

5.5 Finding: "Sustainable and Blended Solution"

Our research has identified a list of possible solutions to overcome the effects of the crisis. These solutions can be the sharing of know-how from NGOs.

Table 1. Crisis solutions

Nr. crt.	Solutions
1.	integrate the lessons learned from this crisis into NGO project management;
2.	rebalancing operations – gives NGOs the opportunity to review and benchmark their cost structures and operational requirements, which could lead to significant savings, efficiencies, and stimulate innovation;
3.	digital transformation – adopting new technological solutions;
4.	staff have acquired new skills and gained experience with new tools and applications;
5.	office closures that are not absolutely necessary;
6.	work from home in situations where NGO activity allows it;
7.	social media/online presence – through the use of social media and participatory funding platforms, NGOs have exploited their online presence to increase their visibility, reach new audiences and garner new support;
8.	increase of income, correlated with cost optimization – NGOs must diversify their sources of income and developing income-generating activities;
9.	building relevance and credibility; NGOs have often responded to the needs of the most vulnerable communities through their own resources and without external support;
10.	cooperation – The NGOs demonstrated their capacity to respond and have strengthened legitimacy and relationships with local communities;
11.	solidarity – COVID-19 provides them with the opportunity to support each other and collaborate on the needs of the local community.

Source: Designed by authors.

6. Conclusion

The impact of COVID has been global and variable depending on the specific NGO. For example, in Romania, the field of art has suffered a lot because of the restrictions due to Covid. On the other hand, NGOs were identified that despite the context, quickly identified the risks and adapted, they found innovative and creative s solutions. In this case, the success in finding solutions is attributed to the new model of the leader, the human-centred leader, who is both creative and innovative. As a result of this research, we observed that NGO leaders may have a broader view of crisis situations, as they have faced many difficult situations over time.

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Cryptocurrencies in the Digital Era. Composite Index-Based Analysis for the Top Ten Virtual Currencies Traded

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Abstract

Virtual currencies represent a new alternative to payment that ensure secure financial transactions within a decentralized system. The basis of cryptocurrencies is represented by the innovative and revolutionary Blockchain technology or the DLT (Distributed Ledger Technology), which in recent years has captured the attention of researchers and practitioners. This paper aims to conduct a relevant analysis of the cryptocurrency market, considering the top ten digital currencies in terms of market capitalization. At the same time, we took into account the launching year of the selected virtual currencies, having as a benchmark the year 2017 in order to ensure a data set as comprehensive as possible. The authors' contribution is brought about by the construction of a composite index to synthesize the performance of the studied cryptocurrencies, the index being designed using the returns and traded volumes associated with each cryptocurrency. The correlations between the indicators will be studied, along with the exploration of the Granger causality between the variables. The paper is structured as follows: In the first part, there is a brief introduction in the sphere of the studied problem, later being presented the current state of knowledge in the field. The study continues with the statement of the purpose and hypotheses of the research, with the presentation of the research methods used, and with the illustration of the main results of the research. The study is completed by the main conclusions drawn and the bibliographical references.

Keywords: cryptocurrency market, Blockchain, composite index, Granger causality, correlation analysis.

JEL Classification: C22, C87, E59, G29.

1. Introduction

Digital currencies are a new type of currency, their foundation being represented by Blockchain technology. Both cryptocurrencies and Blockchain technology are an extremely interesting and attractive topic for both investors and the scientific and

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academic communities. The first virtual currency launched is the famous Bitcoin, which benefits from the Blockchain infrastructure and design. At the same time, Bitcoin is the most popular digital currency and is considered the leader of the cryptocurrency market. The inventor of Bitcoin is considered to be a certain Satoshi Nakamoto (2008), seen either as an individual or as a group of people who collaborated in order to lay the foundations of this digital currency. Although its popularity has grown exponentially in recent years, and its applications in various fields have multiplied rapidly, Blockchain technology is still a novelty for most people. Many researchers already believe that Blockchain technology could soon become part of our daily routine, comparing it to paradigms and technological innovations that have changed our lives: the Internet, computers, the emergence of cars and aircrafts, and so on (Gupta, 2017; Richards, 2019). Thus, Blockchain technology is perceived as a radical innovation with high beneficial potential for many industries and ensures the efficiency of the security, costs, or processing speed of various transactions. Areas in which this technology has already been successfully implemented include management, supply chains, health, insurance, or even government projects and public institutions.

The emergence of Blockchain technology has brought together the focus and research of groups working in distinct but interdependent fields, referring here to mathematicians, computer scientists or cryptographers. Obtaining cryptocurrencies is ensured by performing a process known as mining. Initially, this procedure could be performed using simple desktops or computer processing units (Connolly, Kick, 2015), but later, more powerful tools were needed to produce virtual currencies, such as Application Specific Integrated Circuit (ASIC).

2. Problem Statement

Interest in the cryptocurrency market has intensified in recent years with the expansion of this sector. The market capitalization of the traded currencies reached in April 2022 approximately 1.8 trillion USD dollars. A large number of scientific papers are focusing on research and development methods to ensure a better understanding over the dynamics of the digital currency market.

Bitcoin is the most popular electronic payment alternative that does not require the involvement of a third party in conducting transactions. Using specific cryptographic tools, the fully decentralized payment system associated with Bitcoin ensures that the problem of double spending is avoided. The operability of cryptocurrencies is based on the innovative Blockchain technology. This technology is actually a distributed ledger, and within it all transactions are recorded in chronological order and ensure the execution of transactions without the involvement of financial intermediaries (Aalborg et al., 2019).

Regarding Bitcoin, there are distinct visions. On the one hand, it is seen as an extremely safe and profitable asset, with some researchers even calling it "digital gold". On the other hand, Bitcoin is seen as a speculative bubble or even a Ponzi scheme. Many research papers are focused on forecasting the prices of digital currencies using time series analysis (Phillips, Gorse, 2018; Bartolucci et al., 2019;).

Modern machine learning algorithms (Jing-Zhi, William, 2018) and artificial neural networks (Lahmiri, 2019) represent other innovative techniques used to explore the prices of virtual currencies.

Cryptocurrencies are characterized by extremely high volatility, which has been investigated with great interest by academics, who have repeatedly tried to identify the causes and determinants of this pronounced volatility (Katsiampa, 2017; Lahmiri, Bekiros, Salvi, 2018). There is strong evidence that issues such as global economic activity and trading volume significantly impact the evolution of cryptocurrency prices (Walther, Klein, Bouri, 2019; Bouri et al., 2019).

Uras and Ortu (2021) study Bitcoin price movements using machine learning techniques such as SVM, XGBoost or artificial neural networks such as CNN or LSTM. They also analyze whether the inclusion of technical indicators in the models, other than the classic macroeconomic variables, contributes to the improvement of the Bitcoin price prediction. Other aspects studied regarding cryptocurrencies include their fractal pattern (Stosic et al., 2019; Ferreira et al., 2020), but also the correlation between them (Drozdz et al., 2018; Watorek et al., 2020).

The study of the cryptocurrency market in the context of the COVID-19 pandemic has been a topic of great interest to the academic community, along with the financial contagion and the stability of financial markets (Zhang, Hu, Ji, 2020; Zaremba et al. 2020; Okorie, Lin, 2020; Lahmiri, Bekiros, 2020).

Bălă and Stancu (2021) study the evolution of the top five cryptocurrencies according to the market capitalization over the period 2017-2021. They analyze the existence of cointegration of digital asset prices and note that this is not present in the data set. The methodology used is that of the VECM and Granger causality testing. Their evidence indicates significant two-way influences between Bitcoin and Binance, Dogecoin and Binance, but also Bitcoin and Ethereum, and the fact that cryptocurrencies such as Ethereum or Dogecoin are more likely to be significantly affected by possible shocks to the cryptocurrency market. Another area explored with interest by researchers is that of the link between public opinion and the evolution of the cryptocurrency market. More specifically, a technique often used in this direction is the sentiment analysis.

The relationship between digital asset price dynamics and investor sentiment is studied by Smales (2022). The more pronounced the interest in certain digital assets, the higher the returns recorded by them. On the other hand, uncertainty regarding the crypto market negatively impacts the evolution of digital currencies. Shahzad, Anas and Bouri (2022) examine the correlation between Bitcoin and Dogecoin prices and the public sentiment expressed by Elon Musk on the Twitter platform regarding the cryptocurrency market. Their research reveals that the opinion of some public figures determines the appearance of bubbles in the price of digital assets.

3. Research Questions / Aims of the Research

This paper aims to conduct an analysis of the cryptocurrency market, considering the ten most important digital currencies from the perspective of market

capitalization. On the one hand, a composite index was designed. The index has been obtained from the combination of two indicators regarded as relevant in the context of digital assets: the calculated returns of cryptocurrencies and, respectively, the traded volumes. For this purpose, we intended to observe how the evolution of cryptocurrencies would change, by simulating different values for the weights associated with the variables composing the proposed index. On the other hand, we proposed to evaluate the existence of causal relationships between the indices calculated for the considered cryptocurrencies.

4. Research Methods

In order to accomplish the research objectives presented in the previous section, this paper uses data on the top ten most significant digital currencies as of April 2022. The selection of these cryptocurrencies was based on two key elements, namely the market capitalization associated with each digital asset, but also the launching date of each cryptocurrency. In order to ensure a comprehensive data set, we decided to select and consider in this analysis data on cryptocurrencies launched after 2017. Data was collected using the Yahoo Finance database. The analysis was performed using EViews and RStudio and some processings were realised using the Python programming language. The considered cryptocurrencies are: Bitcoin (BTC), Ripple (XRP), Binance Coin (BNB), Ethereum (ETH), Cardano (ADA), Dogecoing (DOGE), Tether (USDT), Litecoin (LTC), Dash (DASH) and Monero (XMR). For each of these, we calculated the daily returns using the formula:

$$r_i = \frac{P_{t+1} - P_t}{P_t} * 100 \qquad (1)$$

where:

r_i – represents the return of the cryptocurrency i;

P_{t+1} – represents the price of cryptocurrency i at the $t+1$ moment;

P_t – represents the price of cryptocurrency i at the t moment;

Another indicator on which we collected data within this analysis is the traded volume. This indicator has been processed to summarize the growth rates of the traded volume.

Once these two indicators were pre-processed, we proposed designing an index to summarize the evolution of the ten most popular digital currencies. We thus continued with the construction of a composite index, its form being represented below:

$$Crypto\_Index_{i,t} = \alpha_i * r_{i,t} + \beta_i * V_{i,t} \qquad (2)$$

where:

$Crypto\_Index_{i,t}$ – represents the index associated with the cryptocurrency i at the time (time period) t;

α_i – represents the weight associated with $r_{i,t}$ in constructing the composite index;

β_i – represents the weight associated with $V_{i,t}$ in constructing the composite index;

$r_{i,t}$ – represents the return of the cryptocurrency i at the time t;

$V_{i,t}$ – represents the traded volume, expressed as growth rate, associated with the cryptocurrency i, at the time t.

The values representing the weights α_i and β_i can be established both using the observed data series but also using specific simulation techniques.

Furthermore, the correlation between the ten cryptocurrencies will be evaluated using the Pearson correlation coefficient. The intensity and direction of the linear relationship between two quantitative indicators are assessed using the correlation coefficient. The value of the correlation coefficient is situated in the [-1,1] range where values close to -1 indicate strong, negative correlations, while values close to 1 correspond to strong, positive correlations between variables. The absence of correlation is highlighted by values close to 0 of the correlation coefficient.

The Pearson correlation coefficient used to assess the relationship between variables is further highlighted:

$$corr = \frac{\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{\sqrt{\left[\sum_{i=1}^{n}(x_i-\bar{x})^2\right]\left[\sum_{i=1}^{n}(y_i-\bar{y})^2\right]}} \tag{3}$$

where:
x_i – represents the *i*-th value of variable *x*;
$\bar{x}$ – represents the mean of variable *x*;
y_i – represents the *i*-th value of variable *y*;
$\bar{y}$ – represents the mean of variable *y*.

The test proposed by Granger (1969) will also be used to assess the causality between the analyzed variables, in this case, the composite indices associated with the selected digital currencies. Given the two variables X and Y, it will be determined whether X is a Granger cause of Y if the values of the variable Y can be explained based on the past values of Y and whether lagged values of the variable X can improve the prediction of the variable Y.

The associated mathematical model uses bivariate regressions of the form:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \cdots + \alpha_l y_{t-1} + \beta_1 x_{t-1} + \cdots + \beta_l x_{-1} + \varepsilon_t \tag{4}$$
$$x_t = \alpha_0 + \alpha_1 x_{t-1} + \cdots + \alpha_l x_{t-1} + \beta_1 y_{t-1} + \cdots + \beta_l y_{-1} + u_t \tag{5}$$

considering all possible pairs (x, y).

Given the following hypothesis:

$$H_0: \beta_1 = \beta_2 = \cdots = \beta_l = 0 \tag{6}$$

the *F*-statistical indicator is calculated for each equation. The null hypothesis is that *x* is not a Granger cause of the variable *y* in the first regression model, while *y* is not a Granger cause of the variable *x*.

5. Findings

The following figure describes the evolution of the top ten cryptocurrencies, according to the constructed composite index. The two graphs show a comparison between the movement of the composite index, considering distinct weights for the two components of the index. Over the analysed time period, there have been significant fluctuations in the evolution of the ten cryptocurrencies considered, in terms of returns and trading volumes. Significant increases are associated with Binance (BNB_Index), Dash (DASH_Index), Dogecoin (DOGE_Index), and Monero (XMR_Index) in the fourth quarter of 2020. However, the four

cryptocurrencies subsequently declined, both in terms of returns and traded volumes. The most popular cryptocurrencies, Bitcoin and Ethereum, also had an oscillating evolution, but according to the charts below, we did not notice significant shocks in terms of the value of the constructed composite index.

Figure 1. Index comparison for the ten selected cryptocurrencies
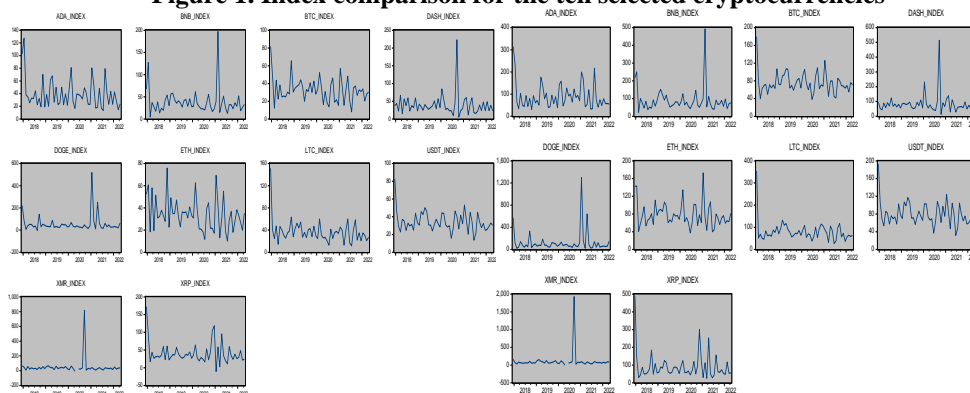
Source: Authors' processing using EViews and RStudio.

Comparing the two graphs, it is noticeable that if we take into account the weights associated with the components of the index, the differences regarding the index oscillation are almost insignificant, except for a few situations, namely: ETH_INDEX, LTC_INDEX, and USDT_INDEX. The difference between the index of these cryptocurrencies and the index associated with other digital currencies is that for Ethereum, Litecoin, and Tether, positive and significant correlations have been identified between traded volumes and their associated returns.

Through the simulations performed, on the whole spectrum of the analysis, the shift of proportion between the two indicators used in the construction of the composite index from 0.7 versus 0.3 (and vice versa) does not significantly change the value of the composite index.

At the same time, the correlation between the indices associated with the ten cryptocurrencies was analyzed. Charts built using correlation matrices indicate strong correlations between digital currencies, regardless of the weights associated with calculated returns and traded volumes in defining the composite index. The index associated with Bitcoin is strongly correlated with most indices, except Monero (XMR_Index). Weak correlations correspond to the calculated indices for Monero (XMR) and Ripple (XRP). One can note that the computed index for Monero is not significantly associated with the evolution of other cryptocurrencies.

Figure 2. Correlation between the ten computed indices
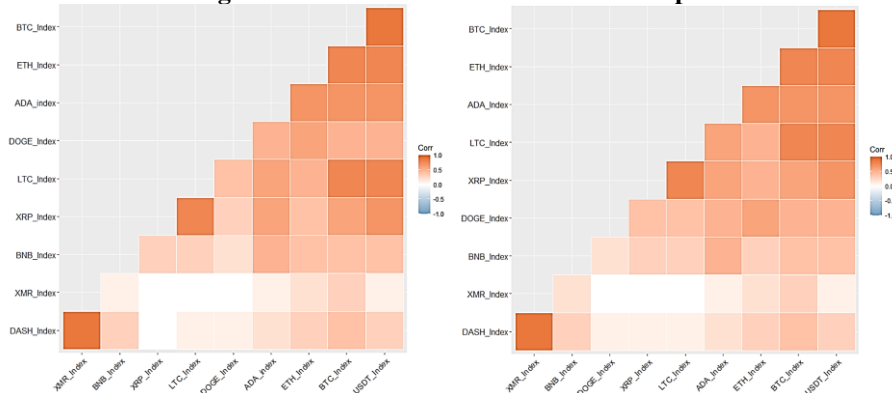
Source: Authors' processings using EViews and RStudio.

Stationarity was analyzed for the variables considered in the study. The use of the Augmented Dickey-Fuller stationarity test indicates the non-stationarity of the level time series, but all indicators become stationary after applying the first order differentiation procedure.

Table 1. ADF Stationarity test results

Variable	Prob.	Conclusion
ADA_INDEX	0.843	Non-stationarity
BNB_INDEX	0.273	Non-stationarity
BTC_INDEX	0.188	Non-stationarity
DASH_INDEX	0.973	Non-stationarity
DOGE_INDEX	0.472	Non-stationarity
ETH_INDEX	0.725	Non-stationarity
LTC_INDEX	0.678	Non-stationarity
USDT_INDEX	0.375	Non-stationarity
XMR_INDEX	0.524	Non-stationarity
XRP_INDEX	0.341	Non-stationarity

Source: Authors' processings using EViews and RStudio.

The Johansen cointegration procedure was applied in order to test the cointegration of the studied variables. The notion of cointegration refers to the existence of a long-term relationship between the considered indicators. According to the results presented in the table below, it is noted that there is a long-term association between the variables studied, as indicated by the existence of a cointegration equation.

Table 2. Johansen cointegration test results

Unrestricted Cointegration Rank Test (Trace)		
Hypothesized No. of CE(s)	Eigenvalue	Prob.
None	0.881	0.000
At most 1	0.728	0.000
At most 2	0.612	0.109
At most 3	0.523	0.218

Source: Authors' processings using EViews and RStudio.

To investigate the association between the variables in more detail manner, we used the Granger causality test. Based on this, one can note whether a variable is considered significant in predicting the evolution of other variables. In this case, we intend to observe which are the cryptocurrencies that influence the evolution of other digital assets, having as benchmark the calculated dynamics index.

Table 3. Results of Granger causality test

Null Hypothesis	Prob.
BTC_INDEX does not Granger cause BNB_Index	0.000
BNB_Index does not Granger cause BTC_INDEX	0.009
BTC_INDEX does not Granger cause DOGE_INDEX	0.000
DOGE_INDEX does not Granger cause BTC_INDEX	0.002
BTC_INDEX does not Granger cause ETH_Index	0.001
ETH_Index does not Granger cause BTC_INDEX	0.000
DASH_Index does not Granger cause XMR_Index	0.001
XMR_Index does not Granger cause DASH_Index	0.010
XRP_Index does not Granger cause LTC_Index	0.003
LTC_Index does not Granger cause XRP_Index	0.000

Source: Authors' processings using EViews and RStudio.

In the previous table, only the causal relationships identified as significant, or in other words, the situation of those cryptocurrencies that can explain the evolution of other digital assets, were exposed. We found the existence of bidirectional causal relationships between Bitcoin and Binance, Bitcoin and Dogecoin, Bitcoin and Ethereum, Dash and Monero, but also between Ripple and Litecoin. For example, the BTC_Index can be used to predict the BNB_Index.

6. Conclusions

Many companies, organizations and even industries, if we focus on a large scale, are impacted by the technological innovations represented by Blockchain and cryptocurrencies. Attracting the attention of both researchers and practitioners, these elements are intensively studied, the interest being focused on identifying how they will succeed in revolutionizing other products and services. Cryptocurrencies and underlying technology have already infiltrated many industries, including cloud services, real estate, healthcare, management, logistics, and retail. Given the growing popularity of these elements, this paper considered a study of the cryptocurrency market in terms of correlations between the main virtual currencies traded and the study of causality between them. Prior to the analysis, we proposed the construction of an index that summarizes the evolution of the main cryptocurrencies, through two measures, namely the calculated returns of the selected virtual currencies and their traded volume. The index was established using importance coefficients or weights associated with the two previously mentioned indicators, weights simulated or given based on the observed data. Giving distinct weights to the two indicators that compose the proposed index, we noticed that the evolution of the main digital assets does not change significantly, and any changes correspond only to cryptocurrencies for which there are correlations

between returns and traded volumes. In addition, using the Pearson correlation coefficient, we noticed that the connections between the ten currencies considered are predominantly statistically significant and denote strong, positive correlations between the studied variables. Subsequently, evaluating Granger causality, we identified bidirectional causal relationships between Bitcoin and Binance cryptocurrencies, Bitcoin and Dogecoin, Bitcoin and Ethereum, Dash and Monero, and Ripple and Litecoin. This translates into the fact that past values regarding the price of these cryptocurrencies may prove useful in predicting the price of other cryptocurrencies. These records can be considered useful for investors interested in acquiring digital assets, as well as for the academic community focused on discovering mechanisms and tools that will better serve the understanding of the fundamentals of the cryptocurrency market. As a future research guideline, the inclusion of a volatility measure in the construction of the proposed composite index may be considered.

Acknowledgment

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Do Governance Indicators Impact the Shadow Economy? Evidence from CEE Countries

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Abstract

In this article, shadow economy and governance indices in Central and Eastern European countries are examined. For the year 2019, we looked at cross-sectional data for 17 countries and found that the most significant governance factors affecting economic activity that occurs outside of the official sector, such as the shadow or underground economy, were control of corruption, rule of law, political stability, voice accountability, government effectiveness, and regulatory quality. Ridge, Lasso, and Elastic Net Regression are all employed in this study. The findings are used to compare the strengths and weaknesses of the three chosen models and to determine the relative importance of each governance metric in the final model. The results suggested that all three methods have similar results. In terms of R-squared the method with highest value is Lasso, while in terms of the RMSE indicator elastic net regression shows the lowest value.

Keywords: governance indicators, shadow economy, shrinkage, ridge regression, lasso regression, elastic net regression.

JEL Classification: O17, J46, E26, E27, C59.

1. Introduction

In the past decade, substantial progress has been made in characterizing the size and composition of the informal economy in Central and Eastern Europe (Kapelyushnikov et al., 2010, Williams et al., 2013; Likić-Brborić et al., 2013; Kukk, Staehr, 2014; Davies, Polese, 2015). However, until recently, this has been done by examining the reasons individuals labor in the shadow economy, resulting in intense theoretical discussions over whether undeclared employees do so out of need or choice (Maloney, 2004, Williams, 2015).

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Most countries are concerned about corruption, since it has an impact on economic growth (D'Agostino et al., 2016). Because of this phenomenon, there is a lack of trust in institutions, and so corruption does not serve as a force that fosters economic progress (Rodriguez-Pose, 2013).

The shadow economy comprises both legal and economic repercussions that have a considerable impact on a country's economic and financial policies (Dell'Anno et al., 2007; Schneider, Enste, 2000). A significant informal economy may force a country's leaders to make choices based on false indications, which may have fiscal ramifications and effect on taxes and distribution policies in that country.

As a result, it is critical to lower levels of corruption and other related phenomena, such as the shadow economy, in order to entice foreign money to come onshore, raise investment, and ultimately foster innovation. Following this logic, the goal of this study is to examine the influence of governance indicators on the shadow economy in Central and Eastern European countries using the latest available data for informal economy estimation provided by the International Monetary Fund (Kelmanson et al., 2019). Using shrinking methodology that minimizes the possibility of overfitting or underfitting the data by adding a penalty term, the results indicate that control of corruption has the most impact in shadow economy.

Such an endeavor, to the best of the authors' knowledge, has not yet been made. There are several studies that treat the issue of corruption and shadow economy or governance quality and informal economy, but there has not yet been developed a model that is trying to point out what and how governance indicators impact the shadow economy. The research is focused on Central and Eastern European countries, considering that other authors highlighted that shadow economy and corruption are alternatives in wealthy nations but complements in unwealthy countries.

The following research questions will be addressed in this study: RQ1. What governance indicator has the most impact in the shadow economy? RQ2. What shrinkage method performs the best in terms of accuracy? RQ3. Does the three methods highlight highly different results? RQ4. What variables have shrinked almost to zero in shadow economy impact?

There are five main parts to this study. The purpose of this introduction is to briefly explain the importance of the subject. Theories and studies pertinent to the topic will be discussed in the section following this one. The third section presents data and technique, while the next section demonstrates empirical outcomes. The end of the paper is a summary of the important points.

2. Review of the Scientific Literature

This research seeks to examine the influence of governance factors on the shadow economy in Central and Eastern European nations. Theoretically, corruption (a governance indicator) and the shadow economy can be substitutes or complements (Dreher, Schneider, 2010). This section presents a literature review to better comprehend these phenomena (the shadow economy and governance indicators) and their relationship.

In the early 1970s, a series of studies investigating the social and economic factors of underdevelopment sparked the first wave of study on the informal sector (Hart, 1973). For more than four decades, the shadow economy has been documented as a phenomenon, sometimes known as the unofficial, hidden, subterranean, or black market. Economists around the world are attempting to define it, assess its scope, and advocate for control or elimination. Nevertheless, it is understood that once developed, the underground economy is famously hard to ignore (Schneider, 2000).

In recent years, it has become generally accepted that every national economy consists of a formal and an informal sector (Schneider, Enste, 2013). The domestic sector (self-sufficient economy) and the shadow economy make up the latter category (products and services are traded through markets as usual). Most publications eliminate acceptable self-sufficient activities from their concerns since they are quasi-economic activities (Eilat, Zinnes, 2002; Zaman, Goschin, 2015). The shadow economy consists of illegal activities like illegal workers and the illegal sector (Schneider, 2000).

Eilat and Zinnes (2002), Mikulic and Nagyszombaty (2013), and Schneider and Hametner (2014) all highlight regulatory perception density as a crucial predictor of the shadow economy in transitional nations. Individuals and businesses are said to be able to operate without monitoring if governance and the rule of law are weak. Bribes and corruption are unfavorable outcomes of the officials' lack of control.

In recent years, there has been a significant surge in interest in discovering the roots of the shadow economy and other criminal activities. However, identifying the causes remains a developing field of study. One of the primary reasons for the interest in governance quality was the emergence of institutional flaws and corruption as key impediments to market reforms (Abed, Gupta, 2002). The informal sector, on the other hand, is essential not only in transition nations, but also in developing countries. For many people, employment in the informal sector appears to be a viable source of income.

The political system, as well as the economic system, has an impact on both official and informal economic activity. Many countries' outcomes may be explained by underlying political factors. In terms of the size and shape of their fiscal systems, countries may tend to find a middle ground that reflects the balance of political forces and institutions and remain there until "shocked" to a new middle ground (Bird et al., 2008). It is interesting to study if existing contemporary political research on the relevance of governance and institutions allows us to comprehend the scope and evolution of the shadow economy. Citizen's identification with the state grows, as does their desire to pay, when they believe their interests are effectively reflected in institutions of government and they get an appropriate quantity of common goods. In an inefficient state, on the other hand, citizens will have little faith in government, and consequently no motivation to collaborate. Citizens are more eager to contribute when the state is more comprehensive and genuine. Corruption is exacerbated when the government and administration have extensive control over resource distribution. Schneider et al. (2000) demonstrate that nations with higher levels of corruption have

a higher percentage of the shadow economy. According to Dreher and Schneider (2006), the informal economy and corruption are alternatives in wealthy nations, but complements in unwealthy countries.

In countries where corruption is pervasive and the government budget is opaque, it is impossible to assume that the obligation to pay taxes is an accepted social norm. Citizens are reluctant to participate in the formal sector due to institutional insecurity, a lack of honesty, and lack of rule of law. Furthermore, when there are a significant number of corrupt colleagues, morality between tax administrators may be crowded out. Furthermore, legislative limitations and bureaucratic processes not only hinder competitiveness and market operation, but also provide as a better foundation for corrupt actions. Individuals and enterprises are likely to engage in the informal economy if they assume that neither contracts nor constructive activities will be enforced (Torgler, Schneider, 2007).

3. Data and Methodology

Using the most recent available data from 2019, this section analyses the data and methodology used in empirical research to examine how governance issues affect the shadow economy in Central and Eastern European countries. There are approximately 300 carefully selected indicators from several official sources, including the International Monetary Fund, United Nations, the World Bank, and the World Economic Forum in The Global Economy, which is the primary source of data.

Beyond that, a description of the variables considered in the analysis is provided. Starting with the key variable of interest: the shadow economy, we outline the variables used: shadow economy (percent of GDP) – the dependent variable expressed as a percentage of total yearly GDP along with the following independent governance variables control of corruption, regulatory quality, political stability, and absence of violence/terrorism, rule of law, government effectiveness, voice and accountability, political rights, competitiveness, corruption perception, and cost of starting a business.

Regarding the main objective of the paper, the following variables are included to analyse the effect of governance indicators on informal economy e in the Central and Eastern European countries. Table 1 summarizes the descriptive statistics for all the variables included in the investigation.

The descriptive statistics show a mean value of 23.55 for the informal economy in case of Central and Eastern European nations. The minimum value for shadow economy of 10.47 is represented by Czechia, while the maximum value of 37.6 is attributed to North Macedonia. Skewness and kurtosis values between -2 and 2 are adequate to show a normal univariate distribution. All the current distributions are perfectly normal.

Table 1. Summary statistics of the variables included in the analysis

Variable	Mean	Standard deviation	Median	Min	Max	Skewness	Kurtosis
Shadow Economy	23.55	8.58	20.83	10.47	37.6	0.3	-1.19
Rule of Law	0.38	0.56	0.37	-0.41	1.28	0.14	-1.51
Government Effectiveness	0.42	0.53	0.41	-0.63	1.17	-0.15	-1.15
Control of Corruption	0.16	0.58	0.01	-0.61	1.54	0.65	-0.37
Regulatory Quality	0.68	0.49	0.59	-0.19	1.59	0.03	-1.12
Voice Accountability	0.43	0.55	0.49	-0.83	1.21	-0.49	-0.65
Political Stability	0.35	0.59	0.53	-1.37	0.95	-1.45	1.71
Corruption	49.29	10.91	45	35	74	0.61	-0.55
Political Rights	2.35	1.32	2	1	5	0.45	-1.22
Civil liberties	2.41	1.28	2	1	6	1.12	1.17
Competitiveness	64.28	4.97	64.9	54.7	70.9	-0.3	-1.16
Cost of starting a new business	3.88	4.36	1.5	0	13.78	1.08	-0.32

Source: Author's work.

This section provides an overview of the processing approach, variable building, and model estimation strategies used in this paper. Our approaches are based on linear regression, which is outlined in this section. Following a group of independent variables $x_1, x_2, …, x_n$ and a dependent features y of interest that it is wanted to highlight the impact, seeked parameters $\beta_0, \beta_1, …, \beta_n$ so that $\beta_0 + \Sigma_{i=1}^{n}\beta_i x_i$ represents a fine approximation of y. When given a collection of m instances of each x_i, termed $x_{i,j}$, and the associated instances y_i, it was chosen the values β_i to minimize the residuals sum of squares $RSS = \Sigma_{j=1}^{m}(\beta_o + \Sigma_{i=1}^{n}\beta_i x_{i,j} - y_j)^2$.

As shown by Hastie et al., forward stepwise selection (Bendel and Afifi, 1977) first sets β_o to $\bar{y}$ and every other $\beta = 0$. Then it picks i and a β value repeatedly to construct a model that minimizes the error function as much as feasible. Once a β_i value is selected, it cannot be changed. As a result, each subsequent model differs only by one coefficient from the prior model. As a result, $n+1$ distinct models are generated, each with a smaller error than the previous one in the series.

The impacts of multicollinearity in regression when highly correlated variables are included have an influence on the model. To check the multicollinearity hypothesis of the regression model, the first approach is to compute the correlation coefficients between variables using Pearson coefficient $\rho_{xy} = \sigma_{xy}/\sigma_x\sigma_y$, where σ_x and σ_y represents the population standard deviation and σ_{xy} as the population covariance. The variance inflation factor (VIF) can be used to describe the impacts of multicollinearity in a regression model. The VIF has been proposed as a second diagnostic for multicollinearity in this paper. If two or more independent variables have an exact linear connection, there is perfect multicollinearity. The first

estimation of the regression model has considered shadow economy as a dependent variable and all other governance indicators as independent variables. The VIF of $\widehat{\beta}_t$ is defined as *VIF* $(\widehat{\beta}_t) = \sigma^2/(1 - R_j^2)$, where R_j^2 is the coefficient of determination of the initial model. The presence of severe multicollinearity is considered when *VIF* $(\widehat{\beta}_t) > 10$.

Ridge regression is predicated on first normalizing the predictor variables. When calculating the standard deviation, subtract the predictor's estimated mean from all of the data before dividing it by the predicted standard deviation. A single standard deviation means that all values are on the same scale and have the same standard error of one. Ridge regression penalizes the overall magnitude of the coefficients, so models with smaller coefficients tend to perform better. Predictors with higher statistical significance should have greater coefficient values, so that the penalty does not increase the values of less significant predictors. To a minimum $RSS + \lambda \sum_{j=1}^{m} \beta_j^2$, the ridge models as a tuning parameter, with $\lambda > 0$, can be used to balance between the importance of a small coefficient and low error. Each λ value is represented by a separate model.

Lasso regression (least absolute shrinkage and selection operator) reduces $RSS + \lambda \sum_{j=1}^{m} |\beta_j|$ while being otherwise identical to ridge regression. Because it zeroes out some coefficients when is large, lasso regression produces smaller models than ridge regression. Ridge regression does not do this.

The elastic net approach is a further extension of both the ridge and lasso regression methods. The elastic net regression approach is a convex mixture of the ridge regression penalty and the lasso penalty. Elastic net regression arose in response to criticism of the lasso, whose variable selection might be too dependent on data and hence unstable. Elastic net regression reduces $RSS + \lambda \sum_{j=1}^{m} \beta_j^2 + \lambda \sum_{j=1}^{m} |\beta_j|$. For all the three approached methods, the R library glmnet was used (Friedman et al., 2009).

The data needed to build a model is randomly divided into two sets: those used for training the model and those used for testing it. In order to develop a model, training data is used, and the model's accuracy is measured using test data. A model's accuracy in simulating real-world data is what the results are after. When a model's error on the training data is low, but its error on the test data is large, this is called overfitting. Because of the belief that "a model with too many settable parameters is unlikely to have all of them adequately set," these models often perform poorly. The least significant criterion for picking a model is to minimize the model's error on test data samples. The model's error on the test data must be reduced. Each iteration of resolution, ridge, lasso, and elastic net refines a hyperparameter (λ) that guides the algorithm. Decisions are made based on the hyperparameter value.

4. Results and Discussion

The OLS estimator has the required attribute of objectivity. It can, however, vary greatly. This occurs when the predictor variables are significantly associated with each other or when there are many predictors. The usual answer is to minimize the

variation at the expense of adding bias. This method is known as regularization, and it is virtually always helpful to the model's prediction performance.

A first glance of multicollinearity issue in a regression model can be tested using Pearson correlation. Figure 1 represents a visualization method of the correlation matrix called a correlogram. As decided to test the impact of governance indicators on shadow economy, it can be spotted that our dependent variable shadow economy is medium to highly negative correlated (ranging from -0.59 to -0.84) with all the variables included in the model except starting a new business which is positive low correlated (0.3). This is the first signal of multicollinearity.

Figure 1. Correlation plot of the data set
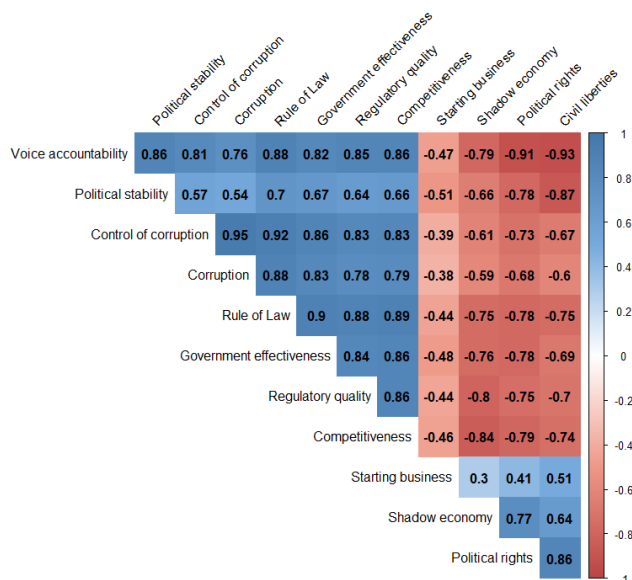
Source: Author's work.

To double confirm the presence of multicollinearity in the data a simple OLS estimation is tested using a multiple regression with shadow economy being the de dependent variable and the governance indicators being the dependent variables. From Table 2 it can be concluded that the data for the regression model contains multicollinearity effects in case of rule of law, control of corruption, corruption, voice accountability, and civil liberties because VIF exceeded 10.

Based on the discussions, it has determined that it would like to reduce the model complexity, as an example, the number of predictors. It can be used the forward or backward selection for this, but it would not be able to capture anything about the influence of the eliminated variables on the response. Removing predictors from the model is equivalent to zeroing out their coefficients. Instead of ordering them to be exactly zero, the approach is to punish them if they are too far from zero, causing them to be little indefinitely. It can reduce model complexity while retaining all variables in the model.

Table 2. Multicollinearity Test

Variable	VIF
Rule of Law	16.39
Government Effectiveness	6.90
Control of Corruption	17.25
Regulatory Quality	6.79
Voice Accountability	36.16
Political Stability	7.10
Corruption	11.05
Political Rights	7.31
Civil liberties	10.6
Competitiveness	6.62
Cost of starting a new business	1.72

Source: Author's work

Regression was developed as a second complimentary strategy to favour the inclusion of simple, sparse model predictors. Cross-validation is used to construct the best-fitting parsimonious model, which forecasts hazard ratios that are shrunk closer to the null. Models with a high degree of multicollinearity or where specific components of model selection, such as variable selection/parameter removal, need to be automated, benefit greatly from this type of regression. The L1 regularization approach used by Lasso Regression involves a penalty proportionate to the magnitude of the coefficient. Sparse models with minimal coefficients can be produced using this regularization technique. It is possible that some coefficients will fall below a certain threshold, and so be deleted from the model. The higher the penalty, the lower the coefficient value becomes (ideal for producing simpler models).

Elastic net linear regression uses penalties from the lasso and ridge methodologies to regularize regression models. Combining the LASSO and ridge regression approaches, the strategy improves statistical model regularization by learning from their weaknesses. LASSO's drawbacks, such as the fact that lasso only requires a few samples for high-dimensional data, are overcome by the elastic net technique. As many variables as needed can be incorporated into the model using the elastic net approach. LASSO often selects one variable from each group and ignores the others if the variables are tightly clustered. A two-step strategy is employed to determine the elastic net method's estimate using the LASSO and ridge approaches. As soon as the ridge regression coefficients have been discovered, a LASSO can be used to reduce the original coefficients.

The optimal minimum value found for λ in the cross-validation process is 0.049, while α remained 0 in case of ridge penalty. The optimal minimum value found for λ in the cross-validation process is 0.002, while α is 1 in case of the LASSO penalty. The optimal minimum value found for λ in the cross-validation process is 0.014, while α is 0.1 in the case of elastic net penalty. The minimised value found for Ridge MSE is 5.33, for LASSO MSE is 5.15 and for Elastic Net MSE is 5.61.

To find fitted ridge regression model based on the minimum value of MSE, thus it is considered to selected Alpha (α) = 0. In Table 3 it is denoted that the most appropriate fitted ridge regression model represents $\hat{y} = 101.85 + 5.68\,x_1 - 4.91\,x_2 - 10.69\,x_3 - 5.73\,x_4 - 7.01\,x_5 - 6.15\,x_6 - 0.1\,x_7 + 0.72\,x_8 - 3.31\,x_9 - 0.95\,x_{10} + 0.09\,x_{11}$. To find fitted LASSO regression model based on the minimum value of MSE, thus it was considered to selected Alpha (α) = 1. It is denoted that the most appropriate fitted LASSO regression model represents $\hat{y} = 99.47 + 4.97\,x_1 - 5.10\,x_2 - 10.67\,x_3 - 5.50\,x_4 - 6.16\,x_5 - 5.53\,x_6 - 0.09\,x_7 + 0.61\,x_8 - 2.82\,x_9 - 0.94\,x_{10} + 0.06\,x_{11}$. To find fitted elastic net regression model based on the minimum value of MSE, thus it was considered to selected Alpha (α) = 0.1. It is denoted that the most appropriate fitted elastic net regression model represents $\hat{y} = 108.1 + 6.33\,x_1 - 5.17\,x_2 - 12.01\,x_3 - 5.75\,x_4 - 8.52\,x_5 - 6.31\,x_6 - 0.14\,x_7 + 0.73\,x_8 - 3.78\,x_9 - 0.99\,x_{10} + 0.1\,x_{11}$.

Table 3. Ridge, LASSO and Elastic net regression coefficients

Variable	Ridge coefficients (alpha = 0)	LASSO coefficients (alpha = 1)	Elastic net coefficients (alpha = 0.1)
(Intercept)	101.85526753	99.47321004	108.1090109
Rule of Law (x1)	5.68317331	4.97820717	6.3371185
Government Effectiveness (x2)	-4.91987653	-5.10603148	-5.1705810
Control of Corruption (x3)	-10.69500872	-10.67350288	-12.0126203
Regulatory Quality (x4)	-5.73782169	-5.50828515	-5.7570394
Voice Accountability (x5)	-7.01852379	-6.16898734	-8.5230165
Political Stability (x6)	-6.15109322	-5.53512373	-6.3120144
Corruption (x7)	-0.10287180	-0.09003829	-0.1430631
Political Rights (x8)	0.72001218	0.61045729	0.7318538
Civil liberties (x9)	-3.31819191	-2.82668945	-3.7841000
Competitiveness (x10)	-0.95138346	-0.94316216	-0.9957976
Cost of starting a new business (x11)	0.09280123	0.06260667	0.1030126

Source: Author's work.

The ridge, LASSO, and Elastic Net methods were used to build three regression models with the given features. There were eleven characteristics in the regression models based on LASSO, ridge, and Elastic Net. All models exhibited similar root mean squared error metrics and explained almost 70% of the variability in governance indicators, demonstrating that the models were good at forecasting shadow economy based on governance variables. According to the parsimony principle, elastic net regression has the lowest prediction error. The root mean square error (i.e., prediction error) was also offered as a performance metric for our models based on the estimates gained during cross-validation. Predictive error is an important consideration when selecting a model. Here again, the elastic net model (RMSE = 1.499, SD = 0.528) performed relatively better than the Ridge (RMSE =1.774, SD = 0.523) and LASSO (RMSE = 1.505, SD = 0.544) models (Table 4), supporting the choice of the elastic net model. Elastic net models were used to analyse these data.

Table 4. Explained variance results for Ridge, LASSO and Elastic Net

Model	R-squared	RMSE (95% CI)	SD
Ridge	0.6934	1.774 (1.251, 2.297)	0.523
LASSO	0.7002	1.505 (0.961, 2.049)	0.544
Elastic Net	0.6920	1.499 (0.971, 2.027)	0.528

Source: Author's work.

5. Conclusions

This paper examined the relationship between governance indicators and shadow economy estimates for CEE nations. The empirical findings indicate that the three shrinkage techniques yield comparable results. The paper extends previous empirical models of the impact of governance indicators on the shadow economy by employing an approach that considers all the model's features without omitting any but penalizes the coefficients.

The multicollinearity hypothesis was tested before shrinkage methods such as ridge regression, lasso regression, and elastic net regression were applied. Shadow economies in Central and Eastern Europe (CEE) are positively impacted by the rule of law, political rights, and the cost of launching a new firm. When it comes to control of corruption, government effectiveness and quality of regulation and the voice of the people's accountability in the legislative process, these factors have a negative influence.

Corruption control, voice accountability, political stability, the rule of law, regulatory quality, and government efficiency are the most significant factors influencing the shadow economy. The relevance of the other coefficients has been reduced by a modest coefficient.

The model with the highest variability explained by the features is the LASSO regression, while the elastic net regression has the slightest prediction error. The accuracy between the three models is similar, with small differences.

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Exploring the Relationship between Exchange Rates, Gold Price and Inflation. An Multivariate Empirical Approach

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Abstract

Financial markets have calendar effects, also known as calendar anomalies. These refer to abnormal returns on traded assets with a specific frequency of occurrence at intervals of less than one year. Exchange rates formed in the financial markets are the main subjects of such calendar effects. Capital markets are studied much more frequently from this point of view. In comparison, it has been observed that those in foreign exchange markets can also have a consistent speculative dimension, which favors the appearance of calendar anomalies.

That is why we will further study the evolution of the euro-ron and dollar-ron exchange rates.

The study aims to explore the main dynamics between exchange rates, gold price, and inflation rate from a multivariate perspective covering the period 2009-2022 based on the Granger causality approach and the impulse response function testing empirically the existence of the long-run relationship using Johansen multivariate approach and the estimation of VAR/VECM model.

The gold market is a signal of crisis. When the prices of many financial assets collapse, the intrinsic value of the precious metal becomes very tempting to many investors. The pandemic has affected the Romanian foreign exchange market through various mechanisms. Fears about the prospects of the national economy, which existed even before COVID-19, have aroused distrust in the national currency. Furthermore, there are significant interdependencies between emerging and foreign capital markets, especially during periods of instability. The massive withdrawal of foreign investors from a capital market with a large share will cause stock prices to decline. Thus, it generates a substantial increase in demand in the foreign exchange market (investors will need currency to repatriate their capital).

The empirical results pointed out a long-run relationship between exchange rates, gold price, and inflation and denied any short-term relationship, while the Granger causality test highlighted a long-run causality between all four variables in the model.

Keywords: exchange rates, gold price, inflation, economic crisis, Romania.

JEL Classification: G01, G17, O24, D53, C32.

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1. Introduction

Financial markets have calendar effects, also known as calendar anomalies. These refer to abnormal returns on traded assets with a specific frequency of occurrence at intervals of less than one year. In some articles, they are considered seasonal variations in evolution. Courses formed in the financial markets are the main subjects of such calendar effects; thus, the necessity of studying the evolution of such exchange rates Euro-RON and Dollar-RON.

Capital markets are much more frequently studied from this point of view, but, by comparison, it has been observed that those in foreign exchange markets can also have a consistent speculative dimension, which favors the appearance of calendar anomalies. On the other hand, fluctuations in foreign exchange markets, as opposed to capital markets, can be decisively influenced by the prompt interventions of the Central Bank. From this perspective, the Central Bank has efficient means of buying or selling the national currency at its disposal, aiming to bring exchange rates to a desirable level (Ștefănescu, Dumitriu, 2020). Consequently, such regulatory actions mitigate or even eliminate seasonal variations.

It is worth mentioning that the National Bank of Romania opts for applying a controlled flotation regime, referring to consistent interventions on the foreign exchange market that will fade certain seasonal variations. The NBR focuses on maintaining the stability of the euro and US dollar exchange rates, the two most important currencies for the Romanian economy.

In order to determine precisely how the RON / EUR exchange rate fluctuates, three periods have been analyzed: 2 months from the financial crisis (January-February 2009), March 2009 - June 2017 post-crisis period, and the crisis caused by COVID March 2020 - May 2022.

According to the philosophy that guided the NBR's policy on foreign exchange interventions, high exchange rate volatility is detrimental to both the inflation target and the financial health of the fundamental and financial sectors. This is because high exchange rate volatility makes it more difficult to achieve inflation targets. The NBR adhered to this ideology and advocated for a floating exchange rate as a means to take advantage of the valences offered by the free market, deter speculative activity, and prevent an undue appreciation of the currency.

The NBR was necessary to make quite significant purchases of foreign currency on the market in order to maintain a consistent application of this ideology. The National Bank of Rwanda (NBR) came under fire for not allowing the exchange rate to increase in accordance with the needs of the market when it bought the currency. As of today, it has become clear that the policy in question was correct. The ongoing global financial crisis has resulted in a dramatic reversal of the trend of RON appreciation, which has been accompanied by substantial periods of volatility. Similarly to how foreign exchange inflows led to an overestimation of the local currency that was significantly higher than the level indicated by the fundamentals of the exchange rate, the reduction in external financing and uncertainty tend to lead to an unjustified depreciation of the leu as indicated by the fundamentals of the exchange rate. In times of overestimation, the reserves that are purchased on the

foreign exchange market act as interventions to calm the depreciation of the national currency (RON).

In this light, the study aims to explore the main dynamics between exchange rates, gold price, and inflation rate from a multivariate perspective covering the period 2009-2022 based on a VAR/VECM approach together with Granger causality and impulse response function.

The paper is organized as follows. The section of the problem statement introduces the reader to the topic of the financial crisis. It explores the main implications between exchange rates and gold price focusing on the most relevant research publications.

A brief description of the data and the fundamental elements of the multivariate approach is included in the methodology section. The empirical findings section highlighted the main findings between all the model variables. The research continues with remarks and findings pointing out the dynamics between exchange rates, inflation, and the gold price.

2. Problem Statement

The findings of numerous different forms of study have provided evidence for the occurrence of a variety of calendar anomalies, which runs counter to the recognized assumptions that are the foundation of asset–pricing models. Some examples of these include the monthly effect, also known as the January effect (Kim, Park, 1994; Haug, Hirschey, 2006; Rendon, Ziemba, 2007; Agnani, Aray, 2011; Kumar, 2016a,b), the holiday effect, also known as the Liano and White effect (Vergin, McGinnis, 1999), and the week–end effect (Lakonishok, Levi, 1982; Jaffe, Westerfield, 1985; Kohli, Kohers, 1992; Levy, Yagil, 2012).

Among them, the January effect, the Day-of-the-week effect (also known as DOW), and the Turn-of-the-month effect (also known as TOM) are the most well-known and have attracted a significant amount of interest from academicians as well as practitioners (Alt, Fortin, Weinberger, 2011). Previous research has made an effort to investigate the root of these aberrations, but thus far, no satisfactory explanation has been uncovered.

The influence of the Dow Jones Industrial Average makes Monday the worst day of the week for investors when compared to the other days of the week (Condoyanni, et al., 1987). The January effect is a peculiarity of the calendar that occurs only in the context of the financial markets. This impact causes returns in January to be much higher than those in any other month of the year (Floros, 2008; Moller, Zilca, 2008; Dbouk, Jamali, Kryzanowski, 2013; Lynch, Puckett, Yan, 2014). Many experts in the field of academia are of the opinion that the performance of stocks during the first month of the year is an accurate predictor of how those stocks will perform throughout the rest of the year. When a security is carried over from one month to the next, an unusual price anomaly known as the "TOM effect" might appear in the equity markets. This impact is common knowledge among market participants. According to Moller and Zilca (2008), the last few days of December and the first few days of January are times when stock returns are particularly strong. According

to Kumar, the returns on TOM trading days were much lower than the returns on non-TOM trading days (2015).

Mondays in Central and Eastern Europe (CEE) experienced negative returns from 1997 to 2000, according to Patev (2003). Despite providing contradictory evidence for the presence of the impact in Eastern European emerging markets between 1990 and 2002, Ajayi et al. (2004) provided support for the weekday effect. Tonchev and Kim 2004 discovered that there was essentially little evidence of calendar impacts in the markets of the Czech Republic, Slovakia, and Slovenia. The research conducted by Chukwuogor-Ndu in 2006 looked at fifteen European financial markets and discovered that several countries, such as the Czech Republic, Slovakia, and Turkey, have had negative returns on Monday. After entering the EU, the nations of Central and Eastern Europe reportedly saw a decline in the occurrence of these anomalies, as stated by Heinineni and Puttonen (2008). Mondays are the days of the week when Turkey, Cyprus, and Greece have the least amount of impact, according to Hourvouliades and Kourkoumelis (2009). While Francesco and Rakesh (2010) observed a day-of-the-week effect in the Slovenian stock market following EU accession of European equity markets from 1999 to 2009, Borges (2009) found anomalies in seventeen European equities markets between the years of 1994 and 2007. Borges' research focused on the period between 1994 and 2007.

2.1 The Impact of the Day of the Week

Cross was one of the first people to look at data from the United States (US) while evaluating daily fluctuations in stock prices by the day of the week (1973). According to the available research, the prices of stocks tend to be higher on Fridays than they are on any other day of the week, whereas the opposite is true on Mondays: they tend to be lower than they are on any other day of the week. According to research on the influence of the day of the week, Mondays often have lower daily returns than the other weekdays (French, 1980). The weekdays are expected to have varying effects on the average returns (Cross, 1973; Gibbons, Hess, 1981; Cai, Li, Qi, 2006).

According to Zhang, when it comes to portfolio selection, profit management, and overall investing strategy, the day of the week influence may influence investors (2017). Furthermore, Zhang et al. (2017) point out that finance theory cannot adequately explain this type of phenomenon. They also note that, even though calendar impacts have been documented in the literature, there is no uniform consensus among the researchers because of differences in sample data and methodologies. The oddity regarding the days of the week was also found by Sias and Starks (1995). Because investors tend to trade fewer securities on Mondays than they do on other days of the week, Mondays tend to have lower returns than on the other days of the week. According to Golder and Macy (2011), a distinctive weekly pattern of better mood could be able to explain why Monday returns are lower than those seen on other days of the week.

2.2 The Influence of the First of the Month

The time-of-the-month effect (also known as the TOM effect) is a well-studied price anomaly that occurs in the stock markets and takes place at a certain period of the month or when an asset is carried over from one month to the next. Ariel (1987) referred to an empirical irregularity in stock returns as the "monthly effect," and he used that word to define the phenomenon. After analyzing the stock index returns from 1963 to 1981, he finds that stock returns are statistically distinguishable from zero on days immediately before and throughout the first half of each calendar month. His research covers the period from 1963 to 1981. Expanding on the research done by Ariel (1987) for four additional nations, Jaffe and Westerfield (1989) offer a flimsy case for the validity of his findings.

However, they uncover compelling data suggesting that the last day of the month has an impact.

The time value of the money impact is created when an asset is carried over from one month to the next. This phenomenon is well-known in the equity markets, and it has received a significant amount of research attention. An empirical irregularity in equity returns was given the name "monthly effect" by Ariel (1987), who coined the phrase. It has been discovered that the average return on stocks is profitable in the days immediately preceding and during the first half of calendar months, but that such returns are statistically negligible in the days that fall in the second half of the month. The findings of Ariel's (1987) research were extended to four other nations by Jaffe and Westerfield's (1989) investigation. Despite this, the conclusions formed by Ariel do not hold water in their eyes. On the other hand, they uncover compelling data suggesting that the last day of the month has an impact.

2.3 The Influence of the New Year (January Effect)

The January impact wasn't documented for the first time until Rozeff and Kinney (1976) did their study on the New York Stock Exchange. According to research conducted by Gultekin and Gultekin (1983), the best months for returns in the United Kingdom are January and April. In Japan, however, only one month is among the best. According to Mill and Coutts' research, there is evidence that January had an effect on the FTSE100, Mid 250, and 350 indexes from 1986 to 1992. [Citation needed] (1995).

The monthly CRSP statistics from 1926 to 2005 include evidence of the impact that January had on the market. Agnani and Aray (2011) utilize monthly data from the United States from 1940 to 2006 to investigate whether or not a time-varying January impact is both positive and strong in high volatility regimes, and low volatility regimes respectively. Jacobsen and Zhang (2013) looked at more than 300 years of stock returns in the UK and discovered that the January effect first appeared around the year 1830. However, between 1951 and 2009, the January influence gradually disappeared. This finding was based on the fact that Christmas became a public holiday in the UK in 1830.

When analyzing the relationship between currency pairings and the US dollar, Kumar (2016) focused on the influence that January had between 1995 and 2014. Statistics collected from 1995 to 2004 show that the returns on all currencies are greater in January and that they fall during the remainder of the year, which confirms the January impact. He argues that the January impact has mostly disappeared for virtually all currencies from 2005 to 2014, which is evidence that markets have become more efficient throughout this time.

Due to its long history of usage as a medium of trade and a store of value, gold is considered to be both a commodity and a kind of money. When it was initially extracted from the ground, gold was one of the first metals discovered by humankind. The Bretton Woods system, which was put into place after World War II, established a price for gold of $35 per troy ounce. In 1971, the United States switched to a currency system based on fiat, which meant that dollars could no longer be directly exchanged for gold. Decoupling from gold was finally accomplished with the Swiss Franc in the year 2000.

Gold investment may be utilized as a risk management strategy to reduce the impact of adverse macroeconomic and financial conditions (Agyei-Ampomah, Gounopoulos, Mazouz, 2014; Baur, Lucey, 2010; Beckmann, Berger, Czudaj, 2015, 2019; Bilgin, Gozgor, Lau, Sheng, 2018; Bouoiyour, Selmi, Wohar, 2018). Investors acquire gold as a hedge against currency changes since it is seen as a stable asset in both economically challenged and non-stressed contexts. As a result, gold prices tend to remain relatively stable (Beckmann et al., 2019; Harris, Shen, 2017; Mensi, Hammoudeh, Al-Jarrah, Sensoy, Kang, 2017; Singhal, Choudhary, Biswal, 2019).

Over the course of the previous two decades, there has been a rising interest in the study and literature about gold investments. O'Connor, Batten, and Baur (2015); O'Connor, Lucey, and Batten. O'Connor, Batten, and Baur (2015). Gold is a popular investment choice among investors during times of economic instability and underperformance (Jain & Biswal, 2016). To put it another way (Bouri, Jain, Biswal, Roubaud, 2017). Since the global financial crisis (GFC), gold has been an increasingly appealing alternative hedge that may be utilized in portfolio diversification (Kirkulak, Uludag, Lkhamazhapov, 2014).

It has also been demonstrated that previous financial crises have had an effect on the relationship between gold's reputation as a safe-haven asset and a loss in the value of other currencies (Baur et al., 2010; Nguyen et al., 2020; Yang et al., 2014). According to the findings of a research done by Morales-Zumaquero and Sosvilla-Rivero (2014), which examined the period of time between 1970 and 2011, GFCs are what induce breaks in the volatility of currency rates. Because of this, the world's central banks were forced to implement unconventional monetary policy measures in order to stabilize the relationship between gold prices and currency rates. These measures included lowering interest rates to zero and initiating quantitative easing (QE), two of the more notable examples.

Since the Great Financial Crisis (GFC), the introduction of COVID-19 has sent ripples across the financial markets that have rattled them to their very foundations (Baker, Bloom, Davis, Terry, 2020; Goodell, 2020). The global market for foreign

currencies has been significantly impacted because of the financial crisis that began in COVID-19. This current financial crisis is significantly more extensive and damaging than those that have occurred in the past (Shehzad, Xiaoxing, Kazouz, 2020). In response to the impact that COVID-19 had on the currency exchange rate, several developed and developing countries implemented unconventional macroeconomic policies that encouraged interest rates to remain at or near zero. This was done to prevent the long-term trend of exchange rate volatility from being disrupted (Yilmazkuday, 2022).

Academics have established a connection between the prices of stocks and commodities such as gold and oil for many years. Economists make use of a wide variety of economic indicators, including industrial production, interest rates, inflation, and currency exchange rates (Amoateng, Jovad, 2004). El-Sharif et al. (2005) used only data from the United Kingdom in their study, and they discovered a positive and sometimes substantial correlation between the stock prices of oil and gas sector companies and the fluctuations in the prices of oil and gas on the market. Basher and Sadorsky (2006) stated that the risk of fluctuating oil prices has a substantial influence on the stock returns of developing economies.

According to Zang et al., cointegration and causality both point to a relationship between the prices of gold and crude oil (2010). The analysis found a significant relationship between the prices of crude oil and gold during the time covered by the sample. Additionally, it was revealed that the long-term equilibrium between the two markets as well as the linear Granger variation in crude oil prices were the primary drivers of the fluctuation in the gold price. In addition to this, it seems that the price of crude oil has a greater influence on the predicted effective price between the two markets than gold does.

Laughlin (1997) stated that the value of gold rises regardless of whether the value of other commodities falls. In his analysis of the future price of gold, Pravit (2009) makes use of a combination of multiple regression and ARIMA. The ARIMA (1, 1, 1) model provides the most accurate projections of the short-term movement of gold prices. The multiple regression model used in the research revealed that fluctuations in the price of gold in Thailand are influenced by a variety of economic variables, including but not limited to the following: the value of the Australian Dollar, the Japanese Yen, the United States Dollar, the Canadian Dollar, the European Union Ponds, the price of oil, and the price of gold futures.

3. Research Questions / Aims of the Research

The paper investigates the nature of the relationship between the euro-Ron exchange rate, the dollar-Ron exchange rate, gold price, and inflation using monthly data from January 2009 to May 2022. To do that, a multivariate approach has been applied, incorporating the cointegration analysis, Granger causality, and impulse response function.

4. Research Methods

The research used monthly data covering 2009-2022 using four main variables: average Euro-Ron exchange rate, average Dollar-Ron exchange rate, average gold price, and harmonized consumer price index.

Analyzing the average monthly Euro-Ron exchange rate between 2013 and 2015, a relatively stationary evolution is observed, fluctuating between 4.395 and 4.52. This is a relatively horizontal trend, with the recorded values fluctuating around an average value. In this case, it is not a question of a significant trend (Ștefănescu, Dumitriu, 2018). Regarding the evolution of the average monthly Euro-Ron exchange rate in the next period, 2015-2018, it is observed that the time series shows an upward trend corresponding to a significant increase. Thus, the national currency depreciated against the European one.

The reason for which the Dollar-Ron exchange rate has been included is that until 2004, the representative foreign currency in Romania was the US dollar. The evolution of this time series highlights a downward linear trend and an alternation of periods of appreciation and significant depreciation. In 2009-2020, the dollar-Ron exchange rate shows a horizontal linear trend. However, during the late period, the national currency depreciated significantly against the US dollar (Ștefănescu, Dumitriu, 2020).

The gold market is a signal of crisis. When the prices of many financial assets collapse, the intrinsic value of the precious metal becomes very tempting to many investors. If rising inflation erodes confidence in some currencies and financial market volatility is expected to remain high, gold transactions will become attractive to many investors. As a result, the price of gold followed an upward trend in the first quarter of 2020. However, as with the Dow Jones index, the positive shocks alternated with the negative ones.

The study aims to explore the main dynamics between exchange rates, gold price, and inflation rate from a multivariate perspective covering the period 2009-2022 based on the Granger causality approach and the impulse response function testing empirically the existence of the long-run relationship using Johansen multivariate approach and the estimation of VAR/VECM model.

The unit root ADF and PP were tested to determine the order in which the variables should be integrated. In addition, the presence of a long-run relationship has been investigated by utilizing a VAR model to ascertain the lack of a serial correlation in the residuals. The optimal lag length has been determined by applying informational standards such as the AIC and the SCH.

If the analysis does not reveal the presence of a cointegration relationship, a VAR model in difference needs to be estimated, and thus the Granger causality could offer only the short-term perspective. If the variables exhibit a co-movement relationship, that a cointegrated VAR model that considers an error correction mechanism will be necessary. It is possible to witness long-run and short-run causalities inside a VECM simultaneously. The ECM coefficients must be negative and statistically significant in terms of the t-test to validate the existence of Granger causation over the long run. The short-run Granger causality is validated when the lagged coefficients are jointly

statistically significant in terms of the Wald test or the F test. After the Granger causality was established, generalized impulse response functions developed by Pesaran and Shin (1998) were used to determine the impact of a shock in gold price and inflation on the exchange rates.

5. Findings

The analysis has used the period 2009M01 2018M12 training period and 2019M01-2022M12 as test and forecast horizon periods.

Figure 1. The Evolution of Romanian exchange rates
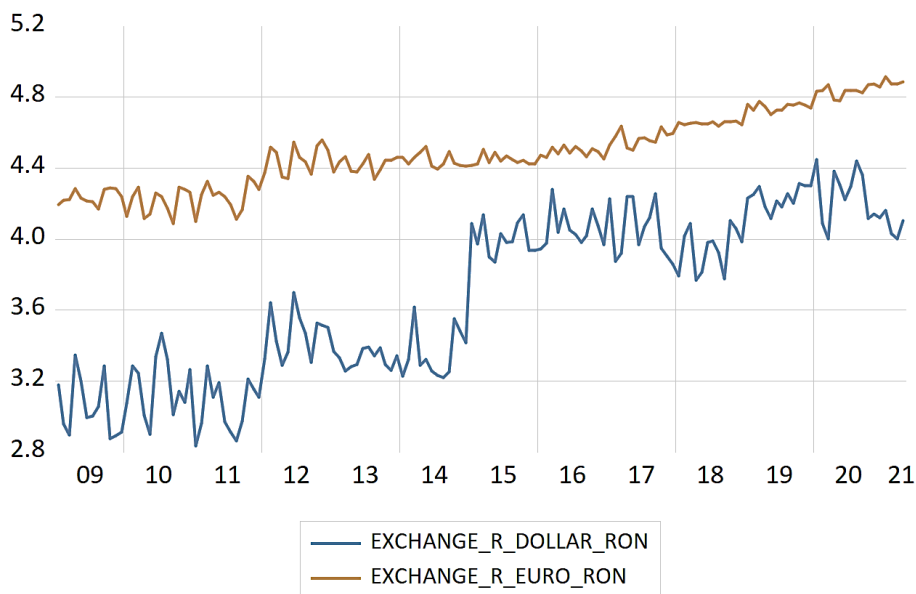
Source: Own processing in EViews.

Analysing both exchange rates, the ascendant trend of the dollar-Ron exchange rate can be highlighted, as well as the oscillating trend of the euro-Ron exchange rate, even if characterized by several shocks.

In analysing the dynamic interdependencies between exchange rates, gold price and inflation, the first step requires the analysis of the stationarity of each series to test if all variables are integrated on the same order, and thus the cointegration could be considered. The ADF test revealed that all series are I (1), being integrated in the same order, and thus, the first condition from cointegration definition is accomplished. Furthermore, the Johansen approach is applied within a VAR framework to explore the existence of a long-run equilibrium relationship between the variables. The empirical results of the Johansen approach (Table 1) revealed the existence of a unique cointegration relationship at the 1% significance level. The

optimal lag length according to AIC and SBC was 1, for which the main hypotheses on residuals and the stability condition have also been validated.

Table 1. The empirical results of Johansen's approach

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.263153	84.70693	63.87610	0.0003
At most 1	0.157618	41.03832	42.91525	0.0761
At most 2	0.063197	16.51077	25.87211	0.4522
At most 3	0.048939	7.175339	12.51798	0.3266

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.263153	43.66861	32.11832	0.0013
At most 1	0.157618	24.52755	25.82321	0.0734
At most 2	0.063197	9.335430	19.38704	0.6895
At most 3	0.048939	7.175339	12.51798	0.3266

Source: Own processing in EViews.

The existence of a long-run equilibrium being proved, a VECM model has been estimated (Table 2). The empirical results pointed out a co-integration relationship between the dollar-ron exchange rate, euro-ron exchange rate, gold price, and inflation. The long-run equilibrium analysis revealed a negative and statistically significant relationship between both exchange rates, while the gold price positively impacted the euro-Ron exchange rate. The inflation pointed out a negative impact which, however, suffers from the lack of statistical significance. The results have also been confirmed by the study of Houcine et al. (2020), which found a long-run relationship between the price of crude oil, the Euro Dollar Exchange Rate, and the Gold Price pointing out the existence of a Granger causality moving from the Euro/ Dollar towards oil prices, highlighting that the variation in the exchange rate causes changes in oil prices.

Therefore, the gold price and the dollar-ron exchange rate explain the long-term changes in the euro-Ron exchange rate, given the statistical significance of the long-run coefficients.

Table 2. The empirical results of the VECM model

Cointegrating Eq:	CointEq1
EXCHANGE_R_EUR...	1.000000
EXCHANGE_R_DOLL...	0.234001 (0.05673) [4.12487]
GOLD_PRICE(-1)	-0.001489 (0.00049) [-3.06253]
HCPI(-1)	0.008365 (0.00460) [1.82042]
@TREND(09M01)	-0.007278 (0.00106) [-6.87264]
C	-5.393013

Error Correction:	D(EXCHA...	D(EXCHA...	D(GOLD_...	D(HCPI)
CointEq1	-0.446061 (0.07172) [-6.21988]	-0.911832 (0.20610) [-4.42415]	-35.98342 (17.6915) [-2.03393]	-4.523664 (1.68435) [-2.68571]
D(EXCHANGE_R_EU...	0.039958 (0.09449) [0.42286]	0.297893 (0.27156) [1.09696]	10.37209 (23.3105) [0.44495]	2.558213 (2.21931) [1.15271]
D(EXCHANGE_R_DO...	0.024283 (0.03061) [0.79332]	-0.118490 (0.08797) [-1.34698]	-0.176224 (7.55063) [-0.02334]	0.061702 (0.71890) [0.08583]
D(GOLD_PRICE(-1))	-0.000197 (0.00039) [-0.50801]	-0.000135 (0.00112) [-0.12103]	-0.193060 (0.09574) [-2.01641]	-0.002515 (0.00912) [-0.27593]
D(HCPI(-1))	0.001303 (0.00395) [0.32996]	0.007456 (0.01135) [0.65700]	1.479292 (0.97417) [1.51851]	-0.208708 (0.09275) [-2.25028]
C	0.004213 (0.00485) [0.86871]	0.006936 (0.01394) [0.49772]	0.949003 (1.19628) [0.79330]	0.233234 (0.11389) [2.04782]
R-squared	0.257018	0.176151	0.062013	0.099630
Adj. R-squared	0.229902	0.146083	0.027780	0.066770
Sum sq. resids	0.450690	3.722401	27427.41	248.6095
S.E. equation	0.057356	0.164836	14.14921	1.347096
F-statistic	9.478431	5.858517	1.811493	3.031934
Log likelihood	208.9189	57.95781	-578.7446	-242.4505
Akaike AIC	-2.838027	-0.726683	8.178247	3.474832
Schwarz SC	-2.713711	-0.602367	8.302562	3.599147
Mean dependent	0.004581	0.008852	1.056069	0.202448
S.D. dependent	0.065359	0.178379	14.34993	1.394454

Source: Own processing in EViews.

The statistical significance of the four error correction terms and the negative sign confirmed the existence of a long-run Granger causality between the four variables within the model.

Table 3. The empirical results of Granger causality

Dependent variable: D(EXCHANGE_R_EURO_RON)

Excluded	Chi-sq	df	Prob.
D(EXCHANGE_R_D...	0.629349	1	0.4276
D(GOLD_PRICE)	0.258079	1	0.6114
D(HCPI)	0.108872	1	0.7414
All	0.773039	3	0.8559

Dependent variable: D(EXCHANGE_R_DOLLAR_RON)

Excluded	Chi-sq	df	Prob.
D(EXCHANGE_R_E...	1.203317	1	0.2727
D(GOLD_PRICE)	0.014649	1	0.9037
D(HCPI)	0.431646	1	0.5112
All	2.447453	3	0.4849

Dependent variable: D(GOLD_PRICE)

Excluded	Chi-sq	df	Prob.
D(EXCHANGE_R_E...	0.197984	1	0.6564
D(EXCHANGE_R_D...	0.000545	1	0.9814
D(HCPI)	2.305870	1	0.1289
All	3.069720	3	0.3810

Dependent variable: D(HCPI)

Excluded	Chi-sq	df	Prob.
D(EXCHANGE_R_E...	1.328733	1	0.2490
D(EXCHANGE_R_D...	0.007366	1	0.9316
D(GOLD_PRICE)	0.076137	1	0.7826
All	1.414063	3	0.7022

Source: Own processing in EViews.

Figure 2. The effect of a shock in gold price and inflation on the exchange rates

Accumulated Response to Generalized One S.D. Innovations
95% CI using Standard percentile bootstrap with 999 bootstrap repetitions

Accumulated Response of EXCHANGE_R_EURO_RON to GOLD_PRICE Innovation

Accumulated Response of EXCHANGE_R_EURO_RON to HCPI Innovation

Accumulated Response of EXCHANGE_R_DOLLAR_RON to GOLD_PRICE Innovation

Accumulated Response of EXCHANGE_R_DOLLAR_RON to HCPI Innovation
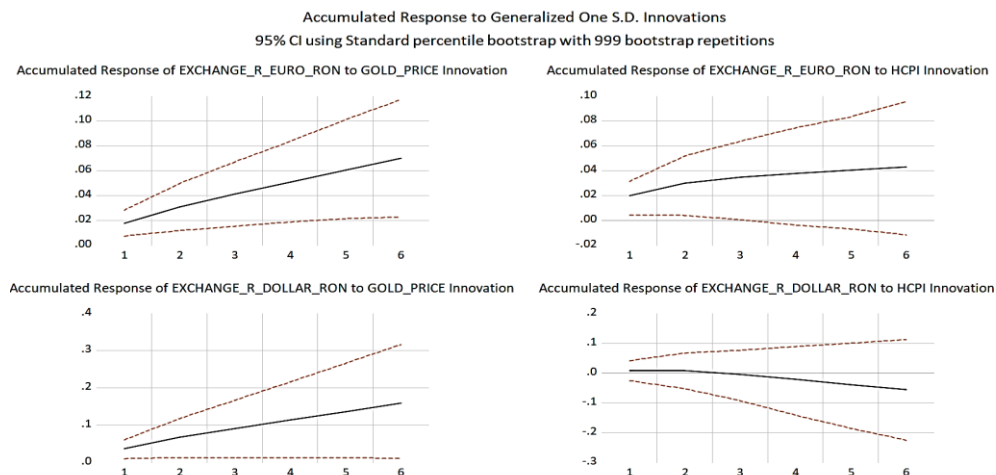
Source: Own processing in EViews.

Particularly in the case of the euro-Ron exchange rate, the ECTt-1 value of –0.44 highlighted that the deviation from the long-term equilibrium is restored by 44% each month (Table 2). The Granger causality test pointed out a long-run causal relationship between the dollar-Ron exchange rate, gold price, and inflation to the euro-Ron exchange rate.

However, in the short-run, the Granger causality test (Table 3) revealed that lack of causality relationships between all variables analysed within the model, given the high probabilities of the test.

Therefore, the relationship happened only on a long-term one. It can be revealed that a long-term equilibrium relationship exists between the euro-Ron exchange rate, dollar-Ron exchange rate, and gold price. Thus, changes in the dollar-Ron exchange rate and gold price are leading to changes in the euro-Ron exchange rate. The effect of a positive shock on the gold price revealed by the impulse response function (Figure 3) reflected a positive impact on both exchange rates.

Figure 3. Forecasts of both exchange rates for 2021-2022

EXCHANGE_R_DOLLAR_RON_F

EXCHANGE_R_EURO_RON_F
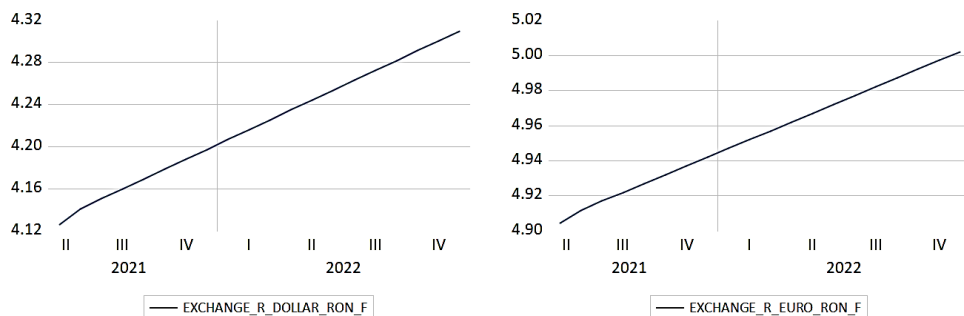
Source: Own processing in EViews.

Analysing the forecasts provided by the model, it can be highlighted that at the end of this year, the dollar-Ron exchange rate will register the value of 4.31 Ron, while the exchange rate for the euro will be at the value of 5.00 Ron.

6. Conclusions

The paper investigated the relationship between euro/dollar-Ron exchange rates, gold price, and inflation for the Romanian economy using monthly data covering the period 2009M01-2022M12.

The empirical results pointed out a long-run relationship between exchange rates, gold price, and inflation and denied any short-term relationship. Also, the Granger causality test highlighted a long-run causality between all four variables in the model. The impulse response function pointed out that changes in the dollar-ron exchange rate and gold price lead to changes in the euro-ron exchange rate.

The central forecast results pointed out the value of 4.31 for dollar Ron exchange rate and 5.00 for euro-ron exchange rate at the end of 2022.

As future research directions, the analysis can be extended to the level of European Union based on VAR or VECM models using panel data.

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Human Capital or Human Beings? Analysis of Added Value and Employee Efficiency between SME's and Large Companies

Dragoș Gabriel ION [1]

Abstract

The aim of this research is to illustrate the differences in perception of human capital within companies in the sector of commercializing construction materials. The analysis focuses on the differences between SME's and large companies that activate in the same industry and within a similar cultural and geographic context. For the results to be valid, we have analyzed the productivity of human capital within 1.100 companies for a period of eight consecutive years. The companies activate under the same geo-political terms and are evenly distributed within the territory of Romania. In total, we have 8.800 observations collected annually (2010-2018), represented by two variables: number of employees and turnover of the company. Using a density-based spatial clustering of applications with noise algorithm also known as DBSCAN, we have managed to identify five subgroups that are not homogeneous in terms of employee productivity. Our findings suggest that the indicator analyzed could vary by more than 100% and it is size dependable.

Keywords: human capital; productivity; added value of employees, workforce, labour.

JEL Classification: J24.

1. Introduction

Traditional research is based on the analysis of human capital as a factor of production and investment in non-material assets. The problems of training and efficient use of people's productive qualities have been studied within the framework of human capital theory. The approach to human productive capacities as a result of investments, the accumulation of skills capable of bringing income have been reflected in the works of scholars: W. Petty, A. Smith, D. Ricardo, J. Mill, K. Marx, F. List, L. Walras, A. Marshall, etc. In our view, the notion of human capital is conditioned by the emergence and development of interaction between production and consumption, and, moreover, the metric proposed is based on a quantitative

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measure that evaluates the efficiency of human capital. These values are determined by analysing the financial results of a company in close relationship to the size of the company and the efficiency of human capital. The proposed measured human productivity is calculated as total turnover of a company over the number of employees. Using this technique, we have obtained an "average employee turnover" according to company size.

The aim of the paper is the in-depth investigation of the methodological theory of human capital and its role in the process of formation of the commerce economy of Romania. We are trying to demonstrate the importance of human capital in the process of added value and hence the necessity of developing the innovative economy through analysis of human capital efficiency.

In order to achieve the purpose of the research, the following questions were proposed:

a. What is the productive capacity of an individual from a financial perspective in the given sector (commercializing construction materials)?

b. Are there any differences between productive capacity of individuals according to company size?

Our findings suggests that the employee efficiency of companies that activates in the same industry and within similar cultural and geographic context (Romania) could vary by more than 100% and it is dependable in size. Using DBSCAN, we have managed to identify five subgroups that are not homogeneous in terms of employee productivity. This may suggest that according to company size, there could be entry barriers and technological advancements that can be translated into improved employee productivity.

Although many avenues of research opened up by human capital theory is the "capability approach", which is an application of human capital theory, but which is not limited to addressing the problem exclusively through the labour market, but includes the analysis of individuals' access possibilities in other markets, such as the housing and health care markets, the issue with the human capital theory is that it focuses mostly on the inputs included in developing human capital (e.g., The Organization for Economic Cooperation and Development OECD, (1998) defines human capital as "... productive resources concentrated education, skills, competencies, and knowledge" or "... human competences and skills generated by investment in education and health".), but fails to measure the output of an individual. Because a society is composed of large numbers of individuals that activate under the same conditions, the GDP per capita offers a decent metric in regard to economic development of a society, but the result is homogenised over the industries. The metric that we have proposed looks at one industry and analyses differences of human capital in closed relation to company size.

Aggregate human capital at the national level has been used in particular to characterize the level of development of a country or to explain its economic growth (Robu, Anghel, Șerban, 2014). Poverty can lead to the degradation of the quality of human capital, thus the need for development. Some academics (Hackman, 1999) regard human capital as a means of preventing impoverishment

by making education systems more efficient but especially by investing in lifelong learning.

Specialists addressing the issue of economic growth and development agree with the idea of that as soon as a certain level of human capital accumulation is reached, it becomes more productive, correlating positively with growth in employment rates.

The issue of investment in human capital concerns today all countries competing for progress and welfare, but even more so in emerging economies. Human capital emerges as a complementary factor to other factors of economic growth (Mankiw, Romer, Weil, 1992; Romer, 1986). Investment in human capital, i.e., education, training, and health, is aimed firstly at the professional-scientific training of available human resources and, secondly, on adapting to the structural changes in the economy brought by scientific and technical progress, based on efficiency criteria.

Human capital development strategies focus on the size of capital resources and operational needs of the national economy and on ensuring that human resources use these resources efficiently. They will contribute to the formulation of development strategies by determining future human capital requirements and identifying ways of the best use of this capital, whereby available human capital will support the implementation of economic development plans. But it should be stressed that there are certain restrictive limits in the use of human capital, such as shortage of qualified personnel, difficulties of labour force, low labour productivity, flexibility and adaptability of the labour force, and insufficient flexibility and adaptability, or a work climate that discourages cooperation and personal commitment.

2. Context

The concept of human capital was theoretically founded in the 1960s by the American economist Th. Schultz and G. Becker (Nobel Prize winners in economics: the former in 1979, the latter in 1992). They showed that spending to increase an individual's education increases his or her productivity and hence future income - hence the term "human capital".

In the current literature, there are many definitions of this concept. According to the definition in official OECD publications, human capital is "the sum of knowledge, skills, competencies, and individual characteristics that facilitate the creation of personal, social, and economic well-being".

An important application of the concept of human capital is to deepen the analysis of economic growth. Thus, economic growth theory was initially based on a quantitative approach to the role of labour. For example, in economic growth models based on the Cobb-Douglas production function, the factors capital and labour have an elasticity of substitution equal to 1 (to achieve the same volume of output, a 1% reduction in capital must be compensated by a 1% increase in labour). In these models, labour is considered a homogeneous factor of production; it depends on the number of the working population and on people's behaviour (creativity, performance, etc.), but it influences the rate of economic growth only marginally, since workers are mostly unskilled and therefore only have a role as undifferentiated labour.

The use of the Cobb-Douglas function in empirical investigations of economic growth has made it possible to measure the relative action of capital and labour on the volume of total output. However, this tool has proved insufficient to explain the high rate of economic growth in Western countries in the early post-World War II years and continued into the 1950s. As a result, some economists began to point out the limitations of this approach. For example, Solow (1956) (winner of the 1987 Nobel Prize for economics) introduced a third factor into the Cobb-Douglas function, namely the "residual factor", determined by technical progress, scientific knowledge, the creative capacity of people, etc. This is therefore an "endogenous" factor in relation to the economic growth process, but it incorporates a number of "exogenous" elements which are likely to increase the effectiveness of production processes. In this way, a qualitative approach to the labour factor has been prefigured.

Today, this qualitative approach is predominant in the literature because it allows the role of internal conditions of economic growth to be highlighted. Often referred to as "technical progress", the residual factor reflects the importance – in contemporary economies – of scientific knowledge and technical and organizational innovations, which increase the efficiency of using other factors of production, primarily labour productivity. Therefore, theoretical analyses and empirical studies of technical progress have helped to clarify the role of human capital in economic growth.

The idea that education is not an investment to increase human capital, but a means to create positive externalities in society, was put forward by M. Spence, who is one of the main promoters of the application of what is called "signal theory" in the study of education. According to this theory, education is not only to increase the productivity of individuals but primarily to select the most productive individuals. The social usefulness of an education system which, although costly, does not increase labour productivity can therefore be questioned.

The 'capability approach' is a scientific approach primarily in terms of individual benefits. These advantages are manifested in the capacity of human beings to do many things that are considered important for life. Sen's work thus places at the heart of the economic development process the growth of the individual's capabilities: a set of real freedoms that enable him to use his personal endowments and control his life. In doing so, the scholar (winner of the 1998 Nobel Prize in Economics) takes into account, in addition to pecuniary wealth, all possibilities – economic, social and political opportunities offered to individuals by the society in which they live, opportunities that are directly linked to their health, their level of education, their life expectancy, and the possibility of making their voice heard in local and national debates.

Schultz proposes a way of measuring human capital that takes into account variables likely to improve those attributes of individuals that are likely to lead to higher wages in the labour market: infrastructure and health services, which influence the life expectancy and vitality of individuals; vocational training (including on-the-job apprenticeships) organized by enterprises; the education

system (from primary schools to universities); adult education and training programs organized outside enterprises; migration of individuals and families to find work.

Schultz (1959) concluded that this scarce resource, human capital, must be developed by appropriate means. This confirms Acemoglu (2012) and Acemoglu, Robinson (2019) perspective that countries emerge from poverty if and only if they have adequate economic institutions.

An important contribution of Becker (1964) is the distinction he makes between general human capital and firm-specific capital. General training, which is carried out in the public education system, determines the level of productivity of individuals in all the firms in which they will work, because it is closely linked to the individual worker and can be exploited by him or her in the whole labour market (domestic or international).

Businesses are therefore little interested in bearing the costs involved in an individual's general training, as the individual may well use his or her knowledge in another business, which is prepared to pay better. The firm in question may be interested in financing such specialist training because its managers believe that they have a reasonable chance of getting a return on their investment: the wages they will pay the worker after the end of his training period will be higher than the wages of workers in other firms, which gives the worker an incentive to stay with the firm that trained him. However, this wage will still be lower than the amount of the production bonus obtained by the company as a result of the worker's increased skills. The difference between the value of the additional production achieved by the worker and the wage paid to him represents the return on the investment made by the undertaking in his training.

An important feature of advanced economies is the self-sustaining nature of economic growth. This puzzling phenomenon can be better understood using the conceptual and analytical apparatus provided by human capital theory, which, as we have shown, allows technical progress to be treated as an endogenous factor of economic growth. Indeed, technical progress and innovations (as measured by overall factor productivity) are the creations of scientists, researchers, engineers, etc., trained through investment in human capital.

3. Research Methods / Questions

The approach we have used aims to illustrate the differences in perception of human capital within companies in the sector of commercializing construction materials.

The analysis focuses on the differences between SME's and large companies that activates in the same industry and within similar cultural and geographic context.

For the results to be valid, using the software termene.ro, we have analysed the productivity of human capital within 1.100 companies for a period of eight consecutive years (2010-2018). The companies activate under the same geo-political terms and are evenly distributed within the territory of Romania. In total we have 8.800 observations collected annually, represented by two variables: the number of employees and turnover of the company. We have used a density-based spatial

clustering of applications with a noise algorithm, also known as DBSCAN, with the help of Python.

The DBSCAN algorithm can identify clusters in large spatial data sets by looking at the local density of database elements, suggesting one core parameter. The DBSCAN can also determine what information should be classified as noise or outliers. By using the density distribution of nodes in the database, DBSCAN can categorize these nodes into separate clusters that define the different classes. Compared to other clustering algorithms, DBSCAN can find clusters of arbitrary shape, as can be seen in Figure 1.

Figure 1. Comparing 10 clustering algorithms on *dummy* datasets

Source: https://scikit-learn.org/.
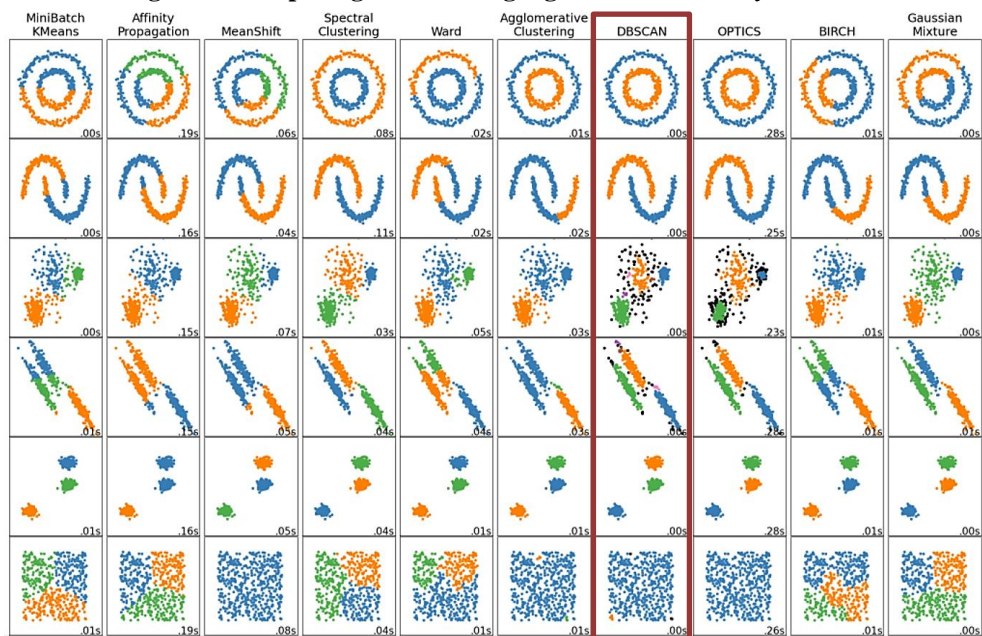
Its computing process is composed on six rules or definitions, creating two lemmas:

Definition 1: (*The Eps-neighborhood of a point*) For a point to belong to a cluster it needs to have at least one other point that lies closer to it than the distance Eps.

$N_{Eps}(p) = \{q \in D | dist(p,q) < Eps\}$

Definition 2: (*Directly density-reachable*) There are two kinds of points belonging to a cluster; there are border points and core points.

Definition 3: (*Density-reachable*) A point p is density-reachable from a point q with respect to *Eps* and *MinPts* if there is a chain of points $p_1…, p_n$, $p_1=q$, $p_n=p$ such that p_i+1 is directly density-reachable from p_i.

Definition 4: (*Density-connected*) A point p is density-connected to a point q with respect to *Eps* and *MinPts* if there is a point o such that both, p and q are density-reachable from o with respect to *Eps* and *MinPts.*

Definition 5: (*Cluster*) If point p is a part of a cluster C and point q is density-reachable from point p with respect to a given distance and a minimum number of points within that distance, then q is also a part of cluster C.

Definition 6: (*Noise*) Noise is the set of points, in the database, that don't belong to any of the clusters.

Lemma 1: A cluster can be formed from any of its core points and will always have the same shape.

Lemma 2: Let p be a core point in cluster C with a given minimum distance (*Eps*) and a minimum number of points within that distance (*MinPts*). If the set O is density-reachable from p with respect to the same *Eps* and *MinPts*, then C is equal to the set O.

Inputs: T*urnover* for a period of one year; average *number of employees* for one year.

Outputs: Employee productivity (employee turnover) compared to company size (number of employees).

4. Analysis of Employee Productivity

In the graph below, we have illustrated a scatter plot for companies that have between 50 and 3050 employees. On the X axis is represented the average number of employees and on the Y axis is represented the average employee productivity obtained by dividing the yearly turnover to average number of employees for each company, for a period of eight consecutive years (2010-2018). Using this method, we can have a holistic image of the variation of employee productivity in relation to company size.

Figure 2. Average employee productivity for large companies
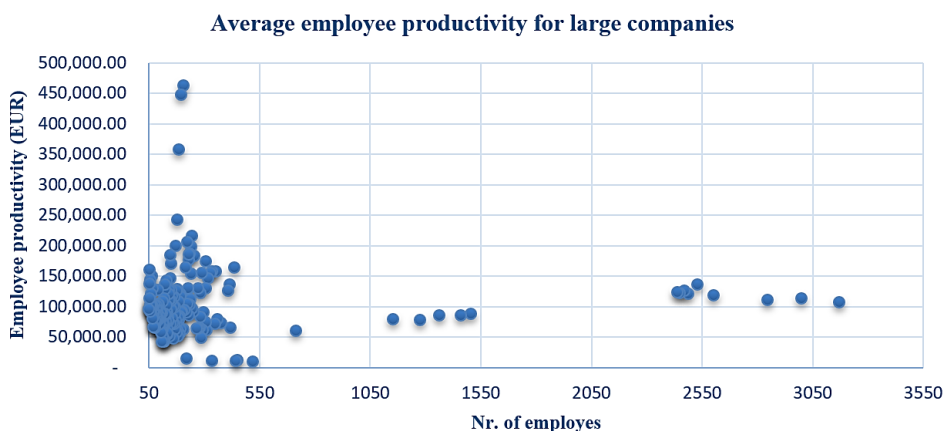
Source: Personal research and analysis.

For the companies that have between 50 and 3050 employees we can distinguish three groups using DBSCAN.

The first cluster, which is represented by the majority, is composed of companies that have between 50 and 500 employees. Within this cluster, the median value of employee productivity is 91k EUR/year.

The second cluster is represented by companies that have between 500 and 1500 employees. Within this group, the median employee productivity is 78k EUR/year; however, due to a reduced number of companies that meet the criteria of the above-mentioned cluster, our findings suggest that there could be a penetration barrier that requires a different business approach. The third cluster is represented by the companies that have between 1500 and 3000 employees. Within this cluster, the median value of employee productivity is 118k EUR/year.

In the graph below is illustrated a scatter plot for companies that have between 0 and 50 employees. On the X axis is represented the average number of employees and on the Y axis is represented the average employee productivity obtained by dividing the yearly turnover to average number of employees for each company, for a period of eight consecutive years (2010-2018). Using this method, we can have a holistic image of the variation of employee productivity in relation to company size.

Figure 3. Average employee productivity for SME's
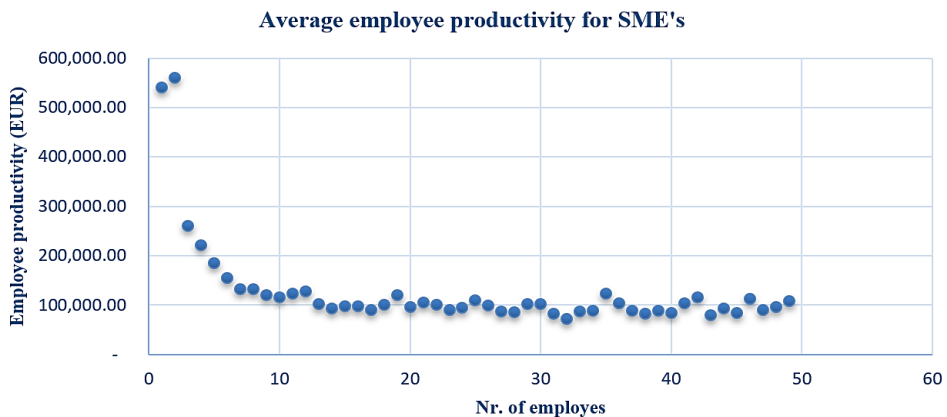
Source: Personal research and analysis.

For the companies that have up to 10 employees, the average productivity has a descending trend ranging from 560k EUR to 116k EUR with a median value of 184k EUR/year. This is an overall 84% increase in employee productivity in comparison to the companies that have between 10 and 50 employees. In other words, our findings suggest that there could be an exogenous effort led by the owner of the company that is translated in increased overall employee productivity. However, as the company size exceeds 10 employees, the overall productivity ranges from 72k EUR to 128k EUR with a median value of 100k EUR/year. In this scenario, we can observe that the effort input of the owner is homogenized due to the increased number of employees. For this reason, we can consider this indicator a representative one for SME's activating in this industry.
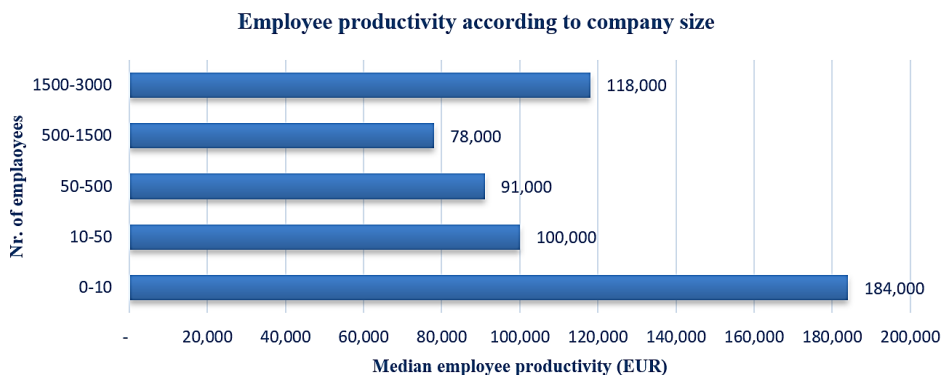
5. Findings

In order to fulfil the purpose of the research, we have answered the following questions that have been proposed:

a. What is the productive capacity of an individual from a financial perspective in the given sector (commercializing construction materials)?

b. Are there any differences between productive capacity of individuals according to company size?

Our findings suggest that there is a large disequilibrium within a homogeneous industry according to employee productivity. Due to exogenous factors, the discrepancy within the same context measured by quantitative indicators varies by more than 100%. Within the first group (0-10 employees), the median employee productivity is 56% larger compared to the fifth group (1500-3000 employees). This result was unexpected, but could be translated in a surplus of effort led mostly by the owner, or some type of embezzlement for unreported employment. This could be a common practice for small companies that activate in an emerging economy.

The second group (10-50 employees) has a median employee productivity of 100k EUR/year. Within this group, the overall productivity of employees is 9% larger than the third group (50-100 employees), and 28% larger than the fourth group (500-1500 employees). However, when we compare it to the fifth group (1500-3000 employees) the representative value for SME's is 18% lower than the employee productivity of large companies.

Figure 4. Employee productivity according to company size

Employee productivity according to company size

Source: Personal research and analysis.

Our findings suggests that the indicator analysed of companies that activate in the same industry and within similar cultural and geographic context could vary by more than 100% and it is size dependable. Using DBSCAN, we have managed to identify five subgroups that are not homogeneous in terms of employee productivity. This may suggest that according to company size, there could be entry barriers and technological advancements that can be translated into improved employee productivity.

6. Conclusions

The conclusion that emerges from this research is that within the same industry, within similar cultural and geographic context, the human capital is exploited differently, contrary to previous beliefs. Thus, analysing an industry as a homogenous group could result in misleading indicators. Our findings suggest that small companies (< 10 employees) tend to have better metrics, in our case, the median employee productivity is 56% larger compared to the fifth group (1500-3000 employees). This result was unexpected, but could be translated in a surplus of effort led mostly by the owner, or some type of embezzlement for unreported employment. This could be a common practice for small companies that activates in an emerging economy.

For this reason, when an industry analysis is performed, our recommendation for further studies is to pay adequate consideration at the number of employees of that specific group of companies and see if they illustrate aberrant values in comparison to the other groups.

"Through this prism, education is not just a means to other ends (income, pleasure, prestige, etc.), but an end in itself, whose multiple ethical and social dimensions stem from the fact that it enables human beings to be free, to grow and evolve as a species."

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On the Potential of Google's "Popular times" Data in Epidemiology

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Abstract

  Human interaction and mobility patterns are one of the key factors in modeling and controlling epidemiological outbreaks, seen with the ongoing SARS-COV2 pandemic. Most public health policies, adopted over the past two years, were designed to contain virus transmission by imposing restrictions on human mobility and interactions.

  We provide a test case scenario of using crowdsourced data from Google's "Popular times" graph available on Google Maps for various points of interest present there. We posit that the data available in this graph can be used as a proxy for both human mobility and human interactions, and at a more granular level, could be used to evaluate the current epidemiological situation and assess the impact of the ongoing public health restrictions. The data collected during our study period was then plotted as a heatmap overlaid atop OpenStreetMaps for ease of visualization.

  The dataset is comprised of a randomly stratified sample of restaurants, bars, and clubs in Bucharest, for which we collected the daily rates "busyness" for each of the points of interest in the sample. For hypothesis testing, we employed several classification algorithms/models to assess Google's "Popular times" statistical strength in predicting current epidemiological status and public health policy effects.

Keywords: COVID-19 transmission, crowd-generated data, epidemiology, human mobility, social interactions.

JEL Classification: C22, C53, I10, I12.

1. Introduction

  The COVID-19 pandemic brought forth by SARS-CoV-2 came with many disruptions to our modern life style, and while the pandemic potential of

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coronaviruses coupled with habitat disruptions were discussed by scientists for many years, the world as a whole was still taken by surprise.

The main public health policies adopted by governments around the world, consisted of lockdowns and severe mobility restrictions for various periods across the early phases of the pandemic. These policies were estimated to have saved millions of lives by curbing the viral spread and keeping the hospitals from being overloaded. However, with more knowledge about the virus being obtained, nations moved away from lockdowns to other non-pharmaceutical interventions (NPI), and with vaccines and better treatment protocols becoming available, blanket restrictions were mostly lifted.

In Romania, the initial lockdown and early policies proved to be highly successful, with the moving average 7 days (MA7) cases before the lockdown was lifted on May 14th, 2020, being 250, and death MA7 at around 23. However, as the lockdown was lifted, cases MA7 jumped to ~1200 by the end of August, 2020, with the death MA7 being at around 45, continuing to increase at an accelerated rate once more restrictions were lifted globally and people interacted more.

Previous research, on other diseases with a respiratory component to them, has shown that mobility and human interaction patterns correlate well with disease transmission (Findlater, Bogoch, 2018), thus it was expected that NPIs will help reduce the spread; however, exact causality of NPIs is hard to establish within a population due to the myriad of host intrinsic and extrinsic factors affecting disease transmission, especially respiratory ones.

2. Problem Statement

Existing literature describes the role human social interactions have in viral transmission dynamics, especially for respiratory diseases (Leung, 2021; Buckee, Noor, Sattenspiel, 2021; Cauchemez et al., 2011). Typical models used in epidemiology are based on SIR (Hethcote, 1989), and other derivatives, wherein they typically forecast growth based on certain disease/pathogen characteristics, such as R0 (i.e. how infectious a disease is), how large the susceptible (S) population is, how many people were already infected (I), and how many recovered (R) and assumed to be completely immune afterwards.

These models were developed to be used in small isolated populations with the specific assumptions of a constant population size and homogeneity in interactions between the individuals of said populations.

Our approach, while also focusing on local populations, uses Google's Popular Times data to explain and potentially forecast the local daily cases. Popular Times is a Google Maps feature which reports historical averages for each hour of each day of the week, in addition to this, it also reports, where available, the "live busyness" value of venues. This live value is determined based on Android's built-in location sharing (Google, 2020). Because the data is aggregated on a temporal basis from local devices, it is able to act as a proxy for local social interaction patterns.

3. Research Questions

We know from the existing literature that the incubation period of SARS-CoV-2 fluctuates to some degree between populations (due to intrinsic and extrinsic host factors), as well as between circulating variants, with the median value ranging between 3-7 days after contact until symptom onset, for both Omicron and Delta variants (Del Águila-Mejía et al., 2022; Mefsin et al., 2022; Zhang et al., 2021). In addition to this lag interval, there exists also a human and bureaucratic lag interval.

The human one stems from the time the symptomatic person decides to get tested, be it because they recognized their symptoms as being related to COVID-19, or because they were required to get tested. The other lag stems from how long the test result takes to come back to the person, and be officially counted in the national statistics. This second, bureaucratic, lag interval will fluctuate depending on the local epidemiological situation and the backlog of testing sites and authorities.

Thus, in order to assess the predictive power of our indicator, we first had to approximate the local bureaucratic lag, and use it to estimate approximate interval between a potential exposure event and being registered in the official statistics.

4. Research Methods

4.1 Data Sources

Venue lists

We compiled a list of popular venues in Bucharest from various websites (e.g., TripAdvisor, Metropotam), from which we kept only ones that had any sort of rating or review. The resulting list was then fed through a Python script to gather and append to each of the venues their peak popular hour for each day of the week, while dropping venues which had no available Popular Times data for the full week. Our final list contained a total of 63 venues, which was then fed through a Python script to gather and add to each of the venues their peak popular hour for each day of the week.

Table 1. Venue type distribution per Google's data

Venue type	
Beer	27
Restaurant	25
Bar	10
Clubs	1

Source: Authors' own work.

COVID-19 data

We used the reports made available on the official coronavirus-related government websites "datelazi.ro" and "stirioficiale.ro". We built 2 datasets from these sources, one containing daily SARS-CoV-2 infections in Bucharest, and one

containing total daily tests, accounting for our study period, from February 10th, 2022 to February 26th.

Popular Times

Since this data is not publicly exposed in Google's Maps API, nor any other public API made available by Google, we employed two different methods for redundancy.

The first method was to build a Selenium scraper that would run daily and visit each of the venues on the list at their peak hour to scrape the "busyness" value, and two hours after the curfew started. This method, however, requires supervision as Google sometimes detects unusual actions and requires a captcha puzzle to be solved.

The second method involved using a third-party platform (i.e., besttime.app) which makes available via API their services to obtain the required popular times data without the issues of the previous method. The dataset obtained from both methods was congruent.

4.2 Data Analysis

To analyse the correlation between human mobility and new COVID-19 cases, we need to account for the lag between first coming into contact with the virus, and when the case is officially recorded in the public data. This lag will consist of the incubation period and the bureaucratic lag.

In order to approximate what the bureaucratic lag was during February, the month of our study period, we fitted the number of daily tests and cases from Bucharest, to a linear regression, and selected the lag which best fit our data, which was 4 days.

For analysing the correlation between our mobility indicators and new daily cases in Bucharest, we offset the data from our dates by the median incubation period (5 days median of 3-7 range) and the bureaucratic lag (4 days), thus 9 days.

5. Findings

5.1 Busyness and dwell time values

Figure 1 presents the aggregated busyness and dwell time values across our study period. Dwell time represents how much time people spend in a location. The first dip is on Tuesday, February 15th, while the second is one is on Monday, February 21th.

Figure 1. Busyness and dwell times
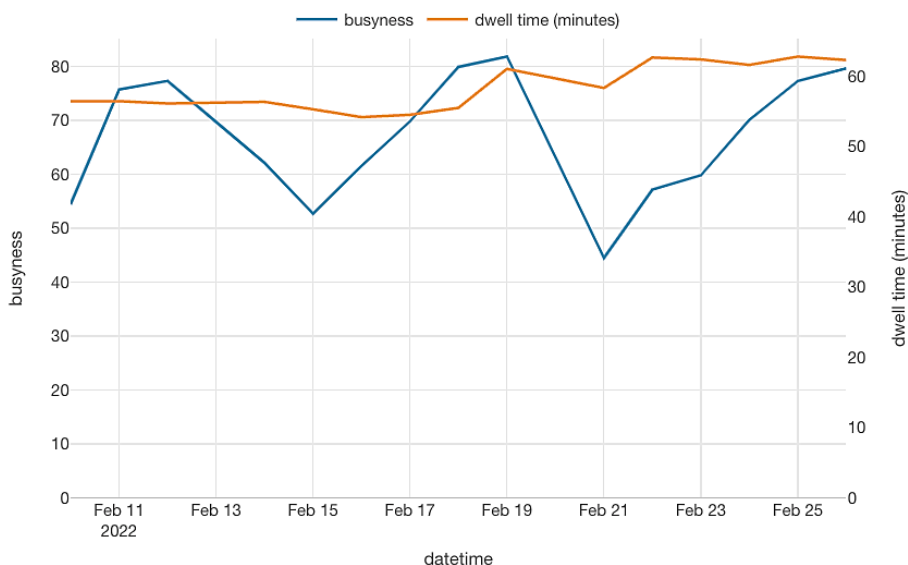
Source: Authors' own work.

It is reasonable to assume a cyclicity in busyness trends based on days of the week, with Monday being the lowest, barring any significant events such as February 14th which seems to have pushed the busyness higher than on February 21th in.

Figure 2. Busyness across day of the week

Source: Authors' own work.

In Figure 2, we look at the aggregated data for days of the week, where we see that Monday is indeed the lowest. As expected, Thursday to Sunday shows a peak, reflecting social interaction patterns.
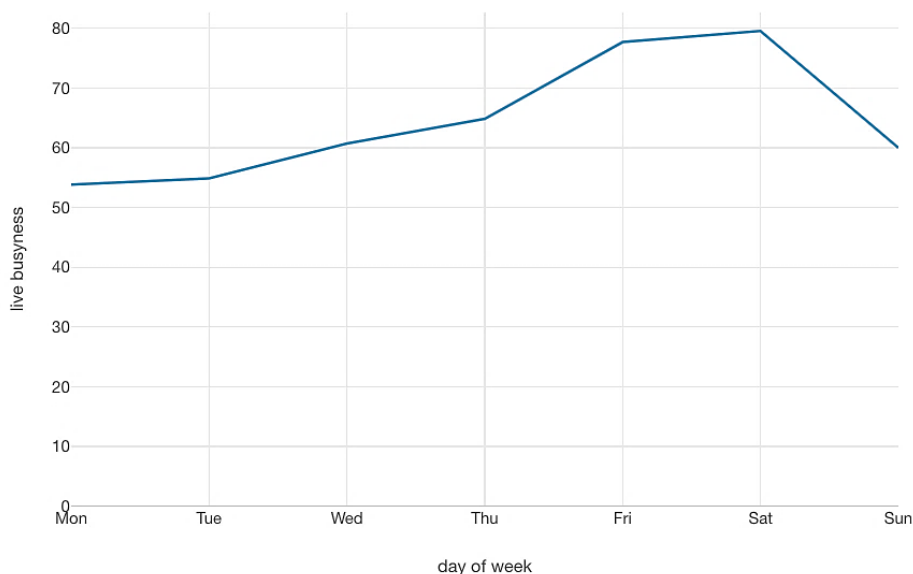
It is also possible that the increased number of observations in this timeframe is from a number of venues which are not open for the full week.

5.2 Daily tests versus new cases in Bucharest

Figure 3 shows the test-case relationship during the month of our study, whereas Table 2 presents the result of the regression where 4 days offset between test date and the official case count was used. With an adjusted R-squared value of 0.8876, the model has a good fit within the time period analysed and with the offset used.

Figure 3. Tests versus cases
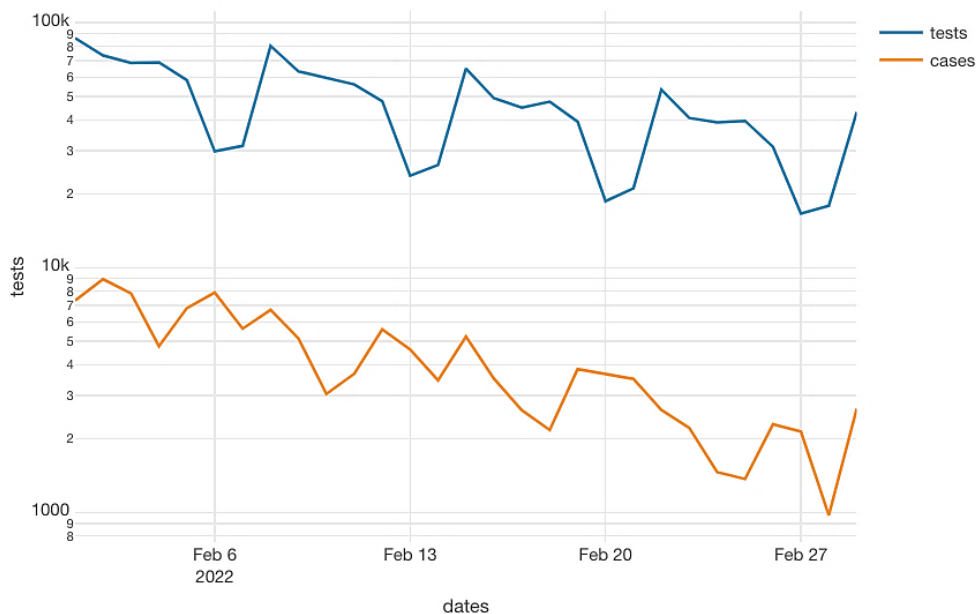
Source: Authors' own work.

Table 2. Test vs cases regression statistics

R Squared	Adj. R Squared	RMSE	F Ratio	P Value
0.915714260	0.887619014	4,061.26678129	32.5932098161	0.0106

Source: Authors' own work.

5.3 Effect of busyness and dwell time on cases

We fitted the busyness value and dwell times on a linear regression versus cases. Table 3 presents the power of the model.

Table 3. Busyness and dwell time vs cases regression statistics

R Squared	Adj. R Squared	RMSE	F Ratio	P Value
0.584231011	0.514936179	562.94886967	8.4310907369	0.0051

Source: Authors' own work

Figure 4 shows how the same variables, when used in Facebook's time series Prophet forecasting procedure, is able to predict accurately the daily cases in Bucharest. Table 4 presents the summary of the model, with a mean absolute percentage error of 20%, the model is considered good.

Figure 4. Prophet forecasting model
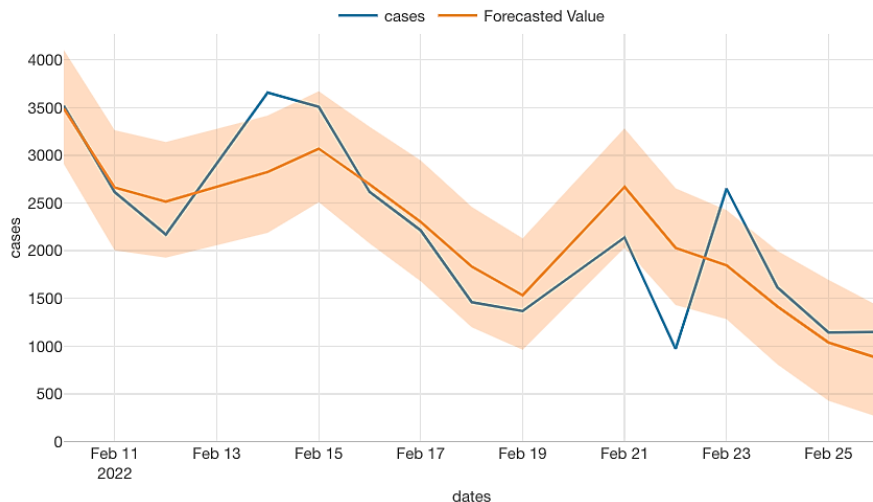
Source: Authors' own work

Table 4. Prophet summary

RMSE	MAE	MAPE
473.6198	358.4501	0.2055

Source: Authors' own work.

From an epidemiological standpoint, the more time someone spends in a location, the bigger the increase in risk of acquiring an infection. Thus, if someone spends more time in an already busy location, we expect that fitting busyness x dwell time (named abs_index in our data) as a factor to increase the fit of the model, which is confirmed in Table 5.

Table 5. abs_index regression statistics

R Squared	Adj. R Squared	RMSE	F Ratio	P Value
0.631954504	0.603643312	529.65570998	22.321720127	0.0003

Source: Authors' own work.

Testing the abs_index, along with the standalone values, using Spearman's rank correlation, we obtain the results presented in Table 6 and Figure 5. These results show how intertwined human behaviour is in cases, as they are in a perpetual feedback loop. As cases go up, people self-correct their behaviour and start avoiding busy places, thus causing venue busyness and dwell times go down. But as they go down and cases peak and start falling, people start to go out more.

Table 6. abs_index correlation statistics

		Correlation	P Value	ρ (rho) Value
abs_index	live_busyness	0.81785714	0.0002971	102
abs_index	dwell_time_avg	0.57857143	0.02636913	236
live_busyness	dwell_time_avg	0.09642857	0.73373753	506
live_busyness	cases	-0.4892857	0.06659231	834
dwell_time_avg	cases	-0.5678571	0.02980447	878
abs_index	cases	-0.7285714	0.00292671	968

Source: Authors' own work.

Figure 5. abs_index correlation graphic
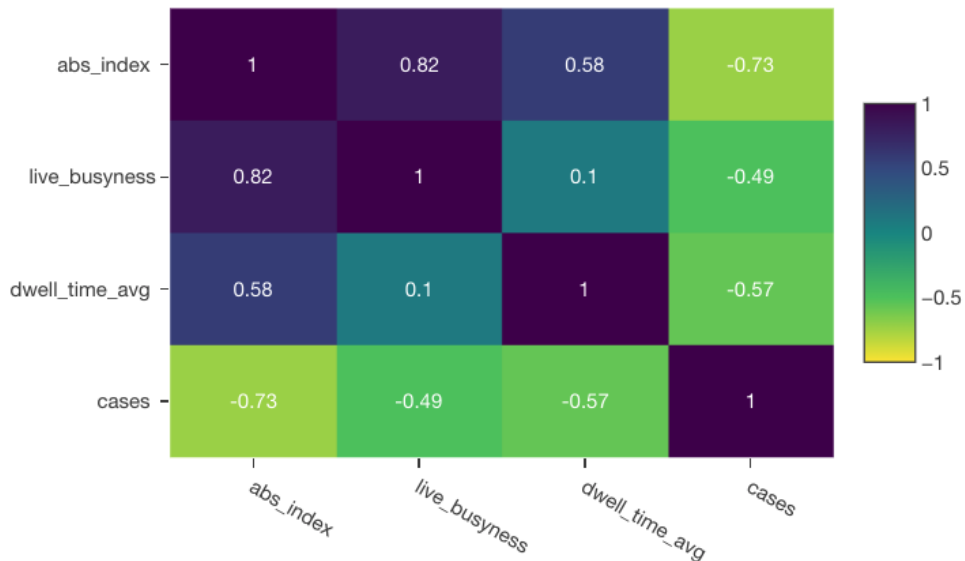
Source: Authors' own work.

5.4 Venue activity before and after curfew

During the period of our study, in Romania several restrictions were in place, one of them being a 10 PM curfew time for public places.

Figure 6a. Activity before curfew
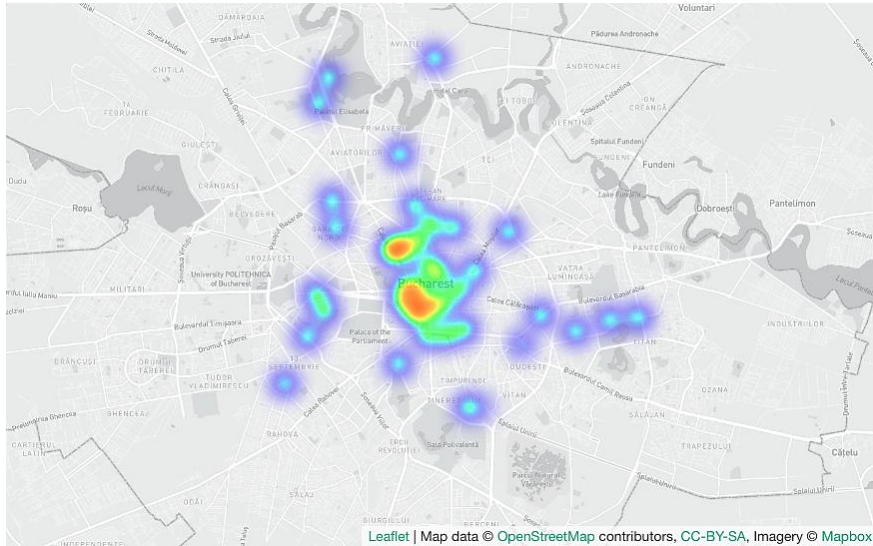
Source: Authors' own work.

As per our collected data, Figure 6a shows the aggregated activity of 63 venues, before the closing time imposed by the 10 PM curfew.

Figure 6b. Activity after curfew
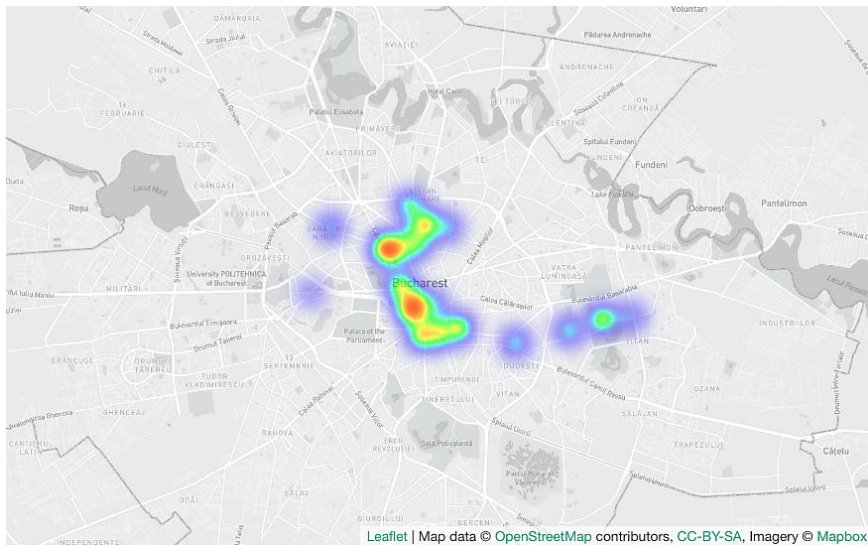
Source: Authors' own work.

After curfew, 23 venues still present activity at 23:59 when the snapshot was taken.

6. Conclusions

Our approach shows the potential to explain, at least in the short term, the evolution of local daily cases. An advantage to this approach is that, in essence, the indicators are based on crowd-generated data, which is publicly available for anyone to scrape and use.

With only 2 indicators, that of venue busyness and time spent by patrons, our model is able to explain the change in cases, and because the indicators dynamically reflect human interaction and mobility patterns, a live forecast model can be deployed to make predictions based on them with decent accuracy and few resources.

An unexpected result of our approach comes from also being able to track adhesion to public health policies, specifically the one imposing a curfew for venues. With a decent number of venues still having live traffic after the curfew hour, it could potentially reflect the mistrust people have in the measures implemented by the authorities, which in a pandemic situation proposes both health and governmental challenges.

Moreover, the two challenges are strongly connected with a governmental crisis leading to inefficacy to manage public health. As such, mistrust in government authority is associated with misperceptions concerning the threat proposed by COVID-19 (Jennings et al., 2021). Extant literature underlines mistrust in authority as the main factor leading to vaccine hesitancy (Hudson, Montelpare, 2021), low engagement in safety behaviours (Blair et al., 2021), and refusing assumed responsibilities such as lockdown measures (Hilhorst, Mena, 2021). As health crises such as COVID-19 surprise in various ways, the public needs to combat the generalized sense of uncertainty with the trust that ministers adequately respond to ambiguous situations (Boin, 2008). In turn, policymakers need to trust the public to implement the measures targeted at reducing the virus spread (Ahern, Loh, 2021). With problems arising in rapid succession, this type of reciprocal trust can only be guaranteed by consistent evidence. Studies suggest that, indeed, controversies should be addressed through thought through crisis communication, responsible journalism, and rumours dispelled (Yu, Lasco, and David, 2021; Jacob et al., 2021). Finally, effective crisis management based on public trust is crucial not only for society as a whole but also for individual well-being and mental comfort with stress, depression, and anxiety steadily increasing across the globe due to the outbreak of COVID-19 (Bawankule et al., 2020).

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Empirical Study of Information Technology in Supply Chain Management: Barriers and Risks

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Abstract

The article focuses on technology adoption in Supply Chain Management (SCM) and the barriers encountered when technology is implemented, and provides a comprehensive picture of the barriers and risks that arise. The knowledge gained from this study would be helpful to organizations that plan to implement information technology in SCM. The paper starts with a brief examination of the notion, definition, and use of technology in SCM. Then, an empirical model is proposed, the model analyzes the barriers at the time of the adopting technology in SCM. A classification predicted model was constructed to predict the variables that have the most significant influence and that can represent the biggest barriers in the adoption of information technology in SCM for a period of four years (2016 – 2019). Finally, the article proposes some recommendations that could be implemented to improve the competitiveness and performance of the SCM by reducing the barriers and risks encountered.

Keywords: IT Risks in SCM, IT Barriers in SCM, IT in Supply Chain Management.

JEL Classification: C, C49.

1. Introduction

The main objective of the barrier and risk analysis presented in this article is to highlight the threats that make the supply chain system vulnerable. The study analyses barriers and risks aimed at promoting technologies in SCM. The analysis should be seen to become more proactive, addressing relevant vulnerability issues before critical events, incidents, or accidents occur. This can be understood as part of the transformation in technology adoption in SCM, which can allow decision-makers to discover new areas of risk factors before implementing and operating technologies in SCM.

There are numerous barriers to applying new technologies; these barriers contain, but are not restricted to, a deficiency of a trained labour force that understands these technologies, inefficient legislation and controls, an inefficient performance framework, and short-term corporate goals (Pravin et al., 2020). The top five barriers

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to the manufacturing industry are lack of technical expertise and training, lack of research and development capabilities, the popularity of traditional technology, high initial investment in state-of-the-art technology, and fear of additional workload and loss of flexibility. in their quest to adopt and implement sustainable supply chain innovation practices (Himanshu et al., 2020). In the early stages of process technology, it is often difficult to match specific configurations of production equipment with the characteristics of the final product, increasing the interdependence between manufacturing and research and development activities (Gray et al., 2015). Tolerances are high, and production output is usually low, resulting in additional processing costs and material waste, where recovery costs can exceed labor costs in high-tech industries (Bohn et al., 1999). Moreover, engineers often have to visit the troubleshooting workshop, increasing process downtime and lowering production rates (Fuchs et al., 2010). Better tools and automated processes can increase the reliability of the technology and allow the production of larger volumes at a lower cost (Featherston et al., 2017); new sensors and measuring instruments accelerate the ability to find potential defects in companies' products that could not otherwise be detected (Hoyssa et al., 2009); the new software modeling tools allow a quick pre-evaluation of the various design options without the cost of extensive prototyping and mechanical testing (Nightingale, P., 2000); shared data platforms and standardized interfaces can accelerate the learning speed of the research community and allow for the specialization of providers (Wamba et al., 2015; Tassey, 2000). Despite their benefits, SCMs face significant barriers to adoption. Adoption costs constitute a significant factor. The technologies must be compatible with the pre-existing SCM processes and routine; they are often subject to network externalities and must become an industry standard before experiencing widespread adoption. Additionally, the SCM must also be approved by the appropriate regulatory agency in highly regulated industries, as existing industry standards may not be good enough to ensure product safety (Bonnín Roca et al., 2017). SCM offers organizations the approach to maintain their competitiveness in the global/global market, and the approach has also been inspired by organizations to improve their quality control, maintain quality products, improve industrial networks, and customer satisfaction. One of the critical factors in improving competitiveness is increasing quality performance to a world-class standard.

Increased SCM performance, which includes inventory management and quality control, will become weaker, as developing operational and management skills and improving IT and technology are also essential elements for improving SCM performance. As difficulties have arisen in the introduction of IoT technology, such as the lack of IoT platform development staff, standardization, integration with the existing system, professional workforce, expenses, detail management, and operation, it has become necessary for us to exercise or greater come up with solutions (Kangbae et al., 2016). Complex technologies offer substantial economic benefits, are difficult to invent and imitate, and refuse rapid dissemination. This duality motivates the idea that the competitive advantages of the regions and,

consequently, their economic growth must have their origin in their capacity to produce and use complex technologies.

The research paper begins with a brief review of technology's concept, definition, and use. The second part of the paper highlights the technologies used in SCM. Subsequently, Sections three and four present the barriers and risks encountered in SCM following the use of the technology. In the last part, an empirical model is proposed that analyzes the barriers and risks in adopting technology in SCM. Finally, the article proposes some recommendations that could be implemented to improve the competitiveness and performance of the SCM by reducing the barriers and risks encountered.

2. Information Technology in Supply Chain Management

Proper alignment and integration between key supply chain actors and increased visibility and transparency will ensure an adequate forecast of resources (people, materials, and equipment), enhancing resource/process optimization, market alignment, and employment growth work.

Over the last decade, the use and evolution of technology in SCM have become inevitable, mainly because it is vital for increasing the organizational efficiency and its level of competitiveness (Heuser et al., 2008) that has promoted the adoption of technology in SCM. Technological evolution is highlighted by well-known applications such as Enterprise Resource Planning (ERP), Warehouse Management Systems (WMS), Systems Management Systems (TMS), and Intelligent Transportation Systems (ITS) (Hasan et al., 2013). The new advanced technology in SCM may require something like the great need for transparency (supply chain visibility); SCM integrity check (right products at the right time, quantity, location, and correct cost) (Macaulay et al., 2015); Dynamic "reconfigurability" of supply networks, in particular by reviewing service level agreements with upstream suppliers and contacting them (Carvalho et al., 2011). The demand for highly personalized products and services is constantly growing. Inbound and outbound logistics must adapt to this changing environment.

Warehouses have always been a vital center in the flow of goods within a supply chain. It should also serve as a critical source of competitive advantage for logistics suppliers. Introducing "smart" management during the proper adoption and implementation of Warehouse Management Systems (WMS) will transform warehouse activities into the future requirements of inbound logistics (Schrauf et al., 2016). The necessary integration among the various actors and stakeholders of the SCM will ensure complete coordination and alignment. Shipments will be able to communicate their position and expected arrival time to the intelligent warehouse management system, which will be able to select and prepare a docking slot, optimizing just-in-time and just-in-sequence delivery. At the same time, the RFID sensors will reveal what has been delivered and send the tracking and tracking data to the entire SCM.

Necessary to increase the level of customer service. The WMS will automatically allocate storage space according to the specifics of the delivery and will demand

suitable equipment to transfer the goods to the precise setting autonomously. Once the pallets are moved to the assigned location, the labels will send signals to WMS to offer real-time distinguishability into inventory points, avoiding overpriced inventory circumstances and improving management decision capacity for adjustments that could be made.

A transport management system (TMS) is part of the SCM focused on transport logistics. A TMS allows interactions between an order management system (WHO) and a distribution center (DC) or warehouse. These systems have been named to support firms in controlling and managing rising transport costs, integrating with other supply chain technologies, and managing electronic communications with customers, trading partners, and carriers. A TMS system is essential for a company to use GPS technology to locate its vehicles accurately. At the same time, on the road, monitor the movement of goods, negotiate with carriers, strengthen shipments, and use the advanced functionality of the platform, and interact with Intelligent Transport Systems (ITS). Major software companies are rapidly moving their TMS solutions to the cloud, thus drastically reducing the number of on-site installations (Cunnane, 2017). TMS redefines companies' strategies, as the latest TMS solutions provide better end-to-end supply chain visibility; with amplified usage of mobile devices and services, which will integrate smartphone applications that drivers can use to create visibility places where there are specific trucks whenever they are needed.

As an increase of physical items is equipped with barcodes, RFID tags, or sensors, transportation and logistics companies can perform real-time monitoring of the movement of physical objects from a source to a destination along the entire supply chain, including production, transportation, and distribution. The IoT also offers promising solutions to transform transportation systems and automotive services (Qin et al., 2013). IoT technologies make it possible to track the current location of each vehicle, monitor its movement, and predict its future location.

The Intelligent Transport System (ITS) is a new field that can work together to achieve a common goal in different areas of transport systems, such as transport management, control, infrastructure, operations, policies, and control methods. ITS adopts new technologies such as computing hardware, positioning system, sensor technologies, telecommunications, data processing, virtual operation, and planning techniques. Integrating virtual technologies is a new issue in transport and plays a vital role in overcoming the problems of a global world. SITs are essential to increase safety and reliability, speed, and traffic flow and reduce risks, accident rates, carbon emissions, and air pollution. An intelligent transport system offers cooperation solutions and a reliable transport platform.

SCM is encouraged to develop sectoral market strategies that allow their corporations to take advantage of technology development while maintaining sufficient flexibility, where possible, to move where appropriate. However, it is often challenging to switch technologies once implemented. Modern SCM is a complex network that connects organizations, industries, and economies. Virtually all SCMs operate in a network of business and multiple relationships.

The increased use of IT, the globalization of SCM, and the integration of companies' networks into "smart businesses" have helped reduce the exposure of SCM to a catastrophic disaster. The challenge for SCM is to recognize the full scope of technology and the barriers it faces and then mitigate and manage them. Barriers can only be managed if the organization and network have the necessary supply chain capabilities (i.e., skills, processes, and contingencies).

Technological innovation and customer requirements for sophisticated technology and services promote the emergence of new challenges, which are increasingly changing SCM. The emergence of technology has promoted new challenges in SCM, which may require technological changes, such as the great need for transparency (supply chain visibility) and integrity control in supply chains (right products, at the right time, place, quantity, and the correct cost). This transformation will dramatically influence how the SCM will be managed following the new incentives and the environment and context configuration.

3. Barriers Encountered in Supply Chain Management Following the Use of Technology

Any condition that hinders progress or the achievement of a goal is defined as a barrier. It is essential to study and highlight barriers as they belong to technological integration, as this knowledge could guide ways to improve technological integration. A developed EMS will encourage a common approach to problem-solving and lead to cost reductions, improved product quality, and exports. The digital technologies used in the supply chain are constantly evolving, so the skills needed to support the technologies must also evolve. For this reason, many companies target more general skill sets, more suitable for dynamic work environments.

Predictive analytics and inventory and network optimization are two critical areas in the digital transformation of the supply chain. The technology value is determined by the increasing accumulation of data and the ability to extract valuable information from this data. In the field of technology, SCM tends to expand its talent groups in data analysis to allow access to these technologies in all sectors of activity. The cost of implementation is a significant barrier to adopting supply chain technologies. The costs include the implementation of automation and sensors and the maintenance of the networks and storage space needed to communicate and collect the data that these systems generate, as well as investing in analytical tools and skills to understand everything. The respondents also identified a lack of qualified talent as a significant barrier to progress.

According to the annual reports published by MHI, the most highlighted barriers identified to the use of technology in SCM are:

- Deficiency of a clear business case to justify the investment: used during the complete life cycle, from initial decisions to implementation, and later project evaluation. A business case is an important tool for "reaping the benefits." The business case can be used as evidence of agreements concluded before and during the execution of a project.

- Deficiency of adequate talent to use technology effectively: technological skills are no longer just focused on IT; they need to be mixed between organizational functions and coupled with "soft skills" to achieve the success of the digital transformation. Also, a critical factor is the degree of knowledge of the SCM processes.
- Deficiency of understanding of the technological landscape: the technologies bring substantial design and integration challenges, which also pose risks for SCM. An in-depth understanding through a current analysis of technology design and integration and the identification of challenges can eliminate these barriers faced by SCM.
- Deficiency of access to capital to make investments: many factors cause a lack of access to capital to make investments (low credit score, inability to borrow from traditional sources of financing, operational problems are affecting cash flow).
- Not wanting to invest due to economic uncertainty: there is always uncertainty about the future, which means it is more challenging to make future-oriented decisions. In the face of an increasingly uncertain future, SCM should wait until there is more certainty in making an important decision. The SCM expects to make an investment, delay research projects, or postpone employment until the economy's future is more precise.

4. Risks Encountered in Supply Chain Management Following the Use of Technology

SCM can face many risks, for example, weaknesses and potential risks within SCM regarding the ability to meet customer needs (uncertainty arises when supply and demand are out of balance) and the fragility of SCM to external events/threats. The aim is to identify potential risk areas and implement appropriate actions to limit this risk in the SCM.

The lack of visibility and control in the SCM can lead to a lack of trust, which increases the risk to the supply chain. Lack of confidence in the SCM can increase the risk. In an effective risk environment, the first thing is to create awareness, which develops when a firm recognizes that it is at risk in a better place of supply and realizes the potentially severe consequences of these disruptions. Awareness must be developed internally at several levels of management so that resources can be allocated and appropriate processes and tools for risk management can be developed and implemented. The second element is prevention to reduce the impact of supply chain disruptions.

The third element is remediation; the SCM needs to take action to recover from a disturbance when it occurs and should consider how it could shorten the duration of the disturbance and minimize its impact. The last element is knowledge management; SCM professionals need to learn from experience when an interruption occurs. Past events should be captured, which will allow SCM professionals to assess whether their strategies have been appropriate and allow management to review what has happened and, in essence, provide information.

According to the annual reports published by MHI, the most highlighted barriers identified to the use of technology in SCM are:

- Cultural aversion to risk: for similar SCM processes, such as making a purchase, SCM processes can be constructed differently depending on the cultural group. Different cultures think differently when presented with risky options due to various cultural environments, such as the community environment, values , and social interactions that could explain these risk responses.
- Cybersecurity: SCM requires a collaborative partnership between people and organizations, leading to several barriers. Through the relationships created, SCM exposes itself to sensitive aspects of the business.

A first step in protecting SCMs from such risks is to identify them. A form of risk comes from Cloud service providers who store confidential data, and these entities invest significantly in the security of their systems. Without solid security, the Internet of Things (IoT) allows attackers to access SCM systems, so these devices should not be overlooked. IoTs have sensors that connect them to the Internet for communication purposes and are common in supply chains because they can help predict machine failures and inventory management. Despite their functional value, they are a popular attack vector that can give attackers access to sensitive data.

5. Empirical Model

The third part of the article describes the application of the empirical approach to investigate the variables associated with barriers to the adoption of technology in SCM. The main objective is to acquire a model that provides a better framework of variables and dynamics that lead to barriers to adopting technology in SCM. The resulting empirical knowledge can be understood as those cases in which new information and knowledge are acquired. It is essential to consider that when modelling is applied to any logistics system, flexibility must be considered.

Root-Mean-Square Error (RMSE): The term average square root error (RMSE) is the square root of the average square error (MSE). RMSE calculates the variances between the values predicted by a hypothetical model and the observed values. It calculates the quality of the match among the real data and the projected model. RMSE is one of the most commonly used measures of goodness for matching generalized regression models (Salkind, 2010).

The mean square root error (RMSE) was used as a standard statistical metric to measure model performance in research studies. Each statistical measure condenses a large amount of data into a single value. It provides a single projection of model errors, emphasizing a particular aspect of the model's performance error characteristics. Moreover, in data assimilation, the sum of square errors is often defined as the cost function that must be minimized by adjusting the model parameters. In such applications, penalizing significant errors by the terms defined with the smallest square proves to be very effective in improving the model's performance.

5.1 Data

The studies were carried out with data processed over a period of 4 years, starting with 2016 and until 2019, extracted from the MHI annual reports.

Table 1. Hypotheses for IT barriers and risks in SCM

Hypothesis	Description
H1	Deficiency of a clear business case to justify the investment
H2	Deficiency of adequate talent to use technology effectively
H3	Cultural aversion to risk
H4	Cybersecurity
H5	Deficiency of understanding of the technological landscape
H6	Deficiency of access to capital to make investments
H7	Not wanting to invest due to economic uncertainty

Source: Own processing based on data from https://www.mhi.org/publications/report.

5.2 Analysis

Comparisons are limited to individual time series. The tables below represent the average RMSE on barriers to technology adoption in SCM. RMSE is analogous to the standard deviation (MSE invariance) and measures the extent to which the residues are distributed. RMSE is a quadratic equation counting rule that measures the typical degree of error. Because errors are square before they are mediated, RMSE gives a relatively high weight to significant errors. RMSE is most beneficial when big errors are predominantly undesirable.

The calculation of the RMSE and MSE for the dataset is as follows:

$$MSE = \frac{\sum_{i=1}^{n} |\hat{y}_n - y_n|}{n} \tag{1}$$

$$RMSE = \sqrt{\frac{\sum_{n-1}^{n} (\hat{y}_n - y_n)^2}{n}} \tag{2}$$

where:

$\hat{y}_n$ − means predictive assessment;

y_n − means the actual evaluation of the test data set;

n – is the number of evaluation prediction pairs between the test data and the prediction result.

Lower RMSE values specify a better fitting model, RMSE is a good measure of how the model accurately predicts the answer, and is the most crucial matching criterion if the model's primary purpose is prediction.

Table 2. Barriers in technology adoption in SCM (2016)

Hypothesis	Actual	Square difference (SE)	Squared Error
H1. Deficiency of a clear business case to justify the investment	43	4.333	18.778
H2. Deficiency of adequate talent to use technology effectively	38	-0.667	0.444
H3. Cultural aversion to risk	35	-3.667	13.444
MSE	**10.8888**		
RMSE	**3.2998**		

Source: Own processing based on data from https://www.mhi.org/publications/report.

The value of RMSE is 3.2998 in 2016 (Table 2) resulting from the adoption of technologies in SCM.

Table 3. Barriers in technology adoption in SCM (2017)

Hypothesis	Actual	Square difference (SE)	Squared Error
H1. Deficiency of a clear business case to justify the investment	44	-4.333	18.778
H5. Deficiency of understanding of the technological landscape	45	-3.333	11.111
H6. Deficiency of access to capital to make investments	56	7.667	58.778
MSE	**29.5555**		
RMSE	**5.4365**		

Source: Own processing based on data from https://www.mhi.org/publications/report.

The RMSE value is 5.4365 in 2017 (Table 3) resulting from the adoption of technologies in SCM.

Table 4. Barriers in technology adoption in SCM (2018)

Hypothesis	Actual	Square difference (SE)	Squared Error
H1. Deficiency of a clear business case to justify the investment	28.2	3.780	14.288
H5. Deficiency of understanding of the technological landscape	24.4	-0.020	0.000
H6. Deficiency of access to capital to make investments	21.5	-2.920	8.526
H2. Deficiency of adequate talent to use technology effectively	22	-2.420	5.856
H4. Cyber security	26	1.580	2.496
MSE	**6.2336**		
RMSE	**2.4967**		

Source: Own processing based on data from https://www.mhi.org/publications/report.

The value of RMSE is 2.4967 in 2018 (Table 4) resulting from the adoption of technologies in SCM.

Table 5. Barriers in technology adoption in SCM (2019)

Hypothesis	Actual	Square difference (SE)	Square d Error
H5. Deficiency of understanding of the technological landscape	27	10.286	105.796
H2. Deficiency of adequate talent to use technology effectively	26	9.286	86.224
H1. Deficiency of a clear business case to justify the investment	19	2.286	5.224
H6. Deficiency of access to capital to make investments	14	-2.714	7.367
H7. Not willing to invest because of economic uncertainty	11	-5.714	32.653
H3. A cultural aversion to risk	10	-6.714	45.082
H4. Cyber security	10	-6.714	45.082
MSE	**46.7755**		
RMSE	**6.8392**		

Source: Own processing based on data from https://www.mhi.org/publications/report.

The value of RMSE is 6.8392 in 2019 (Table 5) resulting from the adoption of technologies in SCM.

This research used RMSE for comparative results over a period of four years (2016-2019). The RMSE value had the highest value of 6.84 in 2019 (Table 5) and the lowest value of 2.50 in 2018 (Table 4), which determines that the model applied in 2018 is the most slightly prone to errors.

5.3 Determine the Barriers in Adoption of IoT in SCM

The classification model predicted the variables that have the most significant influence and that can represent the biggest barriers to the adoption of information technology in SCM for a period of four years (2016 – 2019). Azure Machine Learning was used. The main goal of the classification model is to predict the most significant barriers that can arise when implanting IoT in SCM.

The results of the predicted values for variable "*H1. Deficiency of a clear business case to justify the investment*" indicates that in 2019, the percentage to represent a barrier in IoT adoption in SCM decreased compared to 2016. In 2016 the percentage is 35.7-44% to encounter this barrier, compared to 2019, when the percentage is 19-27.3% (see Figure 1).

**Figure 1. Prediction of variable H1. Deficiency of a clear business case
to justify the investment**

Source: Own processing based on data from https://www.mhi.org/publications/report.
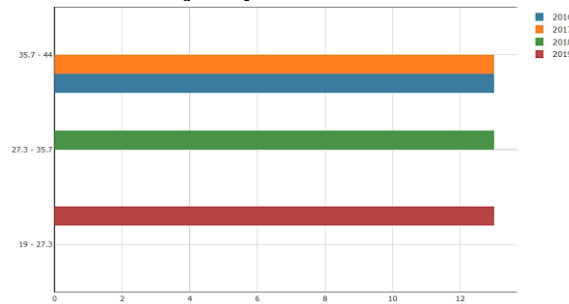
For the second variable "*H2. Deficiency of adequate talent to use technology effectively*" in 2017, it was the most possible to encounter this barrier, with a percentage of approximately 12%. Through the year the percentage increased, and in 2019 has the value of 26-38%. (see Figure 2)

**Figure 2. Prediction of variable H2. Deficiency of adequate talent
to use technology effectively**
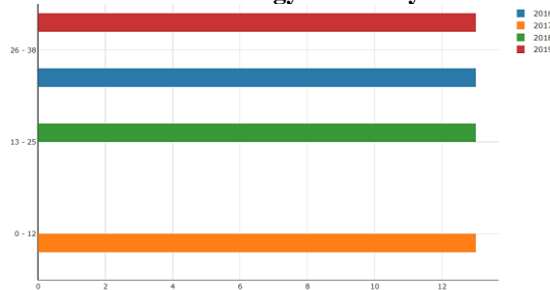
Source: Own processing based on data from https://www.mhi.org/publications/report.

The results of predicted values for the variable "*H3. Cultural aversion to risk*" indicates that in 2016, the highest percentage to encounter this barrier in the adoption of IoT with a value of 24-35%. For the next three years, the values remained constant and decreased compared with 2016 (approximatively 13%) (see Figure 3).

Figure 3. Prediction of variable H3. Cultural aversion to risk
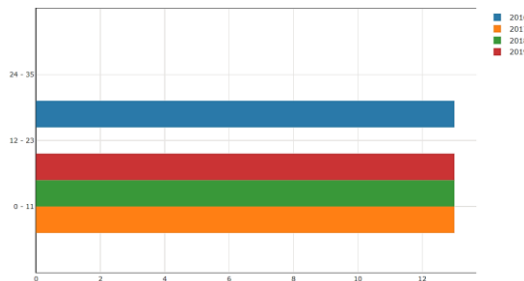
Source: Own processing based on data from https://www.mhi.org/publications/report.

The results of predicted values for the variable "*H4. Cybersecurity*" indicates a growth from 2016 to 2019. If in 2016 and 2017 the percentage for this variable was around 8%, in 2018 the values increased to 18-26%. When comparing 2018 with 2019, in 2019 it was a decrease of how possible to have the Cybersecurity as a barrier (9-17%) (see Figure 4).

Figure 4. Prediction of variable H4. Cybersecurity

Source: Own processing based on data from https://www.mhi.org/publications/report.

For the variable "*H5. Deficiency of understanding of the technological landscape*" through the years, the values increased in what concerned the adoption of IoT in SCM. If in 2016 the percentage for this variable was approximately 15%, in 2018 the values increased to 30-45%. When comparing 2018 with 2019, in 2019 it was a decrease and the values were around 15-30%. (9-17%). (see Figure 5).
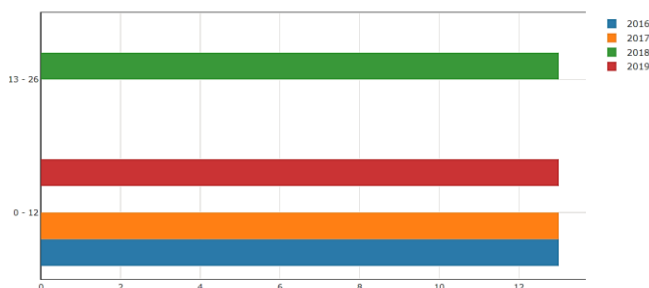
Figure 5. Prediction of variable H5. Deficiency of understanding of the technological landscape

Source: Own processing based on data from https://www.mhi.org/publications/report.
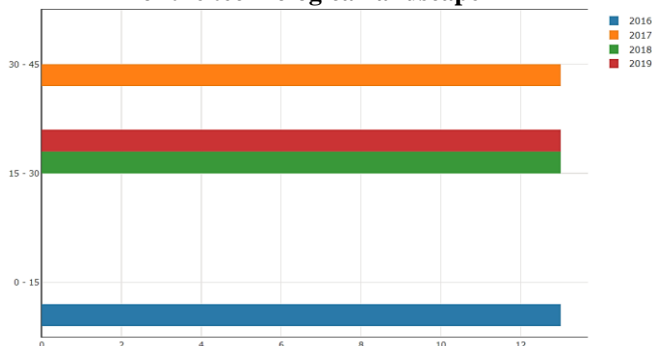
For the variable "*H6. Deficiency of access to capital to make investments*" through the years the values fluctuated from approximately 18.7% in 2016 and 2019 to 18.7-37.3% in 2018 and 37.3-56% in 2017 (see Figure 6).

**Figure 6. Prediction of variable H6. Deficiency of access
to capital to make investments**

Source: Own processing based on data from https://www.mhi.org/publications/report.

The results for the last variable analysed, "*H7. Not willing to invest because of economic uncertainty*" are indicating that the values have constantly increased through the years. From approximately 3% in 2016 to 8-16% in 2019 (see Figure 7).

**Figure 7. Prediction of variable H7. Not willing to invest because
of economic uncertainty**

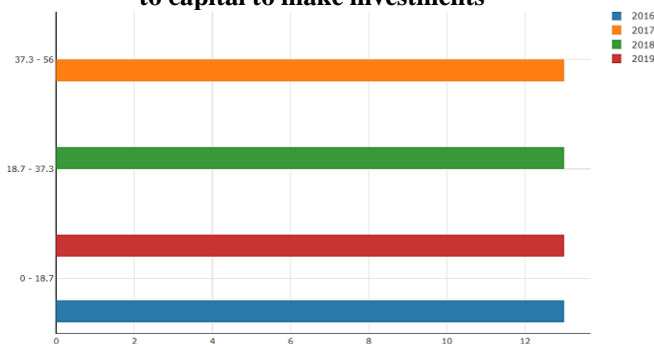*Source*: Own processing based on data from https://www.mhi.org/publications/report.
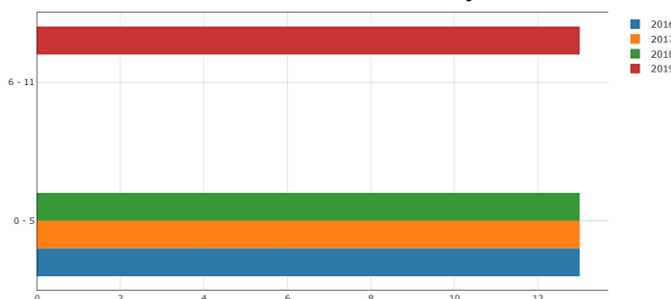
Analysing all the seven variables indicated above has resulted that the overall biggest barrier in the adoption of IoT in SCM is the "Deficiency of a clear business case to justify the investment", even though the percentage have decreased significatively in 2019. In 2019 the most significant impediment is represented by the "Deficiency of adequate talent to use technology effectively" and, respectively, "Deficiency of understanding of the technological landscape". The lowest impediment is represented by "Not willing to invest because of economic uncertainty", followed by "Cyber security concerns" and "Cultural aversion to risk".

6. Conclusions

SCM professionals must therefore take positive steps to identify and manage barriers and risks. They even learn from previous experiences and events, using them to improve your understanding and resilience of SCM. The buyer should constantly check how well the current SCM process is working and whenever there is a non-compliance event, it should be analysed. Learn from the experience of others. Shorter life cycles, driven by changing technology, contribute to the volatility and unpredictability of demand in SCM. Several key recommendations can be concluded on how broader and faster adoption and implementation of technologies in SCM can be supported: (1) the need to improve knowledge for talent creation in technology use and business development in SCM; (2) SCM decision-makers need a more sophisticated decision support framework to introduce or not the technology available in the SCM; (3) an improvement could be achieved through funding mechanisms to make investments and overcome periods of economic uncertainty; and (3) a security improvement to prevent cyber-attacks. Addressing these challenges could strengthen confidence in the adoption of SCM technologies, helping to better understand risks and barriers so that they can be mitigated.

Acknowledgment

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How Convincing is Reliable Data?
Lay Perception of Statistical Evidence

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Abstract

Statistical communication has become crucial in recent years. People are often confronted with making decisions that require comprehension of data insights. Behavioral economics underline that decisions are rarely justified by objective information and that people tend to amend even the most clear-cut evidence. The current study investigates the impact of divergent perceptions of proposed evidence concerning an event on subsequent estimations. To this end, 325 volunteers read the most recent TE-SAT report concerning terrorist attacks from the previous year. The report ends with the official statistics stating that 13 people were killed in these terrorist acts. When asked to estimate the number of victims for the current year, participants' estimations differed based on whether they perceived 13 to indicate a low or a high level of terrorism. Those who perceived 13 as indicative of a big threat also estimated a higher number of victims for the current year. Pre-surveyed worry regarding terrorism determined the personal interpretation of official data. The perceived risk of terrorism did not influence the participants' positioning. Age, gender, and education had no impact on how people perceived the official data on terrorism. Neither did the level of conspiracy ideation, conservatism, religiosity, or optimism. However, numeracy had a significant impact. In their case, contextualizing terrorism as a lesser threat than other threats may be more apparent. However, general analytical thinking had no significant impact. These results show how evidence and perceptions interact. Even though we would expect a one-way causality from objective information to subjective perception, people process information such that evidence and perception are altering one another. This conclusion is most relevant in a data-driven environment that simultaneously triggers emotional reactions with implications for crisis management, public policy, and government communication.

Keywords: information processing, anchoring effect, statistical evidence, reliable data, public communication.

JEL Classification: M15, C10, D73.

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1. Introduction

The abundance of information today is one of the most challenging aspects of our daily lives. To avoid false information and the subsequent consequences of misinformation (e.g., the shift in political opinions, negative impact on well-being, biased perception of strangers; Tucker et al., 2018; Thompson et al., 2019; Ahler, 2014), the most common suggestion is to reduce our engagement solely to accurate information (Zhang, Ghorbani, 2019). However, even the controlled exposure only to trustworthy information sources has its limitations.

Even though statistics and numbers are regarded as more objective than stories or opinions, people deal poorly with understanding statistics. Behavioral studies show how, in an attempt to avoid uncertainty, people fixate on numbers, even when the numbers are arbitrary or wrong (Tversky, Kahneman, 1974; Ariely et al., 2003). People tend to fixate most strongly on the first number they encounter, especially when that number is shocking and seems precise. Even when people are warned that they are facing an unreliable anchor that might influence their decision, they are not able to neglect it (Wilson, 1996).

Even though studies observed an anchoring-and-adjusting tendency (Epley, Gilovich, 2006), further investigation is needed to determine whether people fully commit to these anchors, both rationally and emotionally. The existing literature indicates a possible discrepancy between the two (Roets, 2017; Lewandowsky et al., 2012; Nyhan, Reifler, 2010). This type of insight is most relevant in the case of statics describing real events together with understanding the mediators for a positive or negative adjustment to a supposed anchor.

To this end, we instructed our participants to read basic statistics on terrorist attacks in 2018 and their impact on life losses. We chose terrorism as it is a real event, but remote from Romanian participants 'cultural context. We anticipated that people's expectations will be primed into the proposed statistics, while marginal adjustment will depend on their mental representation of these statistics. The current paper intends to propose some factors driving participants' perception of statistical evidence and the consequential adjustments.

2. Problem Statement

When discussing the assessment of public communication, most authors propose partisanship and political convictions as drivers for perception (Sunstein, 2018; DellaVigna, Kaplan, 2007). Although the entire political spectrum is prone to biased information processing (Harper, Baguley, 2019), the lean toward prior perceptions is more substantially observed among conservatives (Harper, Baguley, 2019; Pennycook, Rand, 2019). Therefore, prior perception of terrorism might moderate how people interpret statistical evidence regarding terrorism with potentially stronger effects for conservatives, those already adopting conspirational ideas, and eurosceptics.

Secondly, the existing literature debates the role of critical or analytical thinking in information processing. Empirical studies agree that successful information processing requires considerable cognitive effort (Pennycook, Rand, 2019) and deliberate attention (Allcott, Gentzkow, 2017). Other studies propose that general critical thinking does not suffice in identifying accurate information and correctly adjusting to misinformation. In this vein, specific analytical skills and direct engagement with a proposed topic are more relevant (Rosu et al., 2021). Therefore, analytical thinking might be less relevant than specific numerical abilities when discussing the interpretation of proposed evidence.

3. Research Questions / Aims of the Research

Hypothesis 1 (H1): Statistical evidence drives readers into the "anchoring effect".

Hypothesis 2 (H2): Statistical evidence drives divergent interpretations, which further influences the estimations regarding the evolution of the event in question.

Hypothesis 3 (H3): The interpretation of proposed evidence is dependent on emotional triggers.

Hypothesis 4 (H4): The interpretation of proposed evidence is dependent on the specific ability to understand and work with numbers.

Hypothesis 5 (H5): The perception of proposed evidence is not dependent on partisanship or event rationalizations (i.e., conspiracy ideation, conservatism, or Euroscepticism).

Demographics such as age, gender, and education are considered control variables.

4. Research Methods

Data were collected at the end of 2019 (November) through an online questionnaire assessing baseline characteristics and a secondary short survey registering perception and estimation after a text reading. A total of 260 participants completed the two surveys with one month gap between them.

4.1 Baseline Characteristics

The first questionnaire consisted of items concerning demographics (age, gender, and education), respondents' prior perception of terrorism (perceived risk and worry regarding terrorism), analytical thinking, specific ability to understand and work with numbers (numeracy), and partisanship and social rationalizations (conservatism, conspiracy ideation, euroscepticism).

Table 1 presents the descriptive statistics fort the demographics.

Table 1. Demographics and socioeconomic variables.

Variable	Statistics
Gender: Male Female Other	20.64% 79% 0.36%
The highest level of completed education: High school degree Bachelor's degree Master's degree PhD studies	75.7% 20.7% 2.86% 0.74%
Age	Min = 18, Max = 48, Mean = 21.17 (SD = 4.45)

Source: Descriptive statistics conducted in Rstudio.

The risk of terrorism was assessed on the recommendations of Nellis and Savage (2012) with two components dimensions: perceived risk to oneself (comprising five items) and perceived risk to someone whom the respondent knows (similar to the same five items).

The worry about terrorism was also assessed through the measurement proposed by Nellis and Savage (2012) by the question "How worried are you about the situation of terrorism in Europe?" on a 1-10 scale (1 = no worried at all, 10 = extremely worried).

Conservatism was measured through respondents' perception of abortion, military and national security, religion, traditional marriage, traditional values, the family unit, and patriotism. The negative or positive leaning towards these seven items was assessed as a score of 1 (greater negativity) through 100 (greater positivity) as recommended by Everett (2013).

Conspiracy ideation was approached through the generic conspiracist beliefs scale (Brotherton et al., 2013), which tackles government malfeasance, extraterrestrial cover-up, malevolent global conspiracies, personal well-being, and control of information.

Euroscepticism was measured on the dimensions proposed by Lubbers and Scheepers (2005) considering the agreement with the empowerment of the European institutions for international policies, immigration policies, sociocultural policies, and country benefits from membership of the EU.

Numeracy was assessed as the score for correctly solving 7 items implying the calculation and understanding of proportions, percentages, and chances as proposed by Lipkus et al. (2001).

Analytical thinking was measured with the short version (Toplak et al., 2014) substitute for the Cognitive Reflection Test (CRT; Frederick, 2005).

4.2 Statistical Evidence and Readers' Following Perceptions

Statistical evidence on terrorist attacks in 2018 was presented as concluded by Europol. The text presented general information regarding Europol's activity, and the TE-SAT reports and followed with the listing of the 2018 terrorist attacks with the corresponding number of victims per attack. The text can be found in Appendix A.

To investigate the anchoring effect, a control group (N=141) received the same text but with coverings for the number of victims per attack. Therefore, these participants had to estimate both the number of victims for 2018 and for 2019.

To control for participants' engagement with proposed evidence, the text ended with a question requiring mathematical computation: "How many human lives losses (people killed) were registered as a result of the terrorist attacks in 2018 in Europe?" Participants were asked to fill in a blank space with the correct calculation, meaning a total of 13 life losses.

Finally, the experimenter presented the participants with the correct calculation, and the participants registered their perception of the number of life losses from terrorist attacks (high or low), and they were asked to estimate the number of life losses for the current year for which no TE-SAT report was yet released (*How many human lives do you think will be registered as a result of the terrorist attacks in 2019 in Europe?*).

5. Findings

Figure 1 reveals the anchoring effect as the difference between the estimations for future statistic between the main group (Min = 0, Max = 30, Mean = 12.93, Median = 10, SD = 7.65) and the control group (Min = 0, Max = 500, Mean = 131.6, Median = 84, SD = 134.9). For the control group, only 16% of the participants (N = 21) reported estimations below 30.

Of all participants, 11% perceived the proposed evidence (i.e., 13 people being killed in terrorist attacks in 2018) to indicate a high level of terrorism, while 89% perceived it as low.

The second hypothesis was confirmed as results revealed a significant difference between the estimations provided by those perceiving 13 as a large number and those perceiving it as a small number (Kruskal-Wallis $H = 4.2851$, $p = 0.04$, $df = 1$). The results are illustrated in Figure 1.

Figure 1. Estimation between perception groups
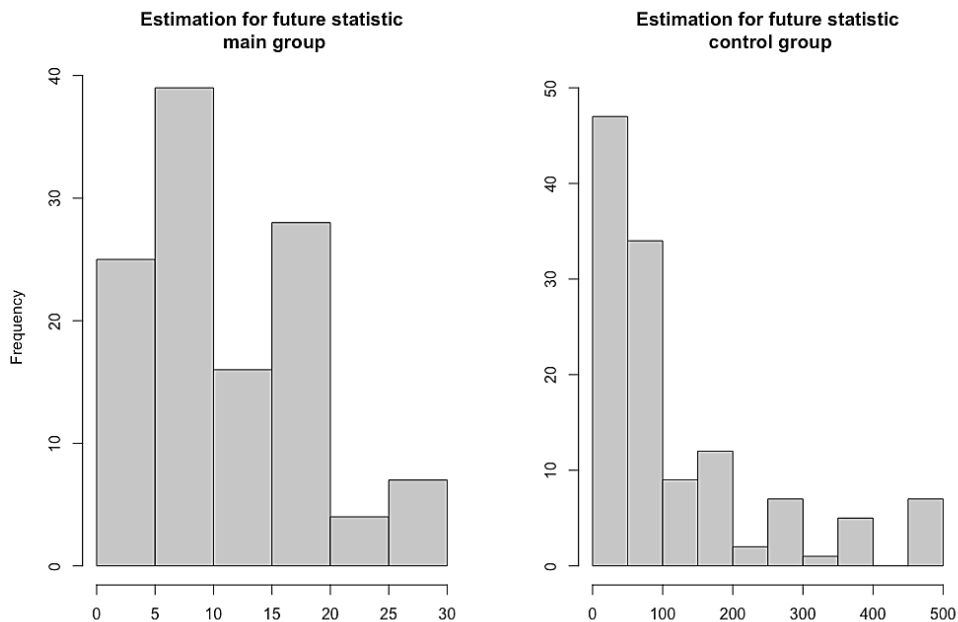
Source: Descriptive statistics conducted in Rstudio.

For those perceiving 13 as a small number, further estimations were significantly above 13 ($p = 0.01$). For those perceiving 13 as a large number, the estimation is not significantly different than 13 ($p = 0.22$).

The third hypothesis was confirmed as worry concerning self-person (Kruskal-Wallis H = 7.5477, $p < 0.01$, df = 1) and a family member (Kruskal-Wallis H = 6.663, $p < 0.01$, df = 1) having a significant influence on the perception of proposed evidence. The perceived risk to self (Kruskal-Wallis H = 0.023402, $p = 0.88$, df = 1) or risk to others (Kruskal-Wallis H = 1.8892, $p = 0.17$, df = 1) had no influence on whether participants considered 13 to be a large or a small number.

The fourth hypothesis was confirmed, with numeracy having a significant impact on how the proposed evidence is perceived (Kruskal-Wallis H = 4.1183, $p = 0.04$, df = 1). Analytical thinking revealed no significant impact on the perception of proposed evidence ($p = 0.41$).

The fifth hypothesis was confirmed with conspiracy ideation (Kruskal-Wallis H = 2.7026, $p = 0.10$, df = 1), conservatism (Kruskal-Wallis H = 0.43312, $p = 0.51$, df = 1), or euroscepticism (X-squared = 0.0092608, df = 2, $p = 0.9$) having no impact on the perception of proposed evidence.

As for the control variables, gender revealed no significant impact (X-squared = 2.4771, df = 2, $p = 0.12$). There was no significant difference (Figure 2) in perception with respect to education (X-squared = 4.0193, df = 3, p-value = 0.3) or age (Kruskal-Wallis H = 2.6219, $p = 0.11$, df = 1).

Figure 2. Future estimations by level of terrorism
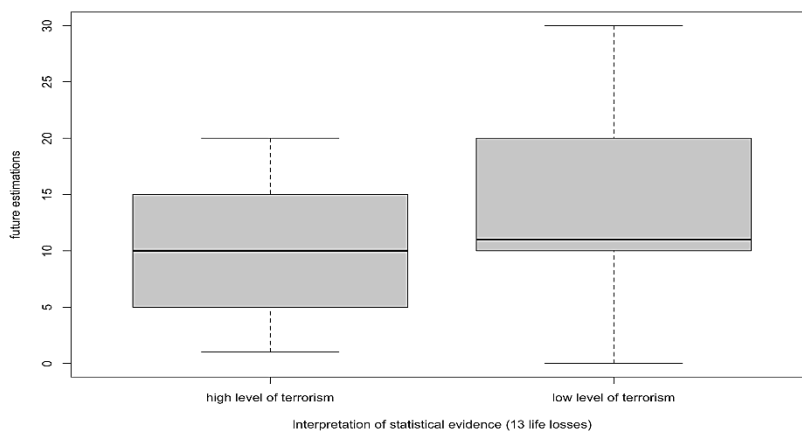
Source: Descriptive statistics conducted in Rstudio.

6. Conclusions

When presented with statistical evidence, people are primed by the numbers they encounter, and they make subsequent estimations accordingly with the "anchoring effect". However, the mental alignment to numerical evidence is not uniform among participants, and people base their expectations also on emotional representations.

In our study, the interpretation of the proposed evidence as indicating a low level of terrorism impacted their expectations so that they estimated a higher level for the future. For those who perceive a high level of terrorism based on the same statistical evidence, no such expectation was identified.

When looking at the factors that lead to divergent interpretations, we identified the worry of terrorism to play a significant role as opposed to the perceived risk of terrorism. This may be indicative of the weight of subjective representations rather than objective calculations, personal worry vs. risk. These results stand both in terms of risk and worry regarding the self-person or others.

As for analytical thinking, it did not reveal any impact on how people interpreted statistical evidence. However, the specific ability to understand and work with numbers had a significant impact.

This type of anchoring-and-adjusting is a general effect, with age, gender, and education revealing no significant differences among participants. Moreover, conspiracy ideation, conservatism, and Euroscepticism did not significantly influence participants' perceptions. This underlines once again the relevance of specificity and contextualization when discussing information processing.

The conclusions of this study are of greatest impact for policymakers and public administrators in the case of successful public communication.

Further investigations should tackle not only the perception but also the behavioral impact of divergent interpretations of statistical evidence and should also adapt to different topics of interest.

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Appendix

Statistical Evidence

Europol is the European Union's law enforcement agency. Europol supports law enforcement authorities throughout the EU on crime-fighting activities in all its mandated areas. Analysis is at the core of our activities. Our criminal analysts are among the best trained in Europe. They use state-of-the-art tools to support investigations by law enforcement in Member States on a daily basis. We produce regular assessments that offer comprehensive, forward-looking analyses of crime and terrorism in the EU.

Every year, the agency produces the EU Terrorism Situation and Trend Report (TE-SAT), which gives a detailed account of the state of terrorism in the EU.

According to the TE-SAT 2019 Report, in 2018, these are the terrorist attacks that resulted in human life losses:

MARCH Carcassone, France — 4 people killed

MAY Paris, France — 1 people killed

MAY Liège, Belgium — 3 people killed

DECEMBER Strasbourg, France — 5 people killed

How many human lives losses (people killed) were registered as a result of the terrorist attacks in 2018 in Europe?
Answer:

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Cyber Security of National IT Applications and Critical Infrastructure for European Funds

Marius ȘTEFAN[1]

Abstract

Modernity is characterized by major transformations and evolutions, which have penetrated into the depths of all levels of human life, in all economic, political, and social spheres, thus significantly increasing the quality of human life.

These legacies of modernity have laid the foundations for an evolving present, characterized by a new model of society, in which production is being replaced by global information services, knowledge and technologies, called the information society. The post-industrial society focuses not on the production of goods, but on the use of services in particular, the evolution thus depending on the use of technology.

Thus, a hierarchy of knowledge occurs, so that the model of access to knowledge undergoes essential changes, the primary interest no longer targets the universal aspect, the concern becoming centred on the local-individual space, producing transformations between word and image, speech and personality.

The information society is the postmodern society, in which the old norms and ways of thinking are replaced by new technologies and new lifestyles. There is a transformation of civilization through three scientific and technological revolutions: traditional conventional crafts, the scientific organization of production, and the automation of the intelligent artificial future.

Starting from the increasing role of science in production processes, corroborated with the emergence of information technologies, the economy and society become focused on a new fundamental principle, namely theoretical knowledge.

The information society is a society in which the quality of life, as well as the prospects for social change and economic development, depend, to an increasing extent, on information and its exploitation. In such a society, living standards, working patterns, the education system, and the labour market are all markedly influenced by advances in information and knowledge. The theme of the information society is described by this phrase - the society based on theoretical knowledge, also being very well synthesized in the term of the information age.

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1. Introduction

Technological developments in recent decades have radically changed the way people communicate with each other, the ways in which they have access to a wide range of services, starting with education and health and continuing especially with working methods.

For decades, the European Union, through its institutions at the Member States level, has been a guarantor of the principles underlying freedom and security (ENISA, 2020).

Respect for human rights, the rule of law, as well as solidarity, give the measure of a free European Union, which will ensure the increase of the quality of life of the citizens.

Public administration services can be simplified through the use of advanced information technology. The European Commission is trying to set its own example in this, through the procedures and tools it uses in its day-to-day work, in its links with Member States' administrations and its own decentralized agencies, which are marked by progress in computerization. The aim is to facilitate citizens' access to public information through new computer applications, as well as to achieve better communication between all levels of public administration across the Union, thanks to the high-speed connection.

The development of the European Information Society involves a considerable and ever-increasing financial effort, which cannot be fully assumed by the European Union and the governments of the Member States. Experience shows that the private sector is best able to take risks of exploitation, so on, and the development of new adaptable markets and holds the capital needed to make such investments.

The social dimension of the information society is undoubtedly one of the most important facets of the new model of society and must be treated with great care in order to minimize risks and maximize potential benefits.

Science has made possible the technologies on which the information society is based, and the needs of the scientific community have often led to innovation in information technology, today benefiting from the Internet and the World Wide Web.

Science is systematized knowledge, which also includes derived activities, such as scientific research, technological development, technology transfer, and innovation.

In the technological age, action plans and policies are being developed to meet the challenges, the most important technology being ICT, which allows information to be processed and conveyed in a revolutionary way.

We thus identify the key terms that dominate the world we live in today: information, communication, and knowledge. The information society is considered to be the ICT-based knowledge society. Information society technologies will evolve in the direction of being at hand in the process of knowledge, i.e., the storage, transmission, and generation of knowledge. Knowledge is the result of the process of information management.

Knowledge and scientific information are of enormous importance in the global information society (European Information Society, 2005), through: supporting innovation, promoting economic development, making decisions in an efficient and transparent way, especially at government level and especially for the fields of education and training.

In order to move towards the construction of the knowledge society, it is necessary to reduce the digital divide, which accentuates disparities in development, excluding groups and even countries, from the benefit of information and knowledge. The human capacity to assimilate and develop these innovations and services can change the paradigm of achieving the impossible for the future of man-made artificial intelligence.

The creation of the European information society cannot be achieved only by adopting decisions and action plans of decision-makers at EU or Member State level, an essential role being played by the final beneficiaries of ICT, i.e., economic actors-companies, consumers, citizens. It is necessary to understand the benefits and the risks involved in developing new technologies, as well as how ICTs can influence their daily lives. While decision-makers have a duty to explain the new model of society and to take into account the suggestions and needs of the beneficiaries in the development of information society policies.

The EU institutions, in particular the European Commission, through its programs, take on the role of coordinator and catalyst for investment in the European Information Society. Coordination is mainly achieved by stimulating cooperation at the European level in order to avoid duplication of funded projects with the same result.

2. History of Computer Applications for European Funds

Computer applications designed to manage European funds have been developed as a necessary measure to increase the absorption of European funds, by streamlining the management of document flows, using capabilities of computer applications and new technologies, as a computing technique, thus succeeding, first notable steps in the process of continuous computerization of the central public administration.

In the 2007-2013 programming period, at the level of 2010, the management of IT applications for European funds was carried out in a decentralized manner, each operational program having its own form of IT organization, which also included an IT application with program-specific features. POSDRU was a pioneer in the electronic submission of projects.

By means of a computer application, the excessive bureaucracy was reduced, eliminating the submission of hundreds of documents related to eligible projects and

expenses. In the relationship between the project beneficiary and the Managing Authority, an electronic communication is established that will streamline the absorption process, but not without encountering difficulties or blocking stages in the evolution process, thus replacing thousands of deposited bookshelves with electronically uploaded files in an account for each project.

These security measures were initiated as a result of counteracting cyber incidents, consisting of cyber attacks on calls for calls / submissions of European projects through the computer application – by electronic mechanisms (bots) for automatic completion of project content, violating thus the established rules of deposit and thus not respecting the principle established for the contracting phase – first come – first served. Simultaneous submission of projects is a violation of applicable law, but also a form of cyber-fraud, which is why we tried to exploit the vulnerabilities of open source technology used by the application – PostgreSQL.

Noting at the level of the institution, the emergence of the need for cyber security, by securing the application, starting from the stage of transferring the hosting location of computer equipment to a more secure data center specialized in the field.

These IT events created the premises for the transfer of the development of IT services and applications for European funds from the private sector of expertise by contracting on the basis of public tenders, in the public environment of interinstitutional cooperation with the related specifics, based on protocol relations established by law.

The management of the equipment that stores and manages information about the submission, contracting, and implementation of projects financed from European funds outlines a character of strategic objective, of national importance manifested in this way through the well-defined collaboration between the institutions involved.

In order to develop and host computer applications, cooperation agreements will be defined with the autonomous institutions that have attributions in the field of information security in Romania.

Decisive transparency in the management process of the submission of projects related to European funds, such as evaluation, contracting, and their implementation, will always be much better, in electronic form, implicitly requiring a high degree of protection and cyber security; only in this way will be reduced drastically and beneficial the current high degree of excessive bureaucratization in public administration. Transforming governance into an efficient, automated activity, in which the result obtained prevails, especially in a sensitive area and with complex implications such as that of European funds.

The critical IT infrastructure of national importance, dedicated to applications with the role of managing European funds, is becoming more and more at the same time a topic of interest for possible cyber attacks, especially since 2016 when the attention of some organizations began to focus on government cyberspace. .

That is why, at the ministerial level, all the necessary resources have been concentrated, creating the premises for strategies to prevent and combat any cyber attacks, which could jeopardize the integrity of information such as European funds,

which have an impact on the country's economy, causing damage on the possible interests of the country, stability, and development.

Thus, through financing programs, the guidelines were established in the future developments of infrastructure protection through the acquisition of specific security equipment. With the considerable contribution of state institutions working in the field of cyber security, as well as through sources of external funding from European funds, it was possible to develop a national system that includes all state institutions, aiming to achieve prevention and protection against cyber threats.

3. Literature Review

Security is a priority; through specific European programs, the capacity of operational cooperation is strengthened, with a desire for consensus on the values that underpin the EU's internal security.

Mutual trust and the exchange of information will increase the preventive nature of the actions of the authorities, thus establishing the Standing Committee on Operational Cooperation in Internal Security, at national and EU level (European Commission, 2021).

The system is a set of principles, rules, and forces which form an organized whole, which aims to put order in a field of theoretical thinking, regulating the classification of material in a field of science or making a practical activity work properly. The purpose is pursued by complying with a set of rules and values.

The state is outlined, as a way of ensuring the political existence, by the established order and the development of the community, the defense and guarantee of the territorial integrity as well as of its autonomy.

National security is that state of balance, legality, economic, social, and political stability which guarantees the existence and development of the sovereign, unitary, indivisible, and independent state, through order, rights, and civil liberties.

National security leads to the realization of constantly evolving values, guided by constitutional-democratic principles. The national interest becoming a fundamental thesis in the applied foreign policy.

Security policy is represented in the long-term organization and ensures security change and innovation.

Security strategies, thus succeeding in adopting measures that counteract threats that evade the state of security.

A strong nation is built on common norms and values, goals, and aspirations, of paramount importance to individual interests. Citizen protection is a vision, an integral and important part of the National Strategy for National Defense.

Information and communication technology have a complex impact not only on the economy and its efficiency, but also on all aspects of people's lives. For a reinvention of governance in the information society, the following concepts have been identified that should be met:
- increase the state's capacity to absorb European funds using new technologies;
- increase the capacity of government administrations in public policy, both at the national and European level;

- e-democracy – the internet can increase democratic participation in government, the citizen of the information society is active;
- the electronic citizen – the citizens of the new society / young people are attracted in the modern technological fields being the key actors of the future governments, the politics in the digital age is in continuous transformation;
- politics in electronic format – the manifestation of politics in digital form is becoming more visible through the significant increase of online election campaigns, the electronic state, and behavioural patterns;
- the electronic state – in the phenomenon of globalization fuelled by the digital integration of the markets of the new economy, it will be desired to rethink and redefine the concept of nation-state.

Thus, increasing the chance of creativity and innovation by profoundly transforming the behaviours and profiles of citizens, from the reactive to the proactive.

4. Methodology

The research was carried out at the level of the Ministry of European Investment and Projects, with the main aim of creating scientific and technological excellence, as well as gaining advantages in the field of security and resilience of systems, services, and critical infrastructure of national importance, as well as increasing cyber security culture in the central public administration and among contract users or civil servants, with the possibility of establishing within the institutional organization, at least 3 posts with specific tasks in the cyber field, in direct collaboration with the Security structure of the Ministry and in cooperation agreement National Cyber-int.

The period included in the analysis activity is between the years 2014-2022, comprising two programming periods of non-reimbursable financing from European funds, facilitated by the European Commission.

The two projects carried out by the Cyber-int National Center, to ensure cyber security at national level, constituting a security umbrella, on the critical infrastructure of national interest, which will be reinvented by the digital transformation generated using emerging technologies, have produced a considerable evolution. Emerging technologies and the integration of Machine Learning or Artificial Intelligence functionalities, at the level of the Ministry of European Investments and Projects, as a development measure through innovation, having positive effects including on the development of the national economy by increasing the absorption of European funds in a cyber secure environment.

The Ministry of Investment and European Projects regularly contracts the services of a certificate authority to allow user authentication and control access to various resources, especially in the application MySMIS2014, the first government IT application with this level of security implemented since 2016. They can be managed with HSM solutions and authentication tokens. Thus, an extra layer of Security can be added by implementing a Dual Factor Authenticator system. Authentication solutions, their management and monitoring, and even administrators

who may have various access privileges may also be useful. Access to the ministry's resources will be secured and endpoints, mobile or immovable, must contain advanced antivirus protection technologies.

Virtual Private Network traffic tunneling and Internet access monitoring are performed through ICIN 54 MIPE – Cyber-int and STS. The encryption of the storage spaces that manage the used applications is performed at STS by securely hosting the equipment in the specially organized data center.

Critical systems must be completely separated from the rest of the network to create an area independent of attacks that may enter the organization. This is the area covered by the security equipment within ICIN 54 MIPE, which will benefit this year from an upgrade of capabilities, through refurbishment. Access should be granted only to people who use the system, and the connections will be encrypted by technologies such as data diodes, zero-trust, etc. Updates are performed through dedicated servers and well-defined policies to prevent access to the Internet Windows Server Update Services (WSUS).

5. Results and Discussions

The first step in the use of emerging technologies by integrating Machine Learning or Artificial Intelligence functionalities, at the level of the Ministry of European Investments and Projects, was made within the projects financed from non-reimbursable funds, as a measure of development through innovation, of a critical infrastructure of national interest, by cooperation agreement with the National Authority in the field of Cyber-intelligence – Cyber-int National Center (Cloud Computing, Events, 2021). The security equipment used, offering advanced management capabilities, to realize the prevention, detection, and investigation of cyber security incidents, analyzing the risk generated by possible attacks, as well as automatic remediation of threats.

Raising awareness will be achieved by informing users, which is the first measure of protection against cyber-attacks. Human error can be avoided. This will close the way for hacker attacks, through good regular information, constant emails, courses, trainings, eliminating the possibility of further, much more serious problems, especially regarding information and data belonging to the state (National Cybersecurity Directorate, 2021).

In the near future, the public administration will evolve towards a different approach to the use of technologies, being transposed into future strategies, the need to use solutions in cloud, on-premises, or hybrid cloud environments, depending on available budgets and advantages or disadvantages. To streamline the activity or in the situation of permanent blocking of the procedures of new employees in the public administration, the subcontracting of services that allow access to these technologies is an efficient way to manage platforms, with a cost-benefit ratio for the benefit of the public institution, will relieve the care of the use of internal resources.

Public administration services can be streamlined using advanced information technology. The European Commission is trying to set its own example in this, through the procedures and tools it uses in its day-to-day work and in its links with

Member States administrations and its own decentralized agencies, which are marked by progress in computerization. The aim is to facilitate citizens' access to public information through new computer applications, as well as to achieve better communication between all levels of public administration across the Union, thanks to the high-speed connection.

The development of the European Information Society involves a considerable and ever-increasing financial effort, which cannot be fully assumed by the European Union and the governments of the Member States. Experience has shown that the private sector is best able to take risks in operating and developing new adaptable markets and has the capital to make such investments.

Integrating Machine Learning or Artificial Intelligence functionalities, at the level of the Ministry of European Investments and Projects, could be seen in Table 1 below, while security levels could be observed in Figure 1.

Table 1. Integrating machine learning and artificial intelligence functionalities, at the level of the Ministry of European Investments and Projects

Implementation period	Protected workstations	Increasing the degree of cyber protection	Automate responses to detected and remedied cyber attacks	Fixed vulnerabilities	Possible security risks
2014-2017	250 to 450	200 Endpoints	About 50%	75%	25%
2020-2024	450 to 1700	1250 Endpoints	About 75%	99%	1%

Source: Author' own research.

Figure 1. Security Layers
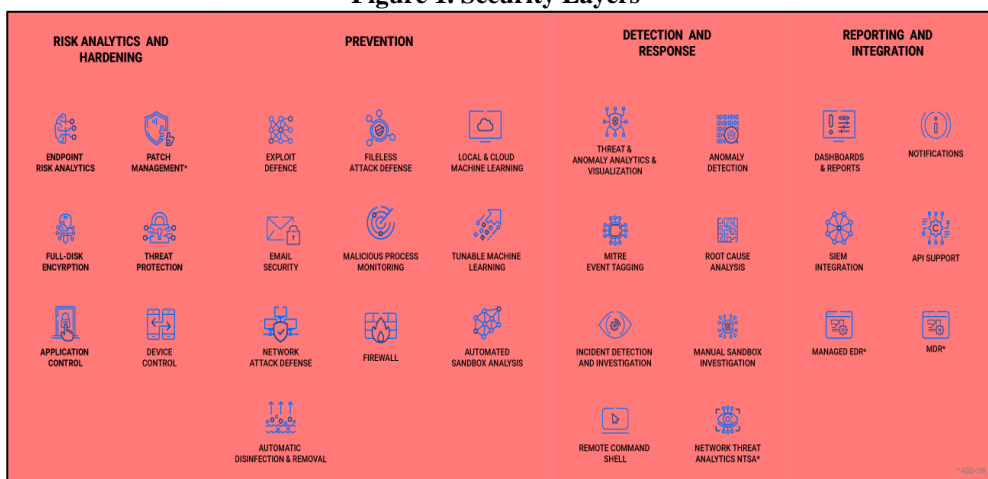
Source: www.bitdefender.com.

**Figure 2. Centralized management of the antivirus solution update process
(Bitdefender MIPE, 2022)**
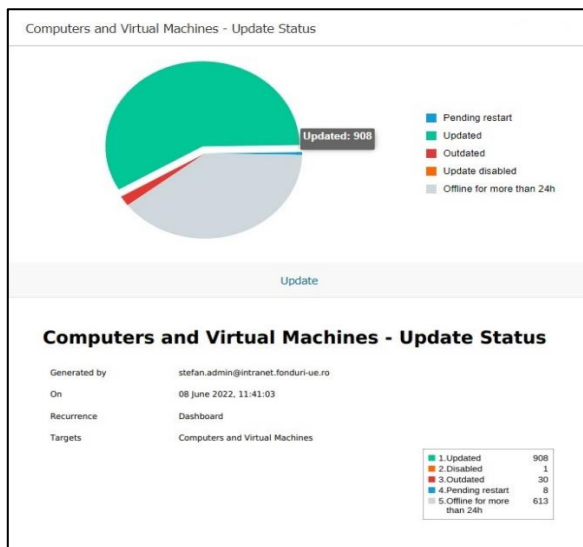
Source: Central administration console – Bitdefender GravityZONE –
Ministry of European Investments and Projects.

**Figure 3. Cloud computing and services – private cloud solution
(nextcloud MIPE, 2022)**
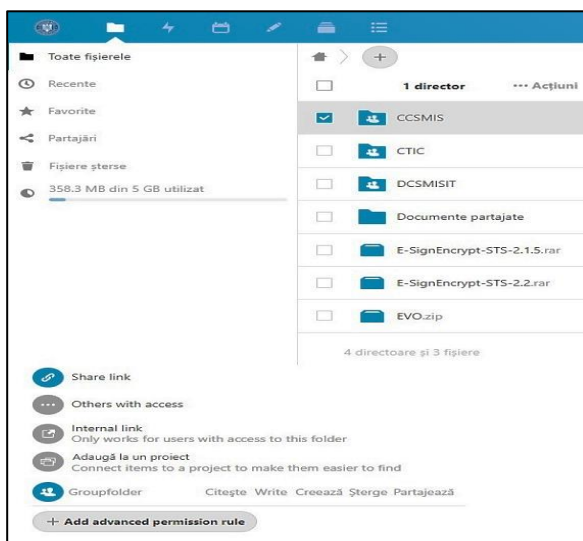
Source: Central administration console – Bitdefender GravityZONE –
Ministry of European Investments and Projects.

Figure 4. Machine learning – cybersecurity incident investigation (Bitdefender MIPE, 2022).
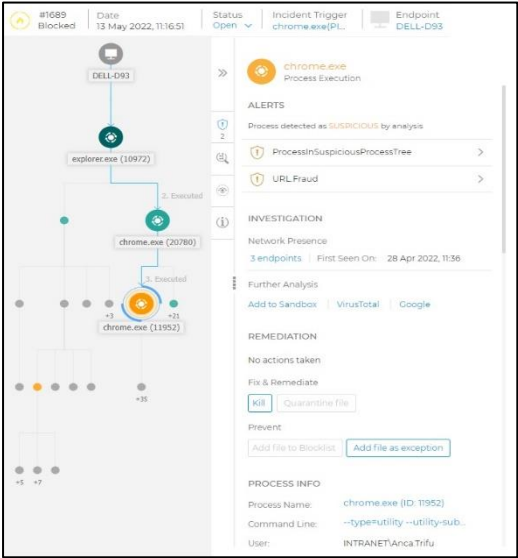
Source: Central administration console – Bitdefender GravityZONE – Ministry of European Investments and Projects.

Figure 5. Machine learning – automatically blocked cyber threat investigation (Bitdefender MIPE, 2022).
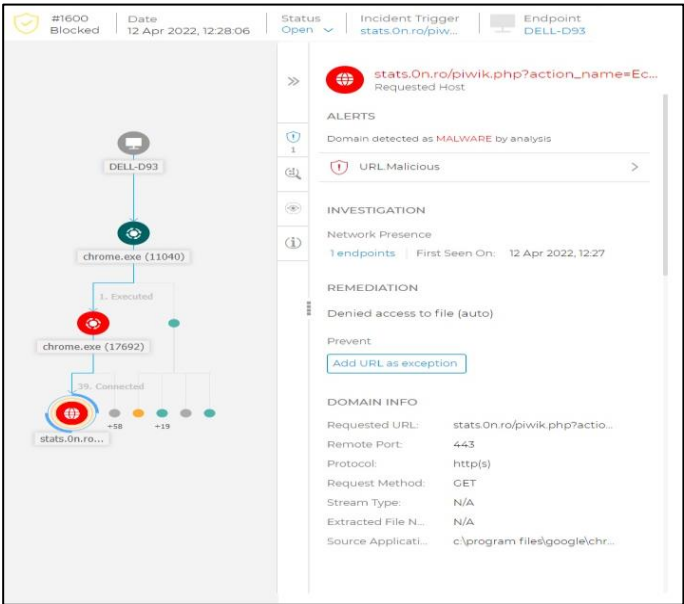
Source: Central administration console – Bitdefender GravityZONE – Ministry of European Investments and Projects.

Figure 6. Top 10 Vulnerabilities detected and blocked by the security solution (Bitdefender MIPE, 2022)
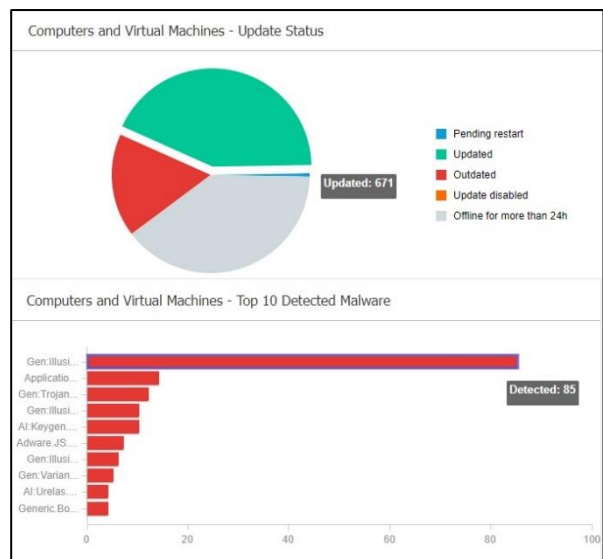
Source: Central administration console – Bitdefender GravityZONE – Ministry of European Investments and Projects.

Figure 7. Malware detection status in the MIPE 2022 internal network (Bitdefender MIPE, 2022)
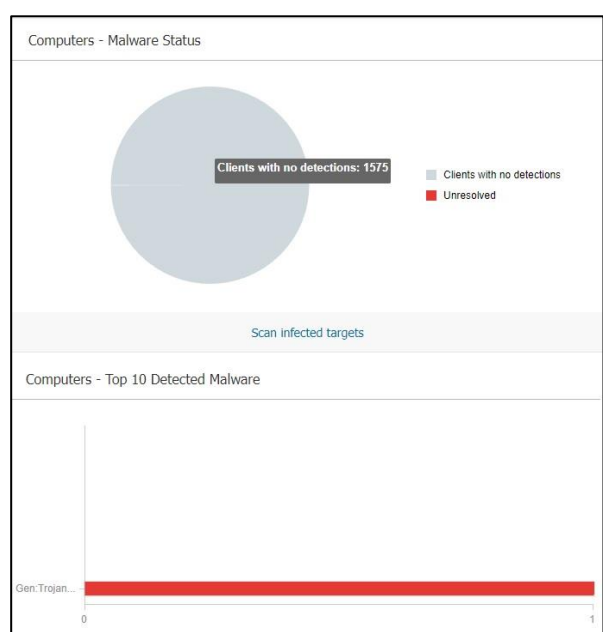
Source: Central administration console – Bitdefender GravityZONE – Ministry of European Investments and Projects.

Figure 8. Network scheme of cyber protection equipment related to critical infrastructure of national importance – ICIN – Țițeica

Source: The national system for the protection of IT/C infrastructures of national interest against threats from cyberspace.

Figure 9. Cyber attacks automatically countered according to the implemented security policies (Bitdefender MIPE, 2022).

Source: Central administration console – Bitdefender GravityZONE – Ministry of European Investments and Projects.

6. Conclusions

According to Article 3, letter f, L51 / 91, "harm to the interests of the country, as well as acts of destruction, degradation or rendering in a state of disuse blocking the absorption of Europe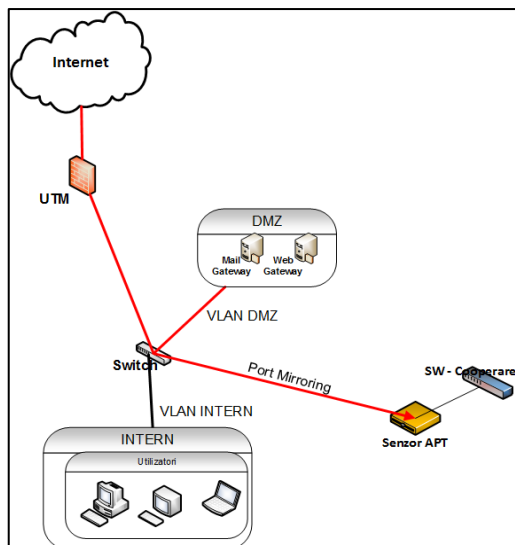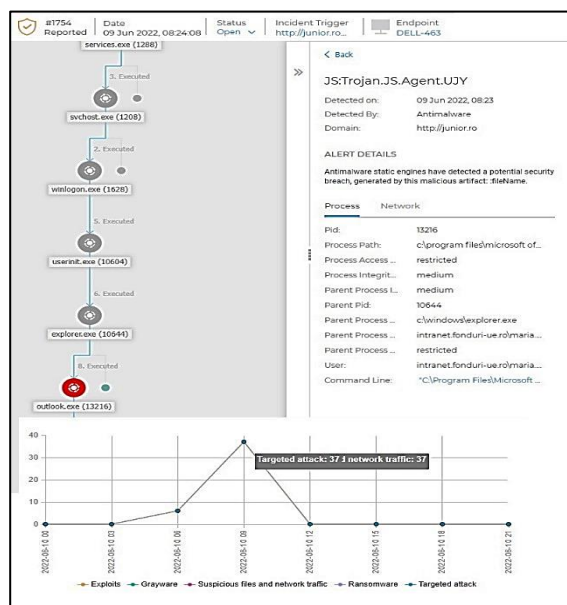an funds. In that case, according to Article 11 letter b – the direct beneficiary is the Minister of European Funds, who must be informed immediately in order to avoid such possible threats to the objectives of national strategic interest. (Information note of the Minister of European Funds 31.05.2018). As a dimension of information, counter-intelligence and security, the threat that consists in – blocking the absorption of European funds - falls within the provisions of Chapter 3 related to the National Strategy for National Defense 2015-2019.

The persistence in the vulnerability regarding the blockade of the absorption of European funds, being a real threat to the national security of Romania, due to the socio-economic implications and the obligations assumed as a member of the European Union, generates the need to capitalize the information for national security. European Funds, as well as by taking the necessary measures to address the shortcomings identified.

These data of national interest have an incidence in the current year – 2019, leading mainly to a non-fulfilment of the conditions established in the relationship with the European Commission, as an EU member state, of Romania.

As cyberattacks become more frequent, it is vital that organizations are equipped with the most effective tools and knowledge to prevent, detect and respond to cyber threats.

Thus, the identification and capitalization of these deficiencies, which constitute information for national security, will be done gradually, due to the degree of persistence manifested, as well as the permanent lack of sufficient and efficient resources, endowed with the necessary training to manage the computer system.

Therefore, it is necessary to create a global framework for security and trust in ICT. This strategic goal is aimed at creating scientific and technological excellence, as well as gaining advantages in terms of security and resilience of systems, services, and infrastructure, while meeting European privacy requirements (Regulation EU, 2016). The aim is to standardize networking and information security activities. The emphasis will be placed on ICT research in the field of public administration innovation, with a view to modernization and innovation, thus promoting an efficient type of governance, offering new services to citizens and economic agents, with the result of creating new public values.

Thus, making European citizenship a reality and providing support to citizens through innovative government services and active participation in decision-making. Everything happens thanks to a process called technology-based learning. The technology used efficiently, safely, with positive results for society, involves ensuring a high degree of security and awareness of the dangers of the virtual environment. Specialized security equipment is the specific technologies that ensure these activities without which the order and normality in electronic financial activity, especially in the institutional field, would be seriously endangered by attacks,

intentionally aimed at the government's online environment, especially in the sensitive management of European funds.

Security solutions are needed, which bring real benefits to the institution once they are configured according to the needs of secure operation. Easy-to-use, intuitive management tools can optimize the time required to implement new policies, to make a correct monitoring and alerting. Also, the collaboration with the National Cyber-int Center offers stability and access to the necessary knowledge in the activity of implementing these systems for ensuring cyber security. Unified and integrated technologies offer a measurable advantage in results, benefiting from such consoles and tools adapted to the level of expertise, in accordance with the strategies built by the IT Security department. Cooperation with other institutions such as National Cyber-int Center, participation in seminars and conferences in the field, is an excellent tool for improvement, and especially a guide of good practices, assimilated to adopt the best decisions for the public institution.

The budget allocated to innovation in public administration will create and maintain such desirable stability, especially in critical areas, such as European funds. In industry and economics, the role of robotics and process automation will increase considerably, with changes related to technology bringing both benefits and vulnerabilities, especially in cyberspace. It will practically create a virtual parallel world, where the existence of the state, with everything it represents must be protected, so the environment will be safe and secure even for the individual. The consequences of competition in innovation produce major transformations, including in society, simplifying the complex life of modern man in the information society. Thus, constituting a national interest for the Government Strategy, the areas such as attracting European funds and ensuring cyber security, aiming at modernizing, and computerizing the public administration in Romania (ENISA, 2021).

Thus, it is necessary to create a global framework of security and trust in ICT, with an expansionist tendency toward process automation to achieve maximum efficiency. This strategic goal is aimed at creating scientific and technological excellence, as well as gaining advantages in terms of security and resilience of systems, services, and critical infrastructure of national importance, as well as increasing the degree of cyber security culture in the central public administration, with the possibility of establishing within the institutional organization, at least 3 positions with specific attributions in the cybernetic field, in direct collaboration with the Security Structure of the Ministry in question and in cooperation agreement with the National Authority in the field of Cyber-intelligence, following designation by SCND- Supreme Council of National Defense - Romanian Service of Information, through the National Cyber-int Center.

In this way, an important stage in inter-institutional collaboration will be fulfilled, to achieve the fundamental objectives of the country strategy, the field of funds becoming critical infrastructure through the implications inherent in the national economy, affecting all plans of society, from financial to economic, social-educational, up to the political one, with all the necessary risks assumed. But most

importantly, the efficient management of infrastructure and applications for European funds, having a special importance in the much-needed process of increasing the quality of life, representing the first step towards knowledge, innovation, and development.

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Irrationality in Decision Making –
an Experimental Economics Based Approach

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Abstract

Economic decisions based on individual choices and individual behaviour can nowadays be assessed considering a change of paradigm. Economists learn and teach the basic principles of rational behaviour based on the homo economicus concept. But when assessing real life situations from our economy and related decisions, one can find out that irrationality is an important element determining our decisions. This triggers a change in re-evaluating the theory and the principles which are the basis for decisions in an economic context. The present paper deals with the subject of irrationality in decision making, presented based on an experimental economics approach. The selfishness axiom, which is a theoretical model explaining human behaviour in an economic context, is analysed, trying to raise questions about the fact that according to this theory, individuals try to maximize their own material gain. The present paper analyses to which extent such a behaviour can be induced by society, by ethics, principles and values, by the economic, social and cultural environment. The paper brings in question to what extent decision making is really based on rational models such as the rational consumer model or rather on irrationality as a key-factor influencing decisions in the economic environment. As a research method, strategic interaction based on behavioural game theory is used in the present paper, such as the prisoner's dilemma, analysing the issue of cooperation and coordination. The findings of behavioural economics are assessed using an interdisciplinary approach, as experimental economics brings together assumptions from economics, sociology, psychology, anthropology as well as legal and cultural aspects.

Keywords: irrationality, experimental economics, homo economicus, behavioural game theory, the prisoner's dilemma.

JEL Classification: A11, A13, C90, C91, C92, D01, D11, D12, D90, D91, F61, I25, J01, J08, M14, M21.

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1. Introduction

Experimental economics is a challenging field dealing with complex issues of human behaviour. The scientific basis for studying human behaviour is multidisciplinary, bringing together economics, psychology, sociology, and even neuroscience and legal aspects. The common element of all these disciplines is the model of individual human behaviour (Gintis, 2007).

The factors influencing individual human behaviour are researched by the field of Experimental Economics, trying to find out to what extent predictions of economic theory can be validated. Especially in this context, it is interesting to find out to what extent pecuniary incentives play a role in economic decision-making. According to research findings, it is actually the influence of non-pecuniary incentives which determines economic decision-making of individuals. Trust and reciprocity play a more important role than money as an incentive. This is a hypothesis to be validated by Experimental Economics, and it is also subject of the present paper. Ultimatum games highlight the above-mentioned aspects, by emphasizing the role of psychological factors in the context of social interaction. Economic decision-making is, in fact, a situation of social interaction with all related components of learning and communicating (Morgan, 2005). The importance of trust in this situation of social interaction is very high. In order to analyse the importance of trust, it is relevant to research how trust can be built and what determines trust, which is a research objective of the present paper. The formulated research hypothesis underlines the fact that economic decision-making deviates from the classical economic models based on rational decision making. There are also other factors, mainly irrational factors that influence economic decision-making, which are difficult to quantify.

Cultural influences can also play a role in economic decision-making. This is also a research hypothesis to be examined in the present paper, in order to find out to what extent cultural values may determine a specific type of economic decision-making process. This research brings more clarity related to the question if cultural factors or values such as equity or altruism may influence economic decision making and if they may explain some deviations from classical economic prediction models (Henrich et al., 2005).

Cultural factors are not necessarily rational decision-making factors. Again, there is more than rational thinking that influences economic decision-making. Values like equity, fairness, and altruism are important factors influencing economic decision-making, and they deviate from the classical rational model focused on pecuniary aspects and on profit maximization. This development is obvious in the current business environment, in the producers' behaviour. Today, producers do not only focus on the main objective of profit maximization, but also consider as well other factors such as corporate social responsibility. This is as well a field of decision making showing that not only rational factors determine economic decisions. There are values and moral criteria playing as well an important role in economic decision making.

The present paper analyses the research hypothesis of irrationality in economic decision making by reviewing the specific literature, leaving as well open space for new experiments in order to validate the formulated research hypothesis. The present paper is a theoretical article, a review article presenting important theoretical aspect of Experimental Economics related to the subject of irrationality in decision making. The main objective of the article is thus to summarize some aspects that are important in the field of Experimental Economics, which is a new research field especially in the Romanian academic context. A next step would be to organise based on the studied theoretical background presented in the present article, an own experiment, to design it and to perform an in-depth analysis of the elements that are presented in this paper. The novelty and originality of the present article is represented by the fact that for the moment there are no experiments performed in laboratories in the field of Experimental Economics in Romania. The present paper also proposes a cross-cultural perspective, which is also something new for the Romanian academic research in this specific field.

2. Problem Statement (Literature Review)

2.1 Change of Paradigm in the Specific Literature

Studying the specific literature which is relevant for the present paper, a shift of paradigm can be noticed. This shift of paradigm shows how the research field developed and how perceptions related to the factors influencing economic decision-making changed over time. The literature was selected considering the criteria of reflecting the change of paradigm over time related to the research topic and of underlining this development. Older literature as well as current literature was chosen for reflecting the change of paradigm.

The "rational actor model" presented by Gintis is based on the fact that individuals make decisions based on the information they have access to. The "rational actor model" was developed by John von Neumann, Leonard Savage and assumes that individuals can determine the logical and mathematical consequences of their actions and choices. The principle of expected utility guides individuals in their behaviour according to this model. The author refers to this model as the "beliefs, preferences and constraints model" ("BPC"). The brain as a decision-making organ has the most important role in the decision-making process, according to this author. The author also speaks about the internalization of norms and values, which happens in time based on cultural development and which influences the decision-making process. The author uses as well the term "gene-culture evolution" to explain the changes in decisions induced by cultural development of humans. When a norm is internalized, it becomes a value that is observed. Such a value is, for example, fairness, being honest. If the norm is internalized, an individual will be honest or will try to be fair even if this is not in their own advantage, if they have no payoffs. This kind of interaction is important in a social environment, where the strategic interaction with other individuals and the response to actions of other

individuals are mentioned by the author under game theory (Gintis, 2007). More detailed considerations about game theory will be analysed further in this paper.

The shift of paradigm is obvious in the literature, as former authors mentioned competition situations as relying on rational decisions (McAfee et al., 1996). More recent authors mention the importance of psychological factors, of beliefs and values in decision-making (Gintis, 2007). Former authors mention rather Cournot-Nash-equilibrium situations based on non-cooperative behaviour and on quantity as a parameter in competition when describing economic issues on the market (Nash, 1950; Nash, 1951), while more recent authors, create models based on a Bertrand-equilibrium, with competition in prices and quality (Nagurney, Wolf, 2013).

Human behaviour is explained in the literature by means of the "selfishness axiom" (Henrich et al., 2005). The authors explain the concept of "selfishness axiom", meaning the fact that human behaviour is self-regarding (Henrich et al., 2005). In recent years this theory has been reconsidered (Gintis, 2007), which is an evidence of the shift of paradigm in this field. The literature states that the violations of the selfishness axiom occur and that they are proven in conducted experiments (Henrich et al., 2005). In recent years this theory has been reconsidered (Gintis, 2007), which is an evidence of the shift of paradigm in this field.

2.2 Game Theory in Experimental Economics

In Game Theory, there are players who are multiple decision makers. They have information about the rules of the game, and they build their own strategies according to the provided information and according to their beliefs and constraints. For each strategy choice, the decision makers have to consider a certain payoff to the players. Each player intends to maximize his preference function according to the information he has, as well as to the beliefs he has, and to the constraints he faces (Kreps, 1990; Gintis, 2005).

Behavioural game theorists explained in the specific literature that individuals are not self-regarding in their actions and in their economic decision-making. They care about the payoff of other players as well. They care about honesty and decency and guide their decisions after these values (Fehr, Gächter, 2002; Gintis et al., 2005; Gneezy, 2005; Wood, 2003). The authors specify also that individuals care about power, self-esteem, and behaving morally and consider these parameters in their economic decisions (Bowles, Gintis 2005; Gintis 2003; Wood 2003).

3. Research Questions / Aims of the Research

As the present paper is a theoretical review article, its main objective is to summarize some important general theoretical aspects of Experimental Economics which are relevant when trying to design an experiment on the topic of irrationality in decision making. The research field of Experimental Economics is a new one at international level and thus it is new as well for Romanian research. In a first step, some general aspects that are important for Experimental Economics are summarized in the present paper, in order to raise awareness regarding this

interesting research field. In the next step, an own experiment will be designed by the authors and will be implemented as soon as the needed infrastructure will be in place, meaning a laboratory permitting to perform experiments in this field. In order to be able to design the experiment, some general theoretical knowledge is needed. Starting with this theoretical, general basis, a specific experiment will be designed in order to analyse the presented aspects in the Romanian environment, in a detailed manner. This will permit some conclusions regarding the specific context of Romania. Such an approach has a high degree of novelty in the Romanian academic context.

4. Methodology

The present paper is a review article and therefore it considers important opinions of authors expressed in the specific literature related to the researched subject. Books on the research topic as well as scientific articles (Science Direct, Elsevier) have been consulted. The selection criteria for the review of the specific literature were to find experiments which are important for some general aspects of Experimental Economics on the topic of irrationality in decision making and that would help to design an own experiment of the authors, once the needed infrastructure will be provided. After studying relevant conclusions of experiments performed worldwide, an experiment in a Romanian laboratory could be designed in order to formulate own research results applied to the Romanian environment. This is why some general aspects of the attitude related to gains and losses have been selected when studying the relevant literature. The cross-cultural component was also an important selection criterion. Experiments from the United States of America, as well from Japan have been presented in the present paper. Values like trust and reciprocity have been analysed in these international experiments. They will also be analysed in a further research step in the Romanian environment, after designing an experiment in a Romanian laboratory, which would be a future research step of the authors of the present paper. For the literature review, those authors were selected, who have research results that could be interesting to study in the Romania environment. Some aspects to be studied, like the importance of trust and reciprocity in decision-making, were mentioned in the present research. They will be implemented in a future research step, and they will be included in an own experiment, with a practical application on the Romanian environment.

The use of qualitative research methods is economics in encouraged, an aspect that has been considered in the present paper (Carlsson, 2018). This is why a qualitative research approach was selected for the present paper.

The novelty of Experimental Economics is underlined, and the change of paradigm brought by the development of this new field of economics is pointed out in the present paper. The paper presents theoretical models that appear in the researched literature, such as the "rational actor model" and the selfishness axiom, which is a theoretical model explaining human behaviour in an economic context.

Furthermore, the paper analyses the importance of Game Theory related to the subject of irrationality in economic decision-making. Some specific examples and

case studies illustrating the application of Game Theory in competition situations are presented in the present paper. Metadata available in studies and research articles is also interpreted and evaluated.

Ultimatum Games are analysed in order to validate some research hypotheses of Experimental Economics, for example, the research hypothesis that individuals react differently to sharing gains than to sharing losses. Experiments concluded in the United States of America but as well at international kevel including countries like Japan are given as practical examples of experiments. The cross-cultural dimension is considered in this research paper.

The paper has a multidisciplinary approach, considering elements of economics (especially advanced microeconomics), psychology, sociology, and neuroscience as the field of Experimental Economics is one with interdisciplinary dimensions.

In the next phase, an own experiment will be designed in order to validate the expressed research hypothesis.

5. Findings − Results and Discussions

5.1 Perceptions of Gains and Losses – a Cross-cultural Perspective

The results of an experiment conducted in the United States of America show that people behave differently when they have to divide losses than when they have to divide gains (Nancy Buchan et al. in Morgan, 2005). This is a research finding based on an experiment conducted in the United States of America. People try to avoid losses, and therefore, as shown in the experiment, people act differently when they have to decide to divide losses than if they have to divide gains. In the conducted experiment, the amount demanded and the amount offered are higher under losses than under gains. A consequence of this research finding is that there are differences between bargaining over losses compared to bargaining over gains. Individuals demand and offer more in ultimatum bargaining in order to avoid losses as much as possible (Morgan, 2005). This is an important research finding for industries dealing with losses, such as the insurance industry, for example. The consulted experiment was performed in the United States of America, but the literature states that this type of behaviour may be generalized, as suggested by the work of Roth, Prasnikar, Okuna-Fujiwara and Zamir (1991) and later Henrich et al. (2001;Morgan, 2005, p. 19). Fairness matters, as well as an important factor related to bargaining over losses and over gains. The principle of profit maximization is thus applied differently, depending on the context of bargaining with losses or with gains (Morgan, 2005).

5.2 Psychological Factors in Decision-making

Assumptions in Economics are currently being reconsidered based on evidence from psychology and neuroscience. In this context, the field of Experimental Economics offers the opportunity to test a certain research hypothesis in a laboratory in order to validate it. A shift of paradigm from the classical model of rational behaviourism, based on the rational self-interest model, towards other models, based

on findings in psychology and neuroscience. A research question related to this subject is why people make irrational choices. In order to answer such a question, findings from economics, psychology, and neuroscience have to be considered. Market anomalies, which are deviations from classical rational models, may be explained by means of irrational choices of individuals (Hilton, D. in Lewis, 2008). Cultural beliefs and values, such as fairness and trust, also play an important role in decision-making. These may be learned values influenced by society and culture.

5.3 Irrationality and Game Theory

Game theory predictions are based on the assumption that agents decide based on rational thinking and that they try to achieve Nash equilibria. The evidence from experiments shows that this hypothesis is falsified. Game theory assumptions are based on the idea that agents decide on a self-regarding basis. Another aspect which is problematic in Game theory is the assumption that individuals have a symmetrical access to information, which is not true in real life situations (Gintis, 2005). In real life situations, individuals do not necessarily seek situations representing a Nash-equilibrium (Gintis, 2007).

The payoffs in game theory are monetary payoffs representing utilities. Players try to maximize their payoffs based on a rational behaviour, acting according to their knowledge and beliefs. In other words, they try to achieve the best possible result in the given circumstances (Gintis, 2007). What happens in reality and which falsifies the assumptions of game theory is the fact that individuals decide based on other criteria than the monetary payoffs, such as trust or fairness or other values they have been educated to apply or to comply with. Sometimes this type of behaviour does not represent the best monetary payoff obeying the profit maximization rule, but due to education and culture, it is considered to be the best way to act.

5.4 Prisoner's Dilemma and Other Dilemmas

An example related to Game Theory is the Prisoner's Dilemma, illustrating the behaviour of cooperation respectively non-cooperation of two rational individuals. The fact that in a situation in which it would be more advantageous to cooperate, the two individuals participating in a crime do not cooperate and decide to betray each other is not rational from the point of view of Game Theory. But it happens in real life, due to psychological, perhaps irrational factors. It happens as well on the market, especially in oligopolies.

Besides the Prisoner's Dilemma, the literature also mentions the Volunteer Dilemma. This dilemma refers to a person waiting for others to intervene and to bear the cost of this intervention. The person waiting for help has the role of a bystander. The bystander would in such a situation intervene only if he knew that nobody else would intervene (Gintis, 2007).

5.5 Possible Research Impact and Research Limitations

The future research impact of the present paper is important, as it represents the basis for future research. The authors intend to improve their research and to develop an own experiment in the laboratory based on this theoretical research. Such a practical research in Experimental Economics would have an important impact on future research, as it would contribute to the development of a new research area. Experimental Economics is a field of great interest and it would be very important to further develop this field in Romania, with the possibility to design own experiments and to study some general aspects applied in the Romanian environment. It would represent an important step in Romanian economic research. It would also place the Romanian research in the context of international research.

Possible limitations of the present research may appear as the field is so new that there were no laboratory experiments performed until now in the field of Experimental Economics, so that it is difficult to have the needed infrastructure and the expertise to organise such experiments. Other possible limitations of the present research paper may be represented by the fact that at the moment it is difficult to organize and design an own laboratory experiment, so that at the moment the paper is a review article. When designing and organizing an experiment will be possible, the present research will be the basis for such a practical research, with applied research findings from a laboratory experiment analysing aspects from the Romanian environment with relevance for Experimental Economics.

6. Conclusions

Irrationality in decision-making is a fact to be observed in the specific literature as well as in real-life situations. Individuals' behaviour is determined by factors that are beyond rational thinking, such as psychological factors, non-monetary incentives, values and beliefs, education, and culture. This shift of paradigm from rational behavioural models to new models, considering research findings of psychology and neuroscience, is studied by the field of Experimental Economics, which is a new, developing field of research with a high potential of development. The present paper studies research findings of the specific literature regarding irrationality in decision-making from an Experimental Economics-based approach. The research results of the present paper may be developed in further research that would for sure be very useful, given the dynamics of this field.

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Hydrocarbons Price Subsidy and Poverty in Cameroon

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Abstract

Subsidies for petroleum products increasingly burden the state budget and prove ineffective in reducing poverty. However, their removal could also harm the well-being of poor or vulnerable households. In this work, we analyse the impact of subsidy abolition on poverty using a computable general equilibrium model.

The main results of this work show that the removal of subsidies does not benefit households. The poverty rate increases by 0.6 points in urban areas and 1.7 points in rural areas after the removal of subsidies. Direct transfers to the poor eased the shock, but do not help reduce poverty. The other poverty indices, in this case the depth and severity of poverty, have experienced the same trends. However, when these measures are accompanied by an improvement in public services by increasing government spending, the poverty indices improve or remain at their baseline levels.

Keywords: Subsidies, Computable General Equilibrium Model, Micro-simulation, Cameroon.

JEL Classification: C68.

1. Introduction

Many countries often use public price subsidies to meet several objectives depending on the nature of the products. The first is the stabilization of the price level in the domestic market and the guarantee of an adequate supply of certain basic products. The second is the protection of existing and infant industries with the aim of maintaining a remunerative price level in certain disadvantaged regions.

The practice of subsidies has been applied in Cameroon since the twentieth century, and they are put in place in order to protect the purchasing power of citizens, to guarantee the supply of the market with basic products, as well as to support the

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development of certain sectors, in particular the oil and gas sector. According to data collected in the database of the Hydrocarbon Price Stabilization Fund (HPSF), the overall cost of the subsidies amounts to 1523 708 652 820 FCFA over the period 2008-2019, and the government budget amounted to about 41069 billion FCFA over the same period. It therefore appears from the above that the cost of petroleum products subsidies in Cameroon is considerable compared to its budget over the same period probably for the benefit of consumers who represent households and whose objective is to contribute to the eradication of poverty. Although Cameroon makes a considerable profit from subsidizing hydrocarbons, amounting to 292 164 992 450 FCFA over a period of 2014-2017. Likewise, according to the World Bank in its economic books, Cameroon's subsidies for petroleum products at the pump reached a sum of FCFA 450 billion in 2014, i.e., about 3% of gross domestic product (GDP) from the country. This sum according to the World Bank is in clear increase of 30 billion FCFA compared to 2013 which it peaked at 420 billion according to the Cameroonian government. However, according to the financial institution, it is only 220 billion FCFA that would have been planned for that year (2014 budget), i.e., a little less than 50% of the sum necessary to support the subsidies. Furthermore, the International Monetary Fund (IMF) suggested to the government to remove the subsidies because, according to them, said subsidies benefit the rich more than the poor. Therefore, it is the starting point of a stormy (interesting) national debate around the subsidy of petroleum products. A posture not shared by civil society and even employer organisation such as the Cameroon Inter-Patronal Grouping best known under its French acronym as GICAM, which made the removal of the subsidy conditional on the implementation of certain accompanying measures clearly proposed to the government. However, the removal of subsidies on petroleum products would have a significant adverse impact on low-income populations, since they spend more of their income on energy than the rich. Thus, an increase in the prices of petroleum products would lower the standard of living of the poor, thus affecting the well-being of the various categories of the population.

Nowadays, several studies have been conducted around the world to precisely study the effectiveness of subsidies or also to determine the impact of their removal, particularly on poverty and inequalities.

2. Problem Statement

Many economists focused on the study and analysis of the issue to measure the effectiveness of these subsidies or to determine the impact of their removal, as well as compensatory measures to alleviate the effect of removal.

Among the first, Audet (2007) and Soile (2015) analysed the utility and effectiveness of subsidies in Egypt and fuel subsidies in Nigeria, respectively. These authors have come to converging results, concluding that these subsidies do not benefit the poor especially and there is a great outflow to the rich. Therefore, subsidies do not have a systematic effect on poverty reduction (Audet, 2007).

The subsidy reform sparked the interest of another group of researchers who analysed the impact of the subsidy removal. These studies focused on reforms related

to energy and fuel subsidies, in particular poverty, government spending, prices, and the environment. These authors used different approaches in different countries to measure the effect of these reforms.

The first method consists of the estimation of income by proxy means (PMT) using an appropriate econometric model. This method is widely used because it relies on easily observable characteristics correlated with income and poverty. Household consumption is often used among its characteristics. However, this method remains incomplete, since it only takes into account a single sector while ignoring the others. This approach was used by Bibi (2002) who showed that although the poor benefit from subsidies, the leakage to the non-poor is considerable. He also stressed that there are no products consumed exclusively by the poor. Thus, targeting these products is not an effective policy against poverty. In contrast, targeted transfers have a more effective impact on poverty than these subsidies.

The second approach is that of input-output models, which were also used in the analysis of subsidies on petroleum products in China (Jiang, 2013) and Morocco (Bentour, 2016). These models offer a possibility to simulate the effect of shocks on the output of a particular industry or the expenditure of a given good or service on the rest of the economy. On the contrary, the major limitation of this approach is the lack of a price adjustment mechanism that would ensure a balance between supply and demand. The authors simulated the effect of removing these subsidies on the general price level. They effectively resulted in an increase in the general price level as a result of this policy.

Moreover, in the United States, Choi (2016) proceeded in a similar manner to approximate the effect of reusing the gasoline tax in subsidizing biofuels on the environment.

Finally, computable general equilibrium models (MCEGs) represent a more complete approach than the previous ones. They have demonstrated their power and utility in the evaluation of economic policies on poverty (Decaluwé, 1999). They make it possible to analyse the effect of income redistribution; they also trace the mechanisms of resource allocation between agents, which represents an important channel for the assessment of poverty. However, with a representative household, these models do not provide information on the effects of the policy within each group of households and, therefore, on poor households. A first way to capture the variance difference between groups of households is to subdivide the household agent into several categories according to the income level. This is the case of Widodo (2012) who considered eight household categories to analyse the effect of the removal of fuel subsidies in Indonesia on government spending. They concluded that the distribution of household, industries, and state income would be affected and that the impact of the reallocation of subsidies is less than the total removal of subsidies. At the same time, Siddig (2014) for their part studied the impact of the removal of the subsidy on imported oil on poverty in Nigeria by considering twelve categories of households. They concluded that this policy had a positive impact on the GDP. On the other hand, it negatively affected household income. They

suggested that a replacement policy, such as direct transfers to poor households, could alleviate the effect.

In addition, a more refined approach of the so-called micro-simulation MCEGs consists in considering a multitude (thousands) of types of households instead of a few categories as before, often those resulting from surveys on household expenditure (Savard, 2004). This method guarantees a certain homogeneity within each group of households. Thus, it allows for inter-group and intra-group analyses and comparisons. Dartanto (2013) used this method to approximate the effect of the removal of fuel subsidies on fiscal balance and poverty in Indonesia.

3. Research Questions / Aims of the Research

Many studies that have dealt with the problem of subsidies in Africa have looked a lot at the ineffectiveness of subsidies based on household surveys, highlighting the leak to the rich. Although this method shows that the poor do not fully benefit from these subsidies, it does not measure the effect of poverty in their absence. On the other hand, the input-output modelling used by Bentour (2016) does not make it possible to determine the incidence on poverty because this modelling does not consider household income. Based on this fact, our analysis would like to answer the question: What is the effect of a simulation of the removal of subsidies on petroleum products?

Therefore, this paper contributes to the literature in two ways. First, it examines the impact of subsidy abolition on poverty using a computable general equilibrium model. Second, this study assesses the effects of abolition of subsidies on petroleum products in the particular case of Cameroon.

4. Research Methods

Computable general equilibrium models aim to simulate the impact of public policies on a given economy by using a set of equations that define the behaviour of supply and demand in several markets. Since the 1980s, several authors have attempted to use MCEGs in the evaluation of economic policies on income distribution and poverty (Abdelkhalek, 2009; Adelman, 1979; Annabi, 2013; Decaluwé, 1999; Dervis, 1982; Morrisson, 1991).

4.1 The Household Model

The microeconomic model of households is derived from the theory of the consumer who maximizes his utility while respecting his budget constraint. The household problem retains a simple formulation. Indeed, a household h has preferences for consuming several products which are translated by its utility function u_h ($q_h{}^d$) where $q_h{}^d$ is the vector of product requested by household h. Household income is made up of wages, capital income and comes from other sources such as transfers. The household problem is given by the following expression: $$Max u_h\left(q_h^d\right)$$

$$p^d q_h^d = sL_h + \sum_j r_j K_j^h + m_H$$

where:

p^d **:** Price vectors of products demanded by the household;

s **:** Wage rate;

L_h **:** Labor offered by household h;

K_j^h **:** Capital of branch j detained by household h;

r_j **:** Capital turnover of branch j;

m_H **:** other sources of revenue.

Thus, following the change in prices caused by the simulation, the variation in household well-being is measured by the variation in its indirect utility $v_h (p^d, s, r_j, m_H)$. This is obtained by differentiating the equation with respect to the prices and by applying the Envelope Theorem in the neighbourhood of an optimum. The change in household well-being (g_h) is given by the monetary value of the change in utility:

$$g_h = \frac{du}{v_{mh}} = -\sum_i \left[p_i^d q_{ih}^d \frac{dp_i^d}{p_i^d} \right] + sL_h \frac{ds}{s} + \sum_j r_j K_j^h \frac{dr_j}{r_j}$$

Where v_{mh} is the marginal utility of the income and p_i^d is the price of product i demanded by the household. This formulation is nothing more than a weighted average of changes in the prices of products and factors that will be used as a measure of the change in household well-being. Thus, the income of the household h after simulation of the shock is calculated by summing its former income with g_h. Since the poverty line is calculated relative to expenditure and often income data is poorly measured, g_h will be added to the total household expenditure to analyse poverty. Moreover, the most widely used poverty indices are those constructed by Foster (1984), denoted FGTα, where α corresponds to the degree of poverty aversion. When α = 0, the index measures the incidence of poverty, when α = 1, it is the depth of poverty index, and if α = 2 the index measures the severity of poverty.

$$FGT_\alpha = \frac{1}{Nz^\alpha} \sum_j^J \left(z - y_j \right)^\alpha$$

Where J is the subgroup of individuals whose income is below the poverty line z, N is the total number of individuals in the sample, and y_j is the income of individual j (see Cockburn 2002). Again, the total hill should be used for the calculation of these indices instead of the household income.

4.2 Description of the Household Survey Data

The data that will be used for the construction of the microeconomic model of the household come from the national surveys on household income and living standards

conducted by the National Institute of Satistics (NIS) in 1996, 2001, 2007 and the last one in 2014.

5. Findings

In this section, we will present the results of our economic analyses. Therefore, in its first part we present the macroeconomic and sectoral results and in the second part we present the microeconomic presentations of households and poverty result. The main simulation in the context of this work is to remove the subsidies applied to petroleum products. This consists of resetting the subsidy rates for these products to zero.

Three scenarios will be simulated for this purpose. In a first scenario, the subsidies will be dismantled for the product without any replacement measures. In the second scenario, along with the removal of subsidies, transfers to poor urban and rural households by the state will be doubled. Finally, in the third scenario, a 9% increase in total government consumption would be simulated at the same time as the measures simulated in scenario 2. In this last scenario, the amount injected into the economy is equal to the base amount of subsidies.

5.1 Macroeconomic and Sectoral Presentations

The removal of subsidies is not without effect. Table 1 presents the variation of the main macroeconomic indicators following the simulation of the three scenarios[4].

Table 1. % variation in main macroeconomic aggregates

Scenarios	Variables	Benchmark	Scenario 1	Scenario 2	Scenario 3
Scenarios	Government Revenu	261 869	3.76	3.70	6.11
	Government Saving	413119	16.61	12.78	-6.42
	Government Consumption	134 042	0	0	9
Households Revenu	Poor urban	10 246	-2.39	3.85	8.8
	Non-poor urban	447 071	-3.18	-3.19	0.76
	Poor rural	6075	-2.78	10.31	13.75
	Non-poor rural	145 788	-3.07	-3.08	0.39
Households Consumption	Poor urban	5 155	-2.35	4.3	9.22
	Non-poor urban	338 856	-3.29	-3.3	0.7
	Poor rural	5 215	-2.75	10.57	14.03
	Non-poor rural	102 119	-3.09	-3.09	0.38
Household savings	Poor urban	4 444	-2.35	4.3	9.22
	Non-poor urban	20 645	-3.29	-3.3	0.7
	Poor rural	752	-2.75	10.57	14.03
	Non-poor rural	39 614	-3.09	-3.09	0.38
	Firms Revenu	322 430	-3.41	-3.42	-0.51
	Firms saving	117 479	-4.97	-5.02	-2.2
	Total investment	261 075	-0.24	-0,83	-4.19
	Gross domestic product	713 211	-1.53	-1,56	1.16
	Wage rate	1	-2.86	-2,88	2.54
	Price index at consumption	1	-1.16	-1,11	1.94

Source: Author.

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[4] Values are millions of FCFA.

The first component affected is government income, which increased in the three scenarios by 3.8%, 3.7%, and 6.1%, respectively. Since the subsidies are counted as negative income for the government, their removal consequently generates a positive impact which has benefited public savings which increased by 16.6% in scenario 1 and 12.8% in scenario 2. However, in scenario 3, savings fell by 6.4% due, in particular, to the increase in total government consumption expenditure.

On the other hand, households are also the agents directly confronted with this policy. The removal of subsidies without any replacement measures negatively affected their income as well as their consumption and savings. In this scenario, both poor and non-poor households in both areas saw their income decrease from 2.4% to 3.2% depending on the category. However, in scenario 2 the government transfer granted to poor households benefited them to increase their income and consumption, respectively, by 3.9% and 4.3% for urban residents and 10.3% and 10.6% for rural people. Finally, scenario 3 is beneficial for all categories of households. The incomes of the non-poor increased by 9% for urban households and 14% for rural households. As for the income of non-poor households, it stabilized at its initial level. However, companies did not take advantage of this policy, and their income and savings declined from their initial levels.

The gross domestic product fell slightly in the first two scenarios, particularly because of the drop in household consumption and total investment. On the other hand, in scenario 3 it recorded an increase of 1.2%, which is generated by the increase in government spending.

At the sectoral level, Table 2 shows the variation in value added for each branch. The branches most affected are those that have suffered the shock directly, namely the food and tobacco industry and petroleum refining. Their added values fell by nearly 2.2% and 2.1%, respectively, in the first two scenarios. As a result, road and maritime transport, which are major consumers of petroleum products, also saw their added value decrease in the three scenarios. On the other hand, non-market production benefited from this drop in subsidies, in particular, thanks to the gain generated for the State.

In fact, the added values of the public administration and security branch, as well as the education and health branch, increased by 1.4% and 1.7% respectively in the first two scenarios and by 4.9% and 3.9% respectively in the third scenario.

Table 2. Variation in added value by branch in%[5]

Branch	Benchmark	Scenario 1	Scenario 2	Scenario 3
Agriculture	10 271	-0.13	-0.12	-0.25
Peach (fishing)	6 124	-1.92	-1.81	-1.27
Extraction Industry	15 910	-1.4	-1.48	-2.67
Tobacco and alimentary Industry	33 962	-2.24	-2.2	-2.02

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[5] Benchmark values are in millions of FCFA.

Branch	Benchmark	Scenario 1	Scenario 2	Scenario 3
Leather and textile Industry	18 080	1.85	1.9	-2.54
Cheimical and semi-chemical Industry	15 319	0.98	1.01	-0.69
Mechanical, metallurgical and electrical Industry	21 866	0.62	0.5	-2.33
Other production industries	19 939	-0.54	-0.6	-2.37
Oil refining	1 102	-2.12	-1.95	-1.89
Water and Energy	18 747	-0.39	-0,33	-0.62
Public works	48 270	0.2	-0.01	-2.46
Commerce	70 789	-0.89	-0.92	-0.26
Hotels and restaurants	16 981	0.17	0.2	-0.19
Railway Transport	2 062	-1	-0.44	-0.34
Road Transport	97 438	-2.43	-2.3	-2.12
Air Transport	27 689	0.14	0.15	-1.31
Maritime Transport	6 369	-3.57	-3.38	-3.67
Other transports	2 631	-1.42	-1.35	-0.97
Posts et telecommunications	22 042	-0.15	-0.1	-0.21
Insurance and financial activities	29 478	-0.33	-0.26	-0.55
Real estate, rental and rendered services to companies	85 331	0.02	0.02	-0.3
Public administartion and social security	60 208	1.37	1.39	4.93
Education, health and social action	62 129	1.7	1.77	3.86
Other non financial services	96 425	-0.18	-0.12	-0.42

Source: Author.

The market prices of products have experienced slight decreases following the simulation of the first two scenarios except for the price of petroleum products, which recorded a relatively large increase (+ 18%). This increase is due, in particular, to the large share of subsidies allocated to these products. Transport prices were also affected by the shock. The price variation is shown in Table 3.

Table 3. Market price variation per product and capital turnover per branch in %

Branch	Benchmark	Market price				Capital turnover	
		Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3
Agriculture	1	-3.67	-3.6	-0.68	-4.98	-4.89	-1.69
Peach (fishing)	1	-2.96	-2.81	3.44	-7.95	-7.69	-1.03
Extraction Industry	1	-3.26	-3.42	-3.52	-10.94	-11.39	-13.21
Tobacco and alimentary Industry	1	-0.63	-0.54	3.25	-14.38	-14.19	-8.45
Leather and textile Industry	1	-0.84	-0.81	0.65	0.99	1.06	-2.88
Cheimical and semi-chemical Industry	1	-0.96	-0.97	0.12	0.18	0.24	0.33
Mechanical, metallurgical and electrical industry	1	-0.35	-0.4	-0.05	-1.13	-1.48	-4.1
Other production industries	1	-0.27	-0.32	0.7	-4.4	-4.62	-4.53
Oil refining	1	17.88	17.82	18.18	-10.1	-9.55	-4.3
Water and Energy	1	-1.79	-1.71	1.31	-4.33	-4.11	0.11
Public works	1	-0.77	-1.12	-1.77	-2.03	-2.93	-7.78
Commerce	1	-3.18	-3.25	2.24	-5.95	-6.08	1.6
Hotels and restaurants	1	-1.58	-1.51	1.93	-1.98	-1.86	1.51
Railway Transport	1	-2.04	-1.9	2.68	-4.47	-4.19	1.45
Road Transport	1	-0.11	0	3.81	-10.29	-9.95	-4.35
Air Transport	1	1	1.08	-0.02	-2.24	-2.23	-3.28
Maritime Transport	1	3.12	3.29	12.64	-9.78	-9.44	-4.97
Other transports	1	-1.28	-1.26	3.55	-4.52	-4.46	1.33
Posts et telecommunications	1	-2.96	-2.81	1.72	-3.66	-3.44	1.33
Insurance and financial activities	1	-3.23	-3.13	1.29	-3.86	-3.67	0.79
Real estate, rental and rendered services to companies	1	-2.78	-2.8	0.11	-2.66	-2.67	-0.36
Public administration and social security	1	-1.6	-1.61	3.07	-1.4	-1.39	8.09
Education, health and social action	1	-2.4	-2.4	3.16	-0.86	-0.79	7.34
Other non financial services	1	-2.74	-2.62	1.37	-3.67	-3.4	0.56

Source: Author.

5.2 Microeconomic Presentations of Households and Poverty

In order to calculate the well-being of households which depends on the variation in the prices of the products consumed and of the factors, price indices of the

Laspeyres-Paasche type are calculated from the prices generated by the MCEG since the types of product present in the database are more aggregated than the products existing in the SAM.

The analysis of Table 4 which presents the main poverty indices, shows that the removal of subsidies would have a negative impact on the well-being of households. As we could see in the three scenarios, the policy accentuated poverty contrary to the results obtained from the MCEG. This confirms the limits of the representative agent approach in the analysis of poverty.

Table 4. Poverty index values in %

	Scenario	Urbain	Rural	Total
FGT0	Benchmark	4.8	14.7	8.9
	Scenario 1	5.4	16.4	9.9
	Scenario 2	5.2	16.4	9.8
	Scenario 3	4.3	15,4	89
FGT1	Benchmark	0.8	3.4	1.9
	Scenario 1	1.1	4	2.3
	Scenario 2	1	3.8	2.1
	Scenario 3	0.7	0.4	1.8
FGT2	Benchmark	0.2	1.2	0.6
	Scenario 1	0.5	1,8	1
	Scenario 2	0.5	1.7	1
	Scenario 3	0.2	1.2	0.6

Source: Author.

Indeed, the incidence of poverty increased by 0.6 points in urban areas for the first scenario. Direct transfers to poor households did not contribute to poverty reduction, but the magnitude was smaller compared to their absence. However, when these transfers are accompanied by improved public services by increasing government consumption, the effect was positive, poverty fell by 0.5 point. On the other hand, in rural areas, the incidence of poverty increased by 1.7 points for the first two scenarios and 0.7 points for the third. The depth of poverty measured by FGT1 also showed an increase of 0.3 points in urban areas and 0.6 points in rural areas for the first scenario. Here again, transfers to households can ease the shock but have not helped reduce poverty. Scenario 3 just manages to stabilize the poverty depth index at its initial level.

Finally, the last index which measures the severity of poverty also saw an increase of 0.3 points in urban areas and 0.6 points in rural areas. The policies initiated in scenario 3 made it possible to maintain this indicator at its base level.

The variation in average expenditure per person (Table 5) also reflects the decline in household well-being caused by the removal of subsidies despite direct transfers to poor households. However, the policies simulated in the third scenario are beneficial to the poor.

Table 5. Average variation of expenses per person in %

Scenario	Urban		Rural		National	
	Non-Poor	**Poor**	**Non-Poor**	**Poor**	**Non-Poor**	**Poor**
Benchmark	14 438	3 180	8 553	2 739	12 156	2 877
Scenario 1	-1.6	-4.07	-1.8	-1.6	-1.5	-2.42
Scenario 2	-1.8	-1.79	-1.96	0.06	-1.68	-0.62
Scenario 3	-1.04	0.7	-1.66	1.4	-1.07	0.72

Source: Author.

6. Conclusions

The objective of this paper was to analyse the impact of the removal of petroleum product subsidies on poverty, using the general equilibrium modelling approach. In this work, three scenarios were simulated. The first is to eliminate subsidies without any other countermeasures. In the second scenario, a direct transfer to poor households was also simulated along with the removal of subsidies. The third scenario follows the second with a 9% increase in total government spending. The main results of this work have shown that removing subsidies does not benefit households. The poverty rate increased by 0.6 points in urban areas and 1.7 points in rural areas. Direct transfers to the poor eased the shock but did not reduce poverty. The other poverty indices, in this case, the depth and severity of poverty have seen the same trends. However, when these measures are accompanied by an improvement in public services by increasing state expenditure, the poverty indices can fall or at least remain at the initial state.

In conclusion, removing subsidies is not an easy task. Despite its positive effect on the state budget, it is not without effect on poor and vulnerable households. In order to counter this negative effect, the state must intervene not only with direct transfers to the poor but also with policies to stimulate demand.

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IoT Security in the Context of Digital Organizations

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Abstract

The main goal of this paper is to identify security issues related to the use of IoT devices in a private or public organization and to propose innovative solutions to solve the problems found. The paper also contains an analysis of the current context and how the part of innovation within a company can be impacted both in terms of overall image and punctuality in the process of finding new solutions by affecting or vulnerabilities that may be exposed through components in the sphere of IoT. The issue of money and how it can create huge losses due to security breaches or possible cyberattacks on the components used at the IoT level is another important aspect that appeared from the analysis performed in this paper. In the end, the analysis performed and the solutions found bring a high yield related to the innovation process within the specialized centers within the private or public companies.

Keywords: IoT, security, innovation, vulnerabilities.

JEL Classification: O36.

1. Introduction

In recent years, both in the sphere of private organizations and public institutions, there has been an ascending trend in the use of smart devices or technology based on the Internet of Things regarding the digitization process. This is due to the need to automate many processes that were previously performed manually.

The Internet of Things, abbreviated as IoT, is for many people a real infrastructure that connects millions of new smart devices that communicate with each other or on the Internet and share data, often sensitive, as explained by Berte and Clara (2018).

The current emphasis is on innovation, with many companies forming dedicated teams for this process. It creates a good image from the outside in this context, attracting new employees who want to develop and find new and smart solutions. The IoT component has an important role in all this setting, helps to significantly improve the results and facilitates the work that the user does to collect information and data that is sensitive.

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In most cases, the use of Internet of Things components is encouraged, especially when it comes to modernizing the public system or innovating in private companies, but a big problem in this regard is at the level of IoT security. Various types of attacks can occur here that can produce the loss of sensitive information, huge loss of money, and destruction of the public image.

There is a need to protect these components that facilitate the daily data collection process, through various means, periodic testing by dedicated people, or their improvement by upgrading to the latest technologies in the field that certainly come high compared to previous versions.

The digitization process at the organization level helps people who use the services offered by companies or public organizations to improve their quality of life, but in addition to this, they also need the protection of personal data. In this case, the security issues that may arise from the use of applications and smart devices are a real problem, and many funds are being made available to dedicated companies to solve them.

In addition to the technology that is advancing day by day, problems can arise from within digital organizations by exposing data, and there can also be malicious people from outside who want to find out sensitive information or create a wrong image for users. The same problem arises in the case of public organizations, on which cyberattacks can occur in order to access valuable information belonging to the state.

2. Problem Statement

As shown by Velsberg et al. (2020), the digitization of the state level using the Internet of Things is done by combining technologies, people, and organizations, with more emphasis on the desire for a modern action that is first done manually on the use of appropriate technologies. Most of the time, the whole process of building smart processes in both public and private organizations is postponed, or they are not discussed as real problems and of immediate impact, they are put at the end of the list of priorities.

Digitization in education has grown in recent years due to the need to automate the learning process, make it easier using smart devices and applications based on IoT technology add value, but also make this activity more interactive and beneficial for both teachers and students, as Stroe (2021) researched.

The integration of IoT components emphasizes the dimensions of efficiency, effectiveness, transparency and collaboration. In other words, security issues may occur if one of the 4 features is not met.

At the level of the public sector, Kankanhalli et al. (2019) identified the challenges that appear in the implementation and adoption of these technologies in order to transform the state system into a high-performance one, emphasizing the degree of responsibility, fairness, and ethics within. Employees working to provide intelligent solutions in the public domain must have the three characteristics in the process of creating and building a digital and innovative environment. IoT security has no value if the elements discussed above are not checked.

Roman-Castro et al. (2018) point out that in recent years both the public and private sectors have continued to explore different paradigms and areas of application that involve connecting all these objects. Moreover, this IoT domain continues to evolve, and its security capabilities must keep up with the same trend. One of the main factors that lead to distrust of using IoT as a secure source is realizing that IoT objects can become their own adversary. This is because web hosts can in some cases be owned by malicious parties or are remotely controlled by exploiting vulnerabilities.

As AboBakr et al. (2017) explained, we meet different technologies inside IoT systems: sensors, 3G, 4G, NFC, RIFD used in the transfer of private data, extremely sensitive and very large in volume. Users who are using these technologies need to consider a number of issues, including the possibility of cyberattacks, ethical and legal issues that are shaping the health of IoT applications.

Miniaturization issue is another problem encountered, going to the nano size level in the case of IoT devices. The process of controlling their quality, data traffic, and security at the bottom point is becoming more difficult.

Also, the IoT globalization brings problems because sensitive data is transmitted from the countries where smart devices are used in the country that offers those services, the medical services are an example.

Tankard (2015) has shown that the main security issues regarding IoT applications are: allowing the use of weak passwords, access to some sensitive information from the huge amount that is transmitted from and to the applications used, the data sent is not encrypted, cross-issues site scripting at the level of web interfaces, and software updates that are not encrypted when downloaded. The solution of the security challenges consists of treating in a special way the following 5 processes according to Figure 1.

Figure 1. Issues currently in place for securing the IoT
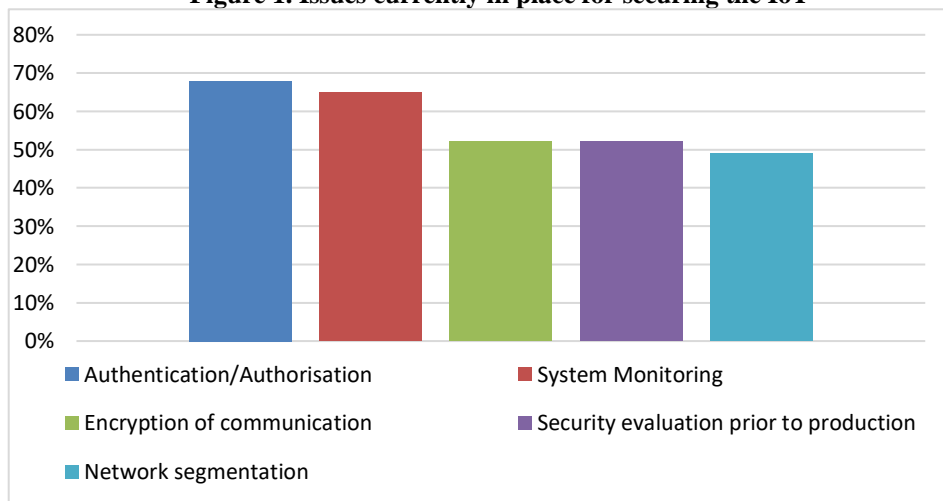
Source: SANS Institute.

These problems in the context of digitization are common and harm to users because the confidentiality of their own data is not ensured.

As can be seen in the paper written by Oser et al. (2020), another IoT security approach is to make users to be aware of the risks and problems that arise when using these smart devices. Users should know what risks they face if they do not follow a certain requirement, such as the current standard for setting passwords at the application level.

Sestino et al. (2020) explain that digitization eases the connection between technology and management for users, but there are still some question marks about the potential of the IoT domain, which has created a disorganized high level of knowledge.

The opportunities and challenges that arise when integrating IoT into the digitalization of companies or public organizations are closely related to the security side and the trust or understanding of smart applications.

3. Aims of the Research

The analysis is based on the identification of security issues at the IoT level in the context of the digitization of private and public organizations. Infrastructure problems can occur, such as how applications are connected to sensors, internet access in a certain area, weather conditions, and other important issues. Also, at the level of applications or smart devices we find many security breaches, which allow different types of attacks to access sensitive information inside. The user's awareness of the components of IoT security contributes to the avoidance of problems that may arise; an example is the need to use strong passwords to avoid breaking them. If the application user is aware of what to use and how to use it properly, many of the attacks and problems can be attenuated.

The current vulnerabilities in the IoT area are another point of interest as it helps to create real solutions in applications that help to digitize public organizations or the private environment.

Another important aspect is how the end user or the citizen can be helped in the case of public organizations in order to avoid the security problems that may occur without him realizing them. What are the ways in which he learns to properly use digital applications and devices that optimize his effort in solving certain tasks, payments, signing documents, or other operations in that case?

Given the security issues identified, users need an application to check how vulnerable an IoT-based application is to the current issues in this area and to make them aware that the use of IoT components involves a risk when they do not know the real problems and how their data may reach into a public image or in possession of malicious people.

4. Research Methods

Starting from the current situation regarding the security of IoT applications and devices in the context of digitalization of private and public organizations,

an essential aspect is that of teaching users about security breaches that can lead to finding their own sensitive information, control, and the identification by another person of the actions performed by the citizen or by a simple user.

It is important that the user does not offer himself the possibility of an attack on his own data, to have strong passwords, to ensure that the documents are signed and saved securely, and all processes are safe and in accordance with the law.

Because this need to know about security issues in smart apps was identified, a prototype app is needed to help users and inform them of vulnerabilities in state-owned or private IoT-based applications they use.

From the collection of vulnerabilities found by Rytel et al. (2020) and currently available for smart devices and applications, a division will be made according to the degree of risk to which a user may be exposed, the problems with major risk will be signaled in the application with red color. In their case, it is chosen not to use that IoT-based application provided by the public or the private digital organization until it is fixed, with the necessary explanations regarding the losses that may occur.

There will be problems with medium risk, and in this case they will be indicated with yellow color. In this case, depending on the severity of the situation, it is possible to choose or not to use the application. The positive scenario is one in which no issues are detected, and this is marked with green.

This model aims to identify new vulnerabilities in IoT-based applications or devices every time and to check if the applications needed by users are experiencing these problems or not. Each time these vulnerabilities will be updated, and from each application test, the user will know if he encountered by those problems as shown in Figure 2.

Figure 2. Testing IoT security breaches
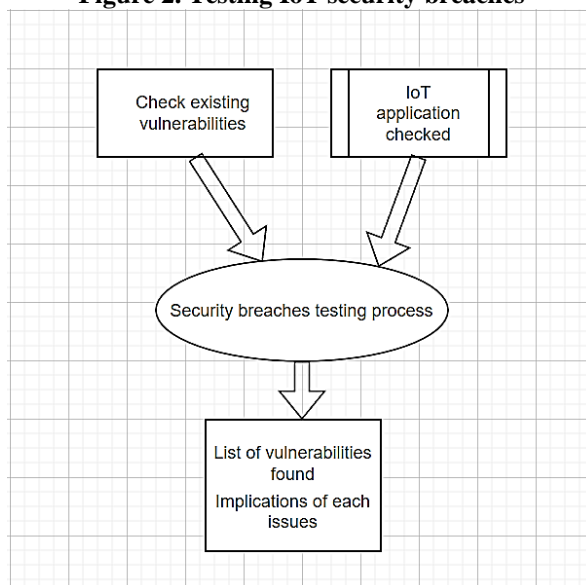
Source: Own figure.

In addition, all identified security breaches will have explanations so that it is known exactly what the implications of using an application are.

Another advantage is that information can be addressed to the relevant digital organizations or state institutions either to upgrade the IoT components used to the final versions or to fix the identified security issues.

As Pocatilu et al. (2020) shows, CVSS (Common Vulnerability Score System) is a standard found in companies to identify vulnerabilities in IoT-based devices and applications. This score helps users to know the security level of smart applications used, and at the time of their use, there are no problems related to the stealing of personal data.

5. Findings

The expected results are based on two directions, the first one is related to the public or private applications based on IoT technology that are checking if the vulnerabilities currently exist or have not upgraded to the latest version that solves the detected problem, and the second one is based on users' understanding and awareness of the current problems and how they can suffer data loss, which ultimately leads to huge loss of money and destruction of personal image.

It is quite useful for users of smart applications, as a result of digitization, to have data in safe and the safe use of various resources exposed by private or public organizations, without data loss or control of other entities on the steps taken.

Taking into account the CVSS, the user will know the security level of the smart application he is using and whether he can use it or not, receiving recommendations that will make him make the right decision.

6. Conclusions

Given the need to protect the data of citizens or users of applications based on IoT technology in the digital age, an application is needed to check the current vulnerabilities in the applications provided and also to expose the consequences that may occur and how can the cyberattacks exist due to unresolved issues.

With the expansion of all IoT-based applications and smart devices in the current digitalization situation, a lot of security problems arise, with users being exposed both cyberattacks and personal data exposure without realizing it.

Depending on the severity of the problems identified, the user may decide to continue using IoT-based applications until the issues are resolved. In the context of digitization, we must be careful to protect data, to prevent, and combat security problems that may occur in the life cycle of an application or a device.

The need to build an application based on the prototype described above was noticed to help users to identify vulnerabilities, making them aware of existing security issues in terms of IoT-based devices and applications. People who use these components should also see what issues are being addressed by certain upgrades.

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A Study on Cognitive and Behavioural Dissonance in a Group Setting

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Abstract

Within a group, if the majority supports a particular idea or value judgment, those who have different opinions and perspectives or disagree with the idea tend to conform to the majority opinion in order to be accepted by the group. The power of the group has become decisive in terms of bias in consumption and choice, so along with advertisements and publicity, we are influenced by the people in the group who already consume those goods (phones, sports shoes, designer clothes, etc.); otherwise you feel alienated and rejected. The present research is based on Solomon Asch's experiment and starts from the hypothesis that people tend to conform to group norms precisely in order not to be rejected by their peers, even if their personal beliefs and standards are different. We conducted an experimental study among first-year students at the Academy of Economic Studies, applying Solomon Asch's experiment. The results of the experiment confirmed Solomon Asch's hypothesis that when we succumb to peer pressure, an identity shift occurs, and judgment distortion is manifested. Very often our choices are influenced by peer power or peer group influence, the causes being related to conformity and fear of being judged, criticized, and marginalized.

Keywords: cognitive dissonance, conformity, normative social influence.

JEL classification: B55, C91, C92.

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1. Introduction

Cognitive dissonance is a mental conflict that occurs when a person's beliefs, behaviours, and actions do not align or are contradictory. When people have contradictory beliefs or their actions contradict their beliefs, then discomfort arises, translated into feelings of unease, tension, frustration, confusion, distrust. Inconsistency between beliefs, actions, and behaviours causes uncomfortable psychological tension - called cognitive dissonance. Cognitive dissonance is not automatic, does not manifest itself to the same degree from one individual to another, and depends on the degree of tolerance and acceptance of inconsistency. When discomfort, frustration, and anxiety arise, people want to reduce dissonance by trying to maintain consistency between thoughts, feelings, and behaviours, and this is called the "*cognitive consistency principle*" (Festinger, 1957) in literature.

Cognitive dissonance has a mental and psychological cause that can apply to any field of activity, where logical confusion arises. This concept has its origins in social psychology, but over time it has been explained in various other fields, where decision-making, behavioural, and motivational processes occur. In economics, the concept appears in consumer theory, in the formation of preferences for making a purchase decision, or in any decision-making process involving a choice, whether economic or otherwise. Cognitive dissonance can occur both before and after the choice. Uzma and Nasreen, 2012, argue that if consumers are well informed before purchasing a good and are satisfied with the choice made, then cognitive dissonance is diminished; however, if a consumer is manipulated through marketing techniques or psychological methods in order to purchase a good, then cognitive dissonance increases.

Jean Jacques Rousseau (2003) stated that *"man is born free but lives everywhere in chains",* freedom is an illusion, most decisions are made by copying and imitating, the reptilian brain learns by association and repetition, and very often the consumer does not choose on principles of economic efficiency, but on emotions, when the limbic system acts. The human brain is an organ that likes comfort, it feels reassured when a situation or an event is familiar, and when unmanageable things arise, or things which do not fit with certain beliefs or ideas, then a discomfort appears translated into anxiety and mental tension which generates maladaptive, irrational actions. An example of this was the outbreak of the COVID 19 pandemic. Because of conflicting information coming from the authorities, as well as the divided opinions of experts, the promotion of ideas about possible conspiracies, some people were very upset, frightened, and, in order to reduce that mental tension, they acted in accordance with the decision of the majority group, even if they did not believe in that decision. Our minds have a tendency to simplify and very often we make decisions based on trust, we tend to look to others for some confirmation, and we act without much consideration of assumptions.

In the economics literature, to determine whether a choice is efficient, the opportunity cost is calculated, i.e. the cost of choice or the price of sacrifice. Opportunity cost tells us to choose the alternative that, at the time of choice, brings the most benefits and whose effect/effort ratio is over unity. Some people take the

cost of choice into account and have the principle of economic efficiency in mind, while others choose on psychosocial or relational criteria, ignoring the principle of economic utility. We buy to be fashionable, for appearance, to create a false idea of who and what we are, for social prestige, to demonstrate financial power, out of a desire to belong to a certain interest group, and the list goes on. Peer group opinions, preferences, and choices weigh quite heavily and can influence individual decisions, especially among teenagers, as they have a developing personality and the phenomenon of imitation is very strong. The notion of conformity arises, the desire to conform to a standard, not to stand out from the norm, because there is a mental fear of being judged and rejected, especially by the peer group and then by others. For example, how do you think a teenager who is 2 metres tall will feel in a group where the average height is 1.60 metres? Obviously, he will not think he is special, but will see this physical aspect as a defect, wanting to be like the others.

To give an example from the field of economics, after the 2008 crisis, economic agents invested in cryptocurrencies, although many were reluctant and said that it was stupid, an aberration. Yet, because certain groups invested when it was a niche phenomenon, the losses were high but the rewards were even higher, so in 2010-2011 it became a mass phenomenon and then the risk profile increased a lot. Basically, many people invested on the emotional impulse of winning groups – if your friend, neighbour, colleague invested and won handsomely, then I was confident that if I invested in Bitcoin, for example, I would win, too. When we make a decision, in this case an investment, very often we anchor ourselves in what we have read or heard from other people whom we appreciate or give credit to. That idea is implemented in the mind, and we no longer pass the actions through the filter of our mind, but act on the emotional impulse of the group.

Very often we are stuck in certain ideas, beliefs, values that are passed down from generation to generation, and when we come into contact with other beliefs, values, and conceptions then we defend ourselves and try to find evidence to support those beliefs, as acceptance could create a very uncomfortable feeling called cognitive dissonance. Of course, cognitive dissonance can cause some people to change their behaviour so that their actions align with their beliefs. In this way, it gives people the opportunity to examine their values and actions and gain cognitive consistency.

2. Literature Review

Solomon Asch (1951) conducted a groundbreaking exploration of conformity and confirmed the hypothesis that people tend to publicly conform to the majority opinion in order to be accepted by the group, even if they disagree with that opinion. Festinger (1957) started from the idea that, in order to confirm the predictions of cognitive dissonance theory, people need to maintain consistency between thoughts, feelings, and behaviours, while inconsistency between beliefs or behaviours causes uncomfortable psychological tension, called cognitive dissonance. In this sense, people will try to change or add one of the inconsistent elements to reduce the dissonance. Festinger et al. (1956) argued that, in order to

reduce cognitive dissonance in a conflict situation, the individual may turn to his or her peers to look for possible consonant elements in the form of mutual support. Clémence (1996) said that this theory explains how a subject determined to perform a behaviour contrary to his beliefs transforms his opinions in the direction of that behaviour. Cooper and Mackie (1983) studied the relationship between group apartness and the reduction of cognitive dissonance, concluding that subjects would not change a position central to their social definition, but would modify an "associated" cognition, a less central opinion in affirming their own identity in order to reduce cognitive dissonance. Turner et al. (1987) developed the self-categorization theory which refers to how we view ourselves and how we interpret our own actions. Neculau (2003) argued that cognitive dissonance involves attitudinal change because change cannot be conceived as a self-value, it must be justified and motivated, and very often people do not let go of stereotypes and habits, even if they declare a desire for transformation. According to Doise et al. (1996), there is cognitive dissonance when, out of two elements that are presented together, one implies the negation of the other, and this incompatibility is not logical but psychological. Turner and Pratkanis (1998) tried to replicate Asch's experiment to see if the same experiment would work similarly with another generation. The experiment worked, so the percentage of conformists was almost identical to that identified by Asch, including those who seemed creative, rebellious, or rallied to the incorrect answers. Aronson and Pratkanis (1993) addressed how the social world determined attitudes and beliefs and how, in turn, those individual beliefs affected the social world.

3. Research Methodology

The research method is based on an experiment to verify or confirm a hypothesis which is the result deduced from a theory, namely Solomon Asch's 1951 experiment on conformity at Swarthmore College, Pennsylvania, in which a subject was placed in a group of seven people who were presented to him as volunteers, but who were, in fact, Asch's accomplices, acting according to a predetermined scenario. The group was shown two boards, one with a single line drawn on it and three lines of varying lengths on the other, only one of the same length as the first board. The subjects had to say which of the lines on the right-hand sheet was equal to the line on the left-hand sheet (see Figure 1).

**Figure 1. Asch's compliance experiment**

Source: One of the pairs of plates used in Asch's compliance experiments, available at https://en.wikipedia.org/wiki/Asch_conformity_experiments.

The findings of Asch's experiment were as follows: people could choose the correct line 99% of the time if judgments were individual; 25% of subjects remained independent throughout the test and did not change their judgments to align with those of the group; when accomplices answered incorrectly, subjects answered incorrectly 33% of the time; 75% of subjects answered incorrectly at least once (Cooper, Mackie, 1983).

Based on Asch's research hypotheses, we made 6 boards similar in terms of the way they are solved, but differentiated in terms of the placement and size of the lines (see Figure 2). The subjects in the experimental group had to answer orally and identify the line that is identical to the standard line. The subject was asked last after most of the accomplices had already spoken. The researcher, through manipulation techniques and by changing independent variables, aims to test the perception mechanisms and behaviours of the subjects.

Figure 2. Work sheets (1-6)
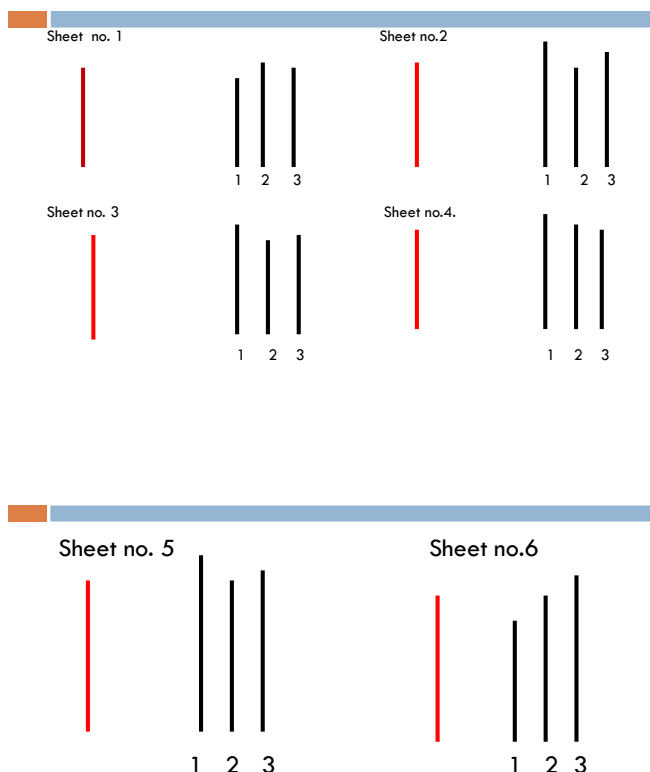
Source: The 6 plates made and used by the authors of this experiment to demonstrate the phenomenon of conformity within a group.

3.1 Design of the Experiment

We used two groups of subjects, one group representing the control group, these being the researcher's accomplices, and the experimental group. The control group was given specific tasks by the researcher as to how the experiment would be conducted. These represented the independent variables, and the dependent variables represented the behaviours or processes being acted upon. At the end of the experiment, we conducted an interview with each control group and the subjects who participated in the experiment to find out some information in terms of how they reacted, what they thought, what they felt, what their emotions and feelings were during and after the experiment.

3.2 Sample and Experimental Situation

General population: all first-year students from the Faculty of Management at the Bucharest Academy of Economic Studies who wished to participate in this experiment.

Sampling frame: first-year students who voluntarily enrolled in this experiment.

Sample: 56 subjects, aged between 19 and 23 years, of which 38 female subjects and 18 male subjects, 85% from urban and 15% from rural areas.

The type of sampling is simple randomized; probability sampling is done by random draw. The control group consisted of 24 subjects divided into 4 control groups and the experimental group consisted of 32 subjects, of which 8 participated in Sample 1 and 24 subjects in the other samples (Sample 2, 3, 4, 5, 6, 7).

Research limitations: All students involved in the experiment, whether they were part of the control group, or the experimental group knew each other, so it was basically a group formed by members who shared more than strictly academic relationships, friendship, sympathy, and trust.

Future directions: to carry out this experiment once at the beginning of the year and then at the end year to see what the differences are in terms of cognitive dissonance between a new group (group members do not know each other) and an already formed group; applying this experiment in economic choice theory.

4. Research Results

Exhibit 1. Individual test - this test aimed to test one of the tenets of Asch's research hypothesis, namely when people are not influenced by certain stimuli and pass through the filter of their mind a given situation, cognitive dissonance is greatly reduced. 8 subjects took part in this test. They were asked individually which answers were correct by showing them the 6 boards. The result was as expected; the subjects answered correctly to all the boards, thus testing Asch's hypothesis (see Tables 1-4).

Table 1. Control group 1

Sample	RC/P1	S1/P2	S2/P3	S3/P4	S4/P5	S5/P6 scris	S6/P7/poz.2
I	3	1	3-3-3	3-1-3	3-3-3	3-3-1	3-1-1
II	2	2	2-2-2	2-3-2	2-1-3	2-2-2	2-3-2
III	3	3	3-3-3	3-2-2	3-3-3	3-1-3	3-2-3
IV	3	3	3-1-3	3-2-2	3-3-3	3-2-3	3-2-3
V	2	2	2-3-3	2-3-3	2-2-3	2-2-2	2-3-2
VI	2	2	2-3-3	2-3-2	2-2-2	2-2-2	2-3-2

Source: Summary of the results obtained after applying the 7 samples to the first control group together with the first experimental group.

Table 2. Control group 2

Sample	RC/P1	S1/P2	S2/P3	S3/P4	S4/P5	S5/P6 scris	S6/P7/poz.2
I	3	3	3-3-1	3-1-1	3-3-3	3-3-3	3-1-3
II	2	2	2-2-2	2-3-3	2-2-2	2-2-2	2-3-2
III	3	3	3-3-3	3-2-2	3-3-3	3-1-1	3-2-3
IV	3	3	3-1-3	3-2-2	3-1-3	3-2-3	3-2-3
V	2	2	2-3-3	2-3-3	2-2-2	2-2-2	2-3-2
VI	2	2	2-3-1	2-3-3	2-3-2	2-2-2	2-3-2

Source: Summary of the results obtained after applying the 7 samples to the second control group together with the second experimental group.

Table 3. Control group 3

Sample	RC/P1	S1/P2	S2/P3	S3/P4	S4/P5	S5/P6 scris	S6/P7 /poz.2
I	3	3	3-3-3	3-1-1	3-3-1	3-3-1	3-1-1
II	2	2	2-2-2	2-3-2	2-2-2	2-2-2	2-3-2
III	3	3	3-3-3	3-2-3	3-3-3	3-1-3	3-2-3
IV	3	3	3-1-1	3-2-3	3-3-3	3-2-3	3-2-3
V	2	2	2-3-3	2-3-3	2-2-3	2-2-2	2-3-2
VI	2	2	2-3-3	2-3-2	2-3-2	2-2-2	2-3-2

Source: Summary of the results obtained from the application of the 7 samples to the third control group together with the third experimental group.

Table 4. Control group 4

Sample	RC/P1	S1/P2	S2/P3	S3/P4	S4/P5	S5/P6 scris	S6/P7/poz.2
I	3	1	3-3-1	3-1-1	3-3-3	3-3-3	3-1-3
II	2	2	2-2-2	2-3-3	2-1-1	2-2-2	2-3-2
III	3	3	3-3-3	3-2-2	3-3-3	3-1-3	3-2-3
IV	3	3	3-1-3	3-2-3	3-3-3	3-2-3	3-2-3
V	2	2	2-3-1	2-3-3	2-2-2	2-2-2	2-3-2
VI	2	2	2-3-3	2-3-3	2-2-3	2-2-2	2-3-2

Note: RC - correct answer; S1...S6 subjects; P1...P7 -probes; Poz.2 - position 2 in the group.

Source: Summary of the results obtained from the application of the 7 samples to the fourth control group together with the fourth experimental group.

Exhibit 2. The experimenter together with the subjects in the control groups decided to correctly answer all the cards presented. This variable was replicated for the 4 control groups, each testing 6 subjects from the experimental group, which showed the fidelity of the experiment because the same results were obtained.

Internal validity was ensured, removing any factors that might have influenced the outcome of the choice in a different direction. One subject in the first group and one in the fourth control group was wrong, so 92.85% of them answered correctly, explaining that at the beginning they felt some uncertainty, mistrust, fear of getting it wrong and felt the need to say something else. Although they realised that the correct version was the one the others had pointed out, they got the first one wrong and then answered correctly (see Tables 1-4).

Exhibit 3. The experimenter changed the independent variable and the rules, then agreed with the accomplices that on the first three boards the answers were correct, then on the next three boards the answers were intentionally wrong. The subject was intentionally the last to answer. In this test, the subjects were a little confused when the answers were intentionally wrong, and even at the beginning some gave the correct answer. In the last boards, the subjects in the control group intentionally gave the wrong answer, while 33.3% of the subjects in the experimental group gave the accomplices' version. Basically, the result of this test verifies another of Asch's hypotheses, namely that when the accomplices got it wrong, the subjects got it wrong too, in a proportion close to that in the experiment conducted 71 years ago (see Tables 1-4).

Exhibit 4. The experimenter changed the independent variable and agreed with the accomplices to give wrong answers to all the boards, but to say those variants that are closest to the correct variant. In this test, they were totally confused, they took a few extra seconds to think about what answer to give, and yet more than half , about 58.33% of the subjects, gave the accomplices' answer, even if they did not totally agree with their answer (see Tables 1-4).

Exhibit 5. The experimenter grouped two subjects from the control group in pairs so that two of them answered correctly and the others incorrectly. In this test, the confusion was even greater, and when the subject was asked which line most closely matched the standard line, the subject was much more attentive and most of the answers were correct, a proportion of 75% of the subjects, which shows us once again that when confusion arises, one automatically tries to find the solution that reduces psychological tension (see Tables 1-4).

Exhibit 6. The experimenter introduced a new independent variable; i.e., the subject was no longer asked orally which variant was correct, but was asked to write down the variant considered correct. The control group orally pointed out the correct variants for plates 1, 2, 5, 6 and the wrong variants for plates 3, 4. In this test, very few people made mistakes, almost the same percentage as in test 2. As the subject did not have to say the answer out loud and did not have to show the answer, they concentrated on the task and got 87.5% of the answers correct without considering the opinions of others (see Tables 1-4).

Exhibit 7. The researcher aimed to see if the position of the manipulated subject influenced distortion and confusion. It was no longer placed in the last group, but in position number 2 while the conditions of the experiment remained as in trial 3. The results of trial 3 showed that 58.33% gave the accomplice response, under the condition that the manipulated subject was in the last position, with the change of the naive subject's position. They were less influenced, which showed that the group influence decreased to 12.5%, meaning that the position is important within a group, as Asch stated *"maximum conformity is reached when we have three accomplices and one naive subject"* – the more isolated the naive subject is, the more indifferent he is and detachment occurs (see Tables 1-4).

Cognitive dissonance may be one of the causes of the great economic crises that have occurred over time, recalling the Great Depression of 1929, the financial crisis of 2008 and the pandemic crisis unleashed at the end of 2019. The crisis of 2007-2008 started in the United States and quickly spread to the global economy due to trade, banking, and financial interdependencies between countries around the world. The crisis in America was based on speculative behaviour, generated by a phenomenon of imitation, in which if one product is more desired than another, demand for that product increases because it can be resold at a higher price, and then all investors or economic agents will be interested in buying it. Banks in America gave out cheap mortgages on a massive scale, which caused prices on the housing market to rise (supply did not keep up with demand), the increase in price did not justify the real value of the property, and a speculative bubble was created, where nothing could explain the increase in price. In order to curb the speculative bubble, the Federal Reserve Board (FED) raised interest rates from 2005 onward, increasing the cost of loans already granted, and many borrowers sold their properties to the banks, which in turn auctioned them off, causing a sharp fall in prices and, on the other hand, a loss of financial and banking resources as economic agents panicked and withdrew their savings, causing massive losses and hence the chain of bank failures.

In the speculative bubble, prices rise artificially, the asset is disconnected from its real value and it is only a matter of time before it collapses, causing massive losses. The consequences are the result of mimetic behaviour and self-fulfilling prophecy, so many economic agents or investors will imitate the behaviour of other economic agents, banking on the fact that they can buy cheap and sell high. The imitation operation of buying and selling contributes to the increase in price, and this happens through simple imitation.

The entry into quarantine at the beginning of March 2020, due to the COVID-19 pandemic, generated panic among the population, leading to compulsive and frantic behaviour in purchasing excess food and non-food products, causing an imbalance in the supply and stock chain, and accentuating certain discrepancies between those who stocked up because no limitation was imposed on the quantity purchased and those who did not react to the first impulse. This phenomenon generated a rapid and unjustified increase in prices, so that overnight for certain products prices increased by 100% or more, practically entering a speculative

bubble that generated increased inflation, increased unemployment, decreased production, increased inequality in income redistribution, and those most affected were those with low and fixed incomes and those who were caught in a discontinuity of economic activity.

Another example of cognitive dissonance and mimetic behaviour is the sudden and overnight increase in fuel prices, so at the beginning of March 2022, after a rumour appeared that the price of fuel would reach 11 lei/litre, huge queues formed at all gas stations in the country, Romanians panicked and on the phenomenon of imitation all car owners bought gasoline and diesel, some even made reserves, and according to the law of supply and demand, the price rose rapidly (at a petrol station in Beiuș the price at the pump was 11.1 lei/litre), and this increase was not only due to the rise in world oil prices and the practice of anti-competitive techniques, but also to the phenomenon of conformity and panic which led to a speculative bubble.
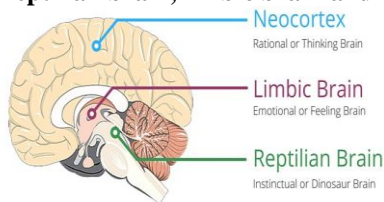
The examples could go on, and the results of our research can be interpreted in any aspect of our lives, professional, social, cultural, sporting, religious, political, etc.

5. Psycho-neural Explanations in Cognitive Dissonance

5.1 Why Does Cognitive Dissonance Occur?

The human brain is made up of 3 cortical structures that have been formed and evolved over millions of years. The three structures are the limbic brain, the reptilian brain and the neocortex, while the first two have been formed over millions of years and deal with survival, the neocortex has been formed over thousands of years and deals with logic, reasoning, the ability to use words, anticipating and planning for the future, etc. (see Figure 3). The problem is that when the limbic system is not quiet, the neocortex does not work, so the uniqueness of the human is given by the neocortex. It follows that the human mind can only trigger stress through thought, because either we think in the past or in the future, while the past cannot be changed and the future is uncertain. Stress substances induce stress hormones from the brain into the body, which produce imbalances, and this is how our own thoughts can make us sick. Thought becomes experience on a mental level as we feel the emotion of that experience, and from there we will also behave appropriately.

Figure 3. Reptilian brain, limbic brain and neocortex

Source: https://medium.com/brand-solutions/how-to-be-more-successful-by-using-reptilian-and-limbic-hot-buttons-71c64de9b366.

At the end of the experiment, we conducted an interview with each of the four control groups and the subjects who participated in the experiment. We wanted to find out what their thoughts, beliefs, emotions, feelings, and behaviours were before and after the experiment. A thought begets an emotion, and an emotion begets a certain behaviour.

Table 5. Thoughts - emotions - behaviours when cognitive dissonance occurs

Thoughts	Emotions	Behaviour
I'm going to be ashamed	Anxiety, regrets	Avoidance, adjournment
I will be criticized, judged	Insecurity, irritation, anger	Excessive cognitive control
I will be stigmatized	Fear, panic	Conformity, frost or flight
I'm going to be fooled	Guilt, regret	Behave differently than you would like
I will be excluded from the group	Fear, nervousness	Indifference, non-participation

Source: Aspects resulting from discussions with participants
after the end of the experiment.

5.2 Issues Arising from Discussions with Participants in the Experiment

In Table 5, we caught some aspects related to the thoughts, emotions and behaviours of the subjects when they were asked why they had acted in one way and not the other. The subjects' answers were in line with the features we found in Table 5. The vast majority of the subjects felt uneasy, a mental discomfort that came from the thought that they would be laughed at, judged, or criticized, and as such some of the subjects said the wrong option, being influenced by the group's decision while following less their own opinions and opinions.

6. Conclusions

The experiment was carried out among the members of a group formed for about a year. They had developed certain relations, ranging from peer relations to friendship relations, including sympathy, appreciation, and love. When a group is in formation, at first, when there is no cohesion, the group is heterogeneous, so the members of that group act and react differently depending on the personality, character, and temperament of each. When among the members of a group more personal relationships appear, the group becomes more homogeneous and its cohesion increases. Any external stimulus no longer has the same effect as in the beginning, when the group members did not know each other. People are easy to manipulate when they trust something or someone. If 10 people share the same opinion about something, you will end up agreeing with them, even if you initially had a different opinion. There is a pressure on the cognitive level and the pressure is optimal when there is unanimity, not just a majority, because in the absence of unanimity, people find their courage and free will. We are often less resistant to the pressure of complying than we might think.

The results of our research can be applied to any decision-making and choice process, especially when we are talking about members of a group based on certain common interests, objectives, and goals, so members will react as one voice, manifesting the phenomenon of conformity and mimicry, in order not to be judged, marginalized, or excluded. This experiment can be applied to any aspect of our lives, professional, social, cultural, sporting, political, religious, etc. If we take the political side, when we have to express our right to vote for a particular political party, very often we are influenced by the group of friends or followers of a political party, and less by relevant and sustainable programmes and projects.

Organising fundraising campaigns to help certain vulnerable or disadvantaged sections of the population, the power of example, compassion, and empathy will lead to mimetic behaviour, being influenced by the limbic system and less by the logical, rational one. Attending an artistic event, for example, the Neversea Festival in Constanta, Romania, being considered the largest music festival on the beach, if the first edition in 2017 was attended by more than 130,000 people, this year 2022, the number of spectators has doubled. Practically this phenomenon has spread with great speed among young people, where the phenomenon of imitation is the one that prevails, an increasing number participated.

In this sense, our research is original because it explains that our decisions, and here we refer to any aspect of our lives, are influenced by a series of internal and external factors, internal ones related to our physiological, biological and psychological structure, and external ones related to our environment and especially to the group of influence. As the saying goes, *"tell me who you are friends with, so I know who you are and how you think!"*

The discrepancy between what we want and what happens is one of the root causes of cognitive dissonance. To reduce this dissonance, we make some recommendations: we need to have realistic expectations of our goals and of the resources we have at our disposal; try to live in the present, here and now, and not let ourselves fall prey to the past or the future; manage stressful situations so as not to generate fears and anxieties; put everything through the filter of our mind; be very well informed when we have to make a decision, whether it is to buy, produce or take any action from a possible range; not to disregard the positive and emphasise the negative; avoid "all or nothing"; avoid putting labels and making value judgements on the actions of others; avoid generalisation, amplification and personalisation, etc.

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