BUCHAREST UNIVERSITY OF ECONOMIC STUDIES

FACULTY OF ACCOUNTING AND MANAGEMENT INFORMATION SYSTEMS

Proceedings of the 16th International Conference Accounting and Management Information Systems AMIS 2022

June 08 – 09, 2022
Bucharest University of Economic Studies
6, Piața Romană, 1st District,
Bucharest, 010374 Romania

ISSN 2247-6245
ISSN-L 2247-6245

ORGANIZING COMMITTEE

From the Faculty of Accounting and Management Information Systems,
Bucharest University of Economic Studies

Liliana Feleagă	Department of Accounting and Audit
Cătălin Albu	Department of Accounting and Audit
Nadia Albu	Department of Accounting and Audit
Raluca Gușe	Department of Accounting and Audit
Dragoș Mangiuc	Department of Accounting and Audit

INTERNATIONAL SCIENTIFIC COMMITTEE

Andrei Filip	ESSEC Business School, France
Alessandro Ghio	Laval University, Canada
Sebastian Hoffmann	HHL, Germany
Linda Kidwell	Nova Southeastern University, USA
Joanna Krasodomska	Cracow University of Economics, Poland
Carly Moulang	Monash University, USA
Maria Rykaczewski	Arizona State University, USA
Maria Vulcheva	Florida International University, USA

Contents

FOREWARD

It was with great pleasure that we hosted at the Bucharest University of Economic Studies, Romania, another edition of our traditional Accounting and Management Information Systems International Conference, on 8-9 June 2022. The very unusual circumstances given by the COVID19 pandemic forced us to organize this year's event in a remote format as well, but this did not prevent participants from engaging in very fruitful conversations about research and educational practices.

During the conference, we organized two research plenary panels, animated by esteemed international colleagues from Australia, Canada, and the United States, and a practitioner-focused panel, with speakers from various national and international bodies (ACCA Southeastern Europe, CECCAR Romania, CAFR Romania, KPMG Romania, and VTM Romania). 9 parallel sessions completed the program, for a total of 27 papers that were presented. 76 participants from 10 countries registered and contributed to the debates in either panels or sessions.

Preceding the AMIS 2022 conference, IAAER and the Association of Chartered Certified Accountants (ACCA) have co-organized, on 6-7 June 2022, another edition of their traditional Accounting Scholars Research Workshop. 10 presenters and 6 other young researchers from the Czech Republic, Poland and Romania benefited from the presentations and feedback offered by 11 established faculty. These accounting academics have also presented their projects to these very accomplished faculty and received timely and constructive feedback on how to improve their work with a view to make it publishable by international journals.

In the end, I will also thank our team: Nadia Albu, Raluca Guşe and Dragoş Mangiuc. They have volunteered their time to this important and traditional event in Central and Eastern Europe.

We are very much looking forward to hosting everybody again at our university!

Professor Cătălin Albu
Conference Chair

SECTION 1

The Current State of Romanian Universities Towards Emerging Industry 4.0

George Marian Ștefan

Daniela Livia Trașcă

Daniela Nicoleta Sahlian

Liviu Matac

Adriana Florina Popa

Ethics Education in Accounting – A Perspective from Romanian Academics

Andreia Manea

The Current State of Romanian Universities Towards Emerging Industry 4.0

George Marian Ștefan[a], Daniela Livia Trașcă[a], Daniela Nicoleta Sahlian[a], Liviu Matac[a] and Popa Adriana Florina[a,1]

[a] *Bucharest University of Economic Studies, Romania*

Abstract: *We live in a world marked by continuous change. The economy, education, technology, habits, way of thinking are all affected in one form or another by this reality. Quality education is one of the objectives set by United Nations as components of a model for achieving a better and more sustainable future. Currently, the most important challenge regarding the role of universities is the adaptability to the current transformations, especially regarding the emergence of the Industrial Revolution 4.0 and its consequences. This article aims to analyze the current degree of preparation that the Romanian universities have in terms of being compatible with the requirements of the Industrial Revolution 4.0. Moreover, along with the research done and the results obtained, an assessment model of the universities is identified to be applied in order to ensure the relevant performances in the new economic reality.*

Keywords*: Industrial revolution; University 4.0; labor market; tertiary education.*

1. Introduction

We live in a continuous changing world in all the possible aspects that provides new opportunities for innovation and economic growth. In this context, a quality education is seen as a general interest shown by all the international and national stakeholders, among which the academic environment. At this moment, the most important challenge on the role of universities is the ability to adapt to socio-economic transformations, especially regarding the emergence of the Industrial Revolution 4.0 (IR 4.0). More important are its consequences on both labor market (way of organizing and conducting activity, productivity, development of new industries, newly created or destroyed jobs), as well as on the lives of individuals (unemployment, achieving the necessary skills, access to information, technological literacy etc,). In the future, universities will continue to play an essential role for companies, individuals and also for research, as important players in finding and offering solutions for different socio-economic problems, on the one hand, but also adapting curricula, teachers and students in the new directions of IR 4.0., on the other hand.

Thus, the present article aims to analyze the current degree of preparation of the Romanian universities in terms of compatibility with the requirements of IR 4.0. In addition, we propose an assessment model of university in order to ensure the relevant performances for the new economic reality. Along with the environmental problems and the phenomenon of population aging, the adaptation to IR 4.0 represents one of the most important driving forces that will influence the social and economic dynamics in

[1] *Corresponding author*: Department of Accounting and Audit, Bucharest University of Economic Studies; 6, Piața Romană, 1st district, Bucharest, 010374 Romania

the future, developed around concepts such as Artificial Intelligence, Big Data, Machine Learning, Internet of Things, Cloud, etc.

As is usually practiced in the case of the various international rankings regarding the performances of the universities or of the economy of a country, the assessment of the university environment in Romania can be carried out on several pillars that capture its structural characteristics. The pillars taken into account can target, for example:

(i) The degree of financing of the universities/faculties and specializations relevant to IR 4.0;
(ii) The level of enrollment of students in the respective specializations;
(iii) The results from the research activity of the Romanian universities in the priority areas for IR 4.0. (Based on JEL codes or existing international rankings: Times Higher Education World University Rankings, Shanghai Ranking's Academic Ranking of World Universities);
(iv) Transfer of specific skills (technical and engineering; business management; design and innovation);
(v) Assuring transferable skills (problem solving, soft-skills, critical and business thinking, technological literacy).

Many times, these criteria are identified in different international reports and research articles on the future dynamics of the skills needed in the new economy. Also, their importance in the evaluation can take into account several factors, such as the directions highlighted by the scientific literature, the questioning of the representatives of the academic and business environment, the future directions of the labor market, the need to support certain expanding sectors, etc.

This article is divided into four main sections. The first section analyzes the context and the most important characteristics of the Industrial Revolution 4.0, the new directions proposed by it and, later, the estimated impact on the evolution of the labor market as it appears from the scientific literature and based on the different relevant opinions on the IR 4.0 issue.

The second and the third sections considers the paradigm shift in the activity of universities and the characteristics of the new concept of higher education institutions that respond to the challenges of IR 4.0 (respectively the so-called concept of „University 4.0"). According to the literature, which deals with the necessary transformations of the university environment, both the specific and transferable skills that the university must provide to new students should be targeted.

The last section presents the result of the assessment of the local university environment, made up of the universities for which data were available regarding the number of students enrolled in the bachelor, master and doctoral programs. Also, we present the most important conclusions and a potential proposal for a more complex evaluation model and possibly new research directions on the issue of the article.

The methodology developed to evaluate the degree of adaptation of the Romanian universities from the perspective of the response to the RI 4.0 emergency covers only the universities from Romania with available data regarding the number of students enrolled in the bachelor, master and doctoral cycles). Starting from the analysis of the

literature regarding the competencies that should be transferred by the universities to the beneficiaries of the educational system (public and private), and according to the data that are currently available both at the National Institute of Statistics (NIS), Ministry of Education and other relevant institutions that monitor and evaluate the higher education system in Romania, we selected the most important areas compatible with the new IR 4.0 framework. Thus, a number of 16 domains (specializations) existing in the educational offer of the Romanian universities were selected, listed below:

- Electronic and telecommunications engineering
- Food engineering
- Computers and information technology
- Mechatronics and robotics
- Biotechnology
- Communication science
- Sociology
- Economy
- Business Administration
- Management
- Psychology
- Cybernetics, statistics and economic informatics
- Biochemistry
- Informatics
- Environmental science
- Mathematics

The database initially built and analyzed included all public and private higher education institutions in Romania (92 institutions) and all available specializations (85 specializations) in 2017. Subsequently, those education institutions without any students enrolled in the bachelor, master, and/or doctoral cycles in the 16 selected fields above, relevant to IR 4.0, were eliminated. Thus, for the bachelor's degree from the 92 institutions only 51 institutions remained, with students enrolled in at least one of the 16 selected fields; for the master's cycle remained 50 institutions, while for the doctoral cycle remained only 23 higher educational institutions.

Further, we analyze the data regarding the number of students registered in Romania in each major specialization for IR 4.0 domains (bachelor's, master's, and doctorate level), both at the aggregate (national) level - see table in Appendix 1- and at the university level. The institutions of higher education with the best performances were highlighted according to the number of registered students. The data with the highest level of trust and availability at the moment of the research were those for 2017. Also, in Appendix 2 we presented the data for each of the 16 selected fields by university, according to the number of students registered in the bachelor cycle in 2017.

The limits of this approach are important. Firstly, at the moment of the research, there was a lack of availability of data for every specialization and university to assess the long-term dynamics of the students enrolled in relevant domains – so we were limited only to the 2017 – 2018 period. Secondly, we limited the assessment only to the number of students registered at universities without taking into account other important activities of universities, like research contracts in the relevant domains of Industry 4.0 (fundamental or applicative research projects), public events and debates organized, the level of internationalization and international partnership with other educational and research institutions. Thirdly, there are difficulties in selecting the relevant domains for Industry 4.0 as this is an emerging phenomenon and possibly some of the current or future domains can be hardly identified.

2. The Industrial Revolution 4.0 - characteristics and structural transformations in the labor market

Amid the emergence of the Industrial Revolution 4.0, business, commerce, industry, educational models but also the interaction between people will inevitably change, being emphasized the digital skills and the need for individual knowledge of what the integration of technologies and their use in economic and social life entails.

At the educational level, the concept of "University 4.0" has been proposed as an entity that encompasses the answer that the tertiary education systems offer to the challenges brought by IR 4.0 from two perspectives: (i) preparing people to adapt to the new economy; and (ii) the involvement of technologies and applications in teaching tools and learning activities. This will be analyzed in the next section of this paper.

World Economic Forum shows that the Industrial Revolution 4.0. is based on several categories of activities/key issues, such as Big Data, Artificial, and Robotic Intelligence, Machine Learning, Internet of Things, Biotechnology, Blockchain, Virtual and Augmented Reality, Neurosciences, Cyber Security, etc., which will significantly transform how economic activities (production, consumption, management, etc.) are carried out and organized, how companies (people) will interact with each other and with new technologies.

Since the first industrial revolution (18th century), global economies have gone through several phases in which the economic model was transformed, generally against the backdrop of the introduction of new technologies that changed the way goods were produced or how the production process was organized.

- The first industrial revolution was characterized by mechanization and the introduction of the steam engine, which offered the possibility of sustained industrial production, the increase in productivity and the reduction of the costs of the personnel, and the creation of the first global distribution chains.
- The second revolution took place at the end of the 19th century, around the discovery of electricity and large-scale specialization, which favored both productivity growth, development of assembly lines, and mass production. It also facilitated the formation of the first global value chains, and the emergence of television, radio, or landline telephony.
- The third revolution came naturally from the second, especially after the 1960s, with the introduction of the first computers and the automation of the internal processes of the companies (management, supply, sales, planning, forecasting). This culminated with the discovery of the Internet and the increase of Internet access globally, the development of electronic commerce, the intensification of globalization, and the mobility of production factors.
- The fourth industrial revolution offers after 2000 another framework for the economic activity and business models, which is characterized by cybersystems, robotics, the use of Big Data, Machine Learning, Cloud, production based on 3D or 4D printers, Virtual and Augmented Reality, smart factory, blockchain architectures or the Internet of Things concept. Also, a particular role is played by the interconnectivity, the feedback received and used in real-time (B2B, B2C), and, last but not least, the possibility of editing the human genome or the creation of new living species.

In this context, we can mention the theoretical model built by the Russian economist Kondratieff. In his seminal paper "On the Notion of Economic Statics, Dynamics and Fluctuation" - published in 1924 – the author analyzed the long-term cycles that characterize the capitalist economy. Starting from the analysis of the statistical data available in that period (1789-1920), Kondratieff distinguished between short-term fluctuations between 5 and 8 years (business cycles) and long cycles (50-60 years), the latter being mainly driven by technological revolutions or fundamentals innovations that make the transition from upper turning points to lower turning points. See Figure 1 below.

Even though following the analysis and processing of the statistical data, he had doubts about the existence of a cyclical character regarding the economic and social phenomena, he concluded that over time there were several types of long economic cycles, respectively:

1. From the end of the 1780s and the period 1844-1851, with a peak of the cycle in 1810-1817.
2. From 1844-1851 to 1890-1896, with a peak of the cycle in 1870-1875.
3. From 1890-1896 until 1914-1920.

Subsequently, other economists continued the work initially started by Kondratieff and identified several long cycles, from the 18th century to the present (Figure no.1). The 5th Kondratieff cycle led by information technology started in the 1970s and then, after 2000, the 6th cycle, based on biotechnology and revolutions in the health area. The latter is also partially found in the periodicity done previously by the World Economic Forum.

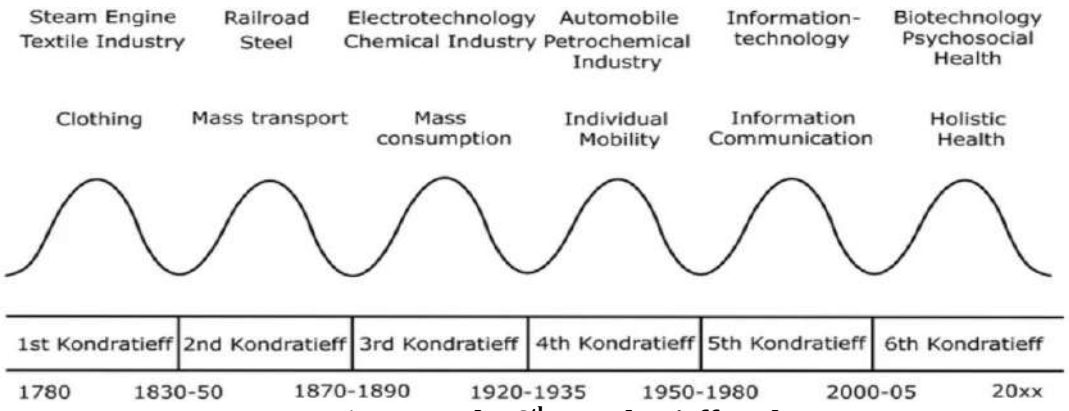


Figure 1. **The 6th Kondratieff cycles**
Source: World Economic Forum

There is an important idea that the development of digital (The Internet of Things, Artificial Intelligence and Machine Learning, Big Data, and Cloud Computing, Digital Platforms), physical (Autonomous Cars and Objects, 3D printing), and biological technologies (like Genetic Engineering and Neurotechnology) are the three fundamental technological drivers of the Fourth Industrial Revolution (see Li *et al.*, 2017).

In literature are many different definitions of IR 4.0. Scholars, academic institutions, and private sector representatives proposed different understandings over the term, but all of them could be considered according to the fundamental technological drivers behind it. According to Baur and Wee (2015), "Industry 4.0 is the next phase in the digitization of the manufacturing sector, driven by four disruptions: the astonishing rise in data volumes, computational power, and connectivity, especially new low-power wide-area networks; the emergence of analytics and business-intelligence capabilities; new forms of human-machine interaction such as touch interfaces and augmented-reality systems; and improvements in transferring digital instructions to the physical world, such as advanced robotics and 3-D printing".

In addition, the European Parliament considers Industry 4.0 as a term applied to a group of rapid transformations in the design, manufacture, operation, and service of manufacturing systems and products. Complementary, the main European legislative body considers that "*the 4.0 designation signifies that this is the world's fourth industrial revolution, the successor to three earlier industrial revolutions that caused quantum leaps in productivity and changed the lives of people throughout the world*".

SAP considers that Industry 4.0 is a collective term for technologies and concepts of value chain organization. Based on the technological concepts of cyber-physical systems, the Internet of Things, and the Internet of Services, it facilitates the vision of the Smart Factory. Moreover, Nirjar Gandhi (2015) considers that Industry 4.0 has six design principles that companies could use to implement Industry 4.0 scenarios.

Interoperability	Virtualization	Decentralization	Real-Time Capability	Modularity	Service Orientation
the ability of cyber-physical systems (i.e. assembly stations and products), humans and Smart Factories to connect and communicate with each other	a virtual copy of the Smart Factory which is created by linking sensor data (from monitoring physical processes) with virtual plant models and simulation models	the ability of cyber-physical systems within Smart Factories to make decisions on their own	the capability to collect and analyze data and provide the insights immediately	flexible adaptation of Smart Factories for changing requirements of individual modules	offering of services (of cyber-physical systems, humans and Smart Factories) via the Internet of Services

Figure 2. **Design principles to implement Industry 4.0.**
Source: SAP (2015)

However, Li *et al*. (2017), citing several research papers published by different authors, like Xu *et al*. (2013), Gentner (2016), Theorin *et al*. (2017), and Webster (2015), affirms that the IR 4.0 is not limited to industrial production, but in all aspects of the society. The authors mention that IR 4.0 will impact more and more activities, including technology, consumption, and business models, and, at the same time, is influencing every field of human life – starting with economy, and productivity (Gerbert *et al*, 2015), jobs, social interaction, food, healthcare, education, etc.

To assess the EU member state, Roland Berger company created 2014 an "*Industry 4.0 Readiness Index*" based on different features, such as "industrial excellence" (production process sophistication, degree of automation, workforce readiness, and innovation intensity) and "value network" (high value-added, industry openness,

innovation network, and Internet sophistication). After the index computation, the study divided the European economies into four groups, presented below:

1) The Frontrunners - with a large and modern industrial base (Sweden, Austria, Germany, Ireland);
2) The Traditionalists – with a sound industrial base, but without bold initiatives to upgrade the industry (Czech Republic, Hungary, Slovakia, Slovenia);
3) The Hesitators – a mixture of southern and eastern European countries – lack a reliable industrial base (Italy, Spain, Portugal, Poland, Estonia, Croatia, Bulgaria);
4) The Potentialists – with a recently weak industrial base (Netherlands, France, and UK).

Figure 3. **Industry 4.0 Readiness Index**

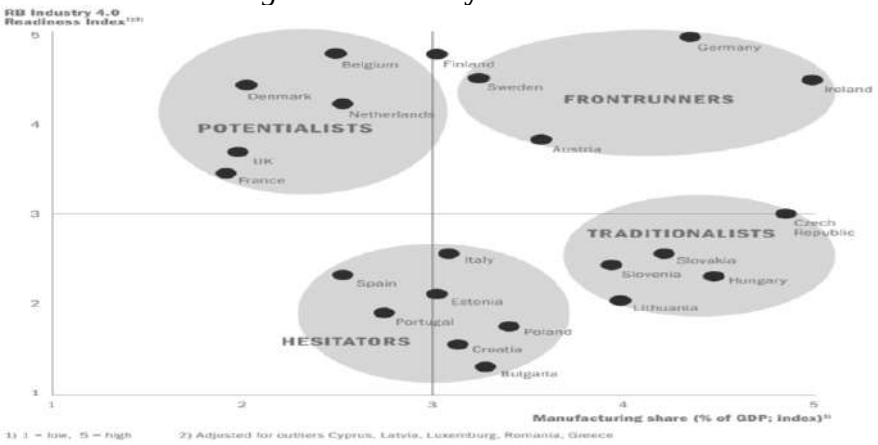


Figure 3. **Industry 4.0 Readiness Index**
Source: Roland Berger company

One of the main conclusions of the study is that the transition towards Industry 4.0 should be facilitated by the players in the system, especially from the corporate sector (technology suppliers, infrastructure providers, and industrial users) on the one hand, and European governments on the other hand. Also, the report affirms that the past top-down approach era is over and innovations come from bottom-up approaches, openly driven by the market, "promoting entrepreneurship, risk-taking, innovation and agility" (Roland Berger, 2014: 20).

3. The impact of Industry 4.0 on Skills and jobs

An important Whitepaper regarding the Skill Development for Industry 4.0, published in 2016 by the BRICS Skill Development Working Group in cooperation with Roland Berger and FICCI, affirms that in terms of business models, the gradual implementation of Industry 4.0 represents a paradigm shift from the traditional manufacturing model (rigid, efficiency-focused and based on manual-operations) to a new model, more dynamic, agile, and automated.

In addition, it marks a shift of business models from mass production to mass customization, on one hand, and a transition from large-scale factories ("*specialized for a product*") to smart factories "*that can produce multiple products at competitive cost*" (BRICS Skill Development Working Group, 2016).

Consequently, skilled labor will have the opportunity to take part in greater task variety and will no longer be associated with only one particular type of job and employees will have to share the activity with robots and algorithms. The latter will support the working process, while information and data will be the key elements for employees. In addition, artificial intelligence will enable collaboration between humans and machines and workers will use different devices to communicate and operate with the machines and robots.

Also, according to the "Future of Jobs" survey conducted by the World Economic Forum (WEF) in 2016 it is expected that "a number of skills that are not considered to be significant in today's context will form one-third of the desired core skill sets of most occupations in 2020. Such a shift in the skill requirements is expected with increased digitalization. The ability to work with data and make data-based decisions will play a major role in the jobs of future" (WEF, 2016).

Furthermore, according to the survey, "with the adoption of automation and artificial intelligence, several tasks involving technical skills like troubleshooting machine problems, etc. and resource management skills like people and time management would be eliminated". An important insight is that more and more jobs requiring the so-called Cognitive Abilities as a core skill will rise to 15% by 2020, compared with 11% in 2016, especially in manufacturing-dominated industries like Automotive (alongside process skills and content skills).

Table 1: **Main work-relevant skills and abilities**

Skills family	Skills
Cognitive analytics	Cognitive Flexibility, Creativity Logical Reasoning, Problem Sensitivity Mathematical Reasoning, Visualization
Physical abilities	Physical Abilities, Physical strength Manual dexterity, Manual precision
Content skills	Active learning, Oral expression Reading comprehension Written expression, ICT literacy
Process skills	Active listening, Critical thinking Monitoring self and others
Social skills	Coordinating with others, Emotional intelligence Negotiation, Persuasion Service orientation, Training & teaching others
Resource management skills	Managing financial resources & material resources People management, Time management
Systems skills	Judgment and decision making Systems analysis
Complex problem-solving skills	Complex problem solving
Technical skills	Equipment maintenance, repair, operation & control Programming, Quality control Troubleshooting, Technology & user experience design

Source: World Economic Forum

Another important aspect presented by the above-mentioned survey is that "among all the jobs requiring cognitive abilities as part of their core skill sets, 52% of the jobs do not have such requirements now and are expected to have growing demand by 2020. In 30% of the jobs, the demand currently is high and will have a stable demand. (…) Cognitive abilities, system skills, and complex problem-solving skills are the top three skills expected to be high in demand and will continue to remain important" by 2020 (World Economic Forum, 2016).

In a study published in 2018, the World Economic Forum analyzes the skills demand trends until 2022. According to the study, there will be a decrease in demand for manual skills and physical abilities, and skills related to the management of financial and other resources (technology installation and maintenance skills). The demand for skills like analytical thinking and innovation, active learning and learning strategies, technology design, and programming will grow. However, there is expected an increase in demand for „more human" skills (creativity, originality, critical thinking, resilience, leadership or emotional intelligence, etc.).

Additionally, research realized by the Federal Reserve St. Louis, in 2016, shows that Middle-skill occupations (manufacturing) are declining, and both high-skill and low-skill occupations such as managers, professionals, and personal care services are growing. In other words, the routine jobs are decreasing and non-routine jobs are increasing, mainly due to automation and offshoring, as the low, labor-intensive jobs are performed in more cost-competitive countries.

Moreover, Hammes (2018) affirms that "service jobs that require the human touch or have to deal with non-routine tasks will remain, but massive numbers of humans will be replaced. Further, up the knowledge ladder, artificial intelligence is already handling tasks formerly assigned to associate lawyers, new accountants, new reporters, new radiologists, and many other specialties. In short, non-routine tasks, whether manual or cognitive, will still be done by humans while routine tasks—even cognitive ones—will be done by machines" (Hammes, 2018, pp. 46).

In the last part of the section, we briefly present the mandatory qualifications and skills for Industry 4.0 economy according to different studies, reports, and institutions. Even though the general perception is that the future workers are usually well prepared in terms of IT&C knowledge, digitalization, interaction and understanding of IT infrastructure and data, etc., we consider that at a relatively close level the social and personal skills will be valuable.

Table 2. **Important qualifications & skills to have for Industry 4.0.**

Category	**Skills**
1. Knowledge about ICT	● Basic Information Technology knowledge ● Ability to use and interact with computers and smart machines like robots, tablets, etc. ● Understanding machine-to-machine communication ● IT security & data protection
2. Ability to work with data	● Ability to process and analyze data and information obtained from machines ● Understanding visual data output & making decisions

Category	Skills
	● Basic statistical knowledge
3. Technical know-how	● Inter-disciplinary & generic knowledge about technology ● Specialized knowledge about manufacturing activities and processes in place ● The Technical know-how of machines to carry out maintenance-related activities
4. Personal skills	● Adaptability & ability to change ● Decision making ● Working in team ● Communication skills ● Mindset change for lifelong learning

Source: Authors' point of view

4. Universities of the future: "University 4.0" concept

In 2011, Kagermann *et al*. (2011) introduced the term Fourth Industry Revolution (4IR) at the Hannover Fair in Germany. The Fourth Industrial Revolution is described as the consequence of an integration and compounding effects of numerous "exponential technologies" (like the exponential increase in computer power or decreasing cost in storage) such as nanomaterials, biotechnologies, or artificial intelligence, which will bring a profound and rapid change of higher education system and will accelerate the retraining of the workforce. For identifying the potential transformations in higher education arising from it, a starting point can be the social and educational transformation generated by the first three industrial revolutions.

After the First Industrial Revolution, the new education system named by the Harvard President Charles Eliot (C. Eliot, 1869) "The New Education" assumed a widespread adoption of the German university model for postgraduate research. This transformation allowed the rise of dozens the research universities within the USA.

The Second Industrial Revolution started in 1860. The growth brought by the new technologies was consolidated and accelerated by the increase in access to higher education and the expansion of multiple types of higher education institutions in Europe and the USA. Regarding the USA, the first two industrial revolutions lead to many innovative new educational institutions like Stanford University (1885) or the University of Chicago (1890) and numerous small colleges.

According to the Morrill Act of 1862, the new educational system was accessible to all, especially to the "sons of toil". Most of these new higher education institutions helped foster an accelerated role for women not only in academic settings but in industrial settings too. No matter the new technologies introduce, economists proved that there is a significant lag time between the full adoption of the technology and the providing measurable impacts on productivity. This lag was called a productivity paradox and was attributed to the time necessary for training and experimentation with new technology.

The Third Industrial Revolution is attributed especially to computerization and web-based interconnectivity. Within this revolution, the diversity on campuses increased and online technologies accelerated the globalization of academic research. During the

Third Industrial Revolution, the educational higher system moved toward online courses, which continue to enable students to build rapidly skills and knowledge asynchronously.

Christopher *et al*. (2020) affirms that the various dimensions of Industry 4.0, such as large volumes of data, artificial intelligence (AI), robots, automation and machine learning, internet of things (IoT), were vastly discussed in the literature (Lasi *et al*., 2014 and Schuster *et al*., 2016), emphasizing also the implication of those features on the job market in the future as there will be an important skill shift to cope with the new technologies. Also, most of the authors underline the lifelong learning programs (Bakhshi et. al, 2017; Ehlers and Kellermann, 2019). Additionally, a PricewaterhouseCoopers (PwC) report from 2018 identified that there will be an increasing need for training in domains like digital skills, Science, Technology, Engineering, and Mathematics (STEM), but also in the area of 'soft' skills. The report mentions that the soft skills that cannot easily be automated by machines, such as creativity and flexibility, will be extremely prized (PwC, 2018).

Siti Hajar Halili *et al*.'s (2021) systematic review of the literature with a focus on Malaysia concluded that the universities should develop the student's ability to embrace new technologies. The latter will be the main instrument of adaptation to changes in the learning environment. Moreover, the authors stated that universities need to embrace the novel concept of Education 4.0 in two directions: (i) encouraging more research in the educational domain for a better understanding and adaptation to the new educational trends; and (ii) improving students' academic performance and achievement to categorize appropriate technology tools to assist students (e.g. students can choose their best-fitted learning tools), but also in terms of curriculum, learning methods and ideas creation.

In this context, Michael (2012) suggested disaggregating higher education activities into two groups. The first group refers to those activities that are synchronous and personal, like personal exploration, coaching, or mentorship. The second group refers to those activities that can be easily scaled and shifted online like authoring, production, or content transfer. The free and immediate access to information shifted the focus toward active learning pedagogies. All these transformations created new institutions that have more global and interdisciplinary curricula.

No matter the positive social impacts or devastating environmental damages, the higher education system needs to respond to the power of the Fourth Industrial Revolution technologies. To allow students to develop capacity in the rapidly emerging areas of artificial intelligence or data science or genomics there are necessary substantial changes to the science and technology curriculum.

This new curriculum would revoke the traditional curriculum with "primary" sciences like biology, chemistry, or physics and place higher importance on training in computer science. Regarding biology, the new curriculum might include molecular design or synthetic biology. The new chemistry curriculum will include a worldwide expansion of courses and degree programs in Green Chemistry. Regarding physics, the new approaches might include projects where students design and build cryptographic gadgets, musical instruments, and other inventions collaboratively.

To provide trained workers, it might be necessary the restructuration of institutions for offering new science programs and departments in emerging interdisciplinary fields. The report for the Future of Education elaborated by MIT (2014) underlines the need for leveraging online courses to give more flexibility and modularity to courses and to strengthen residential education. Regarding pedagogy, the report makes five recommendations: catalyzing innovation for the future of MIT education, expanding the freshman learning community model, strengthening the teaching of communications, creating an undergraduate service opportunities program, and improving graduate curriculum accessibility. According to MIT, higher education is at an inflection point and the universities must create an ecosystem for ongoing research, learning, and innovation regarding the future of education.

More than anything, this last industrial revolution puts the accent on adaptability and self-directed learning and thinking. Thus, the future workers need to update their skills and teach themselves about new technologies and new industries continuously, while they are being trained for their initial degrees.

For responding to the increased rate of change and the increasing complexity and volatility of employment are needed to be developed new frameworks like educational programs which shift from routine tasks to more academic curricula developing habits of mind and capacity for creativity within workers at each level. In this framework, are very important soft skills such as innovation, work ethic, and career navigation. All these skills will prepare students for the emerging Fourth Industrial Revolution workplace. The new nature of work characterized by more flexible and shorter-term assignments represents a key factor to address within this new industrial revolution.

In the coming decades, the jobs in technology sectors (robotics, 3D printing, genetics, machine learning, or biotechnology) of the Fourth Industrial Revolution will dominate. Within those sectors are required employers to have social skills like emotional intelligence, persuasion, and capacity for teaching others.

The working life skills required for succeeding in this new environment of the Fourth Industrial Revolution refer to both discipline-specific competencies and transferable skills (see for more details Future Universities Project, 2019). There are three categories of discipline-specific competencies: (i) engineering competencies such as programming skills, robotics, and artificial intelligence; (ii) business competencies such as technology awareness, change management, and strategy; and (iii) design competencies such as understanding the impact of technology or human-robot interaction.

Regarding transferable skills, we can identify five categories: problem-solving skills like creativity or experimentation, soft skills like teamwork and leadership, systems thinking, business thinking, and technological literacy.

5. Results

According to the NIS, at the end of 2018, in Romania, the total number of students enrolled in higher education (bachelor's, master's, postgraduate courses, doctoral and postdoctoral programs), both public and private, amounted to approximately 533.75 thousand people. Depending on the number of students enrolled, most were in Bucharest city (32.3%) and followed by counties such as Cluj (13.0%), Iași (9.9%),

Timiș (7.8%), and Brașov (4.0%). In fact, in 2018 these five counties accumulated almost 67% of the total. Of these, nearly 402.7 thousand people are enrolled in bachelor programs, less than half compared to a decade ago (see figure below).

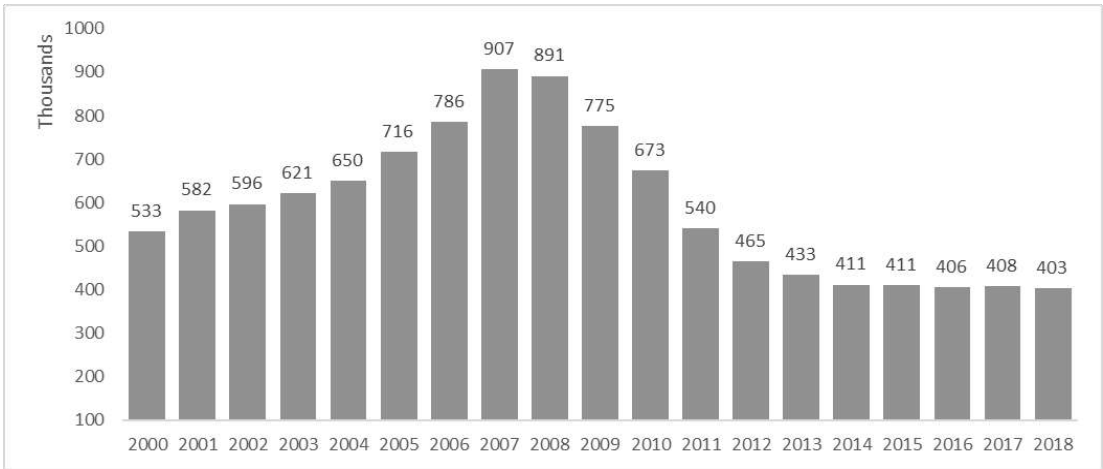


Figure 4. **Students enrolled – undergraduates**
Source: NIS

Even though the total number of students enrolled in tertiary education has decreased in the last 5 years, there is an increase of those enrolled in specializations such as Education Sciences, ICT, Health and Social Care and Services, while in domains such as Business, Management and Law, Natural Sciences, Mathematics and Statistics, Engineering, processing, and construction were registered the largest decrease in the number of students between 2014 and 2018.

Table 3. **Students and course attendees enrolled in tertiary education**

Group of specializations	**2014**	**2015**	**2016**	**2017**	**2018**
Total	541653	535218	531586	538871	533749
Education science	14236	16160	17247	17860	17637
Arts and humanities	49579	49168	48397	48979	48385
Social sciences, journalism and information	46493	46527	45244	47433	46858
Business, management and law	137059	128471	127233	128375	128096
Natural sciences, Mathematics and statistics	28918	27385	24473	24486	23396
Information and communication technologies	34610	32661	34814	36662	37545
Engineering, processing and construction	115691	118621	114623	113047	111578
Agriculture, forestry, fishery, and veterinary science	26071	25742	25669	25102	23999
Health and social care	68230	68933	72490	74065	73430
services	20766	21550	21396	22862	22825

Source: NIS

In this section, we presented and analyzed the results regarding the positioning of universities from Romania compared to the 16 relevant domains selected to adapt to IR 4.0 requirements. Figure 6 shows the most important universities in Romania according to the number of students enrolled in the selected fields for bachelor's degrees.

The most enrolled students in the 16 selected fields in 2017 in the bachelor cycle were at Babeș-Bolyai University from Cluj-Napoca, Bucharest University of Economic Studies (ASE Bucharest), Polytechnic University of Bucharest, University Bucharest, University Al.I. Cuza from Iași and the Technical University from Cluj-Napoca. For the relevance of the information and comparisons, universities with less than 1000 students enrolled for the bachelor's cycle were excluded from the graph. Of these, the highest share of students in the IR 4.0 fields in total enrolled students was Bucharest University of Economic Studies, 52.8%, as they are mostly concentrated in areas such as Business Administration, Cybernetics, Statistics, Economic Informatics, Economics, Management, but also Sociology. These specializations represented 8163 students enrolled out of a total of 15,470.

Although they have the largest number of students enrolled in the bachelor's cycle, the Babeș-Bolyai University from Cluj-Napoca (27700 students) and Bucharest University (21900 students) have lower weights, as can be seen in the graph below. Babeș-Bolyai University from Cluj has a large number of students in Communication Sciences, Business Administration, Psychology, and Computer Science, while Bucharest University has specializations with higher students enrolled in Communication Sciences, Sociology, and Computer Science.

At the same time, there are 3 private universities, the Romanian-American University, the Hyperion University, and the Spiru Haret University in Bucharest, especially as a result of the higher weight in fields such as Psychology, Management, Business Administration and Cybernetics, Statistics and economic informatics, these two areas being more relevant to the Romanian-American University. Last but not least, the high weight of SNSPA Bucharest is explained by a large number of students enrolled in the field of Communication Sciences.

For the master's degree, the situation of the bachelor's degree regarding the number of master's students registered in 2017 is generally maintained, with the mention that, in absolute values, in the first place is the Bucharest University of Economic Studies with almost 2950 master's degrees in the selected fields. for IR 4.0 (See Figure no. 6).

It is followed by the University Bucharest and the Babeș-Bolyai University from Cluj-Napoca. Other higher education institutions with a relatively high number of master's degrees in the 16 selected fields are the Polytechnic University of Bucharest and the Al.I.Cuza University from Iași. Universities with less than 500 undergraduate students enrolled were excluded from the graph.

In the case of Bucharest University of Economic Studies, 2944 of over 5750 master's students are enrolled in at least one of the 16 selected specializations, respectively 50% of the total enrolled. The most important areas are Business Administration, Cybernetics, Statistics, and Economic Informatics, Economics and Management.

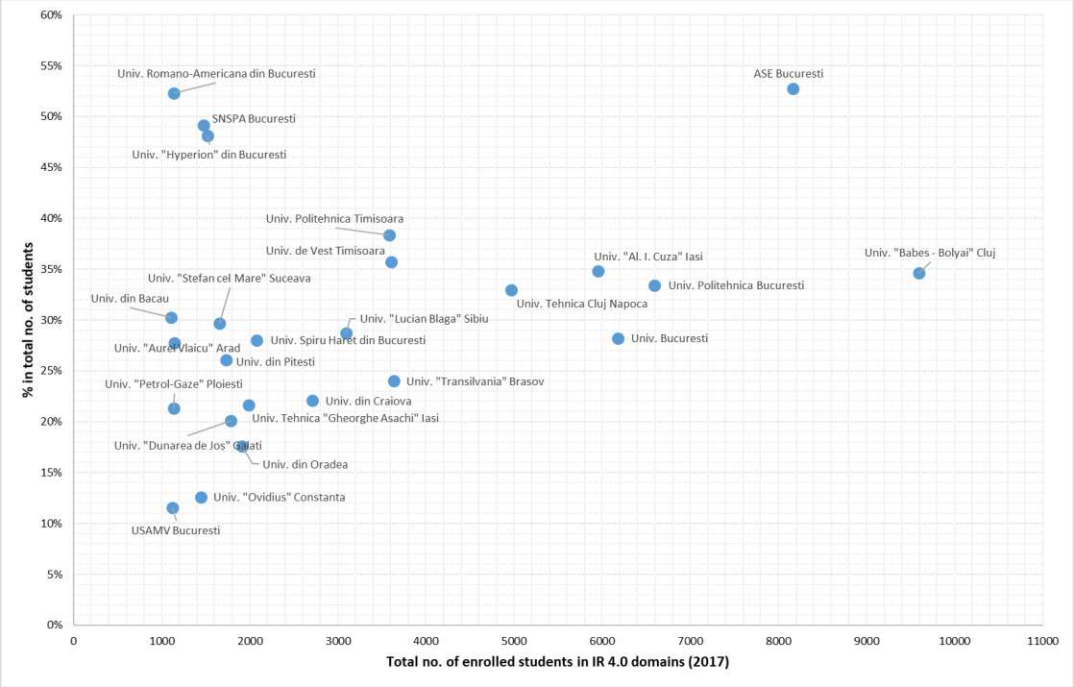


Figure 5. **The share of students enrolled in IR 4.0 selected domains (undergraduates).**

Source: Authors'calculation

The largest share of students belongs to SNSPA Bucharest, with about 55% of the total students being enrolled in one of the 16 selected fields, respectively Communication Sciences, 1024 out of 1269 master's degree students.

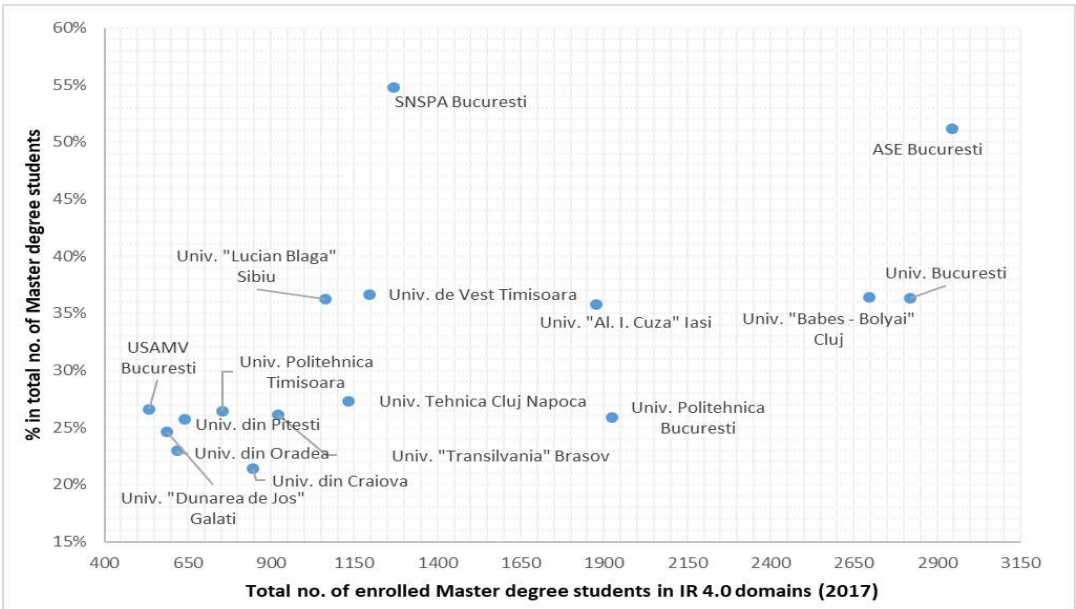


Figure 6. **The share of students enrolled in IR 4.0 selected domains (master's degree)**

Source: Authors'calculation

For Ph.D. students, more than 61% of those enrolled at the Bucharest University of Economic Studies are in areas relevant to IR 4.0, with 590 doctoral students enrolled out of a total number of 958 in 2017, especially in domains such as Cybernetics,

Statistics and Informatics Economics, and Management. Also, the large number of Ph.D. students enrolled in the Management area - the only IR 4.0 domain, explains the high share of Valahia University from Târgoviște (170 Ph.D. students out of 329). For easier graphical illustration, in the case of the students enrolled in the doctorate in the priority areas selected for IR 4.0 the universities were divided into two groups - universities with more than 50 doctoral students in the selected fields (Figure no.7a) and universities with less than 50 doctoral students enrolled (Figure no.7b). See also Appendix 3 for detailed figures.

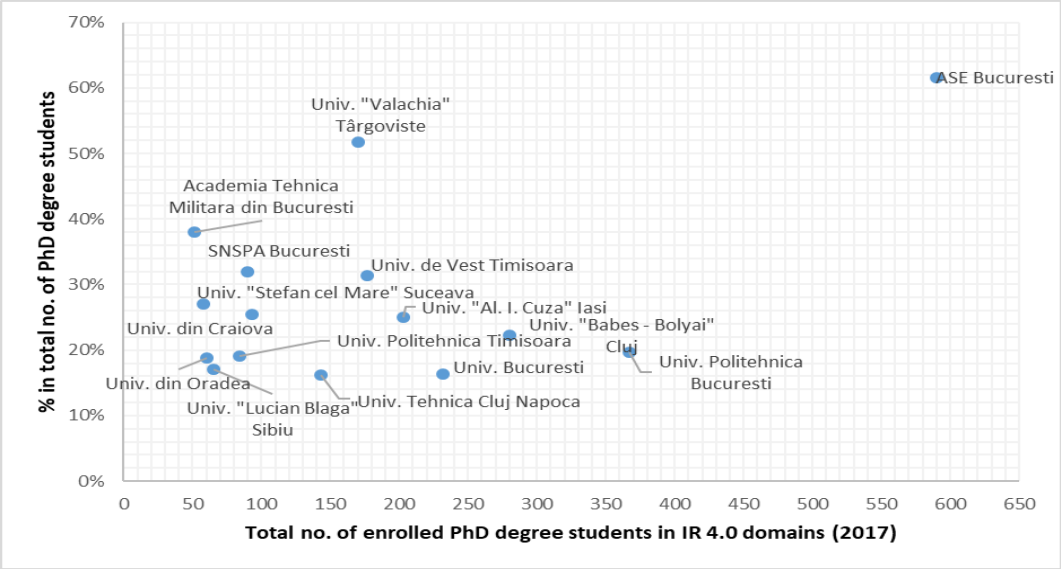


Figure 7a. **The share of students enrolled in IR 4.0 selected domains (Ph.D. degree).**

Source: Authors'calculation

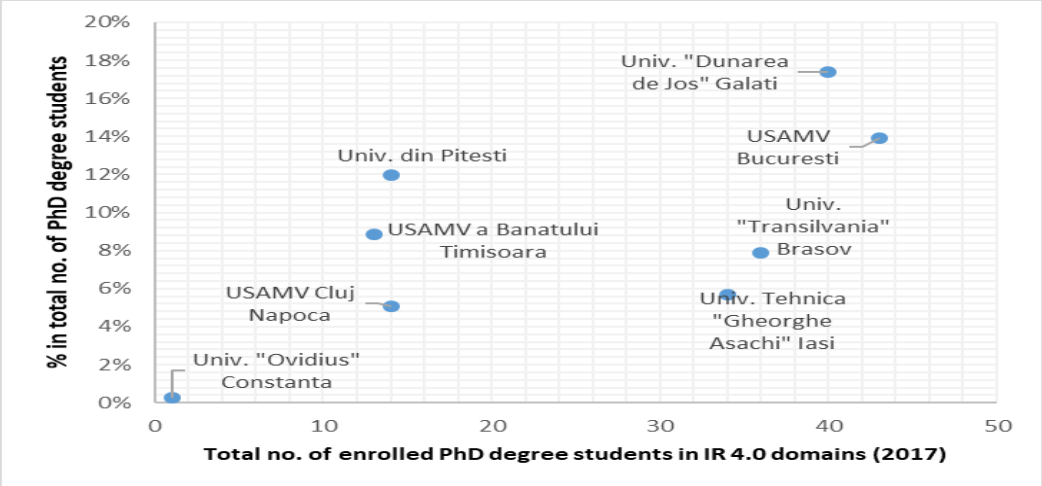


Figure 7b. **The share of students enrolled in IR 4.0 selected domains (Ph.D. degree)**

Source: Authors'calculation

6. Conclusions and further discussions

In the future, the universities will continue to play an essential role for companies, people, and also for research, as important players in finding and offering solutions for

different socio-economic problems. To evaluate the capacity of the higher education institutions from Romania to adapt to the emergency requirements of the Industrial Revolution 4.0 were selected several 16 areas (specializations) relevant to IR 4.0, respectively: Electronic and Telecommunications Engineering, Food Engineering, Computers, and Information Technology, Mechatronics and Robotics, Biotechnology, Communication Science, Sociology, Economy, Business Administration, Management, Psychology, Cybernetics, Statistics, and Economic Informatics, Biochemistry, Informatics, Environmental Science, Mathematics.

The universities that had 2017 the most students enrolled in the bachelor's degree cycle in the 16 key selected fields were Babeș-Bolyai University from Cluj-Napoca, the Bucharest University of Economic Studies, the Polytechnic University of Bucharest, the University Bucharest, the University Al.I. Cuza from Iași and the Technical University from Cluj-Napoca. Of these, the largest share of students in the IR 4.0 fields in total enrolled students was Bucharest University of Economic Studies, 52.8% of the total, they were concentrated mostly in specializations such as Business Administration, Cybernetics, Statistics, Economic Informatics, Economy, Management, but also Sociology. These specializations represented more than 8160 registered students out of 15470. Another important conclusion is that the specializations that have a lower representation within all Romanian universities are Biotechnology (914 students) and Biochemistry (240 students).

For the master's degree, the situation of the bachelor's degree regarding the number of master's students registered in 2017 is generally maintained, with the mention that, in absolute value, the Bucharest University of Economic Studies is in the first place. It is followed by the University of Bucharest and the Babeș-Bolyai University from Cluj-Napoca. Other higher education institutions with a relatively high number of master's degrees in the 16 selected fields are the Polytechnic University of Bucharest and the University of Alexandru Ioan Cuza from Iași. Also, for the Biochemistry specialization, there are no students enrolled in master's courses.

For Ph.D. students, more than 61% of those enrolled in ASE Bucharest are in areas relevant to IR 4.0, with 590 doctoral students enrolled out of 958 in 2017, especially in areas such as Cybernetics, Statistics, Informatics, Economics, and Management. As in the case of the master's programs, there are no Ph.D. students in the field of Biochemistry, while for Mechatronics and Robotics there are only 6 people enrolled in the Ph.D.

The analysis of the literature as well as the characteristics of the theoretical models regarding the future skills needed to adapt to the IR 4.0 standards, can offer further a general picture regarding a more complex system of evaluation of universities and their evaluation criteria. However, the problem of Industry 4.0 impact on academia and education, in general, is still under-researched, and more extensive studies are needed to explore the consequences of the current shift in the higher education environment and also to wider the perspective on the emerging University 4.0. conceptual framework.

From our perspective, the assessment model should take into account at least four pillars:

- Compatibility of the specializations provided by the educational programs of the universities with the emerging fields as a result of IR 4.0. In the present article, only 16 categories of specializations were selected that took into account, on the one hand, the availability of data and, on the other hand, the characteristics of the skills required for new jobs in the economy of the future.
- The number of students enrolled in these specializations, as well as the evolution of subsequent market demands for each particular area.
- Alignment of the financing of higher education institutions from these areas for all preparation cycles: Bachelor's, Master's, Ph.D.
- The scientific research carried out by the teaching staff or by the researchers from the university environment harmonized with the newly emerging fields.

References

Bakhshi, H., Downing, J.M., Osborne, M.A., & Schneider, P. (2017) „The future of skills: Employment in 2030", available on-line at https://media.nesta.org.uk/documents/the_future_of_skills_employment_in_2030_0.pdf [Accessed May 7, 2022]

BRICS Skill Development Working Group (2016) *Skill Development for Industry 4.0*;

Bryan, E.P. (2018), *The Fourth Industrial Revolution and Higher Education*, available at https://link.springer.com/chapter/10.1007/978-981-13-0194-0_9 [Accessed May 7, 2022];

Bonfield, C.A., Salter, M., Longmuir, A., Benson, M. & Adachi, C. (2020) „Transformation or evolution?: Education 4.0, teaching and learning in the digital age", *Higher Education Pedagogies*, vol. 5, no. 1: 223-246, DOI: 10.1080/23752696.2020.1816847;

Baur, C. & Wee, D. (2015) *Manufacturing's next act*, McKinsey Consulting, June, available at https://www.mckinsey.com/business-functions/operations/our-insights/manufacturings-next-act; [Accessed May 7, 2022];

Ehlers, U.-D., & Kellermann, S.A. (2019) „Future skills—The future of learning and higher education. Results of the international Delphi survey".

European Parliament, European Parliamentary Research Service (2015), *Industry 4.0, Digitalisation for productivity and growth*, Brief, September 2015, available on-line at http://www.europarl.europa.eu/RegData/etudes/BRIE/2015/568337/EPRS_BRI(2015)568337_EN.pdf; [Accessed May 7, 2022];

Garvy, G. (1943) „Kondratieff's theory of long cycles*"*. The Review of Economic Statistics, 203-220.

Gentner, S., (2016) „Industry 4.0: reality, future or just science fiction? How to convince today's management to invest in tomorrow's future! Successful Strategies for Industry 4.0 and Manufacturing IT", *Chimia*, vol. 70, no. 9: 628-633. doi: 10.2533/chimia.2016.628;

Gerbert, P. , Lorenz, M., Rüßmann, M., Waldner, M., Justus, J., Engel, P., &Harnisch, M., (2015) *Industry 4.0: The Future of Productivity and Growth in Manufacturing Industries*, Boston Consulting Group, available at: https://www.bcg.com/publications/2015/engineered_products_project_business_industry_4_future_productivity_growth_manufacturing_industries.aspx; [Accessed May 7, 2022];

i-SCOOP, *Industry 4.0: the fourth industrial revolution – guide to Industrie 4.0*, https://www.i-scoop.eu/industry; [Accessed May 7, 2022];

Kondratieff, N.D., (1924). *On the Notion of Economic Statics, Dynamics and Fluctuations*. Sotsialisticheskoe Khoziaistvo, vol. 2: 349-382.

Lasi, H., Fettke, P., Kemper, H.-G., Feld, T., & Hoffmann, M. (2014) „Industry 4.0. Business & Information Systems Engineering", vol. 6, no. 4: 239-242. doi:10.1007/s12599-014-0334-4;

Li Guoping, Hou Yun, Wu Aizhi, (2017) „Fourth Industrial Revolution: technological drivers, impacts and coping method*s"*, Chinese Geographical Science, vol. 27, no. 4: 626-637. doi: 10.1007/s11769-017-0890-x;

Michael S. (2012) *Disaggregating the components of a college degree*, available at https://www.aei.org/wp-content/uploads/2012/08/-disaggregating-the-components-of-a-college-degree_184521175818.pdf, [Accessed May 7, 2022];

MIT (2014) *Institute-wide Task Force on the Future of MIT Education-final report*, available at http://web.mit.edu/future-report/TaskForceFinal_July28.pdf, [Accessed May 7, 2022];

Gandhi, N. (2015) *Industry 4.0 – fourth industrial revolution*, SAP, June 30, available at: https://blogs.sap.com/2015/06/30/industry-40-fourth-industrial-revolution/; [Accessed May 7, 2022]

PricewaterhouseCoopers (PwC). (2018) „AI will create as many jobs as it displaces by boosting economic growth", https://www.pwc.co.uk/press-room/press-releases/AI-will-create-as-many-jobs-as-it-displaces-by-boosting-economic-growth.html, [Accessed May 7, 2022];

Roland Berger Consultants (2014), *Industry 4.0: the new industrial revolution, how Europe will succeed*, available at: http://www.iberglobal.com/files/Roland_Berger_Industry.pdf; [Accessed May 7, 2022]

Schuster, K., Groß, K., Vossen, R., Richert, A., & Jeschke, S. (2016) *Preparing for Industry 4.0 – Collaborative virtual learning environments in engineering education*. In S. Frerich, T. Meisen, A. Richert, M. Petermann, S. Jeschke, U. Wilkesmann, & A.E. Tekkaya (Eds.), *Engineering Education 4.0: Excellent teaching and learning in engineering sciences* (pp. 477–487). Springer International Publishing. doi:10.1007/978-3-319-46916-4_36;

Schwab, K. (2016) *The Fourth Industrial Revol*ution. World Economic Forum

Halili, S.H., Sulaiman, S., Sulaiman, H., & Razak, R. (2021) „Embracing industrial revolution 4.0 in universities", *IOP Conf. Series: Materials Science and Engineering 1088* (2021) 012111. DOI:10.1088/1757-899X/1088/1/012111;

Hammes, T. X. (2018) *Technological change and the fourth industrial revolution, in Beyond Disruption: Technology's Challenge to Governance*, edited by George P. Shultz, Jim Hoagland, James Timbie, Hoover Institution Press;

Theorin, A, Bengtsson, K., Provost, J. (2017) „An event-driven manufacturing information system architecture for Industry 4.0.", International Journal of Production Research, vol. 55, no. 5: 1297-1311, doi: 10.1080/00207543.2016.1201604;

Universities of the Future Project (2019), *Industry 4.0 implication for higher education institutions*, available at https://universitiesofthefuture.eu/wp-content/uploads/2019/02/State-of-Maturity_Report.pdf; [Accessed May 7, 2022];

Webster, S.A. (2015) „Coming to a factory near you: Industry 4.0.", *Manufacturing Engineering*, vol. 154, no. 3: 8;

World Economic Forum, The Future of Jobs Report (2016), *Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*, http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf; [Accessed May 7, 2022];

World Economic Forum, The Future of Jobs Report (2018), *Insight Report, Centre for the New Economy and Society;*

Xu Dong, Nie Beisheng & Wang Longkang (2013) *Accurate localization technology in fully mechanized coal face: the first step towards coal mining Industry 4.0*. Disaster Advances, vol. 6: 69–77.

Appendix 1

Table 4. **Total number of enrolled students in IR 4.0 selected domain**

2017 (Budget and Tax enrolled students)	Undergra-duates	Master Degree	Doctoral Degree	Undergra-duates	Master Degree	Doctoral Degree
Electronic and telecommunications engineering	9129	2061	414	2,4%	2,1%	2,2%
Food engineering	5892	1581	28	1,6%	1,6%	0,2%
Computers and information technology	9984	1948	294	2,6%	2,0%	1,6%
Mechatronics and robotics	2849	635	6	0,7%	0,6%	0,0%
Biotechnology	914	362	67	0,2%	0,4%	0,4%
Communication science	7914	2784	148	2,1%	2,8%	0,8%
Sociology	3182	2367	329	0,8%	2,4%	1,8%
Economy	1920	878	266	0,5%	0,9%	1,4%
Business Administration	11723	3873	128	3,1%	3,9%	0,7%
Management	10505	4339	490	2,8%	4,4%	2,7%
Psychology	8429	2775	186	2,2%	2,8%	1,0%
Cybernetics, statistics and economic informatics	5400	1484	212	1,4%	1,5%	1,1%
Biochemistry	240	0	0	0,1%	0,0%	0,0%
Informatics	9181	2098	98	2,4%	2,1%	0,5%
Environmental science	1547	661	51	0,4%	0,7%	0,3%
Mathematics	2279	753	141	0,6%	0,8%	0,8%
Total specializations for IR 4.0	**91088**	**28599**	**2858**	**24,0%**	**28,7%**	**15,5%**
Total specializations	**379867**	**99561**	**18490**	**100,0%**	**100,0%**	**100,0%**

Source: Processing based on Ministry of Education and Research data

Appendix 2

Table 5. **Main tertiary education institutions by number of undergraduates in IR4.0 selected domains**

Specialization	Institution
1. Electronic and telecommunications engineering	Universitatea Politehnică din București Universitatea Tehnică din Cluj Napoca Universitatea Tehnică "Gheorghe Asachi" Iași Universitatea Politehnica Timișoara
2. Food engineering	USAMV București USAMV Cluj Napoca USAMV "Ion Ionescu de la Brad" Iași
3. Computers and information technology	Universitatea Politehnică din București Universitatea Tehnică din Cluj Napoca Universitatea Tehnică "Gheorghe Asachi" Iași Universitatea Politehnica Timișoara
4. Mechatronics and robotics	Universitatea Politehnică din București Universitatea Tehnică din CLuj Napoca Universitatea "Lucian Blaga" din Sibiu Universitatea Politehnica Timișoara
5. Biotechnology	USAMV București

Specialization	Institution
	USAMV Cluj Napoca USAMV a Banatului Timișoara
6. Communication science	Universitatea din București SNSPA București Universitatea Babeș-Bolyai din Cluj-Napoca
7. Sociology	Universitatea din București ASE București Universitatea "Babeș- Bolyai" Cluj Universitatea "Alexandru Ioan Cuza" din Iași
8. Economy	ASE București Universitatea Babeș-Bolyai din Cluj-Napoca
9. Business administration	ASE București Universitatea „1 Decembrie 1918" din Alba-Iulia Universitatea "Transilvania" Brasov Universitatea Babeș-Bolyai din Cluj-Napoca Universitatea "Ovidius" Constanța Universitatea "Alexandru Ioan Cuza" din Iași Universitatea din București Universitatea "Lucian Blaga" din Sibiu
10. Management	ASE București Universitatea Transilvania din Brașov Universitatea Tenică din Cluj Napoca Universitatea Babeș-Bolyai din Cluj-Napoca Universitatea "Alexandru Ioan Cuza" din Iași Universitatea de Vest din Timișoara
11. Psychology	Universitatea din București Universitatea Babeș-Bolyai din Cluj-Napoca Universitatea "Alexandru Ioan Cuza" din Iași Universitatea de Vest din Timișoara Universitatea Spiru Haret din București
12. Cybernetics, statistics and economic informatics	ASE București Universitatea Babeș-Bolyai din Cluj-Napoca Universitatea "Alexandru Ioan Cuza" din Iași Universitatea de Vest din Timișoara Universitatea Româno-Americană din București
13. Biochemistry	Universitatea din București Universitatea de Vest din Timișoara
14. Informatics	Universitatea din București Universitatea Transilvania din Brașov Universitatea Babeș-Bolyai din Cluj-Napoca Universitatea din Craiova Universitatea "Alexandru Ioan Cuza" din Iași Universitatea de Vest din Timișoara
15. Environmental science	Universitatea din București Universitatea Babeș-Bolyai din Cluj-Napoca Universitatea "Alexandru Ioan Cuza" din Iași Universitatea Ecologică din București
16. Mathematics	Universitatea din București Universitatea Babeș-Bolyai Cluj-Napoca Universitatea "Alexandru Ioan Cuza" din Iași

Source: Processing based on Ministry of Education and Research data

Appendix 3

Table 6. **Tertiary education institutions by number of students in IR4.0 selected domains**

Institution	*Undergraduates*	*Master*	*PhD.*
1. Universitatea „Babeș - Bolyai" Cluj	9597	2697	280
2. Academia de Studii Economice din București	8163	2944	590
3. Universitatea Politehnică din București	6596	1924	367
4. Universitatea din București	6179	2820	232
5. Universitatea „Alexandru Ioan Cuza" din Iași	5950	1877	203
6. Universitatea Tenică din Cluj Napoca	4964	1134	143
7. Universitatea Transilvania din Brașov	3639	921	36
8. Universitatea de Vest din Timișoara	3602	1197	177
9. Universitatea Politehnica Timișoara	3586	755	84
10. Universitatea „Lucian Blaga" din Sibiu	3096	1062	65
11. Universitatea din Craiova	2709	847	93
12. Universitatea Spiru Haret din București	2081	349	0
13. Universitatea Tehnică „Gheorghe Asachi" Iași	1987	447	34
14. Universitatea din Oradea	1909	620	60
15. Universitatea „Dunărea de Jos" Galați	1784	588	40
16. Universitatea din Pitești	1729	642	14
17. Universitatea „Ștefan cel Mare" Suceava	1657	451	58
18. Universitatea „Hyperion" din București	1522	268	0
19. SNSPA București	1476	1269	90
20. Universitatea „Ovidius" Constanța	1444	410	1
21. Universitatea „Aurel Vlaicu" Arad	1142	408	0
22. Universitatea Româno-Americană din București	1141	269	0
23. Universitatea „Petrol-Gaze" Ploiești	1136	395	0
24. USAMV București	1125	534	43
25. Universitatea din Bacău	1107	237	0
26. Universitatea „Sapientia" din Cluj-Napoca	917	204	0
27. Universitatea „Valachia" Târgoviste	859	263	170
28. Universitatea Ecologică din București	826	320	0
29. Universitatea „1 Decembrie 1918" din Alba-Iulia	824	243	0
30. USAMV Cluj Napoca	808	247	14
31. Universitatea „Artifex" din București	644	162	0
32. Universitatea „Bioterra" din București	613	63	0
33. Universitatea „Petru Maior" Târgu Mureș	582	162	0
34. USAMV „Ion Ionescu de la Brad" Iași	578	70	0
35. USAMV a Banatului Timișoara	576	184	13
36. Academia Tehnică Militară din București	561	166	51
37. Universitatea „Danubius" din Galați	540	80	0
38. Universitatea din Petroșani	527	234	0
39. Others	2912	1136	0
40. Universitatea „Andrei Șaguna" din Constanța	428	118	0
41. Universitatea „Nicolae Titulescu" din București	388	43	0

Institution	*Undergraduates*	*Master*	*PhD.*
42. Universitatea de Vest „Vasile Goldiș” din Arad	370	205	0
43. Universitatea „Tibiscus” din Timișoara	364	94	0
44. Universitatea „Constantin Brâncuși” Târgu Jiu	296	110	0
45. Universitatea „Bogdan Vodă” din Cluj-Napoca	212	105	0
46. Fundaţia Universitară „Alma Mater” - Universitatea „Alma Mater” din Sibiu	191	0	0
47. Universitatea Creștină Partium din Oradea	184	104	0
48. Universitatea „George Bacovia” din Bacău	131	113	0
49. Universitatea Agora din Municipiul Oradea	117	64	0
50. Universitatea Maritimă Constanța	98	21	0
51. Universitatea „Eftimie Murgu” Reșița	81	63	0
52. Universitatea Tehnică de Construcții București	52	0	0
53. Institutul de Administrare a Afacerilor din București	0	96	0

Source: Processing based on Ministry of Education and Research data

Ethics Education in Accounting – A Perspective from Romanian Academics

Andreia Manea[a, 2]

[a] *Bucharest University of Economic Studies, Romania*

Abstract: *Ethics should be central to a professional accountant's life. But how is it taught and how important are the ways it is taught and implemented? I looked at these questions from various angles: how economic curricula include ethics, how students in economic universities perceive it and, in this case, how professors in those universities feel about the way it is included in the curricula of their faculties. The conclusions, based on a selection of four out of seventeen total interviews carried at the beginning of 2021, are that professors in large economic faculties in the capital city of Romania do think there is a need for ethics to be taught but opinions are split as to whether the subject should be part of a self-standing course or ingrained. They believe, with some nuances, that their faculties do not cover the topic enough. In terms of the balance between theory and case studies in ethics university education, they believe there is a need for both, with all of the respondents seemingly favoring a practical approach. This qualitative research on professors' opinions of how ethics is taught, which naturally continues the desktop quantitative review of how ethics is included in Romanian economic universities curricula (Manea et al., 2021), is the first of its kind in Romania. Thus, it can form the foundation of future research questions and even practical steps to further strengthen the position of the ethics subject in curricula.*

Keywords: *Accounting, ethics, education, perspectives, academics.*

1. Introduction

During these especially troubled times (pandemic, war in the region) morals and ethical principles should be the guiding lights in the storm. This stands true especially for the accounting profession that has a strong Ethics Code at its core. This research is part of a much larger endeavor which will form my doctoral thesis. Its end objective is to provide a go-to guide of how accounting professionals encounter ethics in their career (from university to employment or practice), who are the most suited stakeholders to acquaint them with ethics (academics, associations or employers) and what are the tools for educating ethics (both theoretical and regarding practical implementation) so that it provides a collection of best practices or at least provokes some debate in the field of ethics teaching.

I started at the origins of where most accounting professionals are trained – in university. My initial research, together with fellow doctoral students, focused on a *desktop quantitative review* that investigated the annual study plans of the majority of Romanian economics faculties' programs in audit, accounting and business to see whether ethics was included and to what extent (Manea *et al., 2*021). More than 90% of programs had an ethics course despite it not being formally required by the higher

[2] *Corresponding author*: Bucharest University of Economic Studies, 6 Piața Romană, 1st District, Bucharest, 010374 Romania

education regulator in Romania (ARACIS). Of these courses, 80% were mandatory and approximately 85% had more than half of the maximum credit points allowed for this subject. These findings gave a good signal as to the importance these Romanian economics universities placed on ethics for future professionals.

The decision to also carry out a *qualitative review* came naturally after I realized that the research will be more comprehensive if I also saw the perceptions of the first educators of ethics for accounting professionals – academics. Not only that, but during the quantitative review I discovered that some disciplines cover ethics even if it is not the main topic so in order to obtain a fuller picture of the depth to which ethics is taught, I think the best choice was to ask directly the people teaching it. Another influencer in my decision to do such a rounded review of how ethics is taught was reading Ghaffari *et al*. (2008) who planned to follow a quantitative analysis with qualitative (interviews). It resulted in this research which is the first step in developing further on the discussions I had with a total of 17 professors in the year 2021.

In this research I first looked into the *regulatory landscape*, inspired by a comprehensive analysis of CSR in Poland found in Dyczkowska *et al.* (2017). I thought it was important to underline that ethics is found in so many university programs and also is considered so paramount by academics and students, all the while it not being a mandatory discipline. There are 12 standards specific to university education that ARACIS issues and enforces. Of these, the standards for Human Sciences and Theology and that for Economic Sciences (in which accounting is comprised) are the ones that haven't been updated in more than 5 years as compared to all the other ten that had been updated less than three years ago and up to the present year.

In the standard for Economic Sciences, ethics is found but is listed as „human science" among sociology, psychology, politology, philosophy, geography, economic history. The human science is listed as fundamental and mandatory discipline in all eight programs of economic sciences (Business Administration, Cybernetics Statistics and Economic Information, Accounting, Economy, Finance, Management, Marketing and Economy and International Business); however, ethics is just another option in a list of other sciences. Hence my conclusion is that the fact it is so pervasive in Romanian economic programs is not due to regulatory demands. The discussions on the topic were hence rich and diverse since the topic of ethics teaching is a matter of faculty decision and of perception. As Liamputtong (2013) (quoted in Saderuddin, 2018) mentioned qualitative methods "focus on context and provide a more holistic account of the reality" so due to these reasons the method of interviewing academics seemed the most appropriate in this context.

2. Research questions and objectives of the review

The main takeaway from the wider qualitative research was to find out the perceptions of academics on:

- The need for ethics education and how it is perceived by students
- How ethics is taught
    - The proportion and timing between theoretical and practical interventions in ethics education
    - How they include ethics in their courses (instruments)

- The way in which ethics is then continued in the professional lives of accountants and auditors (professional associations, perceptions on whistleblowers and on role of disciplinary decisions versus positive reinforcement)

My hypothesis was that ethics would feature centrally in their courses and if not, that they would be looking at ways how to make it more central. For the purposes of this research, only four of the 17 professors were selected based on where they teach (capital city of Romania) and the fact that they do not teach ethics as a self-standing course but they do have connections to teaching about the concept of ethics in the accounting profession to a smaller or larger degree. I selected only the following research questions from the whole interview, besides the demographic ones:

R1. Do interviewed professors think that there is a need of an ethics course at university level? (Question approached from the perspective of students' capacity of understanding of abstract notions?)

R2. Do they believe that economic universities sufficiently cover this subject?

R3. Do they find it difficult to find the right balance between theory and practical examples when they teach ethics?

3. Research methodology

As mentioned in the introduction, the qualitative research to find the academics' opinion on ethics education was the natural next step from the quantitative research.

The questionnaire was derived from findings of the literature review performed for the desktop quantitative research, the findings of the quantitative research itself and from discussions with my PhD coordinator. For instance, Ghaffari *et al*. (2008) was a key article for me in developing the questionnaire (and a big part of my research).

The questionnaire was then shared informally with one taxation professor who did not take part in the interviews for her opinion on the logic sequence and relevance of the questions. So, we might say that the interview was briefly tested by discussing with two professors whose opinions were considered in the final format of the interview.

After having the whole interview ready (*Appendix B*) I put together a brief presentation of the research and its main objectives (*Appendix C*) so that professors have the overall idea of what to expect during the interview and that all have a common understanding of the project (similar to Nkrumah-Abebres and Schachtebeck, 2017). Thus, I eliminated the potential differences that might have come from me explaining to them individually what the interview entails. Also, I might say that informed consent was obtained for voluntary participation which although not as formal as in Chowdhury, 2019, was quite formal as I believe paramount for such endeavors.

I then asked my PhD coordinator to recommend a few academics that might be suitable and willing to sit for a maximum of 60 minutes interview. The criterion was that they teach ethics (self-standing or ingrained) or an economics-related topic in an economic faculty, member of AFER. I benefited from the fact that I had her recommendation to

contact these academics and also from the fact that with some of them I was involved in other projects, so they had the confidence to talk to me. Also, some of them, at their turn, recommended other academics, so in the end, I had the pleasure of interviewing 17 professors over the first half of the year 2021. All of them are Romanian citizens, have Romanian as their native language and are teaching in an economics faculty, member of AFER.

Although I was the only researcher, I took into account the methodology used by Gupta *et al*. (2015) when I reviewed and discussed the interview questions and methods with my PhD coordinator, when I thought about the skills that I need to carry out the interviews and when I practiced the interview questions before actually performing them. This thorough thinking before the actual first interview assured their quality and consistency.

I decided to detail more how I gained access to professors and mention something about our Romanian hierarchies since I found an interesting article detailing the challenges of conducting qualitative interviews in a country with similar hierarchies, power balances and openness to discuss (Voldnes *et al.*, 2014).

The whole group of interviewed professors have been selected through context (no statistical method) but according to some strict criteria (teaching in large universities that are members of AFER, having some contact with professional ethics) hence they definitely have a say in the matter (arguments similar to Albu *et al.*, 2014). For this present research, I have selected from the total of 17 professors all those that are teaching in Bucharest and that do not have a self-standing course in ethics, to get a more nuanced opinion of ethics education. Hence for the purposes of this presentation I will present the analysis of a selection of questions from the interviews of four professors with the idea that their interviews give a good starting point of how to structure the more comprehensive analysis of all interviews I performed on the topic, for future research. *Appendix A* details the list of interviewees related to this article, some statistical generic data that they have shared: size of faculty and accreditation status as well as the length of the interview and date when it was taken (similar to Albu *et al.*, 2020). The selected interviews lasted from 25 to 59 minutes, with a mean of 40 minutes.

The questions I selected from their interviews, which form the research question of this article, are the ones which I considered to be the fundamental ones for this type of endeavor: first tackling the need for ethics in universities, then whether it is covered sufficiently in their faculty curricula, giving me a good starting point for analyzing the full interview for the full group of professors interviewed.

The interview was structured and formal and before agreeing to the interview all professors received in writing the overview of why they received that e-mail, what their participation will entail, results of the research and confidentiality conditions.

The interviews were carried via online platforms (mostly Google Meet), in the Romanian language, respecting the order of the questions. The interview started by asking generic questions, not linked to the topic but with placing the respondent in a context and moved towards the complex ones (Adhabi and Anozie 2017).

All those being interviewed agreed for the interview to be recorded. All the recordings are only audio although the meetings were carried out in video format because I found no relevance in keeping the video files for the purposes of these interviews. There aren't yet full transcripts of these interviews, for now only a summary and selection of most poignant observations from the recordings translated directly to English by me.

Thus, the ethical requirements were respected and there was consistency in the initial approach to professors as well as carrying out the interviews.

As usual, the literature review helped structure the presentation of the research and it was useful since this is the first interview-based research that I have performed. Also, literature review helped me have the confidence that even if data analyzed was not very recent, it was still good to use. Due to objective circumstances that were not connected to this research I was not able to analyze the interviews carried in the first half of 2021, so almost a year from then and my concern was that they might not be acceptable for publication. However, after finding a published article (Kilic and Uyar, 2017) which used four years old interview data and explaining why they thought it was still relevant, I realized that age of data should not be an impediment if there are logical arguments why that information is still relevant. Definitely, within this research I believe this to be case as there have been no changes in the regulatory landscape governing economics university subjects (as mentioned before the ARACIS standards for economy have the oldest updates).

Data limitations. Since respondents have not been selected following any statistical sampling criteria there might be a suspicion that they are not a representative group. However, because very strict criteria were applied to selecting them, they are very relevant for the topic of the research.

One shortcoming which was only later noticed was that all are coming from State universities although AFER also has as Private universities as members. This is something to tackle in the future steps.

Another issue was that being the only researcher I do not have who to run the findings by, especially since quite a long time has passed since the interviews were taken and another opinion on the general feeling of how the interviews went might have been useful.

4. Literature review

As I agree that "interviews form the backbone of primary data collection in qualitative research" (Adhabi and Anozie, 2017) it made sense that for my first qualitative research article, interviews are the main ingredient as they will help me understand and counteract the limitations of my previous quantitative research.

In performing the literature review I focused on three directions of research that eventually helped me structure my thinking for this article.

1) *How interviews are used in research*

Almost all articles quoted in this research have at least a part which is based on interviews or describing interview techniques. What I found particularly interesting, because I didn't expect to have this issue, but I did, was the difficulty to transpose the nuances of the discussion from our native languages, as well as the inflexions of voice, into English and on paper (this was also captured by Schembri, 2022 and Feldermann, 2019).
Also, the articles by Nkem and Tengeh, 2018, Irsyadillah and Lasyoud, 2018 as well as Dewu and Barghathi (2019) helped me understand how quotes are used, put into context and also helped me linking quotes to generic statements.
Dellaportas, 2006, also helped with deriving learnings from the interview data and De los Reyes *et al*., 2017, made me pay attention to divergence points in answers as well as consensus.

2) *How ethics is included in curricula*

   For this, my previous research was useful, and I used a lot of the articles that formed the literature review of the previous paper on ethics education on Romania (Manea *et al.*, 2021) and

3) *How educators are consulted regarding their perception on ethics education* (not necessary in accounting).

The article by Ghaffari and Brennan (2008) was a corner stone, as well as Miller and Becker (2011) and Miller and Shawer (2018).

All these directions helped me structure my methodology, design the interview and its setting and finally performing it, then extracting relevant data from it. Therefore, references are found across the article while the actual literature review section is short.

5. Findings

I always start my research endeavors with a practical objective in mind and this one is no exception. Finding the perceptions of professors on whether accounting ethics is needed, how it is taught in universities and then continued in professionals' lives will give a structured start to future researchers and hopefully will motivate academics who are implementing changes to the universities and professional associations' curricula to think (differently) about ethics. This is only the first step in this direction since, as far as I could find, this is the first research of this kind in Romania.

My thinking is that I lay another stone to the strong foundation that teaching ethics for professional accountants must be, by asking the opinions of senior academics from large economics faculties.

I have no claim that the findings from this article can be generalized (similar to Chowdhury 2019), on the other hand, they will increase the understanding about how academics in Romanian economic faculties perceive ethics and how they teach it.

Finding the right balance between meaningfulness of research and time spent doing the interviews was something which I also considered a lot, especially being the sole researcher, so my time on this research was the only resource available. In Free *et al*.

(2016) I found that median number of interviews in published articles in leading accounting journals is 26 so I think the total number of interviews in the research, seventeen, is balanced and relevant. However, I still had doubts whether the selection of four interviews I made for this paper was enough. I then saw in a further table that the paper also mentioned that reputable journals published articles with 1, 2, 3, 4 and 6 interviews so this paper with 4, if it draws on the right content, it also can be interesting.

This research is the basis, and the testing, for further diving in the larger group and wider interview that will be developed later. Hence, the questions that I selected for it tackle the perception of the overall situation of ethics without going into details: the need for ethics in universities, whether it is covered sufficiently in their faculty curricula as well as how professors find a balance between theory and practice when they teach ethics. This will be me a good starting point for analyzing the full interview for the full group of professors interviewed.

Two of the interviewed professors observed that ethics is evolving and has its "dynamic" as compared to the past, even accelerated by AI developments and more complicated business structures.

> *In the past, accounting ethics meant that you should pay attention how you made your calculations, not commit fraud, send documents to authorities in a timely manner, but now it has many hidden implications…* ***(A4)***

> *I think that this is a very dynamic area because ethical dilemmas appear all the time especially in the areas I teach.* ***(A3)***

Moreover, they have the perception that professionals and even the regulators do not keep pace with these changes.

> *…many accountants don't see this extrapolation of ethics and how far it can reach.* ***(A4)***

> *All the issues are maintained by the gap between the dynamic of business models and the dynamic of the structure of financial reporting standards. Standard setters do not keep pace with the dynamic of business models and by the time they standardize and find the best ethical solution, practice advances and opportunistic behaviors appear…* ***(A3)***

It is not a surprise then that all professors considered that academia doesn't sufficiently cover this topic except one professor who initially said yes citing a lack of news about accounting scandals in Romania, hence extrapolating that we must cover ethics sufficiently at local level, but then nuanced the reply by mentioning that actually in our market maybe actually ethics is ignored altogether, and this is why we don't hear of such scandals.

A remark that I read in the same vein of bitter-sweet opinion of Romanian society came from another respondent

> *I think that learning what it means to be ethical has to start from very early education, from primary education, because if you are growing in a system*

> *where you are always compared with others, always put in your place, never having freedom, never having to have initiative or where you are never allowed to express your divergent opinions, these things are very important in developing some soft skills or some fine behavior traits which later are coming together to form what it means for me to be ethical… We cannot ask our students to be more ethical than we are, we cannot ask our students to be more ethical than society is in general. (**A3**)*

One of the respondents (the only one clearly in favor of a self-standing course – **A1**) proposed that there should be even two separate ethics' subjects – a generic one at BSc level and a more specific one (for accounting purposes) at Master level. Otherwise, the opinions regarding the necessity of the ethics education at university level were very unanimous. Ethics is needed but the comments ranged from when it should be included (towards a higher level) and how (three of four respondents leaned towards integrated in other courses).

One professor that favored the ingrained approach argued that:

> *Ethics should not be separated from the technical competencies developed by a future professional. Ethics is not applied independently from the professional activity and it should be incorporated in a context. **(A2)***

Another believed "ethics should be taken into consideration in absolutely every university subject" (**A3**).

The discussion regarding theory versus practice was rich but without divergent opinions – all seemed to favor the practical approach with two of the professors arguing that it is more appropriate for the desire of the current generation to learn something practical very fast: "…(*Students*) want you to go to the point as fast as possible" (**A2**) and "people want to learn something applied", the "philosophical debate" … "can be done in other faculties if they want" (**A4**).

One professor even combated the mere idea that ethics has abstract notions (when asked the first question regarding the need of the ethics course at university level) by arguing:

> *They are not abstract because we have an Ethics Code of the profession. We have an ethics code so, from their point of view, they have practical elements. They will have to be applied. You cannot say that an Ethics' Code is theoretical. Even if it has principles and notions that are theoretical these are only introductory and then the other elements appear (**A1**)*

Practice was so much favored that there was one voice that also mentioned the preferred order of teaching is "from case study to theory and not the other way around. So, they *(note: students)* need to feel that they need the theory." (**A2**)

The reason cited by one respondent as to why it doesn't so often happen that the professor "introduces ethical values, asks ethical questions, make students think, ask their opinions" was that "many times the professor is the active side and the student the passive one since this is how we were used to and then because we work with very large groups of students" (**A3**).

6. Conclusions and next steps

After analyzing only four of the seventeen interviews and based on the overall impression that the conversations with professors left me, I can safely conclude that there is a unanimous view that introducing ethics concepts in university (and even earlier) is necessary and that economic universities do not sufficiently cover the subject (with some nuances).

The opinions on whether theory and practice in ethics education are easy to introduce in the right balance and order are not necessarily divergent but more detailed and nuanced (due to generation's preferred learning, to the nature of ethics and capacity of understanding of students). However, there is no professor I discussed with who doesn't have a strong opinion on this respect and the whole group seemed to favor practice.

In terms of next steps, I have first to transcribe all the interviews that were taken into word documents (similar to Dellaportas, 2006). Then I will analyze qualitative transcripts by open coding them using a grounded theory approach (Corbin & Strauss, 2007; Glaser & Strauss, 1997; Strauss & Corbin, 1998 quoted in Austin and Toth, 2011).

Then, similar to Aureli *et al*. (2018), I have in mind to back to certain interviewees and organizing more in-depth interviews on the topic of ethics.

Also, as I liked the idea from Rutherford (2005) of "introducing tension" in a study as presented by Klimczak *et al*. (2016). I am thinking to maybe also do that by grouping faculties by opposition: for instance, private versus state ones but for this I will need to have at least as many interviews from private universities (at least from the capital city) which might pose a problem. On the other hand, there will be a tension which will naturally appearing in the larger group of already interviewed professors, that some of them teach ethics as self-standing course and others integrate it in their subjects.

Last but not least, since all interviews were carried in Romanian, but analysis and quotes made in English, I should develop a manuscript's methods section according to Feldermann and Hiebl (2019).

Acknowledgments

I would like to thank my line manager, for being very open about this endeavor to research ethics in an academic setting, my PhD coordinator and the 17 professors from various economic universities in Romania who kindly allocated their time for discussing with me.

References

Adhabi, E.A.R., & Anozie, C.B.L. (2017). Literature Review for the Type of Interview in Qualitative Research. *International Journal of Education*, vol. 9, no. 3: 86.

Albu, C.N., Albu, N., & Alexander, D. (2014). When global accounting standards meet the local context—Insights from an emerging economy. Critical Perspectives on Accounting, vol. 25, no. 6: 489–510

Albu, N., Albu, C.N., Apostol, O., & Cho, C.H. (2020). The past is never dead: the role of imprints in shaping social and environmental reporting in a post-communist context. Accounting, Auditing & Accountability Journal, vol. 34, no. 5: 1109–1136.

Aureli, S., Cardoni, A., Del Baldo, M. & Lombardi, R. (2018) The balanced scorecard logic in the management control and reporting of small business company networks: A case study, *Journal of Accounting and Management Information Systems,* vol. 17, no. 2, pp. 191-215.

Austin, L.L., & Toth, E.L. (2011). Exploring ethics education in global public relations curricula: Analysis of international curricula descriptions and interviews with public relations educators. Public Relations Review, vol. 37, no. 5: 506–512.

Corbin, J.M. & Strauss, A.C. (2007). *Basics of qualitative research (3rd edition).* Thousand Oaks, CA: Sage.

Chowdhury, A. & Nikhil, C.S. (2019), Influence of New Public Management Philosophy on Risk Management, Fraud and Corruption Control and Internal Audit: Evidence from an Australian Public Sector Organization, *Journal of Accounting and Management Information Systems,* vol. 18, no. 4: 486-508.

De los Reyes, G., Kim, T.W. & Weaver, G.R. (2017). Teaching Ethics in Business Schools: A Conversation on Disciplinary Differences, Academic Provincialism, and the Case for Integrated Pedagogy. *Academy of Management Learning & Education*, vol. 16, no. 2: 314–336.

Dellaportas, S. (2006). Making a Difference with a Discrete Course on Accounting Ethics. *Journal of Business Ethics*, vol. 65, no. 4: 391–404.

Dewu Khadija and Barghathi Yasser (2019) The accounting curriculum and the emergence of Big Data, *Journal of Accounting and Management Information Systems,* vol. 18, no. 3: 417-442.

Dyczkowska, J., Krasodomska, J., & Michalakc, J. (2016) CSR in Poland: Institutional context, legal framework and voluntary initiatives, *Journal of Accounting and Management Information Systems,* vol. 15, no. 2: 206-254.

Feldermann, S.K. & Hiebl M.R.W. (2019) Using quotations from non-English interviews in accounting research, *Qualitative Research in Accounting & Management,* vol. 17, no. 2: 229-262.

Free, C., Dai, N.T., & Gendron, Y. (2016) Interview-Based Research in Accounting 2000-2014: A Review. Research Methods & Methodology in Accounting eJournal (2016): n. pag.

Glaser, B. G. & Strauss, A. (1997) *Grounded theory in practice*. Thousand Oaks, CA: Sage.

Ghaffari, F., Kyriacou, O., & Brennan, R. (2008). Exploring the Implementation of Ethics in U.K. Accounting Programs. Issues in Accounting Education, vol. 23, no. 2: 183-198.

Graham, A. (2012) The Teaching of Ethics in Undergraduate Accounting Programmes: The Students' Perspective. *Accounting Education,* vol. 21, no. 6: 599-613.

Gupta, M., Forlini, C., Lenton, K., Duchen, R., & Lohfeld, L. (2015) The Hidden Ethics Curriculum in Two Canadian Psychiatry Residency Programs: A Qualitative Study. *Academic Psychiatry,* vol. 40, no. 4: 592–599.

Irsyadillah I. & Lasyoud, A.A. (2018) Does accounting education develop ethical maturity? Evidence from Indonesia, *Journal of Accounting and Management Information Systems,* vol. 17, no. 3: 462-483

Klimczak K.M., Dynel M. & Pikos A. (2016) Goodwill impairment test disclosures under uncertainty, *Journal of Accounting and Management Information Systems,* vol. 15, no. 4: 639-660

Liamputtong, P. (2013) *Qualitative Research Methods,* 4th ed. Victoria: Oxford University Press

Manea, A., Hoinaru, R., & Păcuraru-Ionescu, C.P. (2021) "Ethics education in Romanian economics faculties, members of AFER" Proceedings of the International Conference on Business Excellence, vol.15, no.1, 2021:705-714.

Kılıç, M. & Uyar, A. (2017) Adoption process of IFRS for SMEs in Turkey: Insights from academics and accountants, *Journal of Accounting and Management Information Systems,* vol. 16, no. 2: 313-339.

Miller, W.F. & Shawver, T.J. (2018). An Exploration of the State of Ethics in UK Accounting Education, *Journal of Business Ethics*, vol. 153, no. 4: 1109-1120.

Miller, W. & Becker, D. (2011). Ethics in the Accounting Curriculum: What Is Really Being Covered? *American Journal of Business Education*, vol. 4: 40-49. 10.19030/ajbe.v4i10.6057.

Nke, L. &Tengeh Robertson, K. (2018) Financial Economics Immigrant-operated Informal Financial Associations in South Africa: Problems and Solutions, *Acta Universitatis Danubius*, vol 14, no. 1.

Nkrumah-Abebres, B. & Schachtebeck, C. (2017) Street Trading in South Africa: A Case of the Tshwane Central Business District, *Acta Universitatis Danubius*, vol. 13, no 3.

Rutherford, B.A. (2005) "Genre analysis of corporate annual report narratives", *Journal of Business Communication*, vol. 42, no. 4: 349-378

Saderuddin, A. and Barghathi, Y. (2018) The impacts of introduction of VAT on the audit profession and economy in the UAE: Auditors' perspective, *Journal of Accounting and Management Information Systems*, vol. 17, no. 3: 406-439

Schembri, N., Jahić Jašić, A. (2022) Ethical issues in multilingual research situations: a focus on interview-based research, *Research Ethics*, March 2022

Strauss, A. & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Thousand Oaks, CA: Sage

Voldnes, G., Grønhaug, K., & Sogn-Grundvåg, G. (2014). Conducting Qualitative Research in Russia: Challenges and Advice, *Journal of East-West Business*, vol. 20, no. 3: 141-161.

Standarde Specifice - ARACIS (https://www.aracis.ro/standarde-specifice-evaluare-licenta/) 6._Standarde_ARACIS_-_Comisia_6._7-_Stiinte_Economice-27.04.2017.pdf (https://www.aracis.ro/wp-content/uploads/2019/07/6._Standarde_ARACIS_-_Comisia_6._7-_Stiinte_Economice-27.04.2017.pdf

Appendix A. List and details of interviewees and interviews (similar to Albu *et al.*, 2020)

Nb.	Interviewee details as given by them during the interview	Interview code	Duration	Date
1	Teaches two courses (one in BSc and one in a Master's degree). The faculty where they teach has four series of Romanian-speaking classes plus one of English-speaking BSc	**A1**	25 min	05 March 2021
2	Some 1500 students, teaches first year BsC in two colleges and also holds seminars in one Masters	**A2**	43 min	03 March 2021
3	Teaches one BSc course and one masters course	**A3**	59 min	16 March 2021
4	Largest university I taught for 23,000 students, teaches four courses also in a non-executive MBA	**A4**	33 min	12 March 2021

Appendix B. Full interview questions

1. How many students does the faculty you teach have, how many courses do you teach?
2. Is your program accredited by CECCAR or CAFR?
3. For how many years have you been teaching, what disciplines? (The only ways to identify the teacher)
4. Do you teach Ethics at university economics programs? Is it taught as a stand-alone subject or included in several courses? In what courses? What percentage of the time do you think is devoted to that subject in those courses?
5. Do you teach ethics in the programs of professional associations (CECCAR, CAFR)? Do you know anyone who teaches?
6. Do you consider that such a course is needed at university level? (How do you adapt abstract notions based on students' level of understanding)
7. Do you use any of the following methods to teach ethics?
    - The case-based method is one of the most popular (Winston, 2000; Thorne *et al*., 1999 cited by Leung *et al., 2*008), but researchers also mention:
    - Ethics textbooks (with the disadvantage that they are too philosophical and with a large part of the learning examples directed to the problems faced by managers and senior executives) (Mathison, 1988 quoted by Leung *et al., 2*008)
    - Lectures (Davidson, 2011)
    - Workshops on applied ethics (Kaufmann, 2018)
    - Themes (Davidson R.A., 2011)
    - Reflective learning (personal diary, work diaries) (Limijaya, 2019)
    - Guest sharing (Limijaya, 2019)
    - Literature and other forms of narrative material (plays, short stories and film) (Young & Annisette, 2009)
    - Experiential learning (Huber and Mafi, 2013 quoted by Chelariu *et al., 2*014)

- Students who become content creators (Kaciuba, 2012 quoted by Chelariu *et al., 2*014)

8. Based on your experience, what is the best time (sooner or later during studies / profession) to include notions of ethics in the education of future professionals?
9. Do you consider that this topic is sufficiently covered in your economic universities / college? In professional associations?
10. How difficult do you find it to achieve the ideal balance between theory and practical experiences / cases when teaching ethics?
11. Do you think it is preferable to approach the subject first on a theoretical or on practical level?
12. How do students react when they are told / taught about ethics?
13. How do you think their future professional development is influenced by whether they have an ethics course in a university / professional association?
14. With regard to the implementation and fixing of the notions of ethics in the daily life of professional accountants, do you consider that it is better to publish disciplinary decisions (i.e., to promote negative cases) or to promote whistleblowers (promotion of positive cases)?
15. Do you know whistleblowers in Romania? How about abroad? How did you hear about them?
16. Do you think they should be promoted? How?

Appendix C. The outline of the communication sent to professors beforehand. Information relevant for interviews

Part of my doctoral thesis (*The role of ethics in the development of the successful professional accountant*) I want to analyze the way in which the subject of ethics is approached in the classroom, in the economic faculties of Romania.

We have already undertaken an analysis of all the business and accounting programs offered by AFER member faculties to see how ethics is included in them. You can see the results here (https://doi.org/10.2478/picbe-2021-0066).

The next step is to do a few interviews of up to 60 minutes, via Skype or other online platform, in March 2021, with professors from these faculties to see.

- How curricula include notions of ethics (theory and practice)
- The way in which they themselves include ethics in their courses
- Their views on how the national association of professionals (CECCAR) teaches the ethics of professional accountants
- Practical application of ethics (whistleblowers)
- What do they think about the promotion of ethics to professional accountants (disciplinary sanctions compared to the promotion of whistleblowers - negative vs positive reinforcement)?

Interviewers will receive an email invitation to a 60-minute interview with myself, outlining the purpose of my research, the purpose of the interview for which they were selected, and the proposed confidentiality arrangements (if they have other proposals to protect their anonymity, I will gladly implement them). If they do not teach ethics or have an opinion on how it should be taught, I will not include them in interviews.

The interview will be conducted via Skype. Teachers will know in advance that the interview will be recorded, but only to be accurate in transcribing their ideas. Under no circumstances will the recording or excerpts from it be made public. They also have the option of disagreeing with the recording in which case I will take notes while the interview is taking place. Also, in that first invitation e-mail, they will have confirmation that the only purpose for which I will use the interview will be my research thesis and the articles that are related to it. Participating professors will be identified in the results of my research only by the size of their faculty (number of students). Interview recordings will be stored on a personal password-protected hard drive that only I will have access to and will be completely deleted after the articles are completed. A copy of the articles will be sent to the participating teachers once they are ready, even before they are published.

SECTION 2

ESG En Vogue. Can We Have Our Cake and Eat It Too? A Literature Review

Loredana Pamfile

Intangible Capital in the Accounting Literature – A Science Mapping Approach

Mihaela Curea

Marilena Mironiuc

Maria Carmen Huian

ESG en Vogue. Can We Have Our Cake and Eat It Too? A Literature Review

Loredana Pamfile [a, 3]

[a] *Bucharest University of Economic Studies, Romania*

Abstract: *This paper is devoted to understanding the current state of affairs in the academic literature covering ESG factors and the impact they have on capital market. ESG is now mainstream worldwide, but the question remains – how accurately does ESG data capture a firm's performance, especially in different geographies, or more specifically in developed, emerging or frontier markets? Overall, the existing literature acknowledges the momentum of the ESG movement and the impact and interest it raises in capital markets worldwide, but also recognizes that established and emerging markets react and incorporate ESG information differently and that the available ESG products being sold today are not a cookie-cutter solution worldwide, that geography, cultural expectations, specific country regulations and a multitude of other particularities play a vital role in what ESG means for specific territories around the world.*

Keywords: *ESG, CSR, SRI, sustainable finance, literature review; sustainable investment; ESG regulation.*

1. Introduction

ESG is now mainstream worldwide, there is no hiding from it, whether you are an issuer, a firm, an investor or a regulator. Markets across the world are thirsty for more ESG information, firms are grappling with the incessive demand from investors to prove themselves sustainable, and regulators are lagging in keeping up with this new reality.

Despite an incredible amount of ESG data, firms are improvising on how to meet voluntary disclosure expectations and mandatory disclosure requirements, investors are struggling to make sense of the outpour of ESG material, ESG ratings providers are using their own methodologies to sell a plethora of reports, which in turn results in market confusion due to a lack of standardization, resulting in bizarre scenarios where the same company, evaluated on the same publicly available data, has considerably different ESG standings (Kotsantonis 2019).

Sustainable investment is not that novel a concept, stemming from religious laws since ancient times, when society oversaw people's endeavors and penalized injurious or forbidden activities, such as under the Islamic law of banking or the Quakers movement against weapons and tobacco enterprises (Tripathi, 2020).

Ironically, there is an anomaly in the market, with sin stocks delivering higher abnormal returns, possibly because they are spurned so excessively, they become systematically

[3] *Corresponding author*: Bucharest University of Economic Studies, 6 Piața Romană, 1st District, 010374 Bucharest, Romania

underpriced, thus rewarding investors willing to take on the reputational risk with a return premium (Blitz, 2017). Sinful stocks are antithetical to ethical investing, with immoral activities ranging from gambling to alcohol to weapons to sex-related industries (Blitz, 2017).

In consequence, one must ask themselves – are markets becoming more ethical, inclined to follow the path of more moral avenues of investment, or is the focus on ESG a fleeting trend, companies window-dressing their initiatives to save face and show the best version of themselves to investors, customers and their broader audience of stakeholders? This paper tries to answer this question and address some follow-ups in through an extensive literature review.

2. ESG definitions and feeble attempts to regulate

ESG is defined in plentiful ways in both the academic and the financial world, with terms such as CSR, SRI, ESG or sustainable investment being used interchangeably (Liang 2020; Sciarelli 2019; Kotsantonis 2019; Ali 2021; Pinney 2019; Tripathi 2020).

Sciarelli (2019) defines socially responsible investment (SRI) as an investment strategy that incorporates into conventional investment decisions a mingling of ethical values, environmental considerations, better social conditions and improved governance.

Liang (2020) describes corporate social responsibility (CSR) as the process of integrating environmental, social and governance factors into corporate management, business decision-making and portfolio's structure, with the underlying assumption that socially responsible companies will internalize the externalities they create (for example, pollution) and will hold themselves accountable not only to shareholders, but to the broader audience of their stakeholders. Liang includes in their discussion a classification of CSR worth mentioning - strategic CSR, focused on reputational gains and enhancing competitive advantage or the proverbial "doing well by doing good," not-for-profit CSR, which stems from purely philanthropical motivations, and CSR resulting from agency problem, which is reflecting of investors' preferences and does not always align with maximizing shareholder value (Liang 2020).

Ding (2021) recognizes the distinctive nature and fragmentation of existing ESG literature and undertakes a systematic literature review to separate four major themes driving ESG results: (1) government vs. freedom or laissez-faire business activity vs. ESG duties, (2) institutional, organizational and individual levels or the various actors relevant to the ESG big picture, (3) stakeholder theory and (4) CSR or the more novel theories used to understand and model future frameworks addressing ESG responsibilities and performance.

In emerging and frontier markets, investors are not as focused on sustainability and ESG factors, in part due to operational difficulties stemming from a lack of regulatory oversight and disproportionate governance (Odell 2016). However, Odell argues that active ownership and investors using more than an ESG quantitative scoring methodology and incorporating the more qualitative ESG aspects into their valuation models and decision-making results in higher returns and a better mitigation of risks. Odell also makes a vital distinction between CSR and ESG factors, with CSR embodying a more charitable approach, autonomous from the core commercial

enterprise, whereas ESG factors translate into policies and strategies that drive long-term value creation for the firm. Overall, Odell believes that combining material ESG factors with conventional investment due diligence can result in better investing strategies.

Table 1. **ESG pillars and components from Ting (2019); Odell (2016); UNPRI Brochure (2021)**

Pillar	Major components
Environmental	Climate change, pollution, environmental management, water scarcity, carbon pricing, deforestation
Social	Employee relations, community involvement, health and safety, human rights, the involvement of harmful products/services, supply chain sustainability, anti-corruption and bribery efforts, modern slavery, child labor
Governance	Policies, practices, board composition and succession planning, cyber security, executive compensation, exposure to politically sensitive individuals, ESG-related disclosure, board diversity and structure, political lobbying and donations, tax strategy, rules used by firms to empower themselves, transfer pricing

However ESG is defined, companies and investors alike must be mindful that markets encourage and welcome more desirable social outcomes and reward ESG practices and that presently, civil society, be it consumers or stakeholders, expect market actors to take a more active role in initiating sustainable products and investments and go beyond legally required ESG practices that have a positive impact on society and the environment (Eliwa 2021).

The ESG landscape is still relatively unregulated, though voluntary ESG disclosures are common, but are mostly compromised by a lack of standardization in ESG methodologies, forcing investors to take ESG information with a grain of salt at best (Hazen, 2020). Eliwa points out that the lack of regulation allows managers to deliberately manipulate their ESG disclosures by getting creative with their language, using more complex syntax to hide their poor performance (Eliwa, 2021).

The European Union introduced the EU Taxonomy in 2020, which lists environmentally sustainable activities in an attempt to create some security for investors and protect them against greenwashing and encourage capital market actors to put their money where their mouth's at – in green bonds and other sustainable initiatives (Grote, 2020). The EU regulation focuses on six environmental objectives: climate change mitigation, climate change adaptation, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control and protection and restoration of biodiversity and ecosystems (Hazen, 2020).

In the United States, the ESG market is remarkably unregulated, with the SEC's limiting themselves to providing guidance for companies wishing to make ESG disclosures (Hazen, 2020). There are some more recent disclosure requirements in SEC Regulation S-K, where companies must disclose material aspects about the workplace environment and human capital and a proposed climate disclosure rule that would allow for federally mandated corporate ESG disclosure (Hazen, 2020).

Plastun's (2019) study finds more than 300 regulatory disclosure tools based on ESG criteria, from standards to laws to regulation and conceptual frameworks (Plastun, 2019). Plastun (2019) argues that for more transparency, investment appeal and a competitive edge for sustainable firms, markets need standardized government intervention in the form of ESG disclosure regulation and the enactment of sustainable development reporting (Plastun, 2019).

Though ESG regulation is showing up in numerous jurisdictions around the world, the ESG regulatory landscape remains mostly uncharted, and all market actors are impatiently waiting for governments to rise up to the challenge and bring about just the right amount and mix of ESG regulation. Despite the copious amount of ESG information, markets do not have a consistent, standardized framework through which to report, assess and incorporate ESG disclosures, making everyone frustrated.

3. Methodology

The paper reviews the relevant literature concentrating on accounting and finance literature employing quantitative methods to investigate the impact of ESG components on corporate performance. Some of the keywords used in selecting relevant academic works are "ESG," "CSR," "SRI," "sustainable investment," "sustainable finance," "literature review."

4. ESG and corporate performance: a literature review

Shuffling through the academic literature published over the last years, one can conclude there exists enough aggregated experimental data to support the strong link between ESG factors and the impact they have on firm performance and companies' bottom line (Brooks, 2018; Ding, 2022; Eliwa, 2021; Grote, 2022; Ting, 2019; Yu, 2021).

The question remains – how accurately does ESG data capture a firm's performance, especially in different geographies, or more specifically in developed, emerging or frontier markets?

Kotsantonis (2019) expresses skepticism about just how precisely ESG data reflects firm performance, claiming that data inconsistency in how different companies report poses an incredible challenge in measuring ESG investment and performance. For more context, Kotsantonis (2019) used a randomized selection of 50 Fortune 500 companies and manually collected information on how they report on a specific sustainability issue (employee health and safety) and found over 20 different reporting styles, with distinct terminology and units of measure. The reporting variation imposes extreme hardship when comparing companies' performance (Kotsantonis, 2019). According to Kotsantonis (2019), benchmarking (or how you define the best and the worst within a selected category) also proves problematic: a peer group can be defined as universal or industry-specific, with the final ESG scoring of a firm being directly influenced by the range of performance (Kotsantonis, 2019). Given the complicated reality of ESG data providers using different industry classifications, building their individual models for scoring and applying different methodologies to interpret the identical publicly available data, Kotsantonis encourages data providers to establish best practices and become more transparent about their methodologies and the trustworthiness of their data (Kotsantonis, 2019).

Mobius (2021) argues that in emerging markets, off-the-shelf ESG solutions such as ESG ratings are no replacement for deep research and expertise in the company's industry and sector in which it operates, with ESG ratings seen as backward-looking and failing to provide investors with that needed competitive edge. Jain (2019) finds no significant differentiation in performance between financially established and sustainable indices and advises investors on how to gain more insight by considering both indices' types when structuring their portfolios, with a hedging and diversification strategy in mind.

In Italy, Landi's (2019) study statistically tests the relationship between ESG assessment and firms' abnormal returns and finds no positive influence when considering market premiums for socially responsible investors (Landi, 2019). However, the study highlights the increased attention paid by the Italian market to ESG assessments, though socially responsible companies do not seem to be rewarded on the Italian stock market and the high performing firms show little incline to invest in CSR, with managers not seeing the embrace of ethical, sustainable choices as a business advantage creating long-term reputational value (Landi, 2019).

Grote (2022) offers quite a cynical view – given the constant media mentions of ESG, one might think that capital markets are greatly contributing to the slowing of global warning, when in fact, purely from an environmental perspective, the financial markets are engaging in a greenwashing narrative, with the ultimate goal of delaying further regulation that would cut into future profits. When looking at the data presented, with 80% of the 100 largest firms in 52 countries adopting sustainability disclosure standards while CO2 emissions rose by 40% during the same timeframe, sustainable finance is failing (Grote, 2022). Grote's grim outcome is that not even fully green markets can save the planet and in fact, all these green initiatives have been damaging, since they amount to political cover for not passing stricter regulation (Grote, 2022).

Khemir (2019) delves into the impact of ESG information on Tunisian investment allocation decisions and discovers a more predominant interest in social and governance issues and less so in environmental information. Khemir's (2019) study tests multiple hypotheses, among which is whether ESG information influences investment choices independent of investors' experience level and horizon and comes up with revealing, though mixed results: Tunisian investors use ESG communication as complementary to financial data in their investment decisions, moreover so, they use any information firms disclose indiscriminately, as long as it is of good quality (Khemir, 2019).

For the European Union territory, Eliwa's study makes an extremely important distinction – there is a difference between ESG performance indicative of an active commitment to sustainable strategies, and ESG disclosure, which is geared towards painting the picture of a company's active commitment to sustainable responsibility, aimed at attracting and manipulating stakeholders' perception of a firm (Eliwa, 2021). Eliwa (2021) finds that both ESG performance and disclosure lower the cost of capital and that lending institutions do incorporate ESG information in their credit decisions.

Dai (2020) adds the dimension of geography and looks at Asia-Pacific, the United States and Europe to highlight that depending on where firms are operating, the strength of ESG strategies and correlation to financial performance differs – investors in

emerging markets are more hesitant to incorporate ESG in their investment decisions. For the case of China, Dai's study concludes that financing ESG equity indices increases risk-adjusted returns when compared to market benchmark indices, and results in better portfolio diversification (Dai, 2020).

Overall, the existing literature acknowledges the momentum of the ESG movement and the impact and interest it raises in capital markets worldwide, but also recognizes that established and emerging markets react and incorporate ESG information differently and that the available ESG products being sold today are not a cookie-cutter solution worldwide, that geography, cultural expectations, specific country regulations and a multitude of other particularities play a vital role in what ESG means for specific territories around the world.

Table 2. **ESG literature review**

Authors	**Context**	**Main research question(s)**	**Key results**
Mobius *et al*. (2021), Journal of Applied Corporate Finance	Emerging markets	Are traditional ESG ratings in emerging markets misleading, in large part because ESG factors are not generally weighted by their materiality?	Financially meaningful ESG integration in emerging and frontier markets requires more than the generalist approach to ESG issues taken by most passive investors. ESG ratings are backward looking and even when independently assessed, can fail to correctly value the ESG credentials and future potential of a company.
Khemir *et al*. (2019), Journal of Applied Accounting Research	Tunisian capital market	Does ESG information have an impact on Tunisian investors decisions and if so, what environmental, social or governance dimension is likely to have more effect on their investment choices?	The factorial mixed analysis of variance shows that ESG information impacts Tunisian investment allocation decisions, with governance and social information influencing more so than environmental information.
Ting *et al*. (2019), Sustainability	Emerging and developed markets	What is the impact of firms' ESG initiatives on financial performance (exploring corporate social performance (CSP) as a determinant of corporate financial performance (CFP))? What are the valuation effects of corporate social performance initiatives in developed	ESG initiatives have a significant positive impact on firms' performance. Developed market firms receive positive valuation effects due to ESG initiatives.

Authors	Context	Main research question(s)	Key results
		and emerging market firms?	
Kotsantonis *et al*. (2019), Journal of Applied Corporate Finance	Worldwide	Does ESG data accurately capture a firm's performance?	The authors are skeptical that ESG data correctly captures a firm's performance, mainly due to data inconsistency, benchmarking resulting in serious distortions, the multitude of ESG models resulting from multiple data collection methods, ESG data providers interpreting data through their own methodologies resulting in conflicting results in ESG standing for the same firm.
Pinney *et al*. (2019), Journal of Applied Corporate Finance	United States	How do capital market participants define what ESG specifically means for their business? How should capital market participants integrate ESG to improve returns and create value for their clients?	Direct communication between investors and companies may help drive coordination among intermediaries around the development of a baseline industry framework for defining and reporting on ESG.
Landi *et al*. (2019), Social Responsibility Journal	Italian capital market	How does ESG paradigm, meant to measure CSP by rating issuance, impact on abnormal returns of publicly traded Italian firms?	The Italian stock exchange market does not reward socially responsible companies, given that the abnormal return values are unrelated to ESG rating. Higher performing companies on the stock exchange market show little willingness to invest in CSR, with decision-makers not considering ethics an asset that can build a lasting reputational value.
Yu *et al*. (2021), International Review of Financial Analysis	Worldwide	What is the potential influence that greater global integration in financial markets can have on firms' ESG disclosure?	Cross-listed firms disclose more ESG data than those listed in their home markets, most likely to diminish the liability associated with their foreign status in international capital markets.

Authors	Context	Main research question(s)	Key results
Dai (2020), The Chinese Economy	China	Can equity indices based on ESG screening outperform their market benchmarks? Can ESG equity indices be replicated by reference indices? Can ESG equity indices improve portfolio diversification?	In China, investing in ESG equity indices can increase risk-adjusted returns and improve portfolio diversification.
Eliwa *et al*. (2021), Critical Perspectives on Accounting	European Union	What are the consequences of ESG performance and its related disclosure that occur within the EU? Can lending institutions interfere in the relationship between firms, state and the community to motivate firms to improve their ESG performance and its related disclosure?	Firms can benefit from improving their ESG performance and increasing their ESG disclosure, which translates into a lower cost of capital. However, there is a failure to distinguish, at market level, between ESG performance and ESG disclosure.
Odell *et al*. (2016), Journal of Applied Corporate Finance	Emerging and frontier markets	What is the context in which numerous emerging and frontier companies operate and why these firms need to consider ESG issues to benefit from opportunities and manage risk?	Incorporating material sustainability factors into traditional due diligence and analysis can help emerging market investors make better investment choices.
Ding (2022), Sustainability	Worldwide	What is the fundamental debate behind ESG responsibility, what are the relevant stakeholders, which are the necessary theories needed to understand ESG management, what are the conditions under which ESG progress will be achieved?	There are three main ESG literature themes: economic drivers, regulatory impact and socially responsible investors.

Authors	Context	Main research question(s)	Key results
Grote *et al*. (2022), SSRN	Worldwide	Are capital markets a major contributor to the goal of limiting global warming?	Actual climate-change prevention driven by capital markets is minimal, some investors are willing to sacrifice returns for climate-change prevention, but most intermediaries are not, and their greatest concerns is climate-change regulation, many financial products are greenwashed.
Jain *et al*. (2019), Risks	Worldwide	Can sustainable investment alternatives offer better financial returns than the conventional indices from both developed and emerging markets?	There is no significant difference in performance between sustainable indices and the traditional conventional indices.
Sciarelli *et al*. (2021), The TQM Journal	Worldwide	Does ESG criteria integration in investment strategies support the transition of finance toward more sustainable growth?	Despite growing awareness about the need to push finance toward sustainability, the effort dedicated to this goal varies across industries and sectors.
Hazen (2021), Journal of Business Law (Penn Law)	United States	What are the various approaches the SEC can take to ESG mandatory disclosure?	The SEC can enhance CSR and ESG disclosures and should encourage voluntary, rather than mandatory disclosures, while providing more guidance on how to improve and standardize ESG disclosures. The SEC should implement a safe harbor rule, which will promote meaningful ESG disclosures, while minimizing liability for deficient disclosures.
Tripathi *et al*. (2020), Journal of Advances in Management Research	BRICS countries	What is the performance of socially responsible indices in BRICS nations (Brazil, Russia, India, China, South Africa), compared to conventional market indices?	Though Brazil holds the top ranker position consistently, India performs better during crisis periods. There is evidence of outperformance in terms of risk-return by SRI indices in BRICS nations.

Authors	Context	Main research question(s)	Key results
Brooks *et al*. (2018), The British Accounting Review	Worldwide	What is the most relevant literature on ESG disclosures and performance and their effects on firm value? What are the crucial knowledge gaps and interesting questions outlining the future agenda for SRI?	ESG disclosures are generally associated with better ESG performance and overall better firm performance. Sin-industries screening and exclusion comes at a financial cost.
Fernando *et al*. (2019), Journal of Applied Corporate Finance	Worldwide	Do all socially responsible corporate policies have the same effect on firm's ownership and value?	By using environmental policies as proxy for CSR initiatives, the study distinguishes two categories of corporate environmental practices: actions that reduce the likelihood of damaging outcomes and therefore lower the risk of firm's exposure to environmental liability and actions that boost firms' apparent "greenness" through investments that go beyond legal provisions and plausible risk management reasoning.
Plastun *et al*. (2019), Problems and Perspectives in Management	Ukraine Worldwide	What is the relationship between ESG disclosure and country competitiveness? Are there any differences in ESG disclosure in developed and developing countries?	There are statistically differences between developed and developing countries when it comes to ESG disclosure (developed countries focus more on ESG). ESG disclosure has a direct impact on the countries' competitiveness, the more ESG disclosure, the higher the competitiveness.
Blitz *et al*. (2017), The Journal of Portfolio Management	Worldwide	Why do sin stocks have higher abnormal returns?	Sin stocks are shunned to the point they become underpriced and investors willing to take on the reputational risk are rewarded with return premiums.

5. Conclusions. ESG and the future – Show me the money!

The promise of ESG factors being the catalyst for a safer, more just world and a healthier planet while stimulating capital markets around the world to reward sustainable investments and enterprises is ever so appealing, but there is much work left to do. At this inflection point in time, most studies show that there is a positive ESG impact on capital markets, but emerging markets need to catch up, there is a dire need for standardization of how ESG information is reported and interpreted, investors and

stakeholders are entitled to more transparency and regulators need to show up, speak up and provide regulatory guidance.

References

Blitz, D. & Fabozzi, F. J. (2017), Sin Stocks Revisited: Resolving the Sin Stock Anomaly. *Journal of Portfolio Management*, vol. 44: 105-111.

Brooks, C. & Oikonomou, I. (2018) The effects of environmental, social and governance disclosures and performance on firm value: A review of the literature in accounting and finance, *British Accounting Review*, vol. 50: 1-15.

Dai, Y. (2020) Can ESG Investing Beat the Market and Improve Portfolio Diversification? Evidence from China. *Chin Econ, vol.* 54: 1-12.

Ding, D.D.A. (2022) Global Drivers for ESG Performance: The Body of Knowledge.*Sustainability*.

Eliwa, Y., Aboud, A., & Saleh, A. (2021) ESG practices and the cost of debt: Evidence from EU countries. *Critical Perspectives on Accounting*, vol. 79: 102097.

Fernando, C. S., Uysal, V. B., & Abeysekera, A. P. (2019) An Investor Perspective on the Black Box of Corporate Social Responsibility. *Journal of Applied Corporate Finance*, vol. 31: 92-104.

Grote, M.H. & Zook, M. (2022) The Role of Capital Markets in Saving the Planet and Changing Capitalism - Just Kidding. *SSRN Electronic Journal.*

Jain, M., Sharma, G.D., & Srivastava, M. (2019) Can Sustainable Investment Yield Better Financial Returns: A Comparative Study of ESG Indices and MSCI Indices. *Risks*, vol. 7, no. 15.

Khemir, S., Baccouche, C., & Ayadi, S. D. (2019) The influence of ESG information on investment allocation decisions. *Journal of Applied Accounting Research*, vol. 20: 458-480.

Kotsantonis, S. & Serafeim, G. (2019) Four Things No One Will Tell You About ESG Data. *Jurnal of Applied Corporate Finance*, vol. 31: 50-58.

Hazen, T.L. (2021), Social Issues in the Spotlight: The Increasing Need to Improve Publicly-Held Companies' CSR and ESG Disclosures. *23 University of Pennsylvania Journal pf Business Law*, vol. 23, no. 3: 740.

Landi, G. & Sciarelli, M. (2019) Towards a more ethical market: the impact of ESG rating on corporate financial performance. *Social Responsibility Jurnal*, vol. 15: 11-27.

Liang, H. & Renneboog, L. (2020) Corporate Social Responsibility and Sustainable Finance: A Review of the Literature. *SSRN Electronic Journal.*

Mobius, M. & Ali, U. (2021) ESG in Emerging Markets: The Value of Fundamental Research and Constructive Engagement in Looking beyond ESG Ratings. *Journal of Applied Corporate Finance*, vol. 33: 112-120.

Odell, J. & Ali, U. (2016) ESG Investing in Emerging and Frontier Markets. *Journal of Applied Corporate Finance*, vol. 28: 96-101.

Pinney, C., Lawrence, S., & Lau, S. (2019) Sustainability and Capital Markets—Are We There Yet? *Journal of Applied Corporate Finance*, vol. 31: 86-91.

Plastun, A., Makarenko, I., Kravchenko, O., Ovcharova, N., & Oleksich, Z. (2019) ESG disclosure regulation: in search of a relationship with the countries' competitiveness. *Problems Perspectives Management*, vol. 17: 76-88.

Sciarelli, M., Cosimato, S., Landi, G. & Iandolo, F. (2021) Socially responsible investment strategies for the transition towards sustainable development: The importance of integrating and communicating ESG.*The TQM Journal*, vol. 33, no. 7: 39-56.

Ting, I.W.K., Azizan, N.A., Bhaskaran, R.K., & Sukumaran, S.K. (2019) Corporate Social Performance and Firm Performance: Comparative Study among Developed and Emerging Market Firms, *Sustainability-basel*, vol. 12, no. 26.

Tripathi, V. & Kaur, A. (2020) Socially responsible investing: performance evaluation of BRICS nations. *Journal of Advanced Management Research*, vol. 17: 525-547.

Yu, E.P. & Luu, B.V. (2021) International variations in ESG disclosure – Do cross-listed companies care more? *Internatonal Review of Financial Analysis, vol.* 75, 101731.
Wong, J.B. & Zhang, Q. (2022) Stock market reactions to adverse ESG disclosure via media channels. *British Accounting Review,* vol. 54: 101045.

Intangible Capital in the Accounting Literature – A Science Mapping Approach

Mihaela Curea[a,4], Marilena Mironiuc[a] and Maria Carmen Huian[a]

[a] *"Alexandru Ioan Cuza" University of Iași, Romania*

Abstract: *Intangible capital (IC) is attracting considerable interest due to its potential to bring a competitive advantage to companies and has established itself as a burgeoning field of research. This topic gained traction in the last decades and was analysed using multi-theoretical lenses. Our paper proposes a quantitative approach to the extant accounting literature, an analysis of the documents exploring IC. Through a bibliometric study of 618 documents, we aim to shed light on the current state of the art and identify the intellectual structure, social structure, and conceptual structure of research. The bibliographic data was retrieved from the Web of Science database and analysed using VOSviewer and Bibliometrix-R package tool with an inbuilt utility Biblioshiny. The analysis revealed a lack of common vocabulary in the IC field, an unsatisfactory level of IC disclosure ascribable to proprietary costs and a dichotomy between theory and practice. Financial statements are limited to some elements of IC on account of conservatory recognition criteria. Our results may be of interest to both academia and financial policy-makers.*

Keywords: *Intangible capital, accounting, bibliometric analysis.*

1. Introduction

Intangible capital is widely recognized as a key driver of cutting-edge scientific advances, corporate innovation and performance (Dost *et al*., 2016; Sardo and Serrasqueiro, 2017; Pucci *et al*., 2015). Going beyond this microscopic description, intangible capital is acknowledged as a determinant of economic growth (Pike *et al*., 2005) and social welfare (Khazabi and Van Quyen, 2017). In light of its importance for both companies and nations, it comes as no surprise that intangible capital is high on the agenda of scholars. Over the last decades, this topic gained traction leading to a broad corpus of theoretical and empirical work (Martín-de Castro *et al*., 2019).

The extant research on IC has evolved into five stages: conceptualization/awareness, measurement/reporting, corporate performance and critical analysis, ecosystem approach and effective IC management through praxis (Dumay *et al*., 2020). The degree of maturity reached by this field coupled with the exponential growth of studies and the renewed interest in the context of integrated reporting motivated us to perform a bibliometric analysis. As stated by other scholars (Ramos-Rodrígues and Ruíz-Navarro, 2004; Vogel and Güttel, 2013), it is common to scrutinize scientific production and conduct bibliometric studies in mature fields of research. Such retrospectives are welcomed by the scientific community as it is incumbent upon us to monitor the

[4] *Corresponding author*: Doctoral School of Economics and Business Administration, "Alexandru Ioan Cuza" University of Iași; No. 22, Carol I Blvd, 700506, Iaşi, România

evolving literature (Givi, 2021). As Garanina *et al*. (2021) note, the topic is of interest not only to academia but also to regulators.

Our study aims to identify the theoretical bases and potential scientific scenarios for the future in the field of IC through a bibliometric study. Unlike previous studies, we focused on the papers that explore IC from an accounting perspective. As Serenko *et al*. (2010) emphasize, despite the exponential growth in publications, it is advisable to engage occasionally in a retrospective analysis in order to respond to queries. We posit the following research questions:
RQ1: What are the characteristics of the accounting literature related to IC?
RQ2: How can the "conceptual structure", the "intellectual structure" and the "social structure" of the accounting research related to IC be characterized?

The remaining sections of this paper are structured as follows: section 2 provides the theoretical background and the rationale behind our research, while the next section describes the research methodology employed in this study. Section 4 includes the results of the bibliometric analysis and related discussions. The final section draws conclusions and suggests potential scientific scenarios.

2. Literature review and motivation

In the field of intangible capital, the initiatives of analysing the *status quo* (Dumay *et al*., 2020; Dumay and Guthrie, 2019; Ferenhof *et al*., 2015; Lee and Wong, 2019; Lin and Edvinsson, 2020; Petty and Guthrie, 2000) often employ a qualitative approach, as a result of reflection or critical judgement. Recently, scholars conducted bibliometric studies on IC, but the *Journal of Intellectual Capital* (JIC) is the center of attention (Bamel *et al*., 2020; Bellucci *et al*., 2021; Dabić *et al*., 2020; Givi, 2021), which makes them narrow in scope. Other bibliometric studies focus on knowledge management (Serenko *et al*., 2010) or human capital (Fernandes Dos Santos *et al*., 2019). We identified two articles that explored the IC of firms through bibliometric techniques (Martín-de Castro *et al*., 2019; Mohammad *et al*., 2021) and one article addressing all publications on intangible capital in the context of the education sector (Quintero-Quintero *et al*., 2021). Table 1 provides a synoptic view of the scientometric studies on IC.

Table 1. **Bibliometric studies in the field of IC**

Study	Data	Timespan	Technique	Software
Givi (2021)	729 documents from JIC (Scopus)	2000-2019	Bibliometric analysis, altmetric analysis and text mining Co-authorship analysis Co-occurrence analysis Co-citation analysis Trend analysis	Excel, VOSviewer and CiteSpace Software

Study	Data	Timespan	Technique	Software
Bamel *et al*. (2020)	727 documents from JIC (Scopus)	2000-2020	Co-citation Bibliographic coupling	R software and VOSviewer
Bellucci *et al*. (2021)	187 documents from JIC (Scopus)	2014-2018	Bibliographic coupling Co-wording analysis	VOSviewer
Dabić *et al*. (2020)	700 documents from JIC (Scopus, Web of Science)	2000-2019	Co-citation Co-occurrence analysis	VOSviewer
Martín-de Castro *et al*. (2019)	553 documents (Web of science)	1990-2016	Co-citation Bibliographic coupling	Bibexcel and Ucinet software
Mohammad *et al*. (2021)	1621 documents (scopus)	1956-2020	Co-occurrence analysis Citation analysis	Publish and Perish and VOSviewer
Quintero-Quintero *et al*. (2021)	389 documents (scopus)	1947-2021	Co-occurrence analysis Collaboration network	R software and VOSviewer

Intangible capital is a solid and interdisciplinary field of research and, therefore, scholars frame intangibles from different perspectives. In our study, papers exploring accounting for intangibles are at the center of attention. Following an in-depth review of IC research covering a decade, Guthrie *et al*. (2012: 68) define IC accounting as "a reporting and management technology of relevance to organizations to understand and manage knowledge resources. It can account and report on the size and development of knowledge resources such as employee competencies, customer relations, financial relationships and communication and information technologies". Dumay (2014: 3) admits that accounting for IC is "an integral part of the IC paradigm". Moreover, Garanina *et al*. (2021) list several reasons that account for studying accounting for intangibles: controversial accounting practices regarding the recognition, assessment and disclosure of intangibles, the evolution of the regulations, and the advances in the harmonization process of IFRS and US GAAP. The interest of academia in IC accounting resulted in the editing of two specialized journals: Journal of Human Resource Costing and Accounting (JHRCA) and JIC.

On the other hand, the maturity of the field makes it advisable to perform an analysis of the extant literature (García-Lillo *et al*., 2018; Martín-de Castro *et al*., 2019). The existing research on IC can be split into five stages (Dumay *et al*., 2020), defined as

follows. The first stage focused on understanding the concept of IC, finding the most appropriate definition, developing a taxonomy, and spreading awareness of its importance (Chiucchi and Dumay, 2015; Dumay and Garanina, 2013). The second stage meant a proliferation of papers aimed at developing methods for measuring and reporting IC (Castilla-Polo and Sánchez-Hernández, 2020). In the third stage, the nexus between IC and organisational performance is the focal point (Lin and Edvinsson, 2020). The most recent stages are defined by a certain degree of maturity (Martín-de Castro *et al*., 2019). We witness a shift from a managerial approach to an ecosystem approach and a switch from organisational problems to societal issues (Garanina *et al*., 2021) in an attempt to understand how intangible capital creates value and contributes to the development of a sustainable environment (Dumay *et al*., 2020).

Going beyond the qualitative approach, founded on interpretations (Onwuegbuzie *et al*., 2012) and often accused of subjectivism or cognitive bias (Dabić *et al*., 2020) and lack of scientific rigour (García-Lillo *et al*., 2018), we propose a quantitative overview of the extant literature on intangible capital using bibliometric information. Bibliometric studies offer an in-depth and objective view of the analysed phenomenon (Givi, 2021), "mapping the research field without subjective bias" (Zupic and Čater, 2015: 430).

3. Research methodology

Through a bibliometric study of 618 documents, we aim to identify the overall direction and the overlaying foundation of intangible capital research and the remaining challenges for the future. Bibliometric studies are an alternative to the conventional literature reviews that use mathematical and statistical techniques (Xu *et al*., 2021) to analyse the extant research in a particular field. Bibliometric methods are typically applied to analyse journals (Dabić *et al*., 2020; Donthu *et al*., 2020) or different topics/subfields of research (Danvila-del-Valle *et al*., 2019; Mohammad *et al*., 2021; Quintero-Quintero *et al*., 2021; Xu *et al*., 2021).

Revealing the citation landscape and publication patterns is possible through a wide spectrum of techniques including citation analysis, co-citation analysis, bibliographic coupling, and co-occurrence analysis of keywords (Xu *et al*., 2021). While co-citation analysis assumes a closer link or a greater similarity between two documents if they are cited together (Martín-de Castro *et al*., 2019), bibliographic coupling takes into account the number of shared references (cited documents) (Zupic and Čater, 2015). An instructive schema, designed by Vogel and Güttel (2013) is depicted in figure 1. To put it simply, co-citation analysis suggests that if "a" and "b" are co-cited by a third document "A", we can infer a strong connection between them, which suggests a thematic similarity and paves the way for scholarly clusters exploration (Dabić *et al*., 2020). Documents "A" and "B" are said to be "bibliographic coupled" if they both cite document "a". The greater the number of shared references, the greater the degree of similarity (Martín-de Castro *et al*., 2019). The unit of analysis can vary depending on the objectives of the research (documents, sources, authors and/or countries).

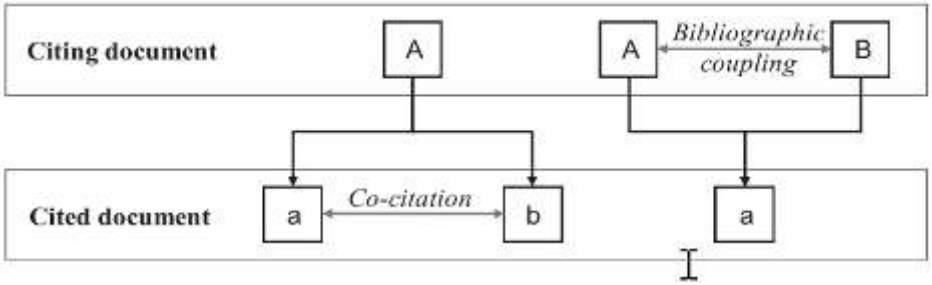


Figure 1. **Co-citation and bibliographic coupling**
Source: Vogel and Güttel, 2013: 429

Our study analyses documents indexed in the Web of Science database and published between 1993 and 2021. As can be seen from Table 1, the bibliographic material of most studies was retrieved from Scopus. This is not surprising as in most articles JIC is at the core. This journal has been indexed in Scopus since its inception and in Web of Science since 2014. Nevertheless, Web of Science was found to be more suitable for the objectives of this study as this scientific database, whose genesis is closely linked to the advent of bibliometrics, is overlooked in most scientometric studies. We searched for "intellectual capital" or "intangible capital" and "accounting" in title, abstract, author keywords and keywords plus. In line with earlier studies (Precob and Mironiuc, 2016; Mulyadi and Panggabean, 2017; Osinski *et al*., 2017; Forte *et al*., 2019), "intellectual capital" and "intangible capital" are assumed to be interchangeable. The vernacular differs across sciences as "intellectual capital" is prevalent in management and law literature, while "intangible capital" is a preponderant term in the accounting literature (Lev, 2001). Moreover, Garanina *et al*. (2021) identify dissimilarities between the vocabulary of the European and the Australian academic community, who prefer the term "intellectual capital" and US scholars, who tend to use "intangible capital". Including both terms in the inquiry allowed us to extract information about all articles exploring intangible capital from an accounting approach. The search syntax is provided:

TS = ("intellectual capital" OR "intangible capital") AND TS = ("accounting")

Following Dumay (2014), all documents were considered for this analysis as they have a role in developing IC research. The current year (2022) was excluded from our inquiry. The search yielded a total of 618 documents from which the majority were articles (340) and proceeding papers (248) published between 1993 and 2022.

To develop graphical visualizations of the bibliographic data, we use two open-source software tools: vosViewer and R software. First software uses two standardized weights (i.e., the number and total strength of the links) for the nodal maps (Donthu *et al*., 2020) and is frequently employed in bibliometric studies (Bellucci *et al*., 2021; Dabić *et al*., 2020; Danvila-del-Valle *et al*., 2019; Givi, 2021; Mohammad *et al*., 2021). It uses the visualization of similarities (VOS) mapping technique to offer informative maps and is able to handle large scale data (van Eck and Waltman, 2010; Xu *et al*., 2021). Our study also uses Bibliometrix, a recent package developed by Aria and Cuccurullo (2017) and written in R language. This tool, known for its rich statistical capabilities (Rodríguez-Soler *et al*., 2020; Ghosh and Satya Prasad, 2021), can be accessed through R-studio. The main advantages that give this software superiority over its counterparts are "the existence of substantial, effective statistical algorithms, access to high-quality

numerical routines, and integrated data visualization tools" (Aria and Cuccurullo, 2017: 963). Dervis (2019) draws a comparison between different software tools for science mapping and concludes that most of them focus on data visualisation, while Bibliometrix also puts a great emphasis on the correctness and completeness of the findings. Moreover, the R-tool "proposes a different approach to analyse the conceptual structure using Factorial Analysis (FA)" (Dervis, 2019: 158).

4. Results and discussions

4.1 Descriptive analysis of the literature

Table 2 provides the descriptive characteristics of the accounting research related to IC. The documents are published in 356 scientific sources. Additionally, 1,205 authors contributed to the development of knowledge in this field. The interest in the debate surrounding IC in the accounting literature is also reflected by the average citation per document. Each document was cited approximately 13 times, which can be deemed as fairly decent. The high number of multi-authored documents (i.e., documents written by more than one author) (456) and the value of the collaboration index (2.35) demonstrate that the scope of the research is highly collaborative. As far as the typology of the research papers is concerned, out of 618 documents, the majority of them are articles (55.02%) and proceedings papers (40.13%).

Table 2. **Main information about data**

Description	Results
Timespan	1993:2021
Sources (Journals, Books, etc.)	356
Documents	618
Average citations per documents	13.48
Average citations per year per doc	1.551
DOCUMENT TYPES	
• Article	340
• Book	1
• Correction; early access	1
• Editorial material	7
• Proceedings paper	248
• Review	21
DOCUMENT CONTENTS	
• Keywords Plus (ID)	720
• Author's Keywords (DE)	1564
• AUTHORS	
• Authors	1205
• Author Appearances	1498
• Authors of single-authored documents	134
• Authors of multi-authored documents	1071
AUTHORS COLLABORATION	
• Single-authored documents	162
• Documents per Author	0.513
• Authors per Document	1.95

Description	Results
• Co-Authors per Documents	2.42
• Collaboration Index	2.35

Figure 2 depicts the temporal evolution of the accounting literature related to IC. Although several documents were published during the 1990s and the early 2000s, it was not until 2008 that a manifest interest in this subject emerged and scientific production was gaining momentum. The temporal distribution of publications bifurcates into two periods: a slow growth stage from 1993 to 2007 (less than 7 documents per annum) and a rapid growth stage from 2008 to 2021 (between 17 and 63 documents per annum). The annual growth rate of documents is 16.33%. As emphasized by earlier studies (Oshodi *et al*., 2020), the annual scientific production can be interpreted as a barometer of the interest and relevance of a particular research topic. Bamel *et al*. (2020) scrutinize the publication trends of the JIC and attribute the growth of IC studies in the recent period to the increased popularity of IC as a field of research. The global financial crisis of 2008 has also impacted the IC academic panorama as we witness a shift from purely empirical studies to qualitative studies, aimed mainly at exploring IC disclosure (Garanina *et al*., 2021).

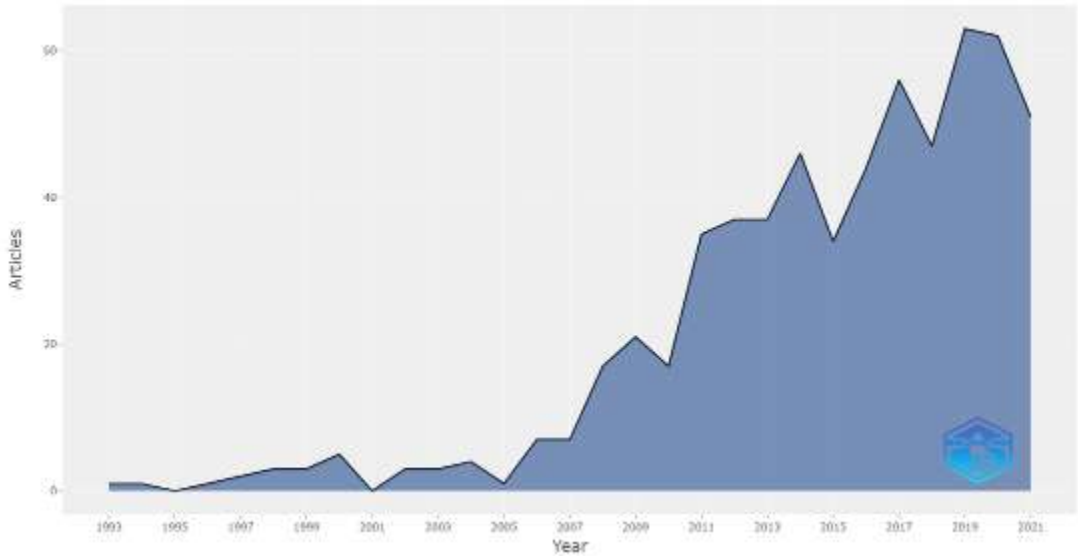


Figure 2 **Annual scientific production**

4.2 Underlying structures of knowledge

Conceptual structure

As mentioned previously, Bibliometrix R-tool performs factorial analysis. To ensure a nuanced understanding of the accounting research related to IC, we developed a conceptual map using multiple correspondence analysis (MCA) based on the keywords indicated by the authors. MCA is a multivariate statistical technique, typically employed to analyse the interconnection between a set of nominal variables (El Baz and Iddik, 2022). The keywords are graphically displayed in two-dimensional space as illustrated in Figure 3. The first-dimension accounts for most of the variations (61.98%), while the second-dimension accounts for 16.19% of the variations. According to Gupta and Chakravarty (2021), the keywords located in the vicinity of the

center have enjoyed attention in the recent period as opposed to those located near the edge.

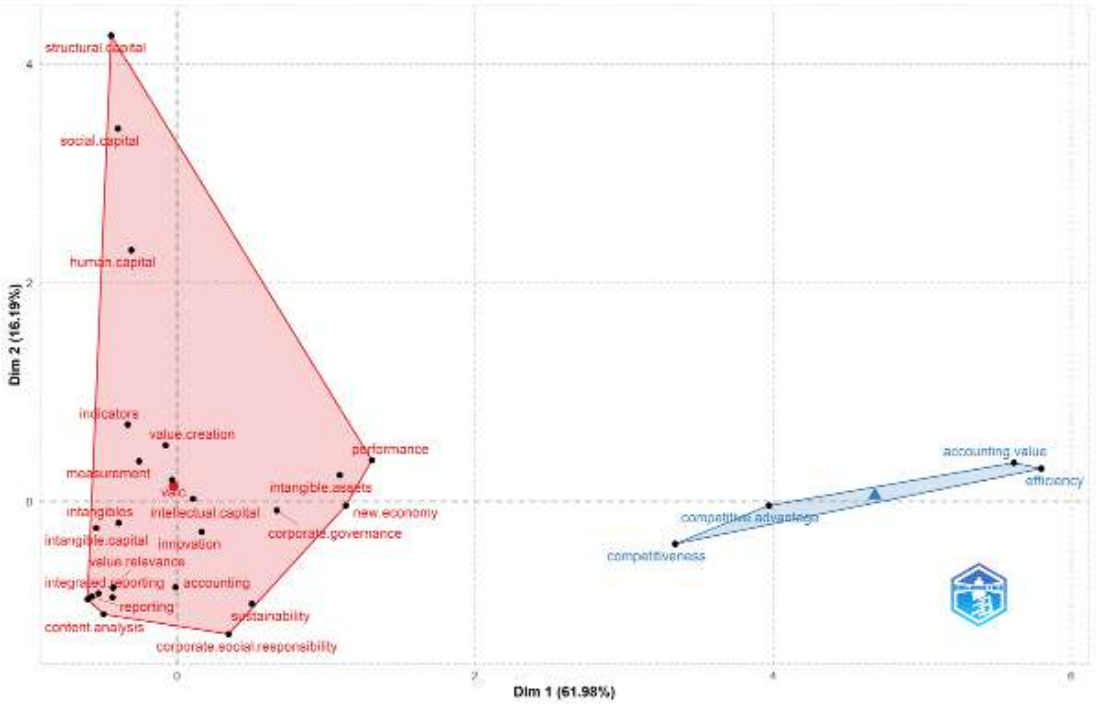


Figure 3. **Conceptual structure map – method MCA**

We can see two major conceptual groups or clusters that emerged from the data. The red cluster encompasses keywords such as VAIC, performance, sustainability, integrated reporting, corporate governance, value creation and the three components of IC, namely human capital, structural capital, and relational capital. Although there is no universally accepted definition of IC, most researchers agree on a threefold classification: human capital, structural capital, and relational capital (Gross-Gołacka *et al*., 2020). If some sciences have no measurement challenges (e.g., sport – performance is measured in speed, times; physics – the temperature can be measured in degrees Celsius, Fahrenheit and the energy is measured in Joule), at the micro-economic level, the measurement process is far from easy, especially if we refer to IC, whose indicators are not often best expressed in monetary terms. The Value Added Intellectual Coefficient (VAIC™) owe its position as the most employed method for measuring IC to several advantages: is simple to compute, it is based on publicly available data (audited financial reports) (Pirogova *et al*., 2020), and allows comparisons (Tan *et al*., 2007). Notwithstanding its widespread acceptance by the academic community, Dženopoljac *et al*. (2016) stress that VAIC is not free from drawbacks as it is based on historic data, sometimes superannuated. Additionally, one of the components of IC (relational capital) is overlooked. Nevertheless, VAIC is extensively used to measure IC and explore the impact of IC on firm performance, sustainability, productivity, and market value. Generally, earlier studies show that IC is positively correlated with corporate performance (Terblanche and De Villiers, 2019) as we talk about "rare, strategic and hard-to-imitate resources" (Forte *et al*., 2019: 592). Most studies focus on science-driven industries (pharmaceuticals, tech industry) where the advantages of IC are undeniable. Dženopoljac *et al*. (2019) scrutinize the nexus between intangibles and organizational performance in a capital-intensive industry like oil and gas. While the results show that IC is positively associated with profitability and market capitalization,

we have to bear in mind the specificity of the oil and gas industry, conventionally orientated towards the exploitation of tangible assets, which reflects in the relatively small impact of intangibles on firm performance.

It is well-known that companies are profit-maximizing, but scholars emphasize that nowadays market survival and long-term profit require a balance between the three spheres of development: economic, social and environmental (Alvino *et al*., 2020; de Villiers and Sharma, 2020). Using intuitionistic fuzzy sets, Gross-Gołacka *et al*. (2020) find that, according to the managers of small enterprises, human capital makes an impactful contribution to the sustainable development of the company. Yusliza *et al*. (2020) analyse the nexus between green IC (i.e., intangible assets used to minimize companies' environmental footprint) and sustainable performance based on survey data from manufacturing companies. The results show that green IC exerts a positive influence on all dimensions of sustainable performance and employees' knowledge and competencies contribute to reducing carbon emissions.

The blue cluster comprises the following keywords: competitiveness, competitive advantage, accounting value and efficiency. The importance ascribed to intangible resources escalated in the knowledge-based economy, thereby promoting IC as a driver of competitiveness (Duff, 2018). The evolution of keywords, illustrated in figure 4, is consistent with the five phases of development of IC research identified by Dumay *et al*. (2020). Corporate governance, sustainability, CSR, value relevance, and integrated reporting (IR) are related to the IC research of the last decade and have given a fresh impetus to this scholarly field.

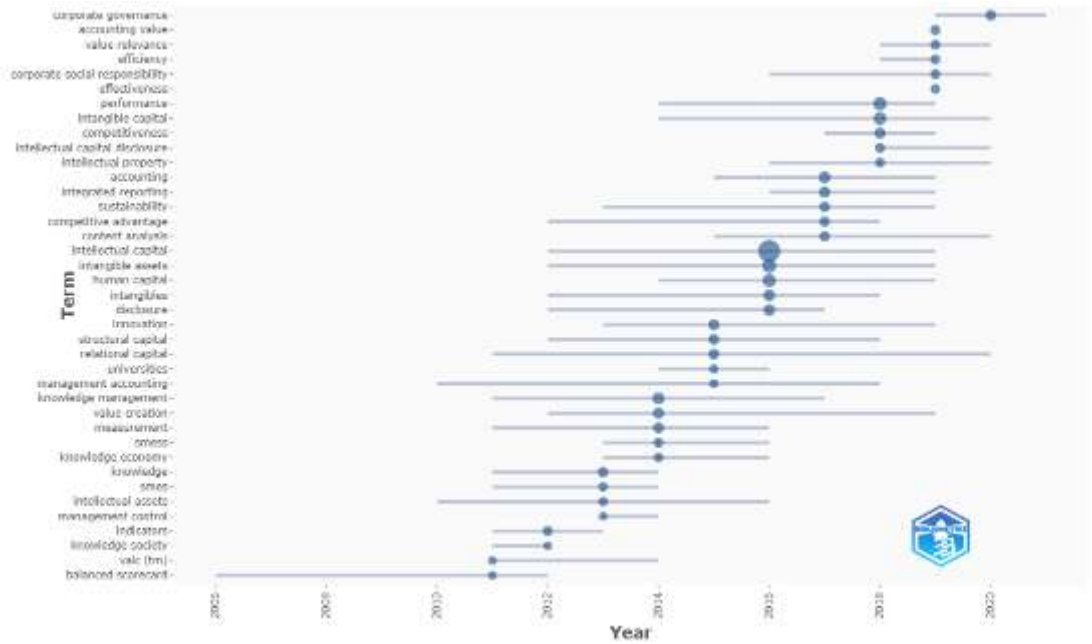


Figure 4. **Trend topic**

Intellectual structure

The intellectual structure of the IC literature is revealed through a co-citation network and a bibliographical coupling network, both developed using VOSviewer. Figure 5 depicts the co-citation analysis of the authors. We proceeded to establish a threshold of 20 minimum citations for each author. As far as the allocation of credit to authors is

concerned, we opted for fractional counting (i.e., proportionally to the number of authors). The findings highlight that of the 13,368 authors of bibliographic references, 129 authors met the minimum citation requirement of 35 citations. Based on a maximum link strength among these authors, the top 100 authors were considered for network construction. As we can see, the central places of the network are dominated by Edvinsson, Bontis, Guthrie, Lev, Dumay, Mouritsen, Sveiby, Stewart, Kaplan and Public. The co-citation analysis yields five interconnected clusters with 4,005 links and a total link strength of 2,865.75. The red cluster is the largest with 67 authors. It is mainly based on the work of Edvinson, Bontis and Public and encompasses articles that scrutinize the impact of IC on corporate performance as well as papers that endeavoured to find a way to measure IC. The blue cluster has 28 authors, whose papers focus on IC reporting and critical examinations and reflections of IC research. The green cluster, mainly based on the work of Lev, Guthrie and Beattie, is concerned with IC accounting and accounting of intangibles. The yellow cluster consists of articles aimed at measuring the IC of companies and universities.

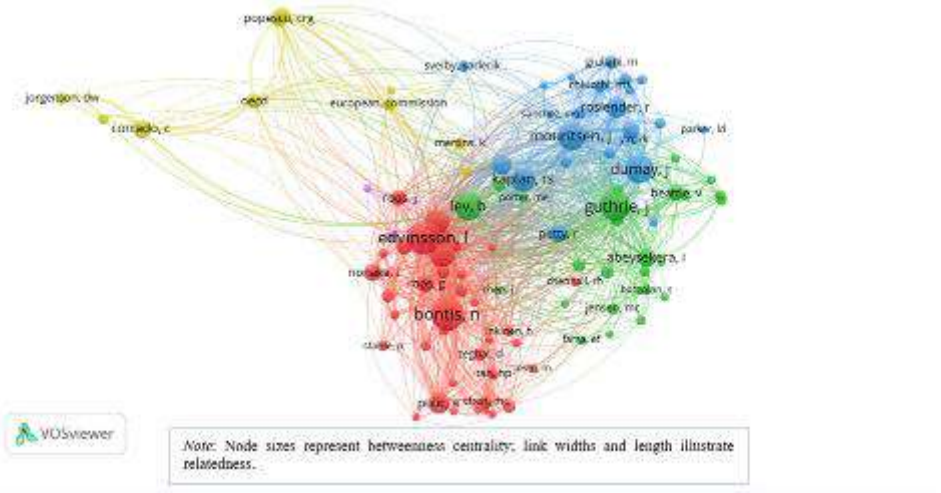


Figure 5. **Co-citation analysis**

The co-citation analysis revealed the theoretical pillars of IC. Next, we develop a bibliographical coupling network to grasp a view of the current research and identify potential scientific trajectories. Figure 6 depicts the bibliometric network of bibliographic coupling of references that exceeded the threshold of 10 citations. It is worth highlighting a thematic similarity of the clustering analyses. The clusters that emerged from the bibliographic coupling analysis are largely consonant with those resulting from the co-citation analysis. The red cluster comprises empirical investigations of the impact of IC on organizational performance, while the green cluster focuses on reflections on IC research. The yellow cluster is concerned with intangible investments and productivity, and the purple cluster refers to IC accounting and interdisciplinary research. At the forefront of the authors' concerns from the blue cluster is IR and IC disclosure, and the turquoise cluster links IC with sustainability.

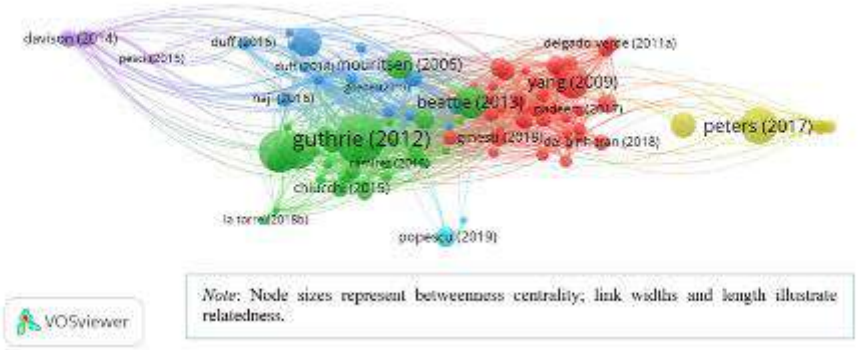
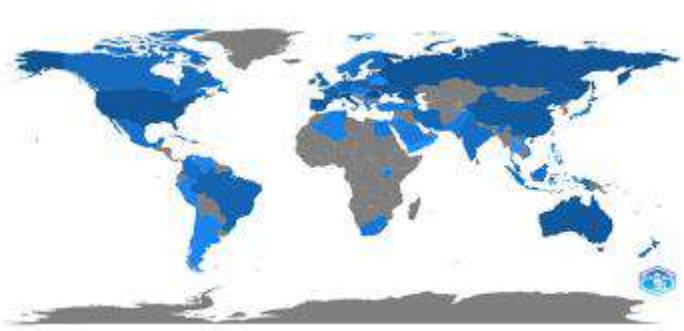


Figure 6. **Bibliographic coupling analysis**

Social structure

Before turning to the map of collaborations, we consider it appropriate to analyse the country scientific production. As we can see from figure 7, the most productive countries are Italy (with 135 documents), Romania (with 123 documents), and Russia (with 73 documents). What is interesting is that the high number of publications is not associated with the scientific impact of the country. When it comes to citations, the most influential country is the USA (with 2,413 citations), followed by Australia (with 1,188 citations) and the United Kingdom (with 591 citations). Italy and Romania occupy lower positions in the 10 most cited countries.



region	Freq
ITALY	135
ROMANIA	123
RUSSIA	73
USA	70
UK	62
AUSTRALIA	58
SPAIN	50
UKRAINE	46
CHINA	45
PORTUGAL	37

Figure 7. **Country scientific production**

The country collaboration of the most prolific countries is graphically displayed in figure 8. The level of cooperation is indicated by the thickness of the line. Italy, Australia, the United Kingdom, the USA, and Denmark show deepened cooperation and exchange among academia. In an extensive review of the top 20 accounting journals, Garanina *et al*. (2021) conclude that American scholars typically focus on identifiable intangibles and their reporting in the balance sheet, while topics like IC and management issues have attracted widespread attention from European and Australian academics. Moreover, dissimilarities in the vernacular of scholars are observed. Multi-country publications are fruitful and enrich the research agenda, leading to the strengthening of the IC field and ultimately, a common vocabulary, definitely missing in IC research, may be reached.

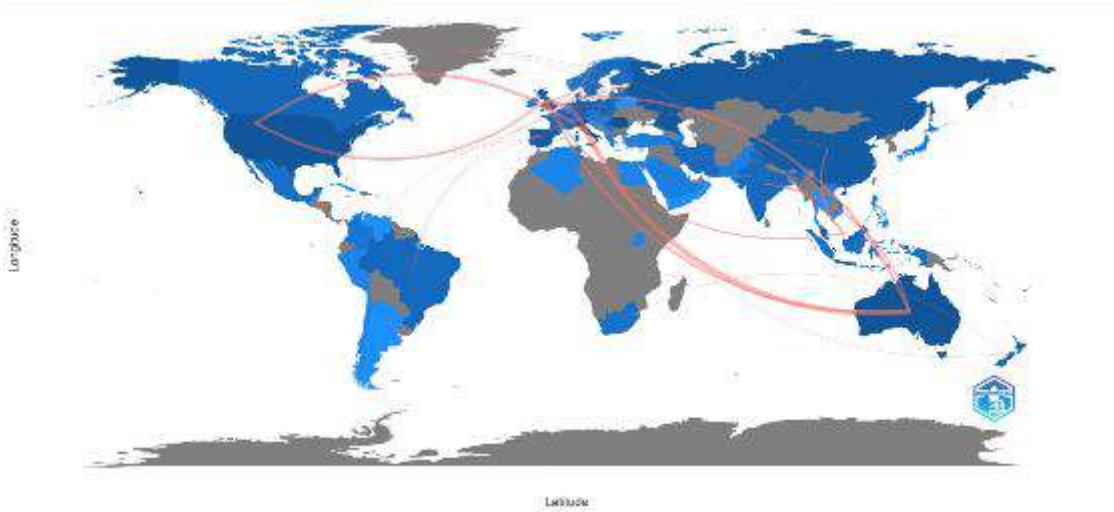


Figure 8. **Country collaboration map**

4.3 Discussions

There is no unified consensus on the definition of IC in the literature, but researchers agree on a tripartite categorization: human capital, structural capital, and relational capital (Gross-Gołacka *et al*., 2020). It has now been suggested that IC can be conceptualized as those hidden values, absent from the financial statements on account of the overly-conservative standpoint of standard setters, but highly valued by the market, which gives rise to a gap between market value and book value (Forte *et al*., 2019). Building on the precepts of the resource-based view, a managerial theory of the firm that advances the importance of a company's valuable, rare and hard-to-imitate resources, IC accounting is linked with the business reporting model (Beattie and Smith, 2013).

Guthrie *et al*. (2012) emphasize the importance of differentiating between IC accounting and "intangible accounting" in order to move beyond the traditional approach, which is confined to assets recognized in the financial statements. In a similar vein, Andriessen (2004) notes that "intangible accounting" is noticeably narrower than IC accounting, being limited to the elements associated with intellectual property (patents, trademarks, copyrights) and goodwill. Other elements that fall under the categorization of IC such as human capital and social capital do not meet the recognition criteria established by international standards (IAS 38, IFRS 3). Consequently, as Lev *et al*. (2005) point out, many valuable intellectual assets, which are likely to create value and bring competitive advantages, will not pass the capitalization test. The authors also point out that attempts to broaden "intangible accounting" have to include clear recognition criteria and take into account the potential "myopic" behaviour of some managers, determined to meet the expectations of the market, and offer a rosy picture of the financial position of the firm, even if it is disconnected from the economic reality. Despite their importance, many IC elements such as reputation, relationships, and creativity of employees are still ignored by regulators and overlooked in GAAP and IFRS-based financial reporting (Garanina *et al*., 2021).

Badia *et al*. (2018) maintain that integrated reporting can help to bridge the gap between theory and practice as this topic has traditionally attracted the attention of scholars. Admittedly, we can talk about "a failure to convert IC theory into practice caused by a

concentration of top-down ostensive research instead of bottom-up performative research" (Guthrie *et al*., 2012: 75) despite the fact that IC is, paradoxically, an extensively discussed subject. Notwithstanding the reporting obligations on sustainability and social responsibility, Cañibano (2018) opines that the level of disclosure of IC information remains unsatisfactory. It was also argued in the literature that the prompt to consider all forms of capital as suggested by the IR framework, of which three equate to IC components, may enhance the level of IC disclosure. Using content analysis, Terblanche and De Villiers (2019) scrutinize IC disclosure in integrated reports and conclude that firms producing integrated reports report more IC information, though the emphasis is on human capital. Beattie and Smith (2013) contend that the reluctance of companies to disclose IC information may be attributed to the proprietary costs involved. Put differently, sharing sensitive information may jeopardise the competitive position of a company and give rise to a competitive disadvantage (Forte *et al*., 2019).

5. Conclusions

The transition from the industrial economy, based mainly on tangible assets, to the new economy, based on knowledge and other intangible elements, challenged both the business environment and the accounting system. Consequently, in the last three decades, we have witnessed a proliferation of IC studies. As Beattie and Smith (2013) emphasize, a change occurred in the nature of the source of competitive advantage. Within this context, many organizations have focused on intangible assets, often being perceived as a key to superior performance. In light of its importance, IC was analysed using multi-theoretical lenses. We confine our research to publications exploring IC from an accounting perspective, thus differentiating our analysis from previous bibliometric studies in the realm of intangibles.

Our bibliometric analysis offers insights into the "social structure", "intellectual structure" and "conceptual structure" of the accounting literature related to IC. The intellectual structure of the IC research is revealed through a co-citation network, used to identify the foundations of the extant research, and a bibliographical coupling network, employed to display the state of the art and to identify emerging trends. The results of the co-citation analysis revealed that the contribution of the IC to the accounting literature is based on five thematic clusters namely (1) IC and firm performance, (2) IC reporting, (3) IC accounting, (4) IC measurement and (5) IC theoretical frameworks. The conceptual structure is analysed through a conceptual map and a trend topic analysis. The results show that as the zeitgeist changed, corporate social responsibility and sustainable development have recently entered the IC scientific discourse as more and more companies have adhered, albeit slowly, to the sustainable philosophy. IR also helped renew the interest in IC research and give a fresh impetus to scholars, but the level of IC disclosure remains unsatisfactory due to proprietary costs and a dichotomy between theory and practice. The social structure allows us to analyse the level of cooperation between countries, particularly important as multi-country publications are conducive to finding a common vocabulary, clearly missing in IC research. Several researchers opine that accounting does not provide a complete picture of IC (Forte *et al*., 2019). We subscribe to the results of earlier studies that financial statements are confined to a part of IC by virtue of conservatory recognition criteria and, consequently, many valuable intangible assets are neglected.

To the authors' best knowledge, no bibliometric studies have explored IC in the accounting literature. Our paper meaningfully complements the large body of IC literature by providing a finer-grained insight into IC accounting and the underlying structures of knowledge. The results may be of interest to both academia and regulators. The data is restricted to the Web of Science, which may be interpreted as a potential limitation of the study. Therefore, it would be interesting to merge the bibliographic material of more scientific databases. As a recent study suggests (Garanina *et al*., 2021), standardizing non-financial disclosure should be a fruitful future avenue as well as a topic high on the agenda of policy-makers. Another promising future line of inquiry links IC and sustainability.

References

Alvino, F., Di Vaio, A., Hassan, R., & Palladino, R. (2020) „Intellectual capital and sustainable development: A systematic literature review", *Journal of Intellectual Capital*, vol. 22, no. 1: 76-94

Andriessen, D. (2004). *Making Sense of Intellectual Capital*, London: Routledge

Badia, F., Dicuonzo, G., Petruzzelli, S., & Dell'Atti, V. (2018) „Integrated reporting in action: mobilizing intellectual capital to improve management and governance practices", *Journal of Management and Governance*, vol. 23, no. 2: 299-320

Bamel, U., Pereira, V., Del Giudice, M., & Temouri, Y. (2020) „The extent and impact of intellectual capital research: a two decade analysis", *Journal of Intellectual Capital*, vol. 23, no. 2: 375-400

Beattie, V. & Smith, S. J. (2013) „Value creation and business models: Refocusing the intellectual capital debate", *British Accounting Review*, vol. 45, no. 4: 243-254

Bellucci, M., Marzi, G., Orlando, B., & Ciampi, F. (2021) „Journal of Intellectual Capital: a review of emerging themes and future trends". *Journal of Intellectual Capital*, vol. 22, no. 4: 744-767

Cañibano, L. (2018) „Accounting and intangibles", *Revista de Contabilidad-Spanish Accounting Review*, vol. 21, no. 1: 1-6

Castilla-Polo, F. & Sánchez-Hernández, M.I. (2020) „Cooperatives and sustainable development: A multilevel approach based on intangible assets", *Sustainability*, vol. 12, no. 10: 4099

Dabić, M., Vlačić, B., Scuotto, V., & Warkentin, M. (2020) „Two decades of the Journal of Intellectual Capital: a bibliometric overview and an agenda for future research", *Journal of Intellectual Capital*, vol. 22, no. 3: 458–477

Danvila-del-Valle, I., Estévez-Mendoza, C., & Lara, F.J. (2019) „Human resources training: A bibliometric analysis", *Journal of Business Research*, vol. 101, no. 3: 627-636

De Villiers, C. & Sharma, U. (2020) „A critical reflection on the future of financial, intellectual capital, sustainability and integrated reporting", *Critical Perspectives on Accounting*, vol. 70: 101999

Dervis, H. (2019) „Bibliometric analysis using bibliometrix an R package", *Journal of Scientometric Research*, vol. 8, no. 3: 156-160

Donthu, N., Kumar, S., & Pattnaik, D. (2020) „Forty-five years of Journal of Business Research: A bibliometric analysis", *Journal of Business Research*, vol. 109: 1-14

Dost, M., Badir, Y.F., Ali, Z., & Tariq, A. (2016) „The impact of intellectual capital on innovation generation and adoption", *Journal of Intellectual Capital*, vol. 17, no. 4: 675-695

Duff, A. (2018) „Intellectual capital disclosure: evidence from UK accounting firms", *Journal of Intellectual Capital*, vol. 19, no. 4: 768-786

Dumay, J. (2014) „15 years of the Journal of Intellectual Capital and counting: A manifesto for transformational IC research", *Journal of Intellectual Capital*, vol. 15, no. 1: 2-37

Dumay, J. (2009) „Intellectual capital measurement: A critical approach", *Journal of*

Intellectual Capital, vol. 10, no. 2: 190-210
Dumay, J. & Guthrie, J. (2019) „Reflections on interdisciplinary critical intellectual capital accounting research: Multidisciplinary propositions for a new future", *Accounting, Auditing and Accountability Journal*, vol. 32, no. 8: 2282–2306
Dumay, J., Guthrie, J., & Rooney, J. (2020) „Being critical about intellectual capital accounting in 2020: An overview", *Critical Perspectives on Accounting*, vol. 70: 102185
Dženopoljac, V., Janoševic, S., & Bontis, N. (2016) „Intellectual capital and financial performance in the Serbian ICT industry", *Journal of Intellectual Capital*, vol. 17, no. 2: 373-396
Dženopoljac, V., Muhammed, S., & Janošević, S. (2019) „Intangibles and performance in oil and gas industry", *Management Decision*, vol. 57, no. 5: 1267-1285
El Baz, J. & Iddik, S. (2022) „Green supply chain management and organizational culture: a bibliometric analysis based on Scopus data (2001-2020)", *International Journal of Organizational Analysis*, vol. 30, no. 1:156–179
Ferenhof, H.A., Durst, S., Zaniboni Bialecki, Z.M., & Selig, P.M. (2015) „Intellectual capital dimensions: state of the art in 2014", *Journal of Intellectual Capital*, vol. 16, no. 1: 58-100
Fernandes Dos Santos, N.M.B., Nunes, D., Cardoso Romão Freitas, F., Polezi Munhoz, I., & Caldana, A. (2019). „Human Capital Measurement: A Bibliometric Survey", *Proceedings of the 4th Brazilian Technology Symposium*, vol. 140
Sardo, F. & Serrasqueiro, Z. (2017) „A European empirical study of the relationship between firms' intellectual capital, financial performance and market value", *Journal of Intellectual Capital*, vol. 18, no. 4: 771-788
Forte, W., Matonti, G., Nicolo, G., & Tucker, J. (2019) „MtB versus VAIC in measuring intellectual capital: Empirical evidence from Italian listed companies", *African Journal of Business Management*, vol. 13, no. 7: 588-601
Garanina, T., Hussinki, H., & Dumay, J. (2021) „Accounting for intangibles and intellectual capital : A literature review from 2000 to 2020", *Accounting and Finance*, vol. 61, no. 4: 5111-5140
García-Lillo, F., Claver-Cortés, E., Marco-Lajara, B., Úbeda-García, M. & Seva-Larrosa, P. (2018) „On clusters and industrial districts: A literature review using bibliometrics methods, 2000–2015", *Papers in Regional Science*, vol. 97, no. 4: 835–861
Givi, M.E. (2021) „Assessment of the history and trends of "The Journal of Intellectual Capital": a bibliometrics, altmetrics and text mining analysis", *Journal of Intellectual Capital*, vol. ahead-of-print
Gross-Gołacka, E., Kusterka-Jefmanska, M., & Jefmanski, B. (2020) „ Can Elements of Intellectual Capital Improve Business Sustainability?—The Perspective of Managers of SMEs in Poland", *Sustainability*, vol. 12, no. 4: 1545
Gupta, N. & Chakravarty, R. (2021) „Research visualization of Indian LIS research using VOSviewer and Bibliometrix", *Library Hi Tech News*, vol. 38, no. 8: 6-8
Guthrie, J., Ricceri, F., & Dumay, J. (2012) „Reflections and projections: A decade of Intellectual Capital Accounting Research", *British Accounting Review*, vol. 48, no. 2: 68-88
Khazabi, M. & Van Quyen, N. (2017) „Competition and innovation with horizontal R&D spillovers", *Journal of Economic Studies*, vol. 44, no. 3: 475-488
Lee, C.S. & Wong, K.Y. (2019) „Advances in intellectual capital performance measurement: a state-of-the-art review", *Bottom Line*, vol. 32, no. 2: 118-134
Lev, B., Cañibano, L., & Marr, B. (2005). An Accounting Perspective on Intellectual Capital. In B. Marr (Ed.), *Advance Praise for Perspectives on Intellectual Capital : Multidisciplinary Insights into Management, Measurement, and Reporting*. Butterworth-Heinemann.
Lin, C.Y.Y. & Edvinsson, L. (2020) „Reflections on JIC's twenty-year history and suggestions for future IC research", *Journal of Intellectual Capital*, vol. 22, no. 3: 439-457
Martín-de Castro, G., Díez-Vial, I., & Delgado-Verde, M. (2019) „Intellectual capital and the firm: evolution and research trends", *Journal of Intellectual Capital*, vol. 20, no. 4: 555-

580.
Mohammad, H.S., Lajuni, N., & Yeng, S.K. (2021) „Current Trend and Development on Intellectual Capital and Performance: A Bibliometric Analysis", *International Journal of Academic Research in Business and Social Sciences*, vol. 11, no. 7: 355-367
Oshodi, O.S., Awuzie, B.O., Akotia, J., Ademiloye, A.S., & Ngowi, A. (2020) „A bibliometric analysis of recycled concrete research (1978–2019)", *Built Environment Project and Asset Management*, vol. 10, no. 5: 725-736
Petty, R. & Guthrie, J. (2000) „Intellectual Capital Literature Review: Measurement, Reporting and Management", *Journal of Intellectual Capital*, vol. 1, no. 2: 155-176.
Pike, S., Fernström, L., & Roos, G. (2005) „Intellectual capital: Management approach in ICS Ltd", *Journal of Intellectual Capital*, vol. 6, no. 4: 489-509
Pirogova, O., Voronova, O., Khnykina, T., & Plotnikov, V. (2020) „Intellectual capital of a trading company: Comprehensive analysis based on reporting", *Sustainability*, vol. 12, no. 7: 7095
Pucci, T., Simoni, C. & Zanni, L. (2015) „Measuring the relationship between marketing assets, intellectual capital and firm performance", *Journal of Management and Governance*, vol. 19, no. 3: 589–616
Quintero-Quintero, W., Blanco-Ariza, A.B., & Garzón-Castrillón, M.A. (2021) „Intellectual Capital: A Review and Bibliometric Analysis", *Publications*, vol. 9, no. 4: 46
Serenko, A., Hardie, T., Bontis, N., Booker, L., & Sadeddin, K. (2010) „A scientometric analysis of knowledge management and intellectual capital academic literature (1994-2008)", *Journal of Knowledge Management*, vol. 14, no. 1: 3-23
Tan, H.P., Plowman, D., & Hancock, P. (2007) „Intellectual capital and financial returns of companies", *Journal of Intellectual Capital*, vol. 8, no. 1: 76-95
Terblanche, W. & De Villiers, C. (2019) „The influence of integrated reporting and internationalisation on intellectual capital disclosures", *Journal of Intellectual Capital*, vol. 20, no. 1: 40-59
Xu, Z., Ge, Z., Wang, X., & Skare, M. (2021) „Bibliometric analysis of technology adoption literature published from 1997 to 2020", *Technological Forecasting and Social Change*, vol. 170: 120896.
Yusliza, M.Y., Yong, J.Y., Tanveer, M.I., Ramayah, T., Noor Faezah, J., & Muhammad, Z. (2020) „A structural model of the impact of green intellectual capital on sustainable performance", *Journal of Cleaner Production*, vol. 249: 119334.

SECTION 3

Budgetary Control and Organisational Culture: The Moderating Role of Information Technology in Local Government

Gifty Kenetey

Boris Popesko

Ashish Singh

The Impact of the Innovative Business Model on the Automotive Industry

Băbeanu Sabin-Alexandru

Budgetary Control and Organisational Culture: The Moderating Role of Information Technology in Local Government

Gifty Kenetey[a, 5], Boris Popesko[a] and Ashish Singh[a]

[a] *Tomas Bata University in Zlin, Czech Republic*

Abstract: *The intensity of political pressures mounted on Government organisations for budgetary compliance has offered a path of direction towards formulating theories on factors affecting performance. One key field of interest that attracts such political pressures is budgetary control, a significant factor affecting budgetary control in Government. Culture intelligence is a vital tool in today's global world as information technology advances and organisations become increasingly global-focused. Cultural intelligence thus implies that organisations have effective communications within their business settings and across cultures. The purpose of this study is presented in two sections; first, to provide an understanding of factors that could affect budgetary control considering organisational culture. Secondly, to examine how integrating information technology with budgetary control can impact financial performance. A literature search is a method adopted for this study, and the general specific interdisciplinary research approach is what the research stands on. The study presented assertions and a conceptual framework that describes and analyses the research variables. Investigating the variables uncovered some organisational culture elements that tend to affect the flow of budgetary control regarding resource prioritisation and spending limits. The study analysed specific corporate culture traits of the Local Government of Ghana. Finally, the study also developed a model on the triggers of Budgetary control and its suitable response patterns and provides a recommendation for conducting an empirical test on the study's conceptual framework in the future.*

Keywords: *Budgetary control, organisational culture, local government, information technology, Ghana, emerging economy.*

1. Introduction

Culture intelligence is a vital tool in today's global world as information technology advances and organisations become increasingly global-focused. Cultural intelligence thus implies that organisations have effective communications within their business settings and across cultures. Goddard (1997) hypothesised that an organisation's core beliefs reflect its budget-related behaviours regarding its financial control system. The research was conducted in a UK local government organisation, proving a correlation between organisational culture and budget-related behaviour. However, the author expressed no direct relationship between culture and the financial control system. The author further argued that organisational culture had to be consistent with its financial control system design; otherwise, the system would face resistance and fail. The

[5] *Corresponding author*: Tomas Bata University in Zlin, nám. T. G. Masaryka 5555, 760 01 Zlín, Czech Republic.

findings and arguments raised by Goddard are still relevant in analysing the objective of this research.

Subsequently, the COVID-19 pandemic tragedy that the world recently encountered and is still experiencing has placed tremendous pressure on most economies, if not all. These economies affected by the pandemic need to cut their expenditures to prevent debt accumulation. Thus, the need for governments to be informed by managerial strategies and budget control techniques. The pressure is perceived more on emerging economies and, most significantly, African economies than developed economies. Therefore, it is prudent for the high-risk economies (the magnitude of the effect of COVID-19 on some economies) to restructure their budgeting system and put appropriate controls on the budgeting environment they operate in. Additionally, a review on budgetary control reveals that fewer studies have been conducted on local Government, and very few have focused on emerging economies.

Aside from this, the dynamic nature of business features in Budgeting (Wagner *et al*., 2021; Vermeulen and Witjes, 2016) focuses on budgetary control to shift its direction toward cost reduction and improve control techniques that enhance budgetary performance. Subsequently, the competitive advantage of organisations can be tied to their capabilities in information technology Jia *et al*. (2017) due to the intense competition in today's business world and the globalisation of markets. Nevertheless, the advancement of information technology seems more evident in advanced economies and lucking behind in emerging economies. Organisational strategies rely strongly on innovative capabilities, and local governments' pressures for budgetary compliance (budgetary performance) will likely intensify in the post-pandemic era. Therefore, integrating information technology with tight budget control is necessary to avoid budget deficits or deviations.

Furthermore, Senyo *et al*. (2021)also express that although economies across the globe engage IT as a transformational strategy, most research on IT is limited to developing economies. In addition, Back *et al*. (2014) assert that a significant challenge developing economies face is institutional void endemic. Nevertheless, the private sector in most developing economies seems to be more abreast with information technology engagement than the public sector. Thus, the transformational effect of adopting innovative technology strategies is more evident in the private and public sectors. Information technology, however, is a terrain that public sectors in developing economies can exploit for economic transformation (Amankwah-Amoah *et al*., 2018). Besides these concerns for public sectors to engage information technology for economic transformation, it is also vital to understand that governments are faced with the challenge of cutting down costs by reducing budgetary costs. Reducing costs and stimulating the same objective with technological innovation poses a challenge for governments (Janssen and Estevez, 2013).

Given the elaborations above, the key research objective formulated is to present an understanding of the factors that could affect budgetary control considering organisational culture through adopting information technology in the Local Government of Ghana. This study's direction of budgetary control is geared toward corrective action in instances of deviations on a spending limit and resource prioritisation in a turbulent local government environment.

2. Literature review and research assertions

Budgetary control provides the management structure to match budgetary results with targets and implement corrective action in deviations (Gianakis and McCue, 1999; Matsoso *et al*., 2021). All Government levels budget for their programs but the structural arrangement and environment differ. The salience of local Government as a public organisation is a variable that differs its Budgeting from the national level. (Gianakis and McCue, 1999; Matsoso *et al*., 2021). According to Johansson and Siverbo (2014), Budgeting focuses on allocating resources to achieve welfare purposes. A budget is considered a mechanism that allows governments to allocate resources and a control instrument for spending. This context categorises budgets into three purposes; an instrument for economic policy, economic management tool, and an accountability instrument (Adongo and Jagongo, 2013). Budgetary challenges in emerging economies are most likely to differ from developed economies considering the dominance of scarcity of financial resources, pointing to poverty that might primarily affect the reconciliation of the planned budget and the actual results.

Meanwhile, the contingent prevalence of global economic turbulence in recent times poses dire economic situations for public organisations. This calls for redressing budgetary control research on public organisations (Lassou *et al*., 2019; Johansson and Siverbo, 2014). The authors suggested a call for public organisations to refocus their budgetary control techniques in such circumstances to achieve set goals.

Johansson and Siverbo (2014) presented the relationship between budget control and budget deviation. The study proved that in the instance of budget turbulence in the public sector, tight budget control is a reasonable response that aids the chances of achieving the budget target. Public sector managers are governed by management control, and these management controls are classified under action and result control (Ouchi, 1979; Jakobsen and Mortensen, 2016; Merchant and Van der Stede, 2017; Siverbo, 2021). The result control defines actions taken to set new goals and measures performance to correct deviations based on feedback. What constitutes a good result control design has to do with the extensiveness of measuring the dimensions of performance, for example, Finance, innovation budget and sustainability (Bedford and Malmi, 2015; Siverbo, 2021). Action control is an emblem of bureaucracy and is highly identified in public sector organisations. The design of the action control constitutes diverse internal and external rules that managers ought to get abreast with and comply with. These rules include the national legislation and regulation, operating procedures and local policies (Bedford and Malmi, 2015; Almklov *et al*., 2018; Siverbo, 2021). Control is considered effective through tight monitoring of compliance rules which shows that the significance of compliance is tied to managerial performance evaluation (Merchant and Van der Stede, 2017; Siverbo, 2021).

The future financial performance of organisations becomes possible through budgetary control, which offers the groundwork for monitoring, evaluating strategies and implementation (Hansen *et al*., 2003; Al Mahroqi and Matriano, 2021). Al Mahroqi and Matriano (2021) explain that Budgetary control techniques impact financial performance through resource allocation and cost control. Organisations that employ the income and expenses budgeting technique rely on the organisation's income for servicing their expenses to achieve profit. Whereas organisations that depend on the variance analysis review the changes in budget and keep a track record of the financial

development or variance. Financial performance is considered a measure that assesses assets usage with revenues and shows the efficiency of an orgainsation. Al Mahroqi & Matriano (2021) assert that Budgetary control is embedded in the financial aspect of the organisation and forms part of the internal control system. This control system directs the budget process to meet the organisation's financial goals. Following the elaborations above, the following research assertions were formed to be empirically tested in future studies.

A1: Budgetary control will have a positive effect on financial resource prioritization.

A2: Tight budgetary Control will impact spending limits positively.

A3: An organisation's budgetary control system positively reflects its financial performance.

2.1. Organisational culture and organisational control

Works on culture (Goddard, 1997; Cameron and Quinn, 2011) have categorised culture into two. The school of thought that views culture as an internal variable about those that treat culture as elements that can be managed and thus can be changed by managers; and those that treat culture as an external variable, which means it cannot be changed as it was transported from the external environment of the organisation. The internal organisational culture variable is categorised into corporate culture and organisational climate. Corporate culture studies view culture as beliefs and shared value systems that seek to identify causes and their management. However, Cameron and Quinn (2011) opines that although there is a distinction between organisational culture and organisational climate, the combination of the two presents the overall organisational culture. Goddard (1997) further outlines a definition of culture that aligns with this study's context; culture is an internal variable that brings both the corporate culture and organisational climate context. Another relevant definition of organisational culture to this study is defined as the mutual understandings, mutual meanings, and mutual sense-making that emanates from reality development which offers people to view and understand events and processes in peculiar ways (Kloot and Martin, 2007).

According to Nikpour (2017), there is a necessitation of achieving high performance of organisations by establishing factors that affect the organisational performance and a key factor in this regard is revealed as the company's organisational culture. The author further explained that some cultural traits might be useful predictors of performance and effectiveness (Wijethilake *et al*., 2021). Subsequently, Kloot and Martin (2007) have also illustrated that organisational culture impacts the efficacity of management control.

Additionally, the illustration of Cameron and Quinn (2011) is also relevant to conceptualising the framework for this study. The authors illustrated elements of organisational culture as Implicit Assumptions, Conscious Contracts and Norms, Artifacts and Explicit behaviours. These elements are assumptions of a culture that have been ignored in accounting because they denote an aspect of culture that is taken for granted. Implicit and explicit behaviour as an element of the organisational culture could affect budgetary control. According to the authors, culture is viewed as an implicit assumption that manifests human conditions and relates to the environment.

These conditions are, however, not noticed until they are challenged. An example of this assumption connotes how humans do not have to make an effort to decide the language to speak until they are confronted with a different language aside from theirs. To have a clear view of what elements constitute organisational cultures of institutions, Hofstede (2011) opines that the elements of organisational culture contain elements from the national culture.

Further on, Cameron and Quinn (2011) explain the dimension of explicit behaviour as the most prominent element in organisations, defining how organisation members interact and their tolerance level to innovation or activities. This is denoted by *"just the way things are done around here".* This denotation is mainly jargon in most Ghanaian organisations, such as Me baay3 Aky3 in the Akan language and nicknamed by the present generation of Ghanaian corporate members as MBA. This means "I" or (we) have been here for an extended period. The explanation is that this is how we have been doing it for years, and the organisation is still in operation without collapsing. Thus, those with this school of thought (MBA) are likely to resist any form of control or change.

A4: Explicit behaviour will positively influence Budgetary control more in Ghana's Local Government.

A5: Explicit behaviour is negatively associated with budgetary control in Ghana's local Government.

According to Ouchi (1979), organisational control is the overall interpersonal impacted relations. The study opines that organisational control could be treated as an equivalence to power and viewed as a problem in the flow of communication. Ouchi, however, considers organisational control more objectively by designing mechanisms through which organisations can ensure control objectively to achieve their set goals. These mechanisms aid in measuring performance in situations where measuring performance tends to be difficult, and thus, "Clans" are to be depended on in ensuring control. According to Goddard (1997), this circumstance often occurs in the public sector.

Ouchi (1979), Cameron and Quinn (2006) developed a competing values framework for culture types as a foundation for an organisational culture assessment instrument (OCAI) intended to identify the approaches to organisational design, organisational quality, and theories of effectiveness. These four culture types were deduced from thirty-nine indicators that define organisational effectiveness. The authors asserted that although no organisational culture framework can be argued to be right or wrong, the competing values framework has been established as a high degree of congruence and accepted scheme that defines how people think, their values, and process information.

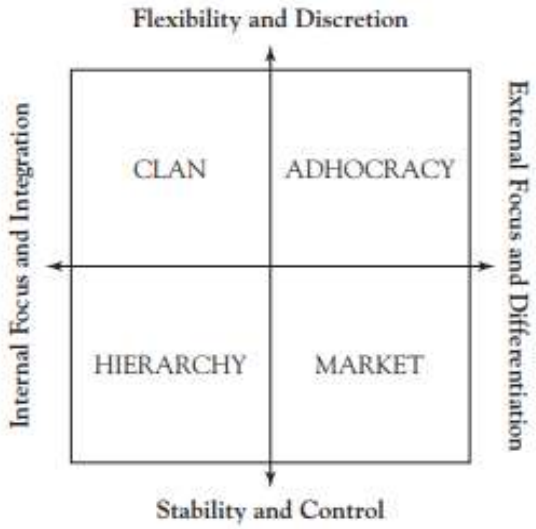


Figure 1. **The competing values framework**
Source: Cameron & Quinn, 2006

Under the Hierarchy culture type of organisational culture, the operational theory for success is that control leads to efficiency, eliminating waste. According to Cameron and Quinn (2006), this culture is attributed to bureaucracy and identified formalised organisations with structured workplaces. The procedures and concerns of such organisations are stability, efficiency and predictability. This type of culture holds formal rules and policies. The authors opine that government agencies included in the Local Government are classified as a prototype of this dimension of organisational culture. The Adhocracy culture according to OCAI is characterised by creativity and an innovative, entrepreneurial and dynamic workplace. Leadership is viewed as effective when innovative, risk-oriented and visionary. The catch that binds the organisation together is the commitment to experimentation, innovation and being at the edge of new knowledge, product and service. Success also means unique products and services. The OCAI assess the clan culture as a reflection of an extended family typified by a friendly workplace. The effective way to control activities in this type of organisational setting culture and make good business sense, especially in a turbulent environment, is to ensure that employees share the same beliefs, values, and goals. Based on Hofstede (2011) and Cameron and Quinn (2006), this type of organisational culture mostly prevails in organisations in collectivist nations. Under the Market Culture, the term market is not an analogue function of marketing or consumers but rather alludes to being a type of organisation that acts as a market-oriented to its external environment—this type of organisation functions through an economic market mechanism in creating a competitive advantage. Control becomes effective where the focal point of the culture is result-oriented, and emphasis is placed on winning.

A4: A dominance of Clan culture and hierarchy culture will have a negative effect on Budgetary Control in the Local Government of Ghana.

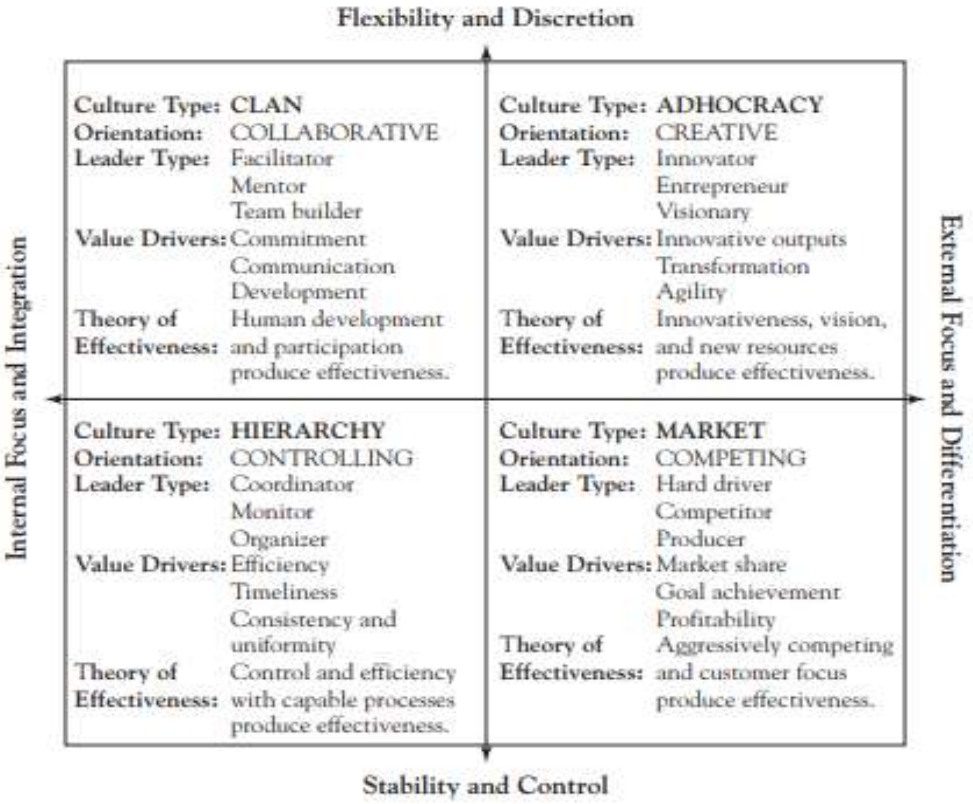


Figure 2. **The competing values of effectiveness**
Source: Cameron and Quinn, 2006

A6: Combination of the organisational cultures will lead to effective budgetary control in local Government.

A7: There is a correlation between organisational culture and budgetary control/financial performance.

2.2. Budgetary technology

According to Taipaleenmäki and Ikäheimo (2013), it is rare to find a study on information technology (IT) focused on management accounting relating to the public sector. The case is even rarer in emerging economies, and Senyo *et al*. (2021) has made it clear that there are idiosyncrasies between Advanced and emerging economies. Therefore, it is prudent to investigate how information technology in modern management accounting practices influences financial performance other than the traditional way of management accounting practices in the public sector. It is not hidden that most advanced and transitional economies got to the levels they are now through the engagement of advanced technology that meets the demands of a fast-growing world. The evolution of traditional management accounting to the modern trend results from the rapid technological development and changes in managerial and organisational structures that have emerged over the years (Ahmed Mohamed Ghandour, 2021). The lack of capacity and inadequate procedures pose a barrier for emerging economies to grasp the assistance offered by the International public sector accounting standard board (IPSASB) in its provision of study 14, which offers help in the transition to accrual base accounting (Krah and Aveh, 2013). Hence, the modern managerial economist in these economies is making efforts to cease depending on the

historical strategies of operations and instead engage innovative and digital analytics that looks to predict markets to meet the new age (Zabiullah *et al*., 2017). Developing economies are thus challenged with the obligation to catch up with this technological evolution

Juana *et al*. (2014) argued that information technology could enhance budget forecasts. Information technology enhances the capacity of organisations in making responses to opportunities, and with IT, there will be a tremendous change in the budgeting performance of an organisation. A key component of the budget is forecasting and controlling, which tends to achieve accuracy and fastness through the integration of IT (Juana *et al*., 2014). According to Bharadwaj and Grover (2016), the fundamental base for growth and survival is centred on information technology. The authors express that differentiation can be achieved through IT resources focusing on the resource-based view of IT. In organisations, information technology resources include human IT skills, IT infrastructure, and the capacity to leverage information technology. Thus, a full IT capacity can be achieved by combining the IT resources to obtain the overall IT capacity. This says that it becomes a potent organisational capability when a flexible IT infrastructure is combined with good human IT skills. As reflected in Juana *et al*. (2014), most literature on IT in accounting focuses on integrated information systems (IIS), like the Enterprise Resource Planning System. However, the authors argue that although information systems support management accounting, they should not be limited to the ERPS. The authors suggested that the ERPS should include software for budget control and call for more literature that focuses on IT and Management control systems because they are scant in academia.

2.3. Challenges of budgeting and information technology in the public sector of emerging economies

According to the UNESCO Institute of Statistics (2010), the global impact pointing to information technology is characterised by the techno-economic paradigm, mainly in the growth of the service sector. The case is the same for emerging or developing countries; however, recording Research and Development (R & R&D) in services is complicated and incomplete, with innovation in the service sector in emerging and developing countries. Senyo *et al*. (2021) also express that although economies across the globe engage IT as a transformational strategy, most of the research on IT is limited in developing economies. Furthermore, Back *et al*. (2014) assert that a significant challenge developing economies face is institutional void endemic. Although, the private sector in most developing economies seems to be more abreast with information technology engagement than the public sector. Thus, the transformational effect of adopting innovative technology strategies is more evident in private sectors than in the public sectors. Information technology, however, is a terrain that public sectors in developing economies can exploit for economic transformation (Amankwah-Amoah *et al*., 2018). Besides these concerns for public sectors to engage information technology for economic transformation, it is also vital to understand that governments are faced with the challenge of having to cut down costs by reducing budgetary costs. The objective to reduce cost coupled with stimulating the same objective with technological innovation poses a challenge for governments (Janssen and Estevez, 2013).

A8: IT will positively impact budgetary control and budget forecasting effectiveness and accuracy, respectively.

A9: IT infrastructure and good human IT skills will positively impact financial performance.

3. Methodology

The general scientific, interdisciplinary and special research approach was used to achieve the objective of this study, as reflected in (Syrtseva *et al*., 2021). The research began by identifying a gap in the phenomenon under study; then, a thorough investigation was conducted by searching secondary data from the following sources; Web of Science, Scopus, library books and Google Scholar. The decision for the selected database sources mentioned is due to their content of high-quality ranked journals, and also, selecting journals from these mentioned sources serves as a basis for performance appraisal for academicians. Approximately two weeks were spent gathering books and research literature on the study, which helped acquire knowledge to build the conceptual idea to achieve the research objective. Content Analysis was conducted on organisational culture, budgetary control, and information technology in the local government context.

4. Findings and discussion

The research differentiated itself from most studies that focus on the relationship between budgetary control and financial performance. This was achieved by identifying the organisational culture elements that affect the flow of budgetary control relating to resource prioritisation and spending limits. The study also focused on how integrated IT and the other variables can influence financial performance. The study presented a model (see figure 3) from which nine Assertions were found that could be tested empirically, as shown below:

A1: Budgetary control will have a positive effect on financial resource prioritization.
A2: Tight budgetary Control will impact spending limits positively.
A3: An organisation's budgetary control system positively reflects its financial performance.
A4: Explicit behaviour will positively influence Budgetary control more (less) in Ghanaian (Developed economies') Local Government.
A5: Explicit behaviour is negatively associated with budgetary control in Ghana's local Government.
A6: Combination of the organisational cultures will lead to effective budgetary control in local Government.
A7: There is a correlation between organisational culture and budgetary control/financial.
A8: IT will positively impact budgetary control and budget forecasting effectiveness and accuracy.
A9: IT infrastructure and good human IT skills will positively impact financial performance performance.

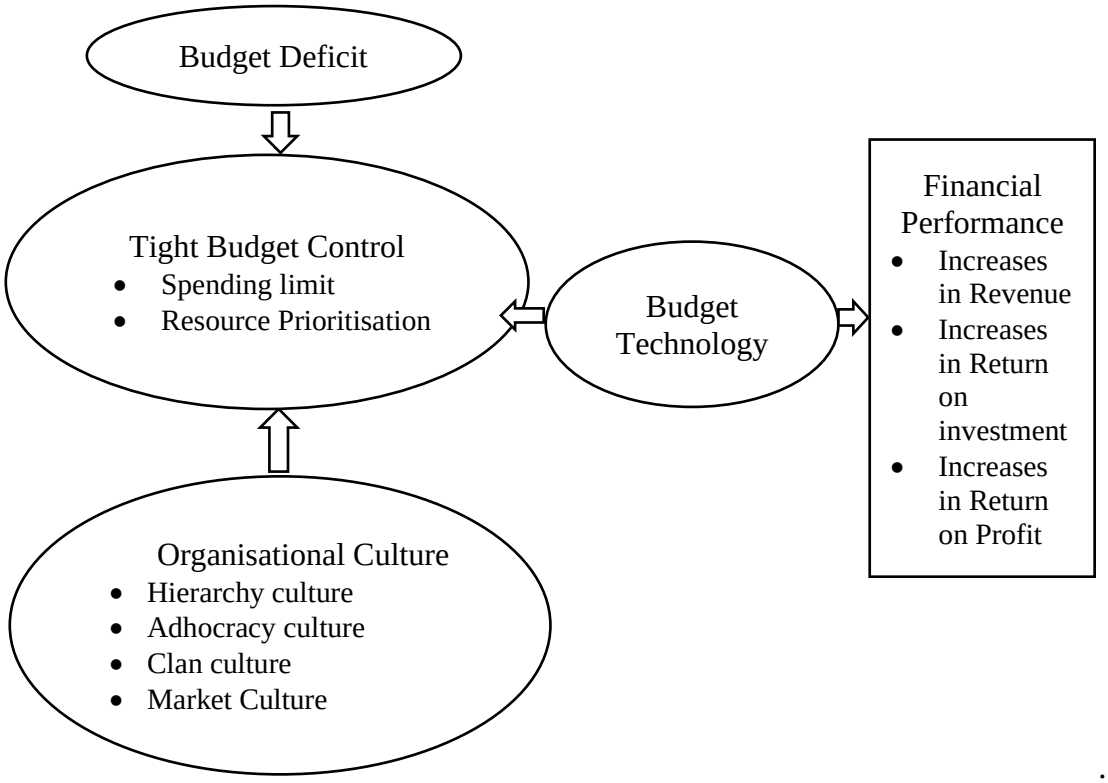


Figure 3. **Conceptual framework**
Source: Author's own

The study revealed that Irrespective of the type of organisational culture prevailing in a particular institution (for example, hierarchy culture), as the organisation expands, subunits ought to be created to foster the best fit of culture; for example, the adhocracy may be the right fit of culture for the new department (the subunit). This means an additional form of control will be introduced to the existing one (Cameron and Quinn, 2006). For example, the local Government of Ghana could be classified as a hierarchical type of organisation; a significant problem that emerging economies face is that R&D is complicated and incomplete, the same with innovation in the service sector (UNESCO Institute of Statistics, 2010). This suggests that local Governments in emerging economies like Ghana are now shifting towards the information age. Thus, innovation and pioneering initiatives could lead to the success of Ghana's local Government. Therefore, the effective form of control under this circumstance would be a combination of the control measures for the hierarchy and adhocracy culture. See figure 2 for the effective form of control under each culture type. Thus, mature and effective local government institutions like Ghana ought to develop subunits like R&D to foster control considering the adhocracy culture.

Additionally, the study reveals that integrating information technology in modern management accounting practices influences financial performance. Moreover, a complete IT capacity can be achieved by combining IT resources to obtain the overall IT capacity. This means it becomes a full organisational capability when a flexible IT infrastructure is combined with good human IT skills.

4.1. Breakdown of reviewed papers

This section of the findings and discussion presents the categorisation of the reviewed papers. The literature review for the topic under discussion is focused on the international and local perspectives. Thus, we categorised the papers according to the international and local perspectives. Where the international perspective refers to papers focused on developed and transition economies and the local, refers to Ghana. Since studies under this theme focused on Ghana are very scarce, our review included papers focusing on emerging economies with similar characteristics like Ghana.

Table 4.1 **Breakdown of Accounting and Non-accounting journals**

Accounting Journals	**No. of papers**
Critical Perspectives on Accounting,	1
Accounting and Business Research	1
Public Administration Review	1
Financial Accountability & Management	1
European Journal of Accounting, Auditing and Finance Research	1
Management Accounting Research,	2
Journal of Management Accounting Research	1
Estudios de Economia Aplicada	
International Journal of Governmental Financial Management,	1
Journal of Accounting in Emerging Economies	1
International Journal of Accounting and Taxation	1
International Journal of Accounting Information Systems	1
Baltic Journal of Management	1
Total number of papers in accounting journals	14
Total number of papers from non-accounting journals	15
Total number of books	3
Total number of conference papers	2
Total number of papers	34

Source: Authors' estimation of reviewed papers

Table 4.1 shows the number of journals sourced from Accounting (Management Accounting-Budget control, Management control and NPM) and non-accounting journals (Information technology and organisational culture). 15 of the journals from which our study sourced papers focused on organisational culture, information technology and a few social science papers relevant to the theme under study. Whilst 14 papers were sourced from Accounting journals, mainly under Management Accounting, relating to Budget control, Management control and the New public management (NPM), 3 studies were sourced from books and 2 from conference papers.

Table 4.2. **Breakdown of papers based on economies – international and locally-related perspectives**

Categorisation	Number of papers	Percentage of total
Developed	11	32
Emerging	10	29
Transition	3	8
General	6	18
Multiple economies/nations	4	12
Total	34	100

Source: Author's estimation based on literature review

Table 4.2 shows the categorisation of our papers based on both local and international perspectives, the idea is to have to reveal the differences and similarities of the process and challenges involved based on the phenomenon under study. The table reveals 11 papers from developed economies representing 32% of the total number of papers, and emerging economies recorded (10) papers representing 29%. Transition economies, papers with a general focus, and papers focused on multiple numbers of economies recorded 3, 6 and 4 papers, representing 8%, 18% and 12%, respectively. Chugunov *et al*. (2019) assert that public finance instruments for reforms in emerging economies are mostly borrowed from developed economies. To project a successful case of a developed economy which is a model for emulation by emerging economies like Ghana, Dabbicco and Mattei (2021) attributed the success of reconciliation in the UK budgeting system to fiscal transparency and accountability. However, since the environments and systems of administration are different for the two economies, this study suggests that the emulations should be structured to fit the budgeting environment and conditions of the emulator.

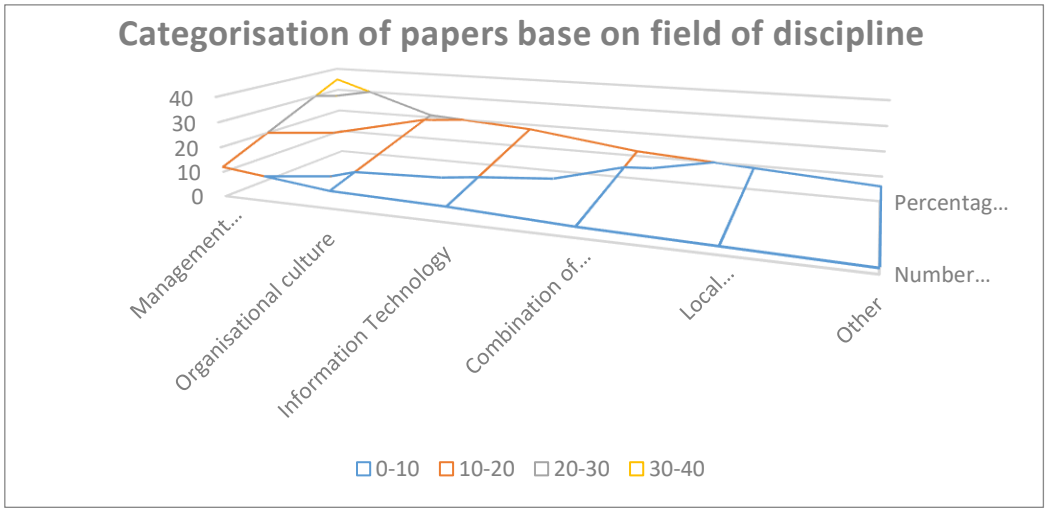


Figure 4.1. **Breakdown of papers according to the field of discipline**
Source: Authors' estimation based on literature

Commitment to theoretical pluralism has served as the glue that has kept accounting research active for the past three decades as it has developed within the inter-disciplinary, or "alternative" tradition (Modell *et al*., 2017). Figure 4.1 depicts the breakdown of the field of discipline for the theme under study. The main discipline for the study is budget control, followed by its relating discipline, which is organisational culture and the moderating role discipline, which is information technology. The finding base on the review shows that budget control, organisational culture and information technology records (12), (7) and (6), which represent 35%, 21% and 18%, respectively. We discovered that some papers focused on not just one discipline but a combination of either two or more disciplines for the study. Although only 4 represented 12% of the total number of papers, these papers were enriched with much more information that guided the direction of the review. The study included (2) papers representing 6% from the social science discipline that was not directly related to the theme of our study but gave direction of how the review for the study was structured. Finally, (3) papers on the local Government theme guided the research.

4.2. Development of Triggers of budgetary control model and suitable patterns

As asserted by Johansson & Siverbo (2014), in the instance of budget turbulence in the public sector, tight budget control is a reasonable response that aids the chances of achieving the budget target. Table 4.3 shows a framework and suitable patterns for local government budgetary control based on this study's literature review.

However, the concern of this study is to, first of all, differentiate between private and public sector budgeting. Public accounting encompasses financial and management accounting, and until the 1970s, the connection between efficiency and administration was only identified in the private sector. The establishment of the international accounting standard (IAS) in the private sector is what triggered the establishment of the international public sector accounting standard (IPSAS) in the public sector (Spanos and Liapis, 2018). Spanos and Liapis (2018) point out that public sector budging is geared towards being accountable to general stakeholders and not specific or well-defined stakeholders, unlike the private sector, where accountability is geared towards owners or shareholders of the private sector organisation. This generalisation of who to be accountable to in the public sector is possible poses threats to the performance of budget in public organisations.

The public sector budget is legally regulated and backed by institutional implementation, while the private sector. Budgeting is without any specific regulatory standard, and it is primarily a management accounting function (Spanos and Liapis, 2018). Spanos and Liapis express that public sector Budgeting primarily falls under public accounting, whereas private sector budgeting falls under management accounting. The authors further explain that modern public accounting uses the approach of private sector management. The application of private-sector principles to the public sector can be traced to the emergence of the new public management (NPM) in the 1980s. According to the authors, adopting the NPM principles in the public sector harmonised the private sector's modern methods with the public sector.

Table 4.3. **Development of budgetary control model and response patterns**

Triggers	**Responses and Patterns**
Idiosyncrasies and crises conditions	Government organisations benefit from tight budget control when there is significant budget turbulence (crises) as they work to control budget variances. Tight budget control is a natural and ideal response to global economic turbulence.
Outcome-based conditions The need to achieve a desired budgetary result pushes for tight budgetary control measures.	An organisation's natural response to a budget outcome when it is not favourable is tight budget control. The outcome is a trigger that forces tight budgetary control responses.
Business dynamic nature	The dynamic nature of business is traced down to Budgeting; thus, Budgeting becomes innovative and requires control measures to achieve better results. Thus,

Triggers	Responses and Patterns
	the natural response to the dynamism is tight budget control.
Strategy for positive performance	Budgetary control is a form of strategy to achieve positive budget performance. Thus, the need to develop an effective budget system arouses tight control measures.

Source: Authors' estimation based on the literature review

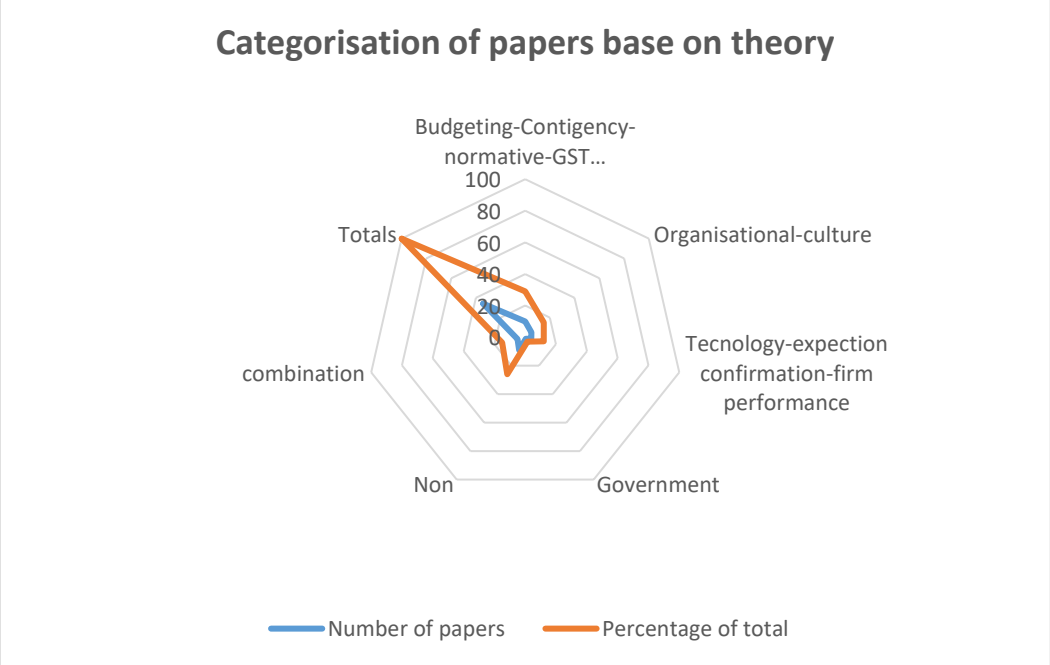


Figure 4.2. **Breakdown of papers based on the theory used**
Source: Authors' estimation based on the literature review

According to Modell *et al*. (2017), Instead of restricting the theories drawn from economics or psychology, typical of conventional accounting research, the inter-disciplinary approach allows and encourages the employment of a broad range of method theories. This blending of method theories reveals an effort to produce new theories. The finding in this section of the review on the theme of discussion as shown on figure 4.2, 29% of papers employed Management accounting theories like Budgeting, contingency, Goal-setting theory (GST), and normative, among others. The single theory involvement, according to Modell *et al*. (2017) is the traditional way by which researchers have conducted Accounting studies. Our finding also shows that 15% of the papers combine theories. However, Modell *et al*. assert that the recent trend of combing other social theories in the accounting discipline poses a paradigmatic challenge and paradigmatic tensions. The two method theories' divergent ontological conceptions of social structures and agency and their drastically different epistemic approach to the function of a theory cause the most tension. To our amusement, we discovered that 26% of the papers did not base their studies on any theory. These non-theory studies were mostly describing a phenomenon in a documentary or report form. Theories based on organisation-culture and IT and Government recorded 15%, 12% and 3%, respectively.

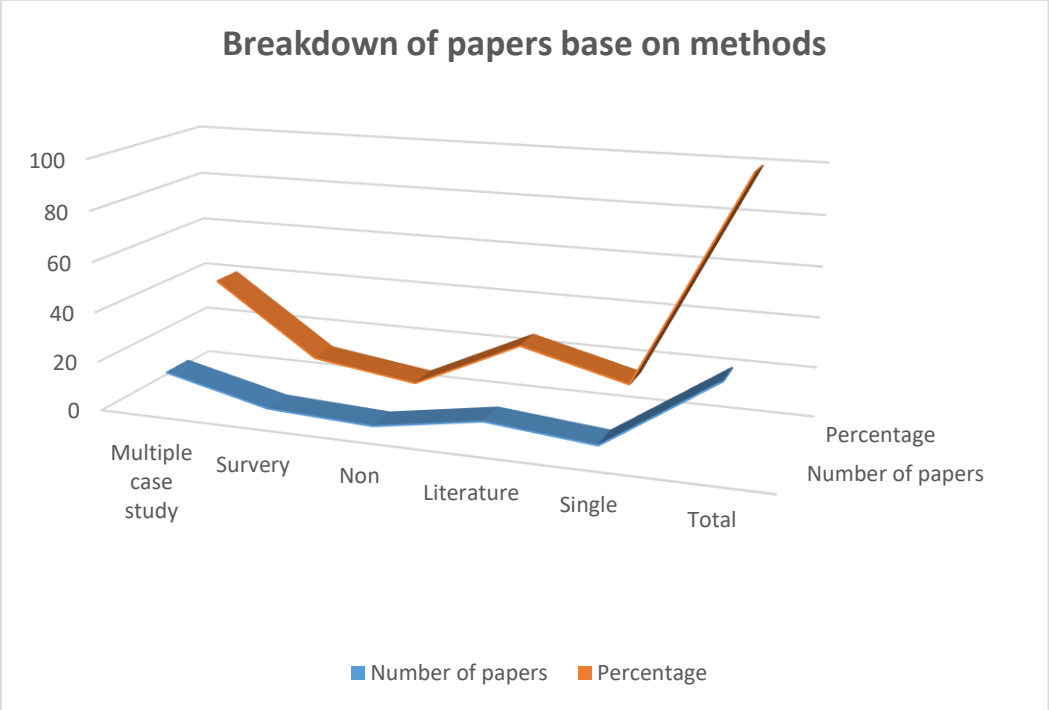


Figure 4.3. Breakdown of papers based on methods of data collection
Source: Authors' estimation based on literature review

As depicted in figure 4.3, case the case study method seems to be the most popular in management accounting research. Multiple case studies and the single case study recorded 14 and 5, representing 41 and 15 per cent, respectively. Few papers engaged the single study method for data collection despite its enrichment of exploring a phenomenon. The reason for a higher number of the multiple case study method may be that the results yielded from the method are more reliable and stronger and offers the researcher to analyse variables across a wider range.

5. Conclusions

Our review covers international and local perspective, where local refers to Ghana, and since studies under this theme focused on Ghana is very scarce, our review included papers focusing on emerging economies with similar characteristics like Ghana. The study draws a conclusion based on its objective by presenting a clearer understanding of the factors that affect budgetary control concerning organisational culture through adopting information technology in the Local Government of Ghana. The study concludes that organisational culture is a factor that affects budgetary control, and the integration of Information technology with budgetary control will intend to have a positive influence on financial performance. However, this conclusion is yet to be empirically tested and cannot be generalised. Based on this study's analysis of Budgetary control, local government organisations ought to tighten the budget controls as an action against any financial turbulence caused by the COVID pandemic. Organisational Culture is also a major factor that attention should be paid to when putting budgetary control measures. The study also developed a model on the triggers of budgetary control with suitable response patterns

6. Limitations and directions for future research

Although a thorough review and analysis were conducted based on other research studies, the study has not been empirically tested. However, the study provides a substantial framework that sets a good path for future empirical testing. Theoretically, the study provides a path to dive deeper into Organisational culture relating to budgetary control by testing and confirming the nine (9) assertions stated. The study will collect data on the case study organisation in an emerging economy pruned to constraints in terms of Research and Development and institutional voids. The study is interested in conducting this empirical study by determining how integrating information technology with budgetary control will impact financial performance.

Acknowledgement

The authors acknowledge the ongoing Internal Grant Agency (IGA) FaME 2021 project at the University of Tomas Bata in Zlin, with Research Project No; IGA/FaME/2022/003 entitled "Budgetary Control and Budgetary Technology in Local Government of Developed and Emerging Economies", and FSR FORD 5-6/2021-23/FaME/002 entitled "Performance measurement and work motivation in manufacturing firms, including IGA/FaME/2021/003 entitled "Consumer behaviour and Performance management of firms in a competitive digital world" respectively. We sincerely thank the stated project's committee for the financial support. We also appreciate the reviewers of the Accounting and Management Information System (AMIS) international conference for the helpful review comments.

References of reviewed papers

Adongo, K.O. & Jagongo, A. (2013). Budgetary Control as a Measure of Financial Performance of State Corporations in Kenya. *International Journal of Accounting and Taxation*, vol. 1, no. 1: 38-57. www.aripd.org/ijat

Ahmed Mohamed Ghandour, D. (2021). Analytical Review of the Current and Future Directions of Management Accounting and Control Systems. *European Journal of Accounting, Auditing and Finance Research*, vol. 9, no. 3: 42-73. https://doi.org/10.2139/ssrn.3819654

Al Mahroqi, R. & Matriano, M. (2021). Examining the Effect of Budgetary Controls on the Financial Performance of Oman Telecommunication Company. *International Journal of Research in Entrepreneurship & Business Studies*, vol. 2, no. 3: 37-46. https://doi.org/10.47259/ijrebs.234

Almklov, P.G. Antonsen, S., Bye, R., & Øren, A. (2018). Organisational culture and societal safety : Collaborating across boundaries. *Safety Science*, vol. 110, no. February 2017: 89-99. https://doi.org/10.1016/j.ssci.2017.12.029

Amankwah-Amoah, J., Egbetokun, A., & Osabutey, E.L.C. (2018). Meeting the 21st century challenges of doing business in Africa. *Technological Forecasting and Social Change*, *131*, 336–338. https://doi.org/10.1016/j.techfore.2018.01.006

Back, Y., Praveen Parboteeah, K., & Nam, D. Il. (2014). Innovation in Emerging Markets: The Role of Management Consulting Firms. *Journal of International Management*, vol. 20, no. 4: 390-405. https://doi.org/10.1016/j.intman.2014.07.001

Bedford, D.S. & Malmi, T. (2015). Configurations of control : An exploratory analysis. *Management Accounting Research*, vol. 27: 2-26. https://doi.org/10.1016/j.mar.2015.04.002

Bharadwaj, A.S. & Grover, V. (2016). A Resource-Based Perspective on Information Technology Capability and Firm Performance: An Empirical Investigation. *MIS*

Quarterly, vol. 24, no. 1: 169-196.
Cameron, K.S. & Quinn, R.E. (2006). Diagnosing and changing organisational culture: Based on the competing values framework. In *John Wiley & Sons* (Revised Ed). John Wiley & Sons.
Chugunov, I., Makohon, V., & Markuts, Y. (2019). Budgetary policy of the emerging countries in conditions of institutional transformations. *Problems and Perspectives in Management*, vol.17, no. 4: 252-261. https://doi.org/10.21511/ppm.17(4).2019.21
Dabbicco, G. & Mattei, G. (2021). The reconciliation of Budgeting with financial reporting: A comparative study of Italy and the UK. *Public Money and Management*, vol. 41, no. 2: 127-137. https://doi.org/10.1080/09540962.2019.1708059
Gianakis, G. & McCue, P.C. (1999). *Local Government Budgeting: A Managerial Approach*. Greenwodd Publishing Group. https://books.google.cz/books?hl=en&lr=&id=qPGIDZvdQ9AC&oi=fnd&pg=PR7&dq=LOCAL+GOVERNMENT+BUDGETING,++MANGERIAL+APPROACH&ots=WfezFw1DhJ&sig=0QQB_zh1cve4CJmR8ItZyCl0sfQ&redir_esc=y#v=onepage&q=LOCAL GOVERNMENT BUDGETING%2C MANGERIAL APPROACH&f=false
Goddard, A. (1997). Organisational culture and budgetary control in a UK local government application. *Accounting and Business Research*, vol. 2, no. 27: 111-123. https://www.proquest.com/docview/198179642/fulltextPDF/70F3EC71D17A4A8APQ/1?accountid=15518
Hansen, S.C., Otley, D.T., & Van der Stede, W.A. (2003). Practice Developments in Budgeting: An Overview and Research Perspective. *Journal of Management Accounting Research*, vol. 15: 95-116.
Hofstede, G. (2011). Dimensionalising Cultures: The Hofstede Model in Context. *Online Readings in Psychology and Culture*, vol. 2, no. 8. https://doi.org/10.9707/2307-0919.1014
Jakobsen, M.L. & Mortensen, P.B. (2016). Rules and the Doctrine of Performance Management. *Public Administration Review*, vol. 2, no. 76: 302-312. https://doi.org/10.1111/puar.12409
Janssen, M. & Estevez, E. (2013). Lean government and platform-based governance-Doing more with less. *Government Information Quarterly*, vol. 30, no. suppl. 1: S1-S8. https://doi.org/10.1016/j.giq.2012.11.003
Jia, Q., Guo, Y., & Barnes, S.J. (2017). Computers in Human Behavior Enterprise 2 . 0 post-adoption : Extending the information system continuance model based on the technology-organisation- environment framework. *Computers in Human Behavior*, vol. 67: 95-105. https://doi.org/10.1016/j.chb.2016.10.022
Johansson, T. & Siverbo, S. (2014). The appropriateness of tight budget control in public sector organisations facing budget turbulence. *Management Accounting Research*, vol. 25, no. 4: 271-283. https://doi.org/10.1016/j.mar.2014.04.001
Juana, D., Rahman, I.K.A., & Wee, S. (2014). Information Technology, Budget Forecasting and Performance. In Y. Zhang (Ed.), *2014 2nd International Conference in Humanities, Social Sciences and Global Business Management (ISSGBM 2014)* (Issue September, p. 93).
Kloot, L. & Martin, J. (2007). Public sector change, organisational culture and financial information: A study of local Government. *Australian Journal of Public Administration*, vol. 66, no. 4: 485-497. https://doi.org/10.1111/j.1467-8500.2007.00558.x
Krah, R.Y. & Aveh, F.K. (2013). International Consortium on Government Financial Management. *International Journal of Governmental Financial Management*, *XIII*, vol. 1, no. 1: 36-49. https://d1wqtxts1xzle7.cloudfront.net/31889200/Public_sector_accounting_education.pdf?1379215876=&response-content-disposition=inline%3B+filename%3DPublic_sector_accounting_education.pdf&Expires=1627134668&Signature=BJvII1G0X5isr-iQi5Eg8ibV2AIqbsfihQxKk-0
Lassou, P.J.C., Hopper, T., Tsamenyi, M., & Murinde, V. (2019). Critical Perspectives on Accounting Varieties of neo-colonialism : Government accounting reforms in

Anglophone and Francophone Africa – Benin and Ghana compared. *Critical Perspectives on Accounting*, vol. 65: 102071. https://doi.org/10.1016/j.cpa.2019.01.003

Matsoso, M.L., Nyathi, M., & Nakpodia, F.A. (2021). An assessment of Budgeting and budgetary controls among small and medium-sized enterprises: evidence from a developing economy. *Journal of Accounting in Emerging Economies*, *vol.11, no. 4:* 552-577. https://doi.org/10.1108/JAEE-04-2020-0082

Merchant, K. & Van der Stede, W. (2017). *Management control systems: performance measurement, evaluation and incentives* (4th ed.). Pearson. http://eprints.lse.ac.uk/id/eprint/76569

Modell, S., Vinnari, E., & Lukka, K. (2017). Accounting , Organisations and Society On the virtues and vices of combining theories : The case of institutional and actor-network theories in accounting research. *Accounting, Organisations and Society*, vol. 60: 62-78.

Nikpour, A. (2017). The impact of organisational culture on organisational performance: The mediating role of employee's organisational commitment. *International Journal of Organizational Leadership*, vol. 6, no. 1: 65-72. https://doi.org/10.33844/ijol.2017.60432

Ouchi, W.G. (1979). A Conceptual Framework for the Design of Organizational Control Mechanisms. *Management Science*, vol. 25, no. 9: 833-848. https://www.jstor.org/stable/2630236?seq=1#metadata_info_tab_contents

Senyo, P.K., Effah, J., & Osabutey, E.L.C. (2021). Digital platformisation as public sector transformation strategy: A case of Ghana's paperless port. *Technological Forecasting and Social Change*, vol. 162 (February 2020), 120387. https://doi.org/10.1016/j.techfore.2020.120387

Siverbo, S. (2021). The impact of management controls on public managers ' well-being. *Financial Accountability & Management.*, 1-21. https://doi.org/10.1111/faam.12290

Spanos, P., & Liapis, K. (2018). International accounting standards, Budgeting and controlling in private and public sector. *Economies of the Balkan and the Eastern European Countries in the Changing World (Ebeec 2018), 2018:* 107-130. https://doi.org/10.18502/kss.v3i10.3533

Syrtseva, S., Burlan, S., Katkova, N., Cheban, Y., Pisochenko, T., & Kostyrko, A. (2021). Digital technologies in the organisation of accounting and control of calculations for tax liabilities of budgetary institutions. *Estudios de Economia Aplicada*, vol. 39, no. 7. https://doi.org/10.25115/eea.v39i7.5010

Taipaleenmäki, J., & Ikäheimo, S. (2013). On the convergence of management accounting and financial accounting - the role of information technology in accounting change. *International Journal of Accounting Information Systems*, vol. 14, no. 4: 321-348. https://doi.org/10.1016/j.accinf.2013.09.003

UNESCO Institute of Statistics. (2010). *Measuring R&D:* (Issue 5). http://uis.unesco.org/sites/default/files/documents/measuring-rd-challenges-faced-by-developing-countries-2010-en.pdf

Vermeulen, W.J.V. & Witjes, S. (2016). On addressing the dual and embedded nature of business and the route towards corporate sustainability. *Journal of Cleaner Production*, vol. 112: 2822-2832. https://doi.org/10.1016/j.jclepro.2015.09.132

Wagner, J., Petera, P., Popesko, B., Novák, P., & Šafr, K. (2021). Usefulness of the budget: the mediating effect of participative Budgeting and budget-based evaluation and rewarding. *Baltic Journal of Management*, vol. 16, no. 4: 1746-5265. https://doi.org/10.1108/bjm-02-2020-0049

Wijethilake, C., Upadhaya, B., & Lama, T. (2021). The role of organisational culture in organisational change towards sustainability: evidence from the garment manufacturing industry. *Production Planning and Control*, vol. 0, no. 0: 1-20. https://doi.org/10.1080/09537287.2021.1913524

Zabiullah, B.I., Bhargava, B., Reddy, K.C.M., & Reddy, C.N.R. (2017). Recent Trends in Management Accounting. *9th Interntional Coference on Recent Innovations in Science, Engineering and Management*, vol. 6, no. 1: 438-444.

References

Chugunov, I., Makohon, V., & Markuts, Y. (2019). Budgetary policy of the emerging countries in conditions of institutional transformations. *Problems and Perspectives in Management*, vol. 17, no.4: 252-261. https://doi.org/10.21511/ppm.17(4).2019.21

Dabbicco, G., & Mattei, G. (2021). The reconciliation of Budgeting with financial reporting: A comparative study of Italy and the UK. *Public Money and Management*, vol. 41, no. 2: 127-137. https://doi.org/10.1080/09540962.2019.1708059

Johansson, T., & Siverbo, S. (2014). The appropriateness of tight budget control in public sector organisations facing budget turbulence. *Management Accounting Research*, vol. 25, no. 4: 271-283. https://doi.org/10.1016/j.mar.2014.04.001

Modell, S., Vinnari, E., & Lukka, K. (2017). Accounting , Organisations and Society On the virtues and vices of combining theories : The case of institutional and actor-network theories in accounting research. *Accounting, Organisations and Society*, vol. 60: 62–78.

Spanos, P., & Liapis, K. (2018). International accounting standards, Budgeting and controlling in private and public sector. *Economies of the Balkan and the Eastern European Countries in the Changing World (Ebeec 2018)*, 2018: 107–130. https://doi.org/10.18502/kss.v3i10.3533

Appendix J

***Table J1*. Detailed information on the breakdown of papers in the review**

Authors	Journal (year)	Nations	Discipline*	Theories	Methods	Main findings
Adongo, K.O. & Jagongo, A.	IJAT (2013)	Kenya	MA	Budget theory by Henry C Adams	Multiple case study	Budgetary control mechanisms had a substantial positive impact on state enterprises' financial performance by influencing their financial goals, how revenue is allocated, and the kinds of investments they make.
Ahmed Mohamed Ghandour, D.	EJ AAFR (2021)	Sudan	MA	Non	Literature review	Over the past 200 years, management accounting and control systems have seen a significant transformation. These modifications were made in response to swift changes in several contingency factors, which impact the layout and functionality of management accounting and control systems.
Al Mahroqi, R. & Matriano, M.	IJREBS (2021)	Oman	MA	Budget control techniques	Single	The findings showed a positive correlation between budgetary control and the company's financial performance, the different effects of budgetary control techniques, confirmation of the company's use of the variance analysis technique and accounting responsibility, and the significance of budgetary control procedures.
Almklov, P.G., Antonsen, S., Bye, R., & Øren, A.	SS (2018)	Netherlands	OC	Organisational theory	Multiple case study	In addition to the conventional methods of macro-level policy development, the construction of societal safety needs to be built mostly on organisation development.

Authors	Journal (year)	Nations	Discipline*	Theories	Methods	Main findings
Amankwah-Amoah, J., Egbetokun, A., & Osabutey, E.L.C.	T FSC (2018)	Ghana (USA-journal)	IT	Non	Literature review	Together, the papers show a broader comprehension and knowledge of several current concerns in the modern global economy.
Back, Y., Praveen Parboteeah, K., & Nam, D.	JIM (2014)	Across countries in emerging markets	IT	Innovation in emerging economies	Survey	According to institutional theory, the study presents that consulting is more beneficial to organisations in emerging markets in overcoming institutional voids.
Bedford, D.S. & Malmi, T.	MAR (2015)	Australia	MA	Management control mechanisms &Configuration approach	Multiple case study	Innovation is one of the strategic initiatives that result based control companies seek. Any efforts are likely to be focused on incremental rather than radical innovation results, which involve less risk and uncertainty because individual accountabilities are closely related to short-term performance.
Bharadwaj, A.S. & Grover, V.	MIS Quarterly (2016)	USA	IT	IT and firm performance	Multiple case study	As predicted, when comparing the IT leaders to the control sample of companies, the profit ratios in each of the four years were much higher. The total operating costs to sales (OEXP/S) ratio was much lower for the IT leaders' sample during the four years.
Cameron, K.S. & Quinn, R.E.	Book: John Wiley & Sons (Revised Ed) (2006)	Publication: USA	OC	Organisational culture	Multiple case study	The competing values framework and the organisational culture assessment instrument (OCAI)
Gianakis, G. & McCue, P.C.	Book: Greenwood Publishing Group (199)	Publication: USA and preaged in London	MA	Normative theory of Budgeting - government budgeting	Non-case	A polemic on budget theory

Authors	Journal (year)	Nations	Discipline*	Theories	Methods	Main findings
Goddard, A.	Accounting and Business Research (1997)	UK	OC, MA, local Government	Contingency theory	Multiple case study	Organisational culture and budget-related behaviour were found to be correlated.
Hansen, S.C., Otley, D.T., & Van der Stede, W.A	Journal of Management Accounting Research (2003)	USA and UK	MA	Budgeting - overview	Literature	By offering practitioners research that may help them enhance their approaches and by suggesting topics of practical value to researchers, the publication has made an effort to close the gap between practice and research.
Hofstede, G.	Online Readings in Psychology and Culture (2011)	Worldwide	OC	Cross-culture dimensions theory	survey	Provides a framework for understanding diverse cultures
Jakobsen, M.L., & Mortensen, P. B.	Public Administration Review (2016)	Denmark	Performance management	Performance management	Literature, Data and strategy: qualitative	The article shows evidence of the concept of considering performance management as a set of rules.
Janssen, M. & Estevez, E.	Government Information Quarterly (2013)	Non	Government	Lean Government	literature	The study provides an approach that Lean-government is a set of tools, a strategy to cut costs and enhance services, a framework, and a philosophy focused on a smaller government that taps into societal resources to achieve public values.
Jia, Q., Guo, Y., & Barnes, S.J	Computers in Human Behavior (2017)	China	IT	Expectation-confirmation theory	Multiple case study	The results of the study demonstrate that, in relation to technological evaluations, organisational and environmental context variables, such as subjective standards and competitive pressure, have a major impact on businesses' intentions to renew their Enterprise 2.0 service.
Johansson, T. & Siverbo, S.	Management Accounting	Sweden	MA, LG	NON	Multiple case study	The analysis supports the notion that tight budget control is a practical

Authors	Journal (year)	Nations	Discipline*	Theories	Methods	Main findings
	Research (2014)					reaction that increases the likelihood of meeting the budget objective in the public sector in the event of budget turbulence.
Juana, D., Rahman, I.K.A., & Wee, S.	2nd International Conference in Humanities, Social Sciences and Global Business Management 2014	Held in the UK, Authors from Malaysia	IT and MA	NON	literature	The study aims to show how well an IT system affects a management control process and how it can improve performance. The study also examines how IT affects a particular budgeting procedure—budgetary forecasting—and business success. The study develops a framework to examine the relationships.
Kloot, L. & Martin, J.	Australian Journal of Public Administration (2007)	Australia	OC, LG	Budgeting, Organisational culture	Multiple case study	Although mandatory competitive tendering continues to be the most significant event, the study finds that organisational culture is not focused on competitive practices despite the reform process.
Krah, R.Y. & Aveh, F.K	International Journal of Governmental Financial Management	Ghana	Ghana	Institutional innovation	Mixed method, quantitative and qualitative (Multiple case study)	High dependency rate, notably among Financial Non-Governmental Organisations. Despite the dependency's modest decline, it is clear that most microfinance institutions will continue to rely on government aid for a while.
Lassou, P.J.C., Hopper, T., Tsamenyi, M., & Murinde, V.	Critical Perspectives on Accounting (2019)	Ghana and Benin	Ghana	Non	Qualitative – interviews-single	The study discovered that, to varying degrees, the former colonial powers of Benin and Ghana still influence government accounting in those countries. However, in Ghana, the former colonial power of the United Kingdom has been replaced and allied

Authors	Journal (year)	Nations	Discipline*	Theories	Methods	Main findings
						with the rising power of the United States, with the help of IFIs, international regulators, and international accounting associations and firms. However, there were differences between the neo-colonial influences on the US from France and Britain.
Matsoso, M.L., Nyathi, M., & Nakpodia, F.A	Journal of Accounting in Emerging Economies (2021)	South Africa	MA	Goal-setting theory (GST)	Multiple case study	According to research findings, the adoption of Budgeting is facilitated by key SME stakeholders' favourable perceptions of the importance of Budgeting and budgetary controls.
Merchant, K. & Van der Stede, W.	performance measurement, evaluation and incentives (2017) Book	Publication: UK	MA	Management control systems	N/A	N/A
Nikpour, A.	AIMI Journal (2017)	Iran	OC	Non	survey	According to the research's findings, the suggested model was a good fit, and organisational culture positively affected organisational performance beyond its direct influence. Employees' organisational commitment mediated this effect, and its magnitude was noticeably greater than its direct influence.
Ouchi, W.G	Management Science (1979)	US	OC	Framework: Organisational control mechanism	Single case study	Developed a control mechanism
Senyo, P.K., Effah, J., & Osabutey, E.L.C	Technological Forecasting and Social Change	Ghana	IT	Technology affordance theory	Single case study	According to the findings, which are based on the technological affordance theory, the study creates a

Authors	Journal (year)	Nations	Discipline*	Theories	Methods	Main findings
	(2021)					transformative affordance framework (TAF) and makes suggestions about how digital platforms might facilitate the transformation of the public sector.
Siverbo, S.	Financial Accountability & Management (2021)	Sweden	M. control-MA	Self-determination theory	Multiple case study	The study created, tested, and confirmed a theoretical model that said that management controls' positive effects on public managers' well-being were explained by improved role clarity and their negative effects by increased control burden, which affected managers' autonomy.
Syrtseva, S., Burlan, S., Katkova, N., Cheban, Y., Pisochenko, T., & Kostyrko, A.	Estudios de Economia Aplicada (2021)	Ukraine	IT and BC	Non	Survey	The study demonstrated how establishing cutting-edge information, and analytical resource for the tax service optimises the accounting and control system, resulting in the introduction of more efficient tax administration mechanisms, the de-shadowing of the economy, and increased control over cash flow.
Taipaleenmäki, J. & Ikäheimo, S	International Journal of Accounting Information Systems (2013)	N/A general	IT & MA	Convergence of management accounting	Literature	The study provides examples of the manifestations and results of convergence in the technological and technical domain
UNESCO Institute of Statistics	UNESCO Institute for Statistics (2010)	Developing countries	IT - Research and experimental development	Non	Technical paper-multiple	The technical paper serves as the Frascati Manual's annexe and informs developing nations on how to use the standards for measuring research and experimental development suggested

Authors	Journal (year)	Nations	Discipline*	Theories	Methods	Main findings
						in the manual.
Vermeulen, W.J.V. & Witjes, S.	Journal of Cleaner Production (2016)	N/A	Other:	Corporate sustainability	literature	The study suggests that the problem of accelerating the application of "inclusive" corporate sustainability calls for a more inclusive systemic perspective.
Wagner, J., Petera, P., Popesko, B., Novák, P., & Šafr, K.	Baltic Journal of Management (2021)	Czech Republic	MA	Budgeting	Multiple case study	The study's findings indicate that the value of budget use positively influences how effective a budget is seen by principals (top managers), but what is more important is that budget-based assessment and rewards have a significant and positive mediating effect on this relationship.
Wijethilake, C., Upadhaya, B., & Lama, T.	Production Planning and Control (2021)	Sri Lanka	OC	Corporate sustainability and the competing values framework	Single case study	According to the report, organisational culture often plays a proactive role in organisational change toward sustainability by going above and beyond compliance and legal requirements.
Zabiullah, B.I., Bhargava, B., Reddy, K.C.M., & Reddy, C.N. R.	9th International Conference on Recent Innovations in Science, Engineering and Management (2017)	General	MA	N/A	Literature	Provides an overview of the evolution of Management Accounting

** Discipline: Management Accounting-Budget control (MA, BC) /Organisational Culture (OC). Local Government (LG), Ghana, Information Technology (IT) themes and other*

The Impact of the Innovative Business Model on the Automotive Industry

Băbeanu Sabin-Alexandru[a,6]

[a] *Bucharest University of Economic Studies, Romania*

Abstract:

Background. *The Industrial Revolution 4.0 brought major changes in the automotive industry due to technological progress and the integration of business processes in the automotive industry with technologies.*

Objectives. *The aim of this paper is to identify the factors that influence the classic business model and at the same time lead to the transformation of this model into an innovative business model, in the automotive industry, as well as the factors involved in the implementation of the model.*

Tools and data. *Three research questions argue the implementation of the innovative business model, concluding with an exploratory research of the literature, from a number of 154 research papers published in scientific journals.*

Research methodology. *It is necessary to identify in scientific literature the functional departments in the company, involved in the realization of the innovative business model and a preliminary analysis of the existing business environment, in which the innovative business model is implemented.*

Results. *The coexistence of the business model in a company and the new technologies from Industry 4.0 lead to discussions related to the implementation of innovation.*

Limits. *The limitations of this research are that the study is based on the automotive industry.*

Conclusions/Originality. *Several factors are important in this transformation, such as quantity of production, product quality, production speed, sales, and profitability. These factors determine the reorganization of the marketing, IT, and especially accounting departments, as well as a series of management processes.*

Keywords: *Industry 4.0, innovation, business model, business factors, domain, automotive industry.*

1. Introduction

Scope of the literature review: It is known that over time, the development of technologies that have an impact on the business environment is a step in the development of the environment that integrates them and therefore all these improvements lead to the emergence of typologies of industry, based on innovation at the time of implementation.

[6] *Corresponding author*: Băbeanu Sabin Alexandru, Bucharest University of Economic Studies; 6 Piața Romană, 1st District, 010374 Bucharest; Romania.

However, business innovation involves the implementation of new processes, systems to provide services or products, based on information technology, reducing the costs of advertising, logistics, and physical transactions, which lead to increased profits (Lorca *et al*., 2019). However, there is a lack of structuring the innovative business model, depending on the domains that are innovative and entering the digital technological process.

Background: From the perspective of connected computer systems, communication, machine learning (with the implications of artificial intelligence), and the cloud, with the birth in the 2000s of a new industrial revolution 4.0 (Xu *et al*., 2021), it can be said that the transformation of the classic business model into an innovative business model is necessary. Technological governance in industry 4.0 involves the transformation of data into Big Data, from discovery to implementation, in any field of activity (Ozdemir and Hekim, 2018) and, moreover, in the automotive industry.

The necessity for research: There is currently much controversy about how to implement an innovative business model. First, implementation is done only in business sectors, where costs are very high and time consuming, and human and material resources processes are replaced by innovation (Dunska, 2018; Wereda and Wozniak, 2019; Dunska *et al*., 2018). On the other hand, not all the risks that may arise, and thus may be able to pre-define the behaviors of innovative processes, are studied in a number of new circumstances. More evidence on risks (Kuznietsova *et al*., 2020; Wereda and Wozniak, 2019) and a number of observations on innovative processes in the transport/automotive industry (Nedeliakova and Stefancova, 2019) have been presented in scientific paper works. A few studies directly address to the question: What are the steps in transforming a classic business model into an innovative one and what factors that lead to this model?

GAP and the author's contribution: In transforming the business model, not all the factors that lead to a successful innovative business are taken into account, as well as the main domains that are reconfigured with artificial intelligence. From this point of view, it is necessary to research four major areas of content and their correlation in supporting the business model: business plan, product promotion, use of information systems based on artificial intelligence, and the identification of digital value in accounting.

Overview of the discussions that will follow: The most important study is related to the data that will be taken into account in innovation, such as the sale of vehicles vs. the sale of a specific brand, the quantity of production related to the need of the market. In addition, the customer, by purchasing power, the speed of production and the quality of the product related to a high degree of technology must take into account. These data are the factors that influence the business and implicitly the areas (domains) of impact in the business.

Companies are implementing new technologies based on digital structures, leading to changing the traditional business model with an innovative one.

The results obtained from the identification of factors will lead to the new innovative business model.

2. Literature review

Chou (2020) demonstrated in one of his paperwork that the factors that influence the innovative business model are: process planning, employee requirements, technological adaptation, and environmental change and innovation services. However, a business plan should have an innovative business strategy (Seow *et al*., 2020), which should play a significant role in business performance. Therefore, a business plan is not enough to implement an innovative business model, but a strategy that takes into account the performance, with performance factors of the business must also be implemented. At a theoretical level, the realization of a product through innovative processes leads to a business plan in which marketing is also integrated (Vaníčková and Szczepańska-Woszczyna, 2020), but without taking into account the interaction that artificial intelligence has with the new business model. However, on a practical level, every professional implements business plans and innovates processes. That could happen even if they derive from business plans based on existing templates (Markopoulos *et al*., 2020).

The general framework for including technologies based on artificial intelligence in the innovative business model is given by the type of artificial intelligence used. In Industry 4.0, the focus is on Big Data, massive databases that are analyzed in real time and can provide digital value in the sense of the five Big Vs, in terms of volume, speed, variety, accuracy, and capitalization (Ozdemir and Hekim, 2018). In this sense, there are smart factories and sales services that are based on Big Data, by using tools called cobots, which perform automation and which replace the classic processing with human intervention. From this point of view, the human factor is involved in supervising the activity of the maintenance and development of these cobot applications, which alternates automation with innovation. What is more, these software robots can use artificial intelligence and develop digital automation on their own. Therefore, the innovative business model of the company will be reached (Ozdemir and Hekim, 2018).

Analyzing how the Industrial Revolution 4.0 brings added value through the use of digital technologies, to create and implement a well-structured innovative business model, leads to a multidisciplinary approach, to the creation of a business simulation environment in the conditions of digitization, digitization and digital transformations, with implications for the automotive industry (Verhoef *et al*., 2021). Digitalization of logistics processes requires a high level of technological training and innovation capabilities (Moldabekova *et al*., 2021).

The results of studies in the field suggest that Data-Driven Innovation (DDI) in the digital economy is a standardized process that includes questioning problems, product conceptualization, data purchasing, data refining, data storage and retrieval, distribution, presentation, and market feedback (Saida and Kyriazis, 2021). The study was made by Price Waterhouse Coopers, “Industry 4.0: Building Digital Enterprise”, points out that the technology needed to implement Industry 4.0 exists (Saida and Kyriazis, 2021).

Digitization in Industry 4.0 applied in the automotive industry, through a smart factory (Okeme *et al*., 2021; Herrmann, 2019), is based on the efficiency of services and the adaptation of the manufacturing environment to technologies based on artificial

intelligence, without taking into account social and maintenance factors over time. In addition to Industry 4.0, Industry 5.0 is born, which is based on planetary resources, in a long term (Majernik *et al*., 2022).

Digital transformation is needed for all companies and leads to how they can remain competitive with innovation. This transformation engages new jobs adapted to digitization, according to the needs of the company, depending on the type of relevant activities / processes in the automotive industry.

The implementation of digital technology in all business processes will lead to the changing of the business model by modifying its structure and how the value resulting from the business is created. Testing new methods of adapting to innovation often uncovers interruptions in the business process (Van Tonder *et al*., 2021).

Thus, the digital economy results from activities that are based on links such as daily online connections between people, companies, devices, data, and processes, and machines resulting from the Internet, digital technology, and the Internet of Things (IoT) (Chinoracky and Corejova, 2021).

The technologies (like the Internet of Things, cloud computing, Big Data analysis, artificial intelligence) associated with I4.0 are the most important in integrating supply chain management-marketing SCM-M. In this sense, the transition from a control-based industry to an industry based on digital technologies integrated in business processes can be made (Ardito *et al*., 2019).

The role of Big Data technology is to increase the profitability of companies through personalized customer service and predictive analytics in the modern digital economy (Novikov, 2020).

Accounting information systems have changed the mode in which data is collected automatically manner and is synthesized for decision making. The further development of such applications, for example through software robots for process automation, the creation of fully digital workflows, and innovative algorithms based on data processing leads to the change in which digital accounting will be more than just collection and processing of data, as the progress in the field of artificial intelligence (Lehner *et al*., 2019).

Intangible asset accounting becomes an accounting practice in the innovative business model, by identifying solutions in accounting for intangible assets, the recognition of assets in the Balance Sheet considering the effect on the valuation in the Profit and Loss Account, to highlight the benefit of investment. An intangible asset must have identifiable control over a resource and produce future economic benefits, such as a brand or prototype (Barker *et al*., 2021).

Because of the development of the global information society, a few companies have managed to create the intellectual assets needed for development (software, digital

platforms), to be implemented in the automotive innovative business model and provide IT component. (Dneprovskaya *et al*., 2018).

Therefore, the research will answer to the following questions:
Q1: What are the steps to transform a classic business model into an innovative one?
Q2: What are the domains in which must reorganize the processes?
Q3: What are the factors that influence innovation in a business plan?

Finally, but important, the link between the factors influencing the innovative business model and the area in which it is identified must be identified. The main objective of this study is to find a relationship between research and the practice of implementing the innovative business model.

3. Research methodology

The European Innovation Scoreboard provides a comparative analysis of innovation performance in EU countries, where innovation leaders play a key role in shaping innovative business processes (European Innovation Scoreboard, 2021). However, the difference in innovation between countries is in the profit-making model, which has various factors (Yun *et al*., 2020).

These factors are defined according to the technologies used in Industry 4.0, such as production machines and tools, material handling equipment, inspection equipment and computer systems that control manufacturing operations (Note *et al*., 2021). These factors can also be implemented in an automotive manufacturing and distribution company. Therefore, research methodology is found to be established from various scientific sources of information in the literature.

The search for the innovative business model was conducted in the databases Web of Science, Scopus, ScienceDirect with results in all areas involving innovation, innovative business model, business processes, factory intelligence, artificial intelligence, production, sales, the customer, and last but not least the profitability in automotive industry. The 154 articles considered in this methodology are published in journals with an impact factor for the last 5 years higher than zero, reaching up to 11, which have an influence score of more than 0,5 and with the verification of metrics, in Clarivate.

These articles specify innovative business models at a theoretical level with no connection to the implementation and testing of the model in a physical, automated, or virtual factory. When transforming an existing business model from an automotive production and/or sales company into an innovative business model, in the environment of Industry 4.0, the first factor studied is the governance of technologies and the analysis of their implementation.

Starting from the old business model, we are looking for business security / security breaches, and we are proposing automatic technologies that will restore the technological flow, in conditions of maximum security, both human and technological, in all business processes (Cavusgil *et al*., 2020).

Research starts from the premise that the framework of the innovative business model can be developed over a long period, to the detriment of the permanent development of digital technologies, through a review of the literature based on the actions of companies, in the automotive industry. In the innovative business environment, the preliminary works of the authors Natalya *et al*. (2019) and Kulmaganbetova *et al*. (2020) had as first objective the configuration of the business model through the business structure and organizational culture, through human resources, technical and technological, material and information.

López-Nicolás *et al*. (2021) compared the factors for the implementation of the innovative business model, respectively, the social factors with that of the knowledge of the model. Works in the field, carried out by Geissdoerfer *et al*. (2018) and Barmuta *et al*. (2020) present the most important concepts of the innovative business model related to Industry 4.0.

These concepts are autonomous systems, cloud computing, augmented reality, IoT cybersecurity, Big Data, the integration of electronic systems and the simulation of the environment, testing, and reconstruction of such a model.

In addition, there was a study of the literature on changes in future innovations in the business model, which could become common. This study is based on articles on the business model, artificial intelligence and digital value, tracking the impact of factors: artificial intelligence in the business model; sales to customers; electronic customer communication channels; the cost of changing the business model to an innovative one; innovation practices and business performance (Stamova and Draganov, 2019).

Finally, the rely on data and information from a wide and varied scientific studies that have provided information on ongoing business modeling trends that could shape future business models. Consider that one of the strengths of the highlighted framework is that it has tested the ideas on which the innovative business model is based (Kaiser, 2019).

Automotive sales employees use machine learning to understand, anticipate, and take action on sales problems and solve them faster and more accurately than any competitor. Given the idea of adapting content that leads to a quick end to sales and is created by machine learning-based applications, will be able to learn what is most effective for each potential customer. Machine learning involves contextual content, marketing automation, including cross-marketing campaigns, customization, and sales forecasting at a new level of accuracy and speed (Holmberg *et al*., 2020; Wang *et al*., 2019).

Marketing departments rely on a set of analytics and performance indicators to measure progress. With machine learning, marketing departments will be able to make even greater contributions to revenue growth by strengthening customer relationships in the process (Wedel and Kannan, 2016; Waldow *et al*.,2021; Boselli *et al*., 2017; Polpinji, 2004).

Risks and limitations in car sales marketing are given only by the availability of source data. From this point of view, an AI can respond limited to the problems that a customer

can raise, while the human being can adapt and look for solutions instantly. Recurring activities can be easily transferred to AI systems, but activities that require human intervention will still be pending, for resolution, for an AI-based computer system (Xu *et al*., 2020).

Like any new technology, the cost of purchasing and maintaining can be very high and can soon be impossible to upgrade without a new investment. Any company must take into account the frequency of such investments before implementing an AI system. This system takes a long time because it requires an adaptation to the culture of the entity and must learn the organizational structure and legislation in force, or even marketing models used by the company (Bodendorf, 2021).

The algorithms used in AI systems can be wrong if you change the architecture the program initially learned about car sales. Without human intervention, the application will generate errors in the configuration of a car and even low prices for optional packages, with high costs.

An AI system does not keep customers confidential. The model that it generates, through configuration, for a certain client, will be provided to another client, proposing the configurations that he learned in the interaction with a previous client (Puri, 2020). However, the power of artificial intelligence systems in digital marketing allows the assisted marketing of vehicles, and thus helps in its business operations or even realizes them.

4. Discussion and results

From the above, it can be seen that in order to build an innovative business model, we need the factors that influence this model. It is obvious that these factors are not the only ones we have taken into account for the automotive industry, and therefore the proposed model will have some limitations. Moreover, as a particular component of the model develops and the model is tested, other factors are more likely to occur.

Primordial in the hierarchy of the transformation of the classic business model into the innovative business model, made with background I4.0, are the automations made either for the entire production, or for certain processes or only operations in the technological flow. Therefore, this is where information technology comes into play, which can lead to high profits, lower costs, if used in most areas / domains of work.

Starting from the company’s business plan, correlated with the production of intelligent cars, with integrated AI, it can be said that the first field in which innovation appears is that of management. Here, it is necessary to build the smart organization chart, which will have the man in the key points of technology verification. Therefore, the typology of the positions occupied in the smart factory also changes compared to the classic business, where we needed the skilled worker to assemble the products.

However, what is artificial intelligence without human control? This question can be answered by specifying the risks associated with artificial intelligence. Moreover, here comes the field of study of computer systems, and even more, the legislation for artificial intelligence:

Who is responsible when the machine learns from the environment in which it operates and causes damage? The designer/programmer who designed and integrated the AI on a car without options, the operator/driver who drove the car, and the developer who produced it? In addition, what is the access of a car with artificial intelligence to data such as Big Data, IoT, cloud computer, etc.?

These are questions that business innovation must answer.

From the literature review, in table 1 there are some factors that influence the business innovation model.

Table 1. **Factors influencing the Innovative Business Model**

No.	Factors Influencing the innovative business model	Relevant papers describing these factors (frequency of occurrence)	Percentage of total articles studied	Observations on the environment and implicitly the area / field in which they activated, the factors were certified and implemented
1.	Profitability of selling an automotive brand	23	15%	It describes the sale with the implementation of AI
2.	Sales in relation to the quantity of production	32	21%	Immediate sale, out of stock
3.	The quantity of production in relation to the purchasing power	42	27%	Attracting the customer to choose the brand in relation to personal needs
4.	Production speed of cars with AI	19	12%	Of which 12 items identify digital value
5.	Product quality leading to significant reductions in production costs	38	25%	Implementing a business model that involves automation

Source: Relevant 154 papers presented at references

Another important element in the development of the innovative business model is the analysis of sales. In addition, from here arise questions related to sales (quantity, brand, color, profile of the customer who buys the automotive, etc.).

How many automotive do they produce?
How many brands do my customers want?
Do I make stock that I may sometimes fail to sell because it is not a product approved by all categories of customers?

These are questions that an innovative business model answers, and an analysis needs to be done before it can be implemented. The marketing field is perhaps the most important in sales through promotions, product presentation, etc. It is necessary to have the field of accounting, because the value that production has or stocks already realized and unsold can lead to profit or loss and for this, each step implemented in the innovative business model must be transformed into value and quantified where it does not exist.

A car can produce risks, but if it produces benefits, such as reduced traffic time, analysis on a stretch of road and calculating the direction to a daily location (service or home) with minimal consumption.

Figure 1 shows these areas and the relationship of the factors that influence them to create an innovative business model.

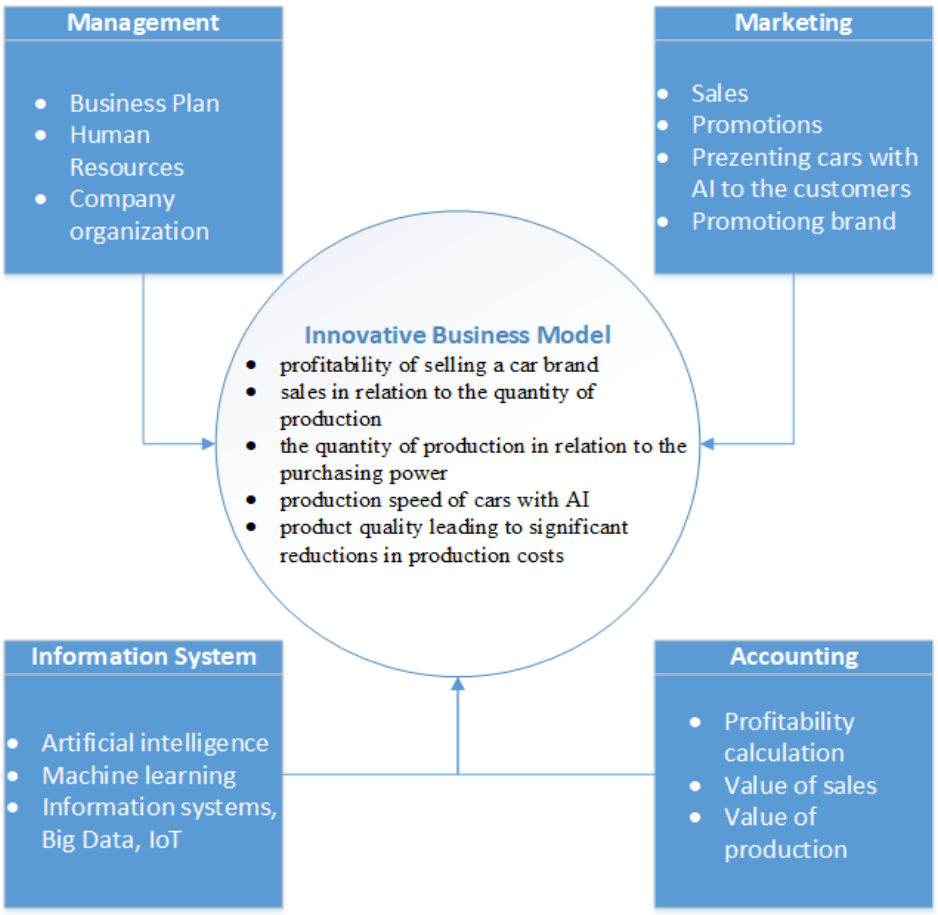


Figure 1. **Correlation of factors with the content domain of implementation**
Source: Relevant 154 papers presented at references

This leads to automatic learning of automatisms and the exemption of the driver from wasting time, which means money. Moreover, if we assume that these automations are made in a smart factory, it is known in what period certain cars can be produced and what facilities they have.

Can we plan production?
Is such an analysis a digital value produced by AI?

There is no legislation to verify and calculate this value.

In building an innovative business model, we need first the areas involved in supporting business processes, and more, the interaction of the external environment with them.

In the end, it is necessary to present how I establish the 154 articles taken into account at the methodology research. The search words are presented in Table 2.

Table 2: **Search words and results**

Science domain	Traditional Business Models*	Important problems to discuss	Innovative Business Model**	Important problems to discuss
	Total,	**From which:**		
• Management	76,738	Business performance management	3,606	Innovative integrated management
• Business	66,490	Traditional enterprise	3,032	Automation
• Economics	61,953	Business model	1,689	Revenue
• Computer Science Information Systems	40,465	Information security	1,247	New technologies
• Operations Research Management Science	36,604	Methodology	973	Operations analysis
• Marketing	4884	Creation of marketing value Customer satisfaction Traditional market	3554	Market for electric cars Business Model Prototyping
• Accounting	2017	Account Data Model Accounting firm Forensic Accounting Technology on accounting	1177	Analytical model Innovative financial services Accounting integration

* Results from WoS, *business model* words for search
** Results from WoS, *innovative business model* words for search
Source: Relevant 154 papers presented at references

The limitations of the research are due to studying only data and environment from the automotive industry.

5. Conclusions

From the perspective of vehicle production, generating a production flow in the smart factory in Industry 4.0, using industrial robots and real-time verification mechanisms of the use of raw materials and materials, can calculate the value of production in line with industrial technological flow.

Moreover, it will be possible to identify the supply in a timely manner, identifying the supply chain and breakdown into collaborative entities of the smart factory, in order to avoid a large stock of finished products. Thus, manufacturing becomes the transformation of the raw material into a finished, physical product without taking into account the consumer's need, while production creates utility according to the existing demand on the market, resulting from marketing studies.

Promotion activities, carried out by the marketing department through all communication channels, as a result of research of the sales market, consist in an image of the product or service that leads to the increase of sales.

Marketing goals are the most important. They are established according to the product or service to be promoted, as well as the marketing program and plan, following the analysis of financial and technological factors.

As a result of the innovative business model implemented in the automotive industry, a series of values will automatically be created. Some of them are quantifiable, measurable, or identifiable; others are intangible or cannot be seen and evaluated. In the automotive industry, an important example would be the artificial intelligence voice navigation assistant, which teaches the route to home, work, or other places where the driver travels.

The person who generates the routing of the usual or new routes is not known, but the guiding action occurs. The action itself, learned by the assistant with the help of artificial intelligence, is a value that cannot be assessed.

Facility Management is an integrated approach in the management of organizations that use Industry 4.0 strictly related to the decision-making process and takes into account general business models. Facility management maintains value through security systems and integration with Industry 4.0 leads to an innovative business model. This combines the business model and technologies of Industry 4.0, which leads to better product quality (Note *et al*., 2021).

The term Industry 4.0 was used in a proposal for economic policy by Germany and was based on strategies with state-of-the-art technologies. The "Internet of Things" is considered an instrument of Industry 4.0, as a result of the literature (Piccarozzi, 2018).

This paperwork can be a support for companies that want to identify if the classic business model can be transformed into an innovative business model. In this sense, it formulates the stages that take place in this transformation and more, how to implement the new innovative model.

There are identified a number of factors that can be considered in this transformation, namely: the profitability of selling a car brand, sales in relation to the quantity of production, the quantity of production in relation to the purchasing power, the speed of production, and the quality of the product at significant reductions in production costs. These factors determine the reorganization of the marketing, IT, and especially accounting departments, as well as a series of management processes.

The transition from classic marketing to marketing based on AI systems is the customer's requirements, in real time, when creating a car order. It will be possible to create the customer profile and implicitly it will be possible to recommend measures for implementation and decision-making for mass production, if necessary.

Artificial intelligence allows the vehicle to learn the requirements of passengers and habits, so man and car communicate more and more and create dependence on automation (identifying Industry 4.0).

In documenting this paper, we identified two directions for further research:
1. The study of information technologies based on digitization (can accounting information be digitized automatically when it is recognized by an intelligent system?)
2. The study of products that can be made only with certain technologies.

In future studies, digital value can be analyzed. To be able to express this digital value in numbers, the hypothesis can be formulated: Identifying the value of a software product, which has evolved over time due to artificial intelligence, can be done by journaling the operations performed by the product at each activity.

References

Aquilani, B., Piccarozzi, M., Abbate, T., & Codini, A. (2020), The Role of Open Innovation and Value Co-creation in the Challenging Transition from Industry 4.0 to Society 5.0: Toward a Theoretical Framework, *Sustainability*, vol. 12, no. 21: 8943.

Barker, R., Lennard, A., Penman, S., & Teixeira, A. (2021), Accounting for intangible assets: suggested solutions, *Accounting and Business Research*, 1-12, https://doi.org/10.1080/00014788.2021.1938963.

Barmuta, K.A., Akhmetshin, E.M., Andryushchenko, I.Y., Tagibova, A.A., Meshkova, G.V., & Zekiy, A.O. (2020), Problems of business processes transformation in the context of building digital economy, *Entrepreneurship and Sustainability Issues*, vol. 8, no. 1: 945-959.

Bencsik, A. (2020), Provocările managementului în economia digitală, *International Journal of Technology*, vol. 11, no. 6: 1275-1285.

Bodendorf, F., Wytopil, B., & Franke, J. (2021), Business Analytics in Strategic Purchasing: Identifying and Evaluating Similarities in Supplier Documents, *Applied Artificial Intelligence*, vol. 35: 857-875.

Bohnsack, B., Kurtz, H., & Hanelt, A. (2021) Re-examining path dependence in the digital age: The evolution of connected car business models, *ScienceDirect, Research Policy*, vol. 50;

Boselli, R., Cesarini, M., Mercorio, F., & Mezzanzanica, M. (2017), Using Machine Learning for Labour Market Intelligence, *Machine Learning and Knowledge Discovery in Databases, ecml pkdd 2017, pt* III, vol. 10536: 330-342.

Cavusgil, S.T., Deligonul, S., Ghauri, P.N., Bamiatzi, V., Park, BI, & Mellahi, K. (2020) Risk in international business and its mitigation, *Journal of World Business*, vol. 55, Article Number 101078.

Chinoracky, R., & Corejova, T. (2021), How to evaluate the digital economy scale and potential? *Entrepreneurship and Sustainability Issues*, vol. 8, no. 4: 536-552.

Chou, D., & Jiang, M. (2021), A Survey on Data-driven Network Intrusion Detection, *ACM computing surveys*, vol. 54, Article Number 182.

Dneprovskaya, N., Urintsov, A., & Afanasev, M. (2018), A Study of the Innovative Environment of the Digital Economy, *Proceedings of the 15th international conference on Intellectual capital, Knowledge management & Organisational learning* (ICICKM 2018), pp. 67-76.

Dunska, M., Salkovska, J., Batraga, A., & Braslina, L. (2018) Consumer behavior in innovative products purchasing process, *Marketing and Management of Innovations*, pp. 276-289.

Dunska, M., & Marcinkevica, A. (2018), Lean effectiveness method application in creative industries of Latvia, *New challenges of economic and business development - 2018: productivity and economic growth*, pp. 188-199.

Fraga-Lamas, P., Varela-Barbeito, J., & Fernandez-Carames, M.T. (2021) Next Generation Auto-Identification and Traceability Technologies for Industry 5.0: A Methodology and Practical Use Case for the Shipbuilding Industry, *IEEE*, vol. 9:140700-140730.

Geissdoerfer, M., Vladimirova, D., & Evans, S. (2018), Sustainable business model innovation: A review, *Journal of Cleaner Production*, vol. 198: 401-416.

Herrmann, F. (2018) The Smart Factory and Its Risks, *MDPI -System Sustainability*, vol. 6, Article Number 38.

Holmberg, L., Davidsson, P., Olsson, CM., & Linde, P. (2020) Contextual machine teaching, IEEE International conference on pervasive computing and communications workshops (percom workshops), Accession Number: 19887881.

https://ec.europa.eu/info/research-and-innovation/statistics/performance-indicators/european-innovation-scoreboard_en, Main report and methodology report, 2021.

Kaiser, C., Festl, A., Pucher, G., Fellmann, M., & Stocker, A. (2019), The Vehicle Data Value Chain as a Lightweight Model to Describe Digital Vehicle Services Webist: Proceedings of the 15th international conference on web information systems and technologies, pp. 68-79.

Kamble, S., Gunasekaran, A., Ghadge, A., & Raut, R. (2020) A performance measurement system for a smart production system enabled for industry 4.0 in SMEs - An empirical review and investigation, *International Journal of Production Economics*, vol. 229.

Khanzode, G. A., KumarMangla, S., & Yuan, H. (2021), Modeling the Industry 4.0 adoption for sustainable production in Micro, Small & Medium Enterprises, *Journal of Cleaner Production*, vol. 279.

Kulmaganbetova, A., Dubina, I., Rakhmetulina, Z., Tlessova, E., & Tulegenova, Z. (2020) Innovative potential of small and medium business, *Entrepreneurship and Sustainability Issues*, vol. 8:1286-1304.

Kuznietsova, N., Kot, L., & Kot, O. (2020) Risks of innovative activity: economic and legal analysis, *Baltic Journal of Economic Studies*, vol. 6: 67-73.

Lopez-Nicolas, C., Ruiz-Nicolas, J., & Mateo-Ortuno, E. (2021) Towards Sustainable Innovative Business Models, *Sustainability*, Vol. 13, Article Number 5804.

Lorca, P., de Andres, J., &Garcia-Diez, J. (2019), Impact of E-Commerce Sales on Profitability and Revenue. The Case of the Manufacturing Industry, *Inzinerine Ekonomika – Engineering Economics*, vol. 30: 544-555.

Lorenzo, A., Petruzzelli, AM, Panniello, U., & Garavelli, A.C. (2019), Towards industry 4.0, Mapping digital technologies for the supply chain, management-marketing integration, *Business Process Management Journal*, vol. 25, no. 2: 323-346.

Majernik, M., Daneshjo, N., Malega, P., Drabik, P., & Barilova, B. (2022) Sustainable Development of the Intelligent Industry from Industry 4.0 to Industry 5.0, *Advances in Science and Technology-Research Journal*, vol. 16: 12-18.

Markopoulos, E., Umar, O., & Vanharanta, H. (2020), Agile Start-up Business Planning and Lean Implementation Management on Democratic Innovation and Creativity, *Human systems engineering and design II, Advances in Intelligent Systems and Computing*, vol. 1026: 885-895.

Masyuk, N., Bushueva, M., & Bragina, Z. (2020), The Institutional Regulatory Environment of the Digital Ecosystem: Theoretical Approach and Russian Experience, Innovative economic symposium 2019 - potential of Eurasian economic union (ies2019), *SHS Web of Conferences*, vol. 73, Article Number 01019.

Moldabekova, A., Pphilipp, R., Satybaldin, A., & Prause, G. (2021), Technological Readiness and Innovation as Drivers for Logistics 4.0, *Journal of Asian Finance, Economics and Business*, vol 8: 145-156.

Nedeliakova, E., Stefancova, V., & Hranicky, M.P. (2019) Implementation of Six Sigma methodology using DMAIC to achieve processes improvement in railway transport, *Production Engineering Archives*, vol. 23: 18-21.

Nota, G., Peluso, D., & Lazo, A.T. (2021), The contribution of Industry 4.0 technologies to facility management, *International Journal of Engineering Business Management*, vol. 13: 1–14.

Novikov, S. (2020), Data science and Big Data technologies, Role in the digital economy, *TEM Journal*, vol. 9, no. 2: 756-762.

Okeme, P.A., Skakun, A.D., & Muzalevskii, A.R. (2021), Transformation of Factory to Smart Factory, IEEE, Proceedings of the 2021 IEEE conference of Russian young researchers in electrical and electronic engineering (ELCONRUS), pp. 1499-1503.

Othmar, L., Leitner-Hanetseder, S., & Eisl, C. (2019), What is digital accounting: status quo and ways to move forward, *Journal of Finance and Risk Perspectives*, vol. 8, Special Issue Digital Accounting: I-V.

Ozdemir, V. & Hekim, N. (2018) Birth of Industry 5.0: Making Sense of Big Data with Artificial Intelligence, "The Internet of Things" and Next-Generation Technology Policy, *OMICS: A Journal of Integrative Biology*, vol. 22: 65-76.

Pacchini, A.P.T., Lucatoa, W.C., Facchini, F., & Mummolo, G. (2019), The degree of readiness for the implementation of Industry 4.0, *ScienceDirect, Computers in Industry*, vol. 113.

Piccarozzi, M., Aquilani, B. & Gatti, C. (2018), Industry 4.0 in Management Studies: A Systematic Literature Review, *Sustainability, vol.* 10, no. 10: 3821.

Polpinij, J. (2004) Automotive market segmentation by machine learning, Proceedings of the IASTED International Conference on Artificial Intelligence and Applications, vol. 1 and 2: 404-408.

Potocan, V., Mulej, M., & Nedelko, Z. (2020) Society 5.0: balancing of Industry 4.0, economic advancement and social problems, *Emerald*, vol. 50: 794-811.

Puri, GS, Tiwary, R., & Shukla, S. (2019), A review on cloud computing, *9th International conference on cloud computing, data science & engineering (confluence 2019*), pp. 63-68.

Saida, S. & Kyriazis, E. (2021), Architecting and Developing Big, Data-Driven, Innovation (DDI) in the Digital Economy, *Journal of Global Information Management*, vol. 29: 165-187.

Secinaro, S., Brescia, V., Calandra, D., & Biancone, P. (2020) Use bibliometric analysis to identify suitable business models for electric cars, *ScienceDirect*, vol. 264.

Seow, AN., Choong, Y.O., & Ramayah, T. (2021) Small and medium-size enterprises' business performance in tourism industry: the mediating role of innovative practice and moderating role of government support, *Asian Journal of Technology Innovation* vol. 29: 283-303.

Stamova, I. & Draganov, M. (2020), Artificial Intelligence in the Digital Age, International scientific conference digital transformation on manufacturing, infrastructure and service, vol. 940, Article Number 012067.

van Tonder, C., Schachtebeck, C., Nieuwenhuizen, C., & Bossink, B. (2020), A framework for digital transformation and business model innovation management, *Journal of Contemporary Management*, vol. 25: 111-132.

Vanickova, R. & Szczepanska-Woszczyna, K. (2020), Innovation of business and marketing plan of growth strategy and competitive advantage in exhibition industry, *Polish Journal of Management Studies*, vol. 21: 425-445.

Verhoef, P., Broekhuizen, T., Yakov, B., Bhattacharya, A., Qi Dong, J., Fabian, N., & Haenlein, M. (2021) "Digital transformation: A multidisciplinary reflection and research agenda", *Journal of Business Research*, pp. 889-901.

Vinitha, K., Ambrose P., Bhaskar, R., & Hariharan, R. (2020), Review on industrial mathematics and materials at Industry 1.0 to Industry 4.0, *ScienceDirect*, vol. 33: 73956-3960.

Waldow, F., Schnaubelt, M., Krauss, C., & Fischer, T.G. (2021), Machine Learning in Futures Markets, *Journal of risk and financial management*, Vol. 14, Article Number 119.

Wang, WL, Malthouse, E.C, Calder, B., & Uzunoglu, E. (2019), B2B content marketing for professional services: In-person versus digital contacts, *Industrial Marketing Management*, vol. 81: 160-168.

Wedel, M. & Kannan, P.K. (2016) Marketing Analytics for Data-Rich Environments, *Journal of Marketing*, vol. 80: 97-121.

Wereda, W. &Wozniak, J. (2019), Contemporary Customer as a Dynamic Factor in Product Innovative Processes, S*trategica: Upscaling Digital Transformation in Business and Economics*, pp. 290-301.

Xu, YZ, Shieh, CH., van Esch, P., & Ling, I.L. (2020) AI customer service: Task complexity, problem-solving ability, and usage intention, *Australasian Marketing Journal*, vol. 28: 189-199.

Xun, X., Yuqian, L., Vogel-Heuser, B., & Wang, L. (2021) "Industry 4.0 and Industry 5.0-Inception, conception and perception", *Journal of Manufacturing Systems*, vol. 61: 530-535.

Yun, J.J., Zhao, X.F., Wu, J.X., Yi, J.C., Park, K., & Jung, W. (2020), Business Model, Open Innovation, and Sustainability in Car Sharing Industry-Comparing Three Economies, *Sustainability*, vol.12, Article Number 1883.

SECTION 4

Review And Modification of the Cash-Based Analysis Model Based on Timothy Jury's Template

Alexey Litvinenko
Jaan Alver

Review and Modification of the Cash-Based Analysis Model Based on Timothy Jury's Template

Alexey Litvinenko[a, 7] and Jaan Alver[a]

[a] *Tallinn University of Technology, Estonia*

Abstract: *This paper looks at Timothy Jury's relatively unknown methodology of credit risk analysis and its underlying template, proposes an improved version in accordance with IFRSs IASB standards (IFRSs), and applies it to the case of a manufacturing company to reveal the company's pre-bankruptcy situation and the likelihood of credit risk default. The aim of the paper is to review the methodology and template of credit risk analysis, elaborate its improved version and apply it to the case of the manufacturing company in order to contribute to the spread of this almost unknown method. The improved methodology shows the probability of default of a company's credit risk based on a cash flow analysis and requires further comparison with the accrual-based credit risk model.*

Keywords: *Cash flow analysis, credit risk, liquidity, probability of default.*

1. Introduction

Nowadays, with the increase in the number of applications to obtain personal and business financing (European Central Bank, 2021), credit risk modelling becomes an important part of the daily operations to assess a borrower's solvency and liquidity. However, the validity and completeness of the analysis obtained from credit risk modelling based on traditional financial statements (income statement and balance sheet) may be questioned (Jury, 2012). Management may internally manipulate the information in traditional accrual based financial statements to acquire benefits, such as additional funding.

For financial institutions, it is essential to determine the exact numerical value of risk exposure when deciding whether to grant a loan. Besides the importance of decision-making and its possible financial consequences, having clear credit risk estimations is a legal requirement to the financial institutions set by the controlling institutions (European Bank Authority, 2021). It is also important for the investors to have a clear analysis of the financial state of their potential investment, especially foreign direct investment. Thus, the economic society faces the problem of the trustworthiness of such an important method of analysis as credit risk modelling, which is usually done based on the traditional financial statements. It is a problem for the business and financial society that currently, relying on the credit risk analysis done through an accrual-based credit risk model, financial institutions risk providing a loan to companies that are close to insolvency, because the accrual-based approach does not grant as clear and trustworthy information as a cash-based approach (Kiaupaite-Grušniene, 2019). The knowledge gap lies in the area of cash-based

[7] *Corresponding author*: Tallinn University of Technology, School of Business and Governance, Department of Business Administration.

methods in credit risk modelling, and the present research and review of one of the methods helps contribute to the development of knowledge in this area.

To increase the reliability of the data outcome from the credit risk modelling, the author of this scientific publication suggests applying the credit risk modelling to the cash flow statements, which are more reliable in showing the actual data about the companies' solvency and liquidity (Mills and Yamamura, 1998).

This paper looks at a credit risk analysis methodology and its underlying template developed by Timothy Jury, a British financial consultant and chartered accountant. Modifications to the methodology and template will be made and the credit risk of the chosen manufacturing company will be analysed based on the modified template to illustrate the operations of the developed system.

2. Theoretical background

It cannot be denied that the 1970s and 1980s played an important role in the development of cash flow theory. The predecessors of Jury have created a certain theoretical background, which is a good starting point for further research and development of the field. American and British professors as well as other authors, including Thomas A. Lee (Lee, 1993) have been researching different aspects of the topic of cash flows, from reporting to the analysis techniques aggregating the literature on these topics and suggesting new approaches.

For the main users of financial statements, particularly creditors, financial management, and shareholders the cash flow statement itself, as well as its analysis, provides a valuable evaluation regarding the company's ability to generate positive net cash flows in the future to meet its liabilities and to pay dividends. All users of the statement of cash flows are united with the desire to see that cash inflows exceed or at least equal the cash outflows. The viability of the company depends on the fact that more cash should flow in than out (Torfason, 2014). What is more important, the analysis of the cash flows can even provide an early warning of the possible financial problems of an enterprise (Mateș and Cernușcă, 2007). "The cash flow statement provides a complete characterization of those aspects of the business, which are not exposed in the basic financial statements, namely the cash efficiency of operating, investing and financing activities, liquidity and solvency" (Brycz and Pauka, 2012). Additionally, a cash flow statement provides beneficial information for management, which plays a key role in an organization's decision-making (Cash flow analysis, 2013).

One category of users that highly benefit from cash flow statement analysis could be auditors, to whom the proper liquidity analysis can help to avoid gross mistakes in the assessment and approval of a company's financial situation (Mills and Yamamura, 1998). The primary usage of cash flow statements to investors, creditors, auditors, and others suggests assessing (Carslaw and Mills, 1991):

- Companies' ability to generate future positive net cash flows;

- Companies' ability to meet its obligations and pay dividends, as well as the needs for external financing;
- The effects of the companies' financial position of both its cash and noncash investing and financial transactions during the period;
- The reasons for differences between net income and associated cash receipts and payments.

Since the cash flow statement has a feature of higher trustworthiness compared to the other financial statements, the ratios based on the cash flow statement are used in detecting red flags in the fraud examination activities, which is essential both for internal and external audit (Urbancic, 2017). There is evidence from the capital market research on the usefulness of the cash flow statement content and its relationships with security returns. Hadri Kusuma concluded in his study that cash flows could be used to predict future cash flows (Kusuma, 1999).

It is also important to mention the structure of cash flow statement that it reconciles the beginning and ending balance of cash and cash equivalents, where cash equivalents are short-term, highly liquid investments that can be easily converted into cash, such as financial instruments with a maturity date less than 3 months (Nobes and Parker, 2008). Cash flows from operating activities represent the amount of cash received from the main operating activities and spent for the main operating activities of the company during the whole year (IAS 7, 2016). To be more precise, cash flows from operating activities are primarily derived from the key revenue-producing activities of the company (Kusuma, 1999). The role of this section is to express the daily activities of the company in terms of cash generated from the company's operations and its cash outflows. It clearly shows the sources and application of cash and indicates whether the generated cash is sufficient for internal financing (Faurescu, 2010). Operating activities include the transactions and events that are involved in the determination of net income. An important point that analysts must consider is that cash flows from operations can include a diverse mix of transactions representing a variety of unusual events, which could make the analysis too difficult and less accurate. Therefore, it is suggested to include cash provided by normal operating activities only (Carslaw and Mills, 1991). For these reasons, the authors consider the operating cash section of the cash flow statement to be the most important when creating a cash-based credit risk model.

Given the nature of this paper, it is important to uncover the notion of credit risk. Since credit risk is associated with every active trade, it is considered a major risk (Spuchlakova *et al*., 2015). One definition states that credit risk is a risk of loss with default when the company does not meet its obligations under the conditions of the contract and thus causes the holders of debt loss. These obligations arise from various sources such as lending activities, trade and investment activities, payment, and settlement of securities trading on its own and foreign account (Jilek, 2000; Spuchlakova *et al*., 2015). Kyriazopoulos (2019) defines credit risk as a probability of loss incurred due to the failure of a borrower to meet financial obligations. Altman and Hotchkiss (2011) associate credit risk with the financial institutions' capability to get their money back from the corporations financed, and the corporations' capability to repay the debt.

The goal of credit risk management is to maximize a bank's risk-adjusted rate of return by maintaining credit risk exposure within acceptable parameters. Banks need to manage the credit risk inherent in the entire portfolio as well as the risk in individual credits or transactions. Banks should consider the relationships between credit risk and other risks. The effective management of credit risk is a critical component of a comprehensive approach to risk management and essential to the long-term success of any banking organization. Torfason (2014) in his doctoral thesis conducted numerous interviews with bank management and confirmed that credit risk alongside the liquidity risk are the vital factors to be managed by banks to ensure that the banking business goes smoothly. However, as per Berger *et al.* (2012), the banks are no longer the major holders of credit risk thanks to securitization, as government expensively supports the banks when necessary.

An analysis of the definitions of credit risk provides us with an understanding of the relationship between credit risk and cash flows. The credit risk occurs when one party fails to conduct the cash outflow directed towards another party due to the lack of cash. Thus, it is evident, that for the credit risk estimation the analysis of cash flows plays an important role. In the trade relationships between buyers and suppliers, credit risk analysis helps to segregate trustworthy customers from the customers with a high probability of default, otherwise incorrect credit decisions can result in economic damage for the company. For example, "the refusal of a good credit can cause the loss of future profit margins, and the approval of a bad credit can cause the loss of the interest and the principal money" (Kyriazopoulos, 2019).

One of the popular areas of cash flow research is its ability to predict financial distress. Gombola and Ketz (Gombola and Ketz, 1983) developed one of the important pieces of research. Researchers found that operating cash flow variables in ratios could be useful in predictive and descriptive analysis of the companies. Further, the research was developed and formed in a more explicit study of cash flow in bankruptcy prediction (Gombola *et al*., 1987). Both studies attempted to estimate the predictive ability of cash flow-based ratios and were an important step in the development of the cash flow theory. Another research paper by Largay and Stickney underlines the importance of cash flow analysis through a comparison with accrual indicators. The authors illustrated the example of Grant's company, which generated no cash and went bankrupt despite moderate accrual indicators (Largay and Stickney, 1980). In this case, accrual indicators showed warning signs too late (United States Court of Appeals, 1983), and the example demonstrated that careful analysis of the company's cash flows would have revealed the upcoming financial distress at an earlier stage (Largay and Stickney, 1980). The research of Thomas Lee states that investors are not only concerned about realised profits, which can be manipulated by the financial management, but also about the operating cash flows that can be consumed by debtors and stock (Lee, 1992). Operating cash flows, as the product of the actions of financial management possess a crucial information about a company's viability and the decision-making of company's financial management. These and many other theories have formed the theoretical basis not only for future research, but also for investors and management to focus additional attention to the cash flow analysis. Jury has subsequently applied these

theoretical concepts to business practice through the development of his methodology of analysis and template.

3. Review of Timothy Jury's template

First, it is important to clarify the background of Jury to understand the reason for his creation of the credit risk template, in which he approaches the analysis of cash flows in a new way through the credit risk perspective. Timothy Jury is a financial training consultant and chartered accountant, qualified by KPMG. He has over twenty years' experience in senior financial roles, specializing in corporate credit training for major UK and Irish banks. During his career, he dealt with hostile takeovers, acquisitions and various turnaround situations, ultimately leading him to create the credit risk template that is analysed in this paper. He has chosen certain cash flow data indicators to serve the credit risk analysis through his template, comparing these across several years. Indicators taken from the statement are listed in Table 1: cash generated from operations as a starting line, deducting generated from net working assets, deducting net CAPEX, deducting taxation paid in the period. These lines result in the line "cash available to satisfy capital providers". Further, the net interest and net dividends are deducted resulting in the line "Cash available for debt service". The next line in the template is "Total net debt in cash", and the last line is "Number of years to repay" which is finalising the template. (Jury, 2012: 208)

Table 1. **Indicators of Jury's template**

Action	Line
Starting line	Cash generated from operations
(Deduct)	(Invested in)/Generated from Net Working (current) Assets
(Deduct)	Net Capital Expenditures
(Deduct)	Taxes paid in the period
Equals to	Cash available to satisfy capital providers
(Deduct)	Net interest
(Deduct)	Net dividends
Equals to	Cash available for debt service
Starting line, divide by line above	Total net (debt)/cash
Equals to	Number of years to repay

Source: Jury, 2012: 208

The classification criteria state that if the number of years to repay the debt is from 0 up to 6 years, it shows that the company is healthy and mature. When the number of years to repay ranges from 6 to 10 years, the leverage of the company is high and cash flow is fully utilized. Finally, if the number of years to repay is more than 10 years, there is too much debt. Jury states that restructuring and business disposals might be required to reduce debt, which speaks of the high credit risk. (Jury, 2012: 205).

Jury has created a template that compares values for five years, and after several mathematical calculations presents the number of years to repay the debt. The higher the

number of years to repay the debt, the closer the company is to the credit default. The healthy number of years to repay is from 0 to 6 years. (Jury, 2012: 205).

Table 2. **Summary of the Jury's credit risk template outputs**

Characteristics	Jury's Template
High credit risk. Marked as a red category.	More than 10 years to repay the debt.
Ordinary credit risk. Marked as a grey category.	From 6 to 10 years to repay the debt.
Low credit risk. Marked as a green category.	From 0 to 6 years to repay the debt.

Source: Jury, 2012: 205

Thus, according to Jury's classification, zero to six years to repay the debt describes a strong, mature company without solvency or liquidity problems, and strong profitability from its major business activities. Jury's six to ten years to repay the debt, means the company is acting normally, has the ability to cover its debt, but has some issues with its solvency, liquidity, and profitability. However, such a company still accumulates positive cash from operating activities. Jury's more than 10 years to repay the debt, especially dangerous if classified as "never", means the company has a negative value of net cash flows from operations. Such companies have serious problems with solvency, liquidity, and especially with profitability, having a high chance of bankruptcy and a high probability of credit default, the inability to repay the debt provided by the financial institutions. There are several advantages, specified by Jury regarding the use of his template (Ibid. 209):

- The analysis using the template shows the actual cash available for the interest and debt service.
- The template indicates the cause of the problems with cash if any.
- The cash flow values summarized based on several years show the historic effects of the industrial and economic cycles.

The template is a valuable invention for both the company and financial professionals, because the cash available for the service of debt is not shown in the financial statements, though it contributes a lot to the credit risk analysis of the company.

4. Reworking the credit risk template

However, the current version of Jury's template possesses disadvantages as well; one of these disadvantages is the lack of comprehensiveness, which leads to some difficulties in the application of the template to practical cases and the checking of the results' correctness. It is important to mention that Jury's template was created based on the Law of United Kingdom and accounting standards which later changed to UK GAAP in the year 2015 (ICAEW, 2021). The present paper reworks the template for European users to comply with the IFRSs. Due to the difference between the financial reporting standards, some lines in Jury's template were composed of different subcomponents compared to IFRSs, which creates confusion for the users and inability to apply the system to their relevant company cases. For example, Jury's template contains the line "Change in net working assets (NWA)". Clarity is crucial, "more information is defined in terms of "fineness". One information set is said to be finer than another if one contains all the information contained in the other." (Hendriksen and van Breda, 1992). Therefore, the

present paper suggests a reworked version of the template according to the IFRSs (see Appendix 1), which breaks down net working assets to the following components:

- Decrease (increase) in biological assets;
- Decrease (increase) in inventories, including right of return assets;
- Decrease (increase) in prepayments;
- Decrease (increase) in trade and other accounts receivable;
- Decrease (increase) in restricted cash;
- Decrease (increase) in trade and other accounts payable.

Brackets indicate the negative direction or the decrease in component value. These subcomponents sum up to the "invested in or generated from the net working assets". The components might vary depending on the company's activity, but the general logic of this breakdown of the components complies with the IFRSs to allow users of the reworked credit risk template to apply it correctly. Another element reworked from Jury's credit risk template is "Total net (debt) in cash". Its calculations are described explicitly in Appendix 2. This paper breaks down the total net debt in cash to the list of components taken from the cash flow statements and balance sheet of the analysed company. The list of components is represented in Appendix 2. These improvements contributed to better comprehensiveness of the technique.

5. Practical application of the reworked template

To illustrate the application of the credit risk analysis, the data was taken from financial statements of Linas Agro Group. Linas Agro Group is a limited liability company registered in Lithuania acting in the agricultural sector (Linas Agro Annual Report, 2016/2017). The company produces milk, poultry, grain and oilseeds for export in the Baltics and Scandinavia, as well as supplying certified seeds, fertilizers, machinery, and plant protection products to the farmers. Linas Agro Group is a publicly listed company with its shares traded on the Nasdaq Baltic (Nasdaq Baltic, 2021). Since the analysis is based on the cash-flow principle, the relevant values were taken from cash flow statements from the year 2016 until the year 2020. The total debt data is taken from the balance sheets. Table 3 shows the template of Jury (2012), which was reworked and improved by the authors of this paper. It contains the analysis for the 5 years. Calculation details are available in Appendix 1.

Table 3. **Cash-based analysis based on Jury's template**

Elements, in thousands of EUR	**2016**	**2017**	**2018**	**2019**	**2020**
Cash generated from operations	**17,372**	**20,603**	**20,606**	**4,985**	**19,770**
Changes in working capital:	-	-	-	-	-
Increase (-) /decrease in biological assets	3,096	1,061	2,894	-968	3,508
Decrease/ increase (-) in inventories, incl. right of return asset	-15,098	1,511	-22,191	4,180	8,224

Elements, in thousands of EUR	2016	2017	2018	2019	2020
Decrease (increase) in prepayments	2,147	-553	-1,598	5,281	1,555
Decrease in trade and other accounts receivable	4,057	-13,366	-15,790	3,201	5,614
Increase (-) in restricted cash	-449	199	-710	600	211
Increase in trade and other accounts payable	13,020	-2,444	-1,401	3,500	164
Invested in (-) / Generated from Net Working Assets	**6,773**	**-13,592**	**-38,796**	**15,794**	**19,276**
Net Capex	-11,911	-15,707	-18,356	-11,440	-5,118
Cash Taxes	-1,251	-1,037	-1,824	-471	-165
Cash available to satisfy capital providers	-6,389	-9,733	-58,976	8,868	33,763
Net interest	-1,896	-2,004	-2,074	-2,309	-2,337
Net dividends	-1,217	-1,228	-1,216	-2,939	-7
Cash available for debt service	-9,502	-12,965	-62,266	3,620	31,419
Total net debt (-) in cash	-98,492	-112,497	-153,968	-150,165	-149,895
Number of years to repay the debt	**Never**	**Never**	**Never**	**41.48**	**4.77**

Source: Calculations based on the reworked template and Appendix 1

The main element, which allows a conclusion to be drawn on the company's ability to repay the debt, is the number of years to repay debt, which is shown in the last line of the Table 3. Table 2 provides the description and categorization of the outputs gained from Jury's template.

It is noted that according to the cash-based credit risk model calculations in Table 3, the number of years to repay for the years 2016–2018 is calculated as "never". In the year 2019, the number of years to repay was 41.48 and in 2020, it finally dropped to 4.77. The interpretation of the results will now be presented in depth.

6. Analysis of the results

Several cash flow-based indicators from the reworked credit risk template help to analyse and audit the company's internal financial processes. Figure 1 shows how much cash from operating activities the company accumulates to satisfy capital providers.

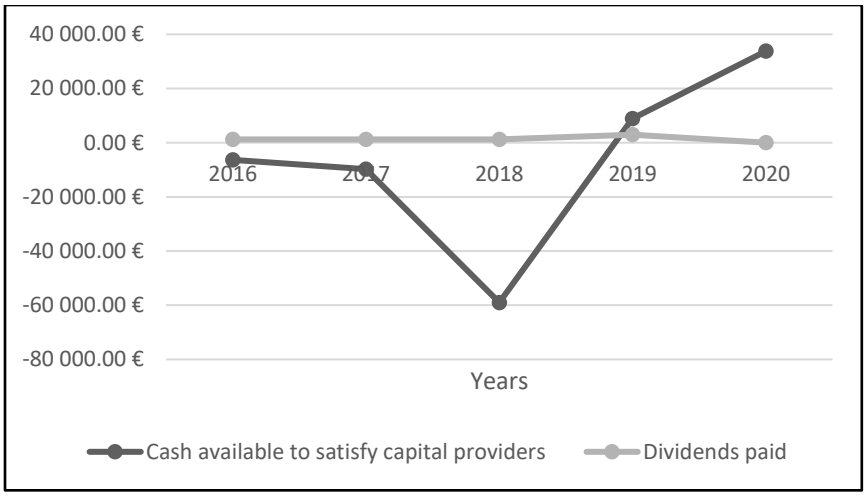


Figure 1. **Cash available to satisfy capital providers**
Source: Calculations based on Appendix 1

Figure 1 demonstrates that the company had negative cash available to satisfy capital providers, beginning in 2016 and when reaching the lowest level in the year 2018. Only in the year 2019, the company had a slightly positive value of its cash available to satisfy capital providers. This shows that the company had negative accumulated cash from operating activities for three years, meaning that the main activities of the company did not result in positive cash flow. Nevertheless, the company was paying dividends during this period. Note 20 on operating lease from the annual report states that in the year 2018 Linas Agro Group concluded several lease contracts which terms did not restrict the dividends (Linas Agro Annual Report, 2017/2018).

The company paid more than a million euros in dividends and over seven million euros in management remuneration in that year, including 1.2 million euros as bonuses (*Ibid*: 54, 66). These payments were made despite the company demonstrating its lowest level of cash available to satisfy capital providers and the highest level of total net debt in cash, as shown in Table 3. The annual report of Linas Agro Group provides evidence that in the year 2017 the company paid the same amount of dividends and 2.6 million euros of remuneration to management including over one million euros bonuses (Linas Agro Group Annual Report 2016/2017, 52, 53, 64).

In the year 2020, the company has paid dividends of only seven thousand euros and remuneration to management of over four million euros including bonuses of just 156,000 euros (Linas Agro Group Annual Report, 2019/2020: 63, 78). This problem was cumulative, visible for all five years of research, meaning that management was consciously performing such financial actions. Researchers have stated that "the use of cash as a predictor of future dividends, therefore, avoids the biases of the reported net income, except to the extent that the timing of certain cash receipts and disbursements can be altered by management" (Hendriksen and van Breda, 1992: 271–272).

Linas Agro started a transformation in the organisational structure in the year 2019. The transformation included the closure of the dormant company in Latvia, closure of Denmark

company Linas Agro, implementing other programs increasing the efficiency of internal processes, and reducing operational costs (Linas Agro Interim Report, 2018/2019). In the year 2020, significant changes in the company's strategy and management have been made. The financial director, who was running the company until the year 2019 was replaced (Linas Agro Annual Report, 2019/2020). In addition, KPMG replaced Ernst & Young as the company's auditors. Moreover, the company has changed its organizational structure and formed a sub-group of companies from new and acquired land management companies (*Ibid*.).

Because of the changes and financial restructuring of Linas Agro, the year 2020 has shown enough cash inflow from the operating activities. As it is visible from Table 3, the main cash outflow of the company is listed in the line "(Invested in)/Generated from Net Working Assets". Thus, the company had the main cash outflow in the years 2017 and 2018. This spoke of the active investments done by the company or that it suffered losses, which is impossible to understand from the annual report of the company in the part of consolidated cash flow statements.

Also in the years 2016, 2017, and 2018, the company was investing in non-current assets, which is visible in the statement of cash flows in the section "Cash flows from investment activities", lines "Acquisition, proceeds from intangible assets, property, plant, and equipment". This activity is marked in Table 3 as "Net CAPEX". Only in the year 2018, the company started to generate the positive value from the net working assets, which led to positive value of cash available to satisfy capital providers. In 2020 because of the company's financial strategy change, the company managed to increase this even further. There is evidence from Figure 1 that during all research periods from the year 2016 until 2020, the company paid out dividends in quite a significant amount, especially in the years 2016–2019, although it had a negative result of cash available to satisfy capital providers.

It is important to consider the total debt to cash calculations for each of the five years shown in Appendix 2 of this paper. Figure 2 illustrates the calculations from Appendix 2. From the calculations, it is clear that that Linas Agro Group was increasing its total debt during the same years (2016–2019) as significant dividends were paid and the cash available to satisfy capital providers was negative. Figure 2 reflects this trend in the direction of total net debt cash line. The fact that significant dividend amounts were paid out even with the negative cash available to satisfy capital providers represents a warning sign for investors and financial institutions.

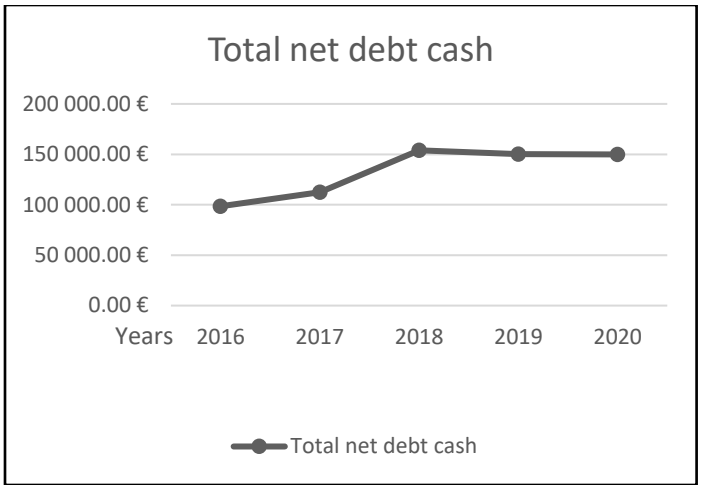


Figure 2. **Total net debt cash**
Source: Calculations based on Appendix 1

Only because of the shift of financial strategy, replacement of financial director, and auditor change (Linas Agro Interim Report, 2019/2020) in the year 2020, Linas Agro Group has paid the least amount of dividends. The finding in Figure 2 is supported by managerial reports. Thus, the managerial report states that in the year 2017 the amount of loans increased, borrowings increased as a short-term loan to finance trade activity (Linas Agro Interim Report, 2016/2017). In the year 2018, the total amount of financial loans portfolio increased, due to the increase in stocks and debts, as the company was investing in poultry business, agricultural companies, and grain elevators (Linas Agro Interim Report, 2017/2018). In the year 2019, the amount of debt decreased due to the diminished amount of stocks and accounts receivable (Linas Agro Interim Report, 2018/2019). The year 2020 continued a decrease further.

The last part of the analysis takes a closer look at the last line of Table 3, the "Number of years to repay the debt", which is calculated according to the following simple formula:

$$Number\ of\ years\ to\ repay = \frac{\text{Total net (debt)/cash}}{\text{Cash available for debt service}}$$

As is visible from Table 4, only in the year 2020 did the company score well with a value of 4.77. This characterises the company's credibility as a mature company with a decent credit rating, minor solvency and liquidity issues, good cash generation ability and minimal probability of default.

Table 4. **Number of years to repay debt**

Years	**2016**	**2017**	**2018**	**2019**	**2020**
Number of years to repay	Never	Never	Never	41.48	4.77

Source: Calculations based on Appendix 1

The year 2019 shows that the company had the value of 41.48 years to repay the debt. According to the classification of Jury, the company is located on the verge of red and grey

zone, but still having positive cash generation ability and the possibility to cover the debt even though it would take a long period. The probability of default, in this case, is high, according to the cash-based credit risk model. However, as it is evident from the Table 4, in the years 2016, 2017, and 2018, Linas Agro Group had a negative value of the years to repay the debt indicated by Jury's classification as "NEVER", because the company had extremely high negative values of cash available for the debt service. This indicated a high probability of default for Linas Agro Group. Nevertheless, at the same time, the company increased its total debt from 98.492 million euros to 153.968 million euros, the highest level of debt for all five years of research, as was mentioned in the description of Figure 2. Thus, having the lowest value of cash available for debt service (-62,266 thousand euros), it had the highest amount of total debt. Because of this finding, it can be stated that financial institutions did not take into account the cash flow principle in credit risk calculation.

7. Conclusions

As a result of the updated methodology and template, the following important conclusions were drawn in the cash flow credit risk analysis of Linas Agro:

- Significant dividends were paid out with negative cash available to satisfy capital providers.
- The improved methodology and template provide better visibility of the actual financial situation of the company, its ability to cover its debt, and specification of the source from which the debt was covered.
- The updated template more clearly shows if the company is close to bankruptcy and specifies the probability of default.

The updated template complies with IFRSs and possesses better comprehensiveness and convenience for users. Moreover, the cash-based credit risk analysis shows the potential to be used as a reliable source of information for the investor. A good continuation of the present paper would be a comparison of the present cash-based credit risk analysis with the accrual-based credit risk model.

References

Altman, E.I. & Hotchkiss, E. (2011). *Corporate Financial Distress and Bankruptcy: Predict and Avoid Bankruptcy, Analyze and Invest in Distressed Debt*. (3rd ed). United States, New Jersey: John Wiley & Sons.

Berger, A.N., Molyneux P., & Wilson J.O.S. (2012). *The Oxford Handbook of Banking*. USA, Oxford: Oxford University Press.

Brycz, B. & Pauka, M. (2012). Analysis of cash flow statement. Financial Sciences 1(10), Publishing house of Wroclaw University of Economics.

Carslaw, A. & Mills, J.R. (1991). Developing Ratios for effective cash flow statement analysis. *Journal of Accountancy:* 63-70.

Cash Flow Analysis (2013). Available on-line at: http://www.free-management-ebooks.com, (Accessed 02.07.2022)

European Bank Authority (2021). Available on-line at: https://www.eba.europa.eu/regulation-and-policy/credit-risk (Accessed April 2022)

European Central Bank Statistical Data Warehouse (2022). Available on-line at: https://sdw.ecb.europa.eu (Accessed April 2022)

Faurescu, F.S. (2010). Study on the importance of Cash Flow Analysis Based on Rates in the Financial Decision-Making Process. Annals of University of Craiova – Economic Sciences Series, vol. 2, no. 38: 10.

Gombola, M.J. & Ketz, J.E. (1983). Financial Ratio Patterns in Retail and Manufacturing Organizations. Journal of Financial Management, vol. 12, no. 2: 45-56

Gombola, M.J., Haskins, M.E., Ketz, J.E., & Williams D.D. (1987). Cash Flow in Bankruptcy Prediction. *Journal of Financial Management*, vol. 16, no. 4: 55-65

Hendriksen, E.S. & van Breda, M.F. (1992). *Accounting Theory. 5th edition*. Boston: United States: Irwin Publishing.

IAS 7 International Accounting Standard 7 (2016). Cash Flow Statement. Available on-line at https://www.ifrs.org/issued-standards/list-of-standards/ias-7-statement-of-cash-flows, (Accessed 26 April 2021).

ICAEW (2021). Available on-line at https://www.icaew.com/library/subject-gateways/accounting-standards/knowledge-guide-to-uk-accounting-standards (Accessed April 2022)

Jilek, J. (2000). Finanční Rizika. 1 vyd, Grada Publishing, 635.

Jury, T.D.H. (2012). *Cash Flow Analysis and Forecasting: The Definitive Guide to Understanding and Using Published Cash Flow Data.* United States, New Jersey: John Wiley & Sons Ltd. Publication

Kiaupaite-Grušniene, V. (2019). *Conceptual Model for Cash Flow Statement: History, Analysis and Further Development. (Doctoral thesis)*. Estonia: Tallinn University of Technology

Kusuma, H. (1999). *The information content of the cash flow statement: an empirical investigation. (The Dissertation in Partial Fulfillment of the requirements of Doctor of Business Administration).* Victoria University of Technology, Australia, 1999.

Kyriazopoulos, G. (2019). Credit risk evaluation and rating for SMES using statistical approaches: the case of European SMES manufacturing sector. *Journal of Applied Finance & Banking*, vol. 9, no. 5: 59-83.

Largay, J.A.III & Stickney, C.P. (1980). Cash Flows, Ratio Analysis and the W.T. Grant Company Bankruptcy. Financial Analysis Journal, vol. 36: 51-54

Lee, T.A. (1993). *Cash Flow Reporting. A Recent History of an Accounting Practice*. Garland Publishing Inc., New York, London.

Lee, T.A. (1992). *Funds Statement and Cash Flow Analysis.* Finance University of Edinburgh.

Linas Agro Group AB Annual Report 2015/2016, 2016/2017, 2017/2018, 2018/2019, 2019/2020.

Linas Agro Group Interim Report 2015/2016, 2016/2017, 2017/2018, 2018/2019, 2019/2020.

Mateș, D. & Cernușcă, L. (2007). The Statement of Cash Flows. Annales Universitatis Apulensis Series Oeconomica, Faculty of Sciences, "1 Decembrie 1918" University, Alba Iulia, vol. 1, no. 9: 1-31.

Mills, J.R. & Yamamura, J.H. (1998). The power of cash flow ratios. *Journal of Accountancy*: 53-61.

Nasdaq Baltic (2021). Available on-line at https://nasdaqbaltic.com/statistics/en/instrument/LT0000128092/trading (Accessed April 2022)

Nobes, C. & Parker, R. (2008). *Comparative International Accounting. (10th ed)*. United Kingdom, Prentice Hall/Financial Times.

Spuchlakova, E., Valaškova, K., & Adamko, P. (2015). The Credit Risk and its Measurement, Hedging and Monitoring. *Procedia Economics and Finance*, vol. 24: 675-681.

Torfason, A.B. (2014). *Cash Flow Accounting in Banks: A study of practice. (Doctoral thesis)*. Department of Business Administration, School of Business, Economics and Law, University of Gothenburg, Sweden.

United States Court of Appeals. (1983). Second Circuit. No 381, Dockets 82-5019, 82-5023, *In re W.T. Grant Co.* 699 F.2d 599, decided 26 January 1983.

Urbancic, F.R. (2017). *The Power of Cash Flow Ratios*. Mitchell College of Business, University of South Alabama. Available on-line at https://silo.tips/download/the-power-of-cash-flow-ratios (Accessed April 2022).

Appendix 1. Author's calculations of cash-based credit risk model

In thousands of EUR	2020	2019	2018	2017	2016
Cash generated from operations	19,770	4,985	20,606	20,603	17,372
Changes in working capital	–	–	–	–	–
(Increase) decrease in biological assets	3,508	-968	2,894	1,061	3,096
Decrease (increase) in inventories, incl. right of return asset	8,224	4,180	-22,191	1,511	-15,098
Decrease (increase) in prepayments	1,555	5,281	-1,598	-553	2,147
Decrease in trade and other accounts receivable	5,614	3,201	-15,790	-13,366	4,057
(Increase) in restricted cash	211	600	-710	199	-449
Increase in trade and other accounts payable	164	3,500	-1,401	-2,444	13,020
(Invested in)/ Generated from Net Working Assets	19,276	15,794	-38,796	-13,592	6,773
Net Capex	-5,118	-11,440	-18,356	-15,707	-11,911
Cash Taxes	-165	-471	-1824	-1,037	-1,251
Cash available to satisfy capital providers	33,763	8,868	-58,976	-9,733	-6,389
Net interest	817-3,148= -2,337	635-2,944 = -2,309	503-2577= -2074	868-2,872= -2004	273- 2,169= -1,896
Net dividends	1-8= -7	4-(17+2,926)= -2,939	14+1,202= -1,216	26+1202= -1,228	15+1,202= -1,217
Cash available for debt service	31,419	3,620	-62,266	-12,965	-9,502
Total net debt (-) in cash	-149,895	-150,165	-153,968	-112,497	-98,492
Number of years to repay	4.77	41.48	Never	Never	Never

Notes:

1. Cash Generated from Operations 2020 = 38,881 + 165 - 19,276 = 19,770
2. Cash Generated from Operations 2019 = 20,308 + 471 - 15,794 = 4,985
3. Cash Generated from Operations 2018 = -20,014 + 1,824 + 38,796 = 20,606
4. Cash Generated from Operations 2017 = 5,974 + 1,037 + 13,592 = 20,603
5. Cash Generated from Operations 2016 = 22,894 + 1251 - 6,773 = 17,372

Appendix 2. Authors' total debt calculations

Year 2020: Total Net Debt (-) in Cash. Changes	Changes
Net debt at beginning of the year	150,165
Increase in cash in the year	1,902
Decrease in short-term borrowing	20,810
Current portion of long-term borrowing	281
Decrease in long-term borrowing	1,101
Finance lease obligation (non-current)	-17,040
Current portion of finance lease obligations	-4,117
Deferred income tax liability	-761
Change in net debt	270
Total net (debt)/cash	149,895

Year 2020. Total Net Debt (-) in Cash	Beginning	Ending	Difference
Cash	7,637	9,539	1,902
Short-term borrowing	113,539	92,729	20,810
Current portion of long-term borrowing	13,411	13,130	281
Long-term borrowing	19,793	18,692	1,101
Finance lease obligation (non-current)	2,455	19,495	17,040
Current portion of finance lease obligations	875	4,992	4,117
Deferred income tax liability	92	853	761
Total (debt)/cash	146,743	124,551	22,192
Difference	3,422	25,344	21,922
Total net (debt) / cash	150,165	149,895	270

Year 2019: Total Net Debt (-) in Cash. Changes	Changes
Net debt at beginning of the year	153,965
Increase in cash in the year	-2,858
Decrease in short-term borrowing	4,570
Current portion of long-term borrowing	-6,576
Decrease in long-term borrowing	7,387
Finance lease obligation (non-current)	-1,283
Current portion of finance lease obligations	-316
Deferred income tax liability	18
Change in net debt	3,800
Total net (debt)/cash	150,165

Year 2019: Total Net Debt (-) in Cash	Beginning	Ending	Difference
Cash	10,495	7,637	2,858
Short-term borrowing	118,109	113,539	4,570
Current portion of long-term borrowing	6,835	13,411	6,576
Long-term borrowing	27,180	19,793	7,387
Finance lease obligation (non-current)	1,172	2,455	1,283
Current portion of finance lease obligations	559	875	316
Deferred income tax liability	110	92	18
Total (debt)/cash	145,399	146,743	1344
Difference	8,566	3,422	5,144
Total net (debt) / cash	153,965	150,165	3,800

Year 2018. Total Net Debt (-) in Cash. Changes	Changes
Net debt at beginning of the year	112,497
Increase in cash in the year	1,598
Decrease in short-term borrowing	-40,615
Current portion of long-term borrowing	4,226
Decrease in long-term borrowing	-6,779
Finance lease obligation (non-current)	-96
Current portion of finance lease obligations	0
Deferred income tax liability	-739
Change in net debt	-41,468
Total net (debt)/cash	153,968

Year 2018. Total Net Debt (-) in Cash	Beginning	Ending	Difference
Cash	8,897	10,495	1,598
Short-term borrowing	77,494	118,109	40,615
Current portion of long-term borrowing	11,061	6,835	4,226
Long-term borrowing	20,401	27,180	6,779
Finance lease obligation (non-current)	1,076	1,172	96
Current portion of finance lease obligations	559	559	0
Deferred income tax liability	1,906	110	1,796
Total (debt)/cash	98,971	145,399	22,192
Difference	13,256	8,566	21,922
Total net (debt) / cash	112,497	153,965	41,468

Year 2017: Total Net Debt (-) in Cash. Changes	Changes
Net debt at beginning of the year	98,492
Increase in cash in the year	1,996
Decrease in short-term borrowing	-19,402
Current portion of long-term borrowing	8,882
Decrease in long-term borrowing	-3,660
Finance lease obligation (non-current)	152
Current portion of finance lease obligations	374
Deferred income tax liability	-351
Change in net debt	-14,005

Total net (debt)/cash	112,497

Year 2017: Total Net Debt (-) in Cash	Beginning	Ending	Difference
Cash	6,901	8,897	1,996
Short-term borrowing	58,092	77,494	19,402
Current portion of long-term borrowing	19,943	11,061	8,882
Long-term borrowing	16,741	20,401	3,660
Finance lease obligation (non-current)	1,228	1,076	152
Current portion of finance lease obligations	933	559	374
Deferred income tax liability	1,555	1,906	351
Total (debt)/cash	76,388	98,971	22,583
Difference	22,104	13,256	8,848
Total net (debt) / cash	98,492	112,497	14,005

Year 2016: Total Net Debt (-) in Cash. Changes	Changes
Net debt at beginning of the year	104,047
Increase in cash in the year	221
Decrease in short-term borrowing	6,164
Current portion of long-term borrowing	-6,630
Decrease in long-term borrowing	5,988
Finance lease obligation (non-current)	561
Current portion of finance lease obligations	-130
Deferred income tax liability	-398
Change in net debt	5,555
Total net (debt)/cash	98,492

Year 2016: Total Net Debt (-) in Cash	Beginning	Ending	Difference
Cash	6,680	6,901	221
Short-term borrowing	64,256	58,092	6,164
Current portion of long-term borrowing	13,313	19,943	6,630
Long-term borrowing	22,729	16,741	5,988
Finance lease obligation (non-current)	1,789	1,228	561
Current portion of finance lease obligations	803	933	-130
Deferred income tax liability	1,157	1,555	-398
Total (debt)/cash	88,774	76,388	12,386
Difference	15,273	22,014	6,741
Total net (debt) / cash	104,047	98,492	5,555

Section 5

Does COVID Speed Up Accounting Changes? Answers from Czech Accounting Professionals

Irena Jindřichovská

Dana Kubíčková

Marie Fišerová

The Effects of the COVID-19 Pandemic on European Stock Markets and the Pandemic Fear Index Perspective

Giorgiana-Roxana Ene

Does COVID Speed Up Accounting Changes? Answers from Czech Accounting Professionals

Irena Jindřichovská [a 8], Dana Kubíčková [b] and Marie Fišerová [c]

[a)] Metropolitan University Prague, Czech Republic
[b)] University of Finance and Administration, Prague, Czech Republic
[c)] Prague University of Economics and Business, Czech Republic

Abstract:

Idea: *The accounting profession is speedily reacting to challenges brought by new technology enforced by industry 4.0. The recent pandemic has forced many professions to operate without direct personal contact everywhere possible. Digitalization and automation in fact presented new opportunities for providing accounting services in a novel form. This paper aims to explore the reactions of representatives of the accounting profession to new challenges that arose after the abrupt spread of COVID infection.*

Data and tools: *We employ the interview method targeting a group of representatives of the accounting profession. After the initial prompts, we use discussions with the representatives which allows us to discuss their particular views on opportunities and challenges brought by this uneasy situation.*

What's new? *We reveal that the accounting profession was more-or-less prepared for the change, even though the conditions in which this new practice had to be speedily introduced were unexpected and threatening.*

So what? *Automation and digitalization are the future of the accounting profession allowing more strategic perspectives instead of daily routine. These new procedures bring in more accuracy allowing professionals to concentrate on the interpretation of findings rather than on data assembling and document verification. Apart from the speed, we get more accuracy and more precise information for strategic decision making.*

Contribution: *Our empirical research has confirmed that digitalization is not a threat to the accounting profession, and professional know how to apply the tools in practice using the forward-reaching features. The practical use was tested in a difficult situation of COVID-19. Nevertheless, we cannot generalize our findings, because of the limited l number of interviews even though our study can show some interesting avenues for future research.*

Keywords: *Accounting profession, Industry 4.0, pandemic, new technology, interviews.*

1. Introduction and motivation

Accounting is a complex socio-economic activity whose evolution is closely linked with development of human civilization, with the forms of production and corresponding social relations and organization and functioning of society. In terms of economic theory,

[8] *Corresponding author:* Department of International Business, Metropolitan University Prague, Dubečská 900/10, 100 00 Praha 10, Czech Republic.

accounting is one of the key institutions contributing to a more efficient functioning of the economic system. In an environment of scattered incomplete information, it is an important link between providers and recipients of capital, and supports the placement and shifting of savings into the most profitable investments. Accounting helps to address the three major economic challenges faced by investors and businesses, namely investment, contracting and signaling (Procházka and Molin, 2016).

Positive accounting theory aims to explain and predict accounting practice. Main problem is that current accounting practices and management attitudes towards such practices. Positive accounting theory realist ontology adopted a strong understanding and this determines epistemology and methodology. Methodologically, this is a positivist or modernism, it is committed to using methods of physics. As a result of this is rooted in empirical epistemology. Positive accounting theory is composed around utility maximization which has a central assumption of neo-classical i.e., each individual has a goal to pursue personal interests (Watts and Zimmerman (1990).

The beginning of positive accounting theory is the Efficient Markets Hypothesis (EMH). The EMH is based on the assumption that capital markets react in an efficient and unbiased manner to publicly available information. The main strengths of Positive Accounting Theories over Normative Accounting Theories are the facts that hypotheses are framed in such a way that they are capable of falsification by empirical research. Also, these theories aim to provide an understanding of how the world works rather than stating how the world should work. Moreover, PAT tries to understand the relationship and connection between various accounting information, managers, firms, and markets; and also analyze these relationships within an economic framework.

One of the main criticisms of Positive Accounting Theory is that it doesn't provide prescription for accounting and therefore doesn't provide any means of improving accounting practice. This, therefore results in alienation of practicing accountants. It is argued that simply explain and predicting accounting practice is not enough. There is no guidance on what people should do, as there is a general absence of prescription.

The other criticisms of Positive Accounting Theory relate to the fundamental that all action is driven by a desire to maximize wealth. Many researchers find this statement very negative in nature. They believe that PAT promotes a morally bankrupt view of the world. The concept of 'positive theory' is drawn from an obsolete philosophy of science and is in any case a misnomer, because the theories of empirical science make no positive statement of "what is". Also, Watts and Zimmerman say, "We do not contend that all issues are settled, but rather encourage others to pursue, correct, and extend our analysis." Watts and Zimmerman (1986).

The recent two years´ pandemic of Covid-19 has affected the whole society all over the globe. It had a very detrimental effect on the health of the human population and besides, it has also altered the behavior of people, nations, institutions and companies, which have forced to adapt to new conditions. Apart from the predominantly damaging effect, it also influenced the speeding up of some innovations. Pharmaceutical innovations were on the

forefront, being vitally important. This being said, Covid-19 and health measures adopted by the majority of countries have also speeded up the effect on communication. For safety reasons, direct human contact had to be minimized, because of highly contagious diseases. Covid-19 enforced that many job routines were performed online - without human contact. On the other hand, the anti-pandemic measures will affect most of the companies which have to solve their ability to sustain their processes in the new conditions. The need of the correct decision in accordance with the reality arose and – as a result - the accounting profession and its ability to use all the available mechanisms to help keep the company afloat.

This paper seeks to answer the question of whether the consequences of Covid-19 in fact brought any positive changes to the accounting profession and its perception and whether and how it has pushed the innovation.

In this paper, we focus on representatives of the accounting profession employing the interview method to enquire about changes in the accounting profession and practice through the prism of the current extraordinary situation in society.

We aim to contribute to a broad discussion concerning the impact of COVID on the accounting profession and the adoption of innovation, mainly in terms of digitization which can offer a possible temporary solution and offers avenues of further development in the field.

This paper is structured as follows: Part one is the introduction and motivation. Part two summarizes the previous literature, and part three explains the used methodology. The following part four delivers our findings. Part five provides conclusions and limitation of the study and suggests areas of future development.

Future accountants will increasingly need education in digital technology (including cloud computing and use of big data), globalization (outsourcing of accounting services), and evolving regulations (tax regulation, new forms of corporate reporting, integrated reporting regulation, and so on). The ACCA report revealed that knowledge of digital technologies is the key competency area where professional accountants have skill gaps. At present, accountants lack knowledge in transformation of new disclosure regulations, new forms of disclosures, and awareness of the interconnectedness of financial and non-financial reporting. Professional accountants will need the skills to provide more all-inclusive corporate reporting, which tells less about the numbers and more about the narrative of the organization.

The theoretical framework of our paper is provided by Positive accounting theory and legitimacy theory, according to which local professional bodies try to mimic their European or world counterparts. It is the stive to imitate the best practices in the profession. Even though the best practice has been achieved under different conditions. Such practice of normative isomorphism is common to professional bodies because they want to keep a high level of professional services that they provide, according to Suchman (1995) and DiMaggio and Powell (2000).

2. Previous literature

The position of the accounting profession and the changes that are reflected in the activities of accountants have been the subject of scientific studies for many years. The authors see the reason for these changes mainly in the rapid development of IT technologies and their use in the field of information processing, as well as in the changes that accompany the activities of companies in the conditions of continuing globalization. These cause changes not only in the actual implementation of accounting operations, but also in the position that the accounting profession occupies in the corporate governance system (e.g., Goddard, 2002; Parker, 2011; Albu, 2011; Islam, 2017).

The authors concluded "… Companies are increasingly requiring a wider range of diverse technical competencies, not only related to accounting reporting but increasingly also related to other disciplines... The accountant is transforming more and more into a consultant or business analyst..." (Albu *et al*., 2011) and also "…the profession of an accountant is no longer limited to bookkeeping - merely involving reporting activities" (Chatzoglou *et al*., 2011).

The results of studies investigating the change in accounting field during the COVID 19 pandemic allow to conclude, that in the pandemic era all these changes assessed in previous studies were further strengthened. Papadopoulou and Papadopoulou (2020) stated: "...the role of professionals in the accounting field has expanded, ...the profession involves more range of responsibilities. ...apart from their usual professional activities, they were also called to implement a series of emergency measures aimed at the support of businesses and individuals affected by the pandemic...". To the same conclusion came in her study Bogasiu (2020) when they concluded: "The role of the accountants has changed – they must offer his help with immediate business survival, can help the company to develop a plan for the medium term, they have to inform of all the aids options, have to collaborate with the internal audit as well as the financial statements auditor, in order to help the company to succeed to avoid the collapse".

The shifts in the accountants' working pattern and its position in the pandemic era is also mentioned in the research of Jabin (2021) or Shen *et al.* (2020). They concluded that "...Accounting professionals have adopted new technology and remote working, which allows to operate more effectively. ... It is necessary for them to adjust all activities to maintain company continuity if business begins to face interruption...".

Based on the empirical investigation Heltzer and Mindak (2021) concluded: Difficulties due to COVID-19, include, but are not limited to: (1) balancing work at home with young children, (2) hiring and training new/young staff and general professional development, (3) work systems at home not being compatible with office systems (including limited ability to print at home), (4) cybersecurity risks of electronic data sharing and communicating with clients who are not tech-savvy, (5) delayed payments from clients experiencing economic hardships, and (6) decreased opportunities to gain new businesses without the ability to meet in-person at conferences. Some benefits from the new working environments include:

(1) the adoption of new technologies, both at the firm-level and client-level, (2) a decrease in staff turnover and (3) increased worktime as commutes were eliminated.

Many previous research studies concentrated on the impact of COVID-19 on innovations in different contexts: Campra *et al.* (2021) explored the impact of COVID on business, management and counting. The impact of covid on digitizing of accounting education was the subject of the study of Sarea *et al.* (2021). Leoni *et al.* (2021) concentrate on new features of accounting and accountability at the time of crisis. Sastararuji *et al.* (2021) explored the cloud accounting adoption in Thai SMEs during the pandemic.

Raghavan (2021) stressed that the disruptive forces of COVID-19 accelerated the digital transformation and innovation, causing business practices in the accounting profession to leapfrog decades ahead. The accountants will need to have skills such as analytical thinking, active learning, complex problem solving, critical thinking, creativity, and ideation.

In the Czech Republic in particular the authors Komenda *et al.* (2020) investigated the complexity of reporting during COVID-19 with the use of interactive web-based tools. The authors Hakalova *et al.* (2021) applied accounting and tax perspective on the impact of the pandemic in the Czech specifics.

Based on these results we strive to contribute to this discussion on the impact of COVID on the accounting profession in condition of the Czech companies and Czech accounting profession.

3. Method

The method that was employed in our research is the qualitative method of interview, using a predetermined target group of professionals. The theoretical framework is provided by positive accounting theory and legitimacy theory. The interviewers were selected from representatives of the accounting profession in the Czech Republic.

The aim was to cover the widest possible platform of entities that participate in the preparation for accounting professions, that are users of its performance in terms of company's management system and in the wider environment.

The interviews were recorded allowing interpretation and setting up to the context. All respondents were from the Czech Republic. In Table 1 the structure of interviewees is presented.

Table 1. **Interviewees**

Interviewee	Professional characteristics	Institution (description)
I1	Professional international accounting education manager	International accounting association
I2	Representative of professional accounting organization	Czech accounting association

Interviewee	Professional characteristics	Institution (description)
I3	Regulator of accounting – state administration	Regulator – state administration
I4	Producer of accounting software	Accounting software firm
I5	Auditor	Big Czech audit firm
I6	Accounting consultant	International audit firm – big four
I7	Auditor and tax advisor	Medium Czech audit firm
I8	Tax advisor	Professional organization
I9	Auditor and tax advisor	International audit firm – non-big four
I10	Educational specialist – business	Business educational firm Specialized on training in accounting
I11	Head Controller	Advisory firm
I12	Accounting Lecturer	University

Source: Own investigation

The interviews were performed in two phases. The first round was held in June and July 2020 in Prague, and the subsequent phase of complementary interviews was executed in December 2020 and January 2021. The questions concerned the preparedness of the accounting profession for difficulties in effective direct interaction with clients and in the firms´ management during the pandemic times and the direct effect of COVID-19 on communication with experts, which could result in a possible impact on results of quality of accounting and audit work. We have also enquired about the preparedness of accounting education to adapt to the current needs of the practice and broader adoption of more sophisticated information technology.

In this vein, semi-structured interviews were organized alongside the following open questions:

Table 2. **Open questions**

1	What new requirements for accounting professionals do you currently perceive?
2	In your opinion, what are the expert requirements in the accounting profession from the standpoint of regulators, tax advisors and auditors?
3	How do you perceive the impact of information technologies and industry 4.0 – automation and digitalization on the accounting profession?
4	How do you assess the challenges to the accounting profession initiated by the recent pandemic
5	Could you, please, explain what new elements became a part of the accounting profession?
6	Could you, please, explain your view on the place and importance of the accounting profession for business management?

Source: Own investigation

The questions build on the findings of the surveys conducted so far. They focus on the main areas in which the accounting profession is changing in response to the Covid 19 pandemic experience.

4. Selected results of enquiry

The most representative responses to each question are summarized in table 3.

Table 3. **Open questions with the most representative responses**

1. What new requirements on accounting professionals do you currently perceive?	
I -1	*More focus on sustainability, environmental and social impacts. More focus on non-financial reporting* **[International Accountancy training]**
I-10	*In my opinion, it is possible to record a shift or return to the important position of the accountant as the right hand of the "director". Automation in the form of accounting software set aside monotonous and time-consuming data recording and sorting activities from the profession. And the weight shifted to the interpretation and use of information. This increases the demand for broader expertise in economics, finance and business management. These requirements are further extended by the efficient use of data processing tools, including relevant software (Excel, etc.). The demands on the ability to communicate with other professional management professions (including technical ones) on the one hand and with external ones on the other hand (tax advisors, auditors, lawyers, etc. stakeholders) are also increasing.* **Educational specialist – business, Accounting**
I-11	*Overcoming the existing limits of the scope of accounting services in the company in the direction of deepening the information support of managerial decision-making, especially in the area of operational controlling marketing and business, and updating the strategic management of the company's finances.* **[Head controller]**
I-7	*In my opinion, there are no big requirements for book-keeping and it can be replaced by automation. Higher demands are placed on accountants, necessary cooperation with management, cooperation on financial statements with management is necessary, economic judgment is necessary, knowledge not only of accounting but also economics and other laws, cooperation with tax advisors, auditors, lawyers. Recently, there is also a requirement for knowledge of the law AML and ESM (37/2021 Coll.)* **[Auditor and tax advisor]**
2. In your opinion, what are the expert requirements in the accounting profession from the standpoint of regulators, tax advisors and auditors??	
I-10	*The state does not impose any conditions for the performance of the accounting profession, which is reflected in the social space by its devaluation (a "tax advisor" is better rated than an "accountant"). A person without a basic economic education can only obtain a trade license for accounting work, only with a completed retraining course. Although this is perceived by companies as dangerous and unacceptable, a solution has not yet been adopted. Resp. it is solved spontaneously, by the demand for the services of tax advisors…. Professional unions - the Association of Accountants - have no powers over the exercise of the profession.* [**Educational specialist – business, Accounting]**
I-7	*The state does not place high demands on accountants. A person with a retraining course can obtain a trade license for accounting work.* *Experience shows that such accounting knowledge will cause significant problems to clients of these accountants, additional estimates by tax administrators. Entrepreneurs*

first look for these cheap accountants and after experience with their work, they look for experts, tax advisors and auditors registered in the chambers.
The professional public, experienced managers place high demands on accountants, require economic education and experience in larger companies, where it is possible to verify the work of accountants. They do not want accountants from small companies or self-employed persons, and accountants often test their knowledge and practice during selection procedures.
There is no oversight of the accounting profession. Associations that have, for example, the Association of Accountants, the Chamber of Certified Accountants, etc., do not supervise accountants. There is no obligation for accountants to have liability insurance. [**Auditor and tax advisor]**

I-4 *Adaptability*
Digital capability development **[Producer of Accounting Software]**

I-2 *The main requirements are:*
- An understanding of accounting based on Czech GAAP and IFRS (in case of working for an international company)
- Accountant should have at least a basic understanding of tax regulations
- Digital capability development
- Continuous learning, education, and training
[CFO Advisory committee of Union of accountants]

3. How do you perceive the impact of information technologies and industry 4.0 – automation and digitalization on the accounting profession?

I-1 *Technology is one of several very important factors that are shaping the future of the accountancy careers. It is creating many opportunities for automating the transactional work of accountants and allows them to focus on more value-added parts of their work.* **[International Accountancy training]**

I-2 *It is important to distinguish between accounting and bookkeeping.*
Digitalization has a positive impact on the elimination of routine work (bookkeeping, regular non-complex reports, routine invoice issuance) and improvement of the approval process.
It creates the space for focusing on more complex accounting and tax matters. **[Big Czech Audit firm]**

I-7 *Automation and digitization in the accounting profession facilitates basic, initial simple accounting steps and presupposes accurate and detailed system settings. There is no need for a human hand to capture the original documents. But preparation and assessment of documents, work on financial statements, accounting estimates - here is a necessary professional economic judgment to protect the entity as such and provide information to management.* **[Auditor and tax advisor]**

I-6 *It is important to distinguish between accounting and bookkeeping.*
Digitalization has a positive impact on the elimination of routine work (bookkeeping, regular non-complex reports, routine invoice issuance) and improvement of the approval process. It creates the space for focusing on more complex accounting and tax matters. **[Advisor - International audit firm – big four]**

4 How do you assess the challenges to the accounting profession initiated the recent pandemic

I-10 *The biggest positive effect of the COVID 19 pandemic can also be considered here the forced attention of IT technologies and the possibility (as well as for a number of other managerial positions) to perform activities outside the workplace, offline. On the other hand, it underlined the link and the need to communicate with other employees in*

managerial and other positions (i.e., the need for a personal meeting, possibly even online).

And perhaps increasing the need and attention to accounting data as a source of information "how the company is doing". [**Educational specialist – business, Accounting]**

I-2 *Working with information. The time brought several legislative changes, support programs, etc. At a time when classical forms of education did not work, the accounting profession had to deal more with proactive information retrieval.*

Digitization and robotics have already resonated with the process before the pandemic. However, the situation has accelerated its implementation. The remote form of receiving and transmitting data has become a necessity.

I see the challenge in the need to educate accountants more in IT, not just in tax accounting and law. [**Auditor and tax advisor]**

I-11 *Substantially more sophisticated outputs from accounting information systems in terms of analytical value of financial analysis, especially in terms of depth and trend approach enabling predictions of future development by ex-ante approach in scenarios* **[Head controller]**

I-1 *The Covid-19 pandemic accelerated the transformation of finance and accountancy profession. The digitalization of accountancy had to be implemented within very short period of time due to all restrictions.* **[International Accountancy training]**

5 Could you, please, explain what new elements became a part of accounting profession?

I-1 *Collecting data from various sources, analyzing all data, drawing conclusions from data analysis and providing insights, real time accounting – no longer need only to prepare FS at the year-end but there is a growing demand for accurate financial reporting throughout the financial year. Strong demand for finance to understand and present the organizations they work for.* **[International Accountancy training]**

I-12: *"Due to the need to interpret the outputs of accounting clearly, language skills and communication skills become part of the profession, as does the use of appropriate tools, such as Power BI, Excel etc."* **[Accounting Lecturer]**

I-11 *Interconnection of controlling and accounting blocks in ERP based on a process approach to cost management using the ABC method.* **[Head controller]**

I-2 *Remote forms of communication either with the state administration or between accountants and their clients – e.g., online meetings with clients or seminars.*

Accountants have always worked with documents - even in this work, SW solutions are used more. **[Union of Accountants]**

6 Could you, please, explain your view on the place and importance of accounting profession for business management?

I-1 *Finance functions have an opportunity to develop a more strategic role across the organization if they capitalize upon these recent successes. Their informed analyses are valued. Increasingly finance teams have a broad purview of the organization. Finance teams increasingly look to both financial and non-financial information in both their external and internal reporting.*

There is an opportunity for finance teams to play a more strategic role in their organizations. **[International Accountancy training firm]**

I-7 *I consider the accounting profession at the highest professional level to be essential for business management. The composition of individual accounting items and their responsible processing, fair classification and assessment provide the necessary basis for decisions on the state, development, direction and health of the company.* **[Auditor and tax advisor]**

I-11 *Guardian and the source of the only relevant and trusted information databases. Especially in terms of the needs of value - based management (VBM)* **[Head controller]**

I-10 *The accounting profession in its target function (i.e., to provide information on the financial condition and performance of a company) is an essential part of the management of any company. It provides the basic and irreplaceable information needed for decision-making by managers and owners as well as other stakeholders. The growing complexity of the performance of this function has historically led to the division of labor in the field of corporate accounting: this information, essential for management, is processed by the "staff" of employees. The requirements for their performance within the accounting department may vary. However, in order to communicate with each other and be actively involved in the whole set of activities, it is necessary to find the "same professional language", so that the demands on education should not differ.* [**Educational specialist – business, Accounting]**

Source: Own investigation

5. Results

The obtained answers of the respondents can be summarized in several levels:

1. The importance of accounting data, their quality, comparability and reliability are increasing so that they can be adequate to the ever-increasing needs of management in the conditions of increasing globalization of economic processes and their differentiated manifestation in the corporate governance system.
2. This increases the importance of the accounting profession and thus the position of accountants in the corporate governance system.
3. In the training of accountants, the accent of knowledge shifts from the knowledge of properly recording accounting operation to the use and interpretation of accounting data for various decision-making, both at the level of the entire company and at the level of internal processes.
4. Increasing demands on the ability to perform administrative, managerial, and analytical tasks, the solution of which modern technology cannot be immediately performed.
5. The demands on the knowledge of digital technologies and their applications in the field of data processing, evaluation and interpretation are increasing, from elementary to more complex ones supported by artificial intelligence, cloud computing and other technologies.
6. An integral part of the accounting profession is the ability to use information technology data and implement decisions that these technologies cannot.
7. The accounting profession also includes other activities related to the financial management of companies, such as communication with the state administration, knowledge and orientation in the broader legal context of the operation of corporate activities, etc.
8. On the other hand, the whole area of bookkeeping and direct provision of accounting data for various purposes of corporate governance will be differentiated both in terms of individual types of information and in terms of training requirements of individual employees in charge of their performance.
9. These results are more-or-less consistent with previous studies. The developments highlighted by the Covid 19 pandemic can also be seen in a broader historical context. Accounting and the accounting profession were initially an integral part of the

performance of production activities. Later on, the accounting as administrative was separated from this process as a specific, relatively separate element in the business management system. This is followed by subsequent synthesis in connection to other elements of the management system, at a higher technological level that extents that both, the ability to influence processes whilst increasing its responsibility.

6. Conclusion and implications

Based on the responses in the interviews we can summarize the views on changes in the position and performance of the accounting profession under the Covid 19 pandemic as they are perceived by the Czech accounting professionals on several levels.

Most interviewees agreed on the following new features of the accounting profession:

- Accounting profession and its performance is under significant influence of information technologies. The structure of accounting activities is changing: the share of simple, not yet automated operations is reduced because it is performed by data processing software. The accountants have to use the information in the solution of more qualified tasks.
- An important part of the performance of the accounting profession became the communication and cooperation with other managerial departments. The share of activities related to the preparation and presentation of data is increasing in the performance of the accounting profession (Walton, 2000).
- These activities require the ability to apply available data processing tools (Excel, PowerPoint or other). It also requires the ability to interpret the presented data with the knowledge of the company processes. And to use the informational technologies in a broader sense, to be able to communicate online, to use various products of interpersonal communication (online).
- In the performance of accounting activities, the importance of so-called ´soft skills´ is growing not only in sense of data presentation but also in the field of interpersonal and interdisciplinary communication and cooperation within the company management system (especially multinational companies).
- The language skills are also becoming a necessary part of the accounting profession in connection with the performance of accounting profession in companies with different ownership structures and also due to the gradual internationalization of the accounting.
- The accounting profession also newly includes other activities related to the financial management of companies, such as communication with the state administration, knowledge, and orientation in the broader legal context of the operation of corporate activities, etc.

Many specifics that are reflected in the performance of accounting profession are related to specific conditions of performance of particular tasks (accountant in SME, accountant in a large company, independent accountant, accountant in an accounting firm, accountant in tax consulting advisory, etc.). In our research, we did not address these specific categories in more detail. They can become an exclusive research area for other research projects.

The specific research problem is the requirements related to the gradual expansion of accounting harmonization and application of IFRS. This area is quite specific due to different cultural, social and economic roots on which IFRS is based in comparison with the conditions from which financial reporting grew in the Czech Republic. Czech profession, nevertheless is directly influenced by standards applied in worldwide accounting profession. Therefore, we can observe many features of normative isomorphism in almost all answers apart from the predominance of tax minimizing effort, which is typical characteristics in Czech accounting practice. Nonetheless, these particular aspects have not been explored in current study, and they may become a topic for follow-up research.

Acknowledgement

This paper is the result of the Metropolitan University Prague research project no. 93-02 "International Business, Financial Management and Tourism" (2022) based on a grant from the Institutional fund for the Long-term Strategic Development of Research Organizations. The authors would also like to express their thanks to anonymous reviewers of the paper and to academic editors of the journal for their guidance and helpful comment.

The authors acknowledge the institutional support for long-term strategic development research organization University of Finance and Administration, Prague.

References

Albu C.N., Albu, N., Faff, F., & Hodgson, A. (2011), Accounting Competencies and the Changing Role of Accountants in Emerging Economies: The Case of Romania, *Accounting in Europe*, vol. 8, no. 2: 155-184, Available at: https://doi.org/10.1080/17449480.2011.621395 (Accessed April 2022)

Campra, M., Paolo, E., & Brescia, V. (2021). State of the art of COVID-19 and business, management, and accounting sector. A bibliometrix analysis, *International Journal of Business and Management*, Canadian Center of Science and Education, vol. 16, no. 1: 1-35.

DiMaggio, P.J., & Powell, W.W. (2000). The iron cage revisited institutional isomorphism and collective rationality in organizational fields. In *Economics meets sociology in strategic management*. Emerald Group Publishing Limited.

Goddard A. (2002) Development of the accounting profession and practices in the public sector – A hegemonic analysis, *Accounting, Auditing & Accountability Journal*, vol. 15, no. 5: 655-688. doi/10.1108/09513570210448957/full/html

Hakalova, J., Kryskova, S., & Psenkova, Y. (2021). Reducing the Impact of the Global COVID-19 Pandemic on Business Entities in the Czech Republic from an Accounting and Tax Perspective. In SHS Web of Conferences, vol. 92, p. 01012. EDP Sciences.

Heltzer, W. & Mindak, M. (2021), COVID-19 and the Accounting Profession. *Journal of Accounting, Ethics and Public Policy.* vol. 22, no. 2: 151-205. Available at SSRN: https://ssrn.com/abstract=3839771 (Accessed April 2022)

Chatzoglou, P.D., Vraimaki, E., Komsiou, E., Polychrou, E., & Diamantidis, A.D. (2011). Factors affecting accountants' job satisfaction and turnover intentions: A structural equation model. In: Proceedings of "The 8th International Conference on Enterprise Systems, Accounting and Logistics 2011, Thassos Island, Greece, pp. 130-147.

Islam, M.A. (2017) Future of Accounting Profession. International Federation of Accountants (IFAC) Available at: https://www.ifac.org/global-knowledge-gateway/business-reporting/discussion/future-accounting-profession-three-major (Accessed April 2022)

Jabin, S. (2021) The Impact of COVID-19 on the Accounting Profession in Bangladesh, *Journal of Industrial Distribution & Business*, vol. 12, no. 7: 7-14.

Komenda, M., Bulhart, V., Karolyi, M., Jarkovský, J., Mužík, J., Májek, O., & Dušek, L. (2020). Complex reporting of the COVID-19 epidemic in the Czech Republic: Use of an interactive web-based app in practice. *Journal of Medical Internet Research*, vol. 22, no. 5, e19367.

Leoni, G., Lai, A., Stacchezzini, R., Steccolini, I., Brammer, S., Linnenluecke, M., & Demirag, I. (2021). Accounting, management and accountability in times of crisis: Lessons from the COVID-19 pandemic. *Accounting, Auditing & Accountability Journal,* vol. 34, no. 6: 1305-1319. https://doi.org/10.1108/AAAJ-05-2021-5279

Miller, P. & Power, M. (2013). Accounting, organizing, and economizing: Connecting accounting research and organization theory. *Academy of Management Annals,* vol. 7, no. 1: 557-605. Available at: https://doi.org/10.5465/19416520.2013.783668

Papadopoulou S. & M. Papadopoulou (2020) "The Accounting Profession Amidst the COVID-19 Pandemic*", International Journal of Accounting and Financial Reporting,* vol. 10, no. 2: 39-59, doi:10.5296/ijafr.v10i2.17001

Parker, L.D., Guthrie, J., & Linacre, S. (2011) "The relationship between academic accounting research and professional practice", *Accounting, Auditing & Accountability Journal*, vol. 24, no. 1: 5-14.

Procházka, D. & Molin, J. (2016). "Book-tax conformity: the review of recent research and its implication for the IFRS adoption in Europe". *eJTR*, 14, 96. Available at http://classic.austlii.edu.au/au/journals/eJlTaxR/2016/4.pdf (Accessed April 2022)

Raghavan, K. (2021) "Impact of Pandemic and Digital Transformation on Global Accounting Profession", *Journal of Global Awareness*, vol. 2, no. 1, Article 7. Available at: https://scholar.stjohns.edu/jga/vol2/iss1/7

Ross L., Watts, & Zimmerman, J.L. (1986), *Positive Accounting Theory*, Prentice-Hall Inc.

Watts, R.L. & Zimmerman, J.L. (1990). *Positive accounting theory: A ten-year perspective*. *Accounting review*, vol. 65, no. 1: 131-156.

Shen, H., Fu, M., Pan H., Yu, F. & Y. Chen (2020) The Impact of the COVID-19 Pandemic on Firm Performance, *Emerging Markets Finance and Trade*, vol. 56, no. 10: 2213-2230, DOI: 10.1080/1540496X.2020.1785863.

Suchman, M. (1995). Managing Legitimacy: Strategic and Institutional Approaches. *The Academy of Management Review,* vol. 20, no. 3: 571-610.

The Effects of the COVID-19 Pandemic on European Stock Markets and the Pandemic Fear Index Perspective

Giorgiana-Roxana Ene [a,9]

[a] *Bucharest University of Economic Studies, Romania*

Abstract: *This paper investigates the causal relation, with the help of Granger Causality Test, between the evolution of the COVID-19 pandemic in USA Europe, Italy (the epicenter of the pandemic in Europe) and Romania against selected European stock market indexes and the VAR model outputs for a constructed pandemic fear index (composed of the number of new cases of COVID-19, new deaths due to COVID-19 and vaccinations against COVID-19 reported) against selected European stock market indexes, between January 2020 and January 2022. This is the first article that takes into account the number of new vaccinations for the fear index calculation and also it spans over a bigger period of time. The results obtained show that the USA COVID-19 statistics, especially the number of new cases and deaths reported, have an impact on the volatility of the stock markets selected. The Granger Causality Test result and VAR model results obtained for the relation between the pandemic fear index of USA related to the stock market indexes selected and the rapid recovery of the stock market show that the stock market does not take into account long-term economic fundamentals, highlighting the decoupling of stock exchanges from the real economy and COVID-19 pandemic.*

Keywords: *European stock markets indexes, pandemic fear index, Granger causality, VAR model.*

1. Introduction

On 31st of December several cases of pneumonia were reported in Wuhan, China, that were later on identified as being coronavirus (COVID-19). When it comes to the evolution of the COVID-19 pandemic nobody thought it will reach a large scale so fast, taking the governments of the world by surprise and thus having a big impact on people's lives and as well on the worldwide economy. However, Krugman (2020) stated "*Let's be clear: we knew, or should have known, that something like COVID-19 was going to happen*", based on the fact that public health experts have been giving warnings as to the likelihood of such an occurrence for several years.

The rapidity with which the virus spread and also the severity of the symptoms raised big concerns and on 11th March 2020 the World Health Organization (WHO, 2021) assessed the sanitary crisis caused by the COVID-19 virus as a pandemic. According to the data I extracted from Our World in Data, from 1st January 2020 to 31st January 2022, a total of

[9] *Corresponding author*: Doctoral student, Doctoral School of Finance - Bucharest University of Economic Studies; 6 Piața Romană, 010374 Bucharest, Romania.

377,429,843 new confirmed cases of COVID-19 and 5,649,908 new deaths reported worldwide due to COVID-19, resulting in a 1.5% mortality rate.

Worldwide, governments took measures to avoid the spread of the virus and as well help contain it, measures such as closure of non-essential businesses and schools, quarantine, travel restriction and social distancing, which took a toll on the economy and stock markets volatility as well (Capelle-Blancard and Desroziers, 2020; Fahlenbrach *et al.*, 2020; Ramelli and Wagner, 2020). In contrast it was observed that the population trust in their government can help reduce volatility (Engelhardt *et al.*, 2021). Daily stock markets registered movements from 5 up to 10% sometimes in the direction of growth, but mainly in the direction of decline and what started as being a problem of the Chinese population and after that the Italian population turned into a worldwide spread problem (Baldwin and Weder di Mauro, 2020).

Baker *et al.* (2020) compared the current situation caused by COVID-19 with other historical events such as the Great Crash (1929), Spanish Flu (1918-1920), Great Depression (1933), Black Monday (1989) and the Global Financial Crisis (GFC; 2008) and noted that not even the Spanish Flu had such significant effects on the stock market as COVID-19, while Yarovaya *et al.* (2021) and Ahmad *et al.* (2021) labeled the current situation as a "*black swan*" event given its scarcity and unpredictability and Harjoto *et al.* (2021) and Harjoto and Rossi (2021) proved that emerging markets were more affected than developed ones.

Although this isn't the first article that aims to analyze the effects of the COVID-19 statistics, as well of the pandemic fear index against the volatility of selected stock market indexes, it is the first one that spans over a big period of time (two years) and as well takes into consideration the number of new vaccinations against COVID-19 reported for the calculation of the pandemic fear index. The scope of the article is to determine the impact magnitude of the evolution of the pandemic on the stock market's volatility based on the results obtained from the Granger causality test and VAR model.

2. Literature review

As presented in the Introduction section it can be said for sure that market volatility rocketed upward, however the current situation generated by the COVID-19 virus is not the only one. If we were to look back in time, the world confronted several pandemics like the Spanish Flu (1918 - 1920), Asian Flu (1957 – 1958), SARS (2002 – 2004), H1N1 Swine Flu Pandemic (2009 – 2010), Ebola (2014 – 2016), and so many others, and for sure more to come, however the literature compares the current times most often with the Spanish Flu given that it had a mortality rate around 2% of the world population, according to an article published in BioSpace (Terry, 2021).

Going back to the article of Baker *et al.* (2020) the authors concluded based on the news recorded regarding infectious disease outbreaks that the Spanish Flu had significant lesser effects on the economy compared to COVID-19. The authors accounted „*more than 1,100 daily stock market moves (up or down) greater than 2.5% from 1900 to 2019*" none of them

due to infectious diseases or pandemics, however they identified „*From February 24 to April 20, 2020, newspapers attributed two dozen such jumps to coronavirus-related developments*." which couldn't be explained by the authors given that the mortality rate of the current pandemic is smaller than the one recorded for the Spanish Flu. Off course we have to take note of the fact that a little over 100 years have passed since then and the knowledge and technological level have grown significantly, but I cannot disapprove their findings which I find significant.

For sure the evolution of COVID-19 pandemics, from its early start led to a wide spread panic among the population and as well among stock market investors. Having this thought in mind, when I looked at the literature, I discovered an interesting phenomenon known as the „*herding behavior*". Espinosa-Méndez and Arias (2020) define the herding behaviors as an imitation game and they concluded that there was an increase of the herding behavior registered on European stock market due to COVID-19. Ferreruela and Mallor (2021) examined the herding behavior on the Spanish and Portuguese stock market (January 2020 - May 2021) and the authors observed that in general there is no herding behavior *during the pandemic* but stronger evidence is found after it for Spain (as from my understanding the authors account as the period of time „during the pandemic" the time frame in which spikes in the number of COVID-19 cases were registered and as „after the pandemic" the calmer periods), while for Portugal there is an observed herding behavior during the pandemic but not after it, as compared to the GFC when the herding behavior was identified pre- and post-crisis but not during the crisis itself. By using similar empirical methods applied to daily stock market data from 72 countries (Q1 2020) accounting as well for the government responses, Kizys *et al.* (2021) found evidence of herding behavior in the analyzed period and identified the VIX index as a favorable factor for the herding behavior given that it is somehow thought as an investors fear index.

Smales (2021) used Google search volumes (GSV) regarding COVID-19 to establish if the focus of investors on this issue may or may not influence the stock market, by concentrating on 11 industry sectors (communication, consumer discretionary, consumer staples, energy, financials, healthcare, industrials, IT, materials, real estate and utilities) from S&P500 and MSCI World indexes (31.12.2019 - 31.05.2020) and by also adding control variables as VIX, ADS and EPU index. From the results the author concludes that (a) the number of cases and deaths related to COVID-19 has a negative impact on stock market returns however it is statistically insignificant with exception of sectors such as materials and utilities, (b) „*that the heightened attention of investors, proxied by Google searches, negatively influenced US (and global) stock returns and helps to explain the heterogeneity of returns across stock market sectors*" and (c) the investors' attention lead to relative outperformance of market sectors such as consumer staples and healthcare and an underperformance for the ones from energy an IT sector. Herding behavior was as well detected during the pandemic under bullish market conditions (Dhall and Singh, 2020; Mishra and Mishra, 2021) and government interventions were found to bring some stability in the economy and help to mitigate the herding behavior on the Indian stock market (Bharti and Kumar, 2021). In Q2 2020 evidence of more intense herding behavior was detected and European investors were more likely to show this kind of behavior compared to Asian investors (Aslam *et al.*, 2021) and another research detected that an increase in herding

behavior contributes to the increase in volatility (Fei and Liu, 2021). Nevertheless, investors turned their attention to cryptocurrency markets, where as well this kind of behavior was detected (Mandaci and Cagli, 2021; Rubbaniy *et al.*, 2021a; Rubbaniy *et al.*, 2021b), especially in the top cryptocurrency markets (Mnif *et al.*, 2020) a behavior which was also found present before COVID-19 (Vidal-Tomás *et al.*, 2019).

The stock market volatility is one of the most researched topics when it comes to the effects of pandemic on the stock markets. Gherghina *et al.* (2021) studied the volatility of daily returns of 13 stock market indexes against the evolution of new cases of COVID-19 registered in Romania, Italy and USA between January 2020 - April 2021 and identify that the time data series for all 13 stock market indexes is leptokurtic which was presented by the authors as possibly caused by volatility clustering. The authors noticed that the stock market volatility increased in Q1 2020 to very close levels to those registered during GFC and only for BET (one of the chosen indexes) they didn't identify a causal relation (VAR Granger) between it and the COVID-19 variables. Chowdhury *et al.* (2021) identifies from the analysis of the most representative stock market indexes from 12 countries spreading throughout four continents that all countries were affected by COVID-19, but especially European countries. On the other hand, Albulescu (2021) focusses on the study of volatility on the USA market, more specifically on S&P500 and identifies a strong correlation between the number of new cases, respectively deaths reported globally and in USA and the increase in volatility. Similar findings were noted by Mazur *et al.* (2021) when analyzing the stock market volatility of S&P1500 as well as the fact that the crash registered in March 2020 could be accounted as one of the most dramatic in stock market history and that at a sectorial level there were sectors that outperformed such as food, healthcare, natural gas and software, respectively other sectors underperformed such as entertainment, reals-estate, hospitality and petroleum, similar to the findings of Smales (2021). As well Al-Awadhi *et al.* (2020) concluded from the study of the effects of new cases and deaths related to COVID-19 on the companies included in the Hang Seng Index and Shanghai Stock Exchange that sectors such as medicine manufacturing and technology outperformed compared to the market, while sectors such as air, highway and water transportation and beverages underperformed and that the decrease registered for stocks owned by foreign investors was significant compared to the ones owned by local investors.

The effects of government responses to the pandemic on stock market volatility is analyzed by Zaremba *et al.* (2020) for 67 countries and the authors conclude that government intervention contribute to the increase in stock market volatility and underline that governments should be conscious and aware that their interventions taken under the form of restrictions have an impact on trading and financial markets. While Baek *et al.* (2020) study the effects of news related to COVID-19 on USA stock market volatility and discover that the volatility is more sensitive and has a negative impact more pronounced to news regarding deaths than the ones regarding recoveries, which the authors have described as „*negativity bias*". The authors also identify significant risk increase in sectors such as petroleum, natural gas, restaurant, hotel and lodging, while in sectors as food production, beer and liquor the risk increase is significantly smaller.

Another wide debated subject related to the topic under discussion is contagion. The contagion effect between stock markets is also referred by Gherghina *et al.* (2021) which stipulate that the effects of COVID-19 on large stock markets was transmitted to other small stock markets (e.g., Romania). Akhtaruzzaman *et al.* (2021) analyze the contagion effects of financial and non-financial firms in China and G7 countries and observe that there is a contagion effect present between China and G7 countries, Italy recording the highest negative return for financial firms and UK for non-financial firms. Okorie and Lin (2021) identify from the empirical analysis conducted at the level of top 32 countries affected by the pandemic as of 31st of March that there is a short-lived contagion effect between stock market regarding both return and volatility. Also, evidence of financial contagion between China and its trading partners both developed and emerging countries is found (Banerjee, 2021), significant increase of contagion during the first wave of COVID-19 infection for 16 major stock market indexes spread throughout three continents (Liu *et al.*, 2021), contagion effect during COVID-19 from US stock market to Vietnamese stock market, however smaller compared to the GFC and greater to Philippine's stock market compared to GFC (Le and Tran, 2021).

Zehri (2021) analyzed the spillover effect from USA to China, Japan, Hong Kong and South Korea, and found evidence of spillover between USA and East Asian stock markets, the most significant result being registered for the spillover effect from USA to China, especially during the pandemic. Similar findings were noted by Youssef *et al.* (2021) which as well observed an increase in the dynamic spillover effect during the pandemic and also added that for the countries analyzed (China, Italy, France, Germany, Spain, UK, Russia, USA) the total connectedness index for all market is 65.34% of which EU countries were the biggest contributors and China, UK, Russia and USA transmitted less spillovers to the other markets that they received and He *et al.* (2020) confirm as well the presence of spillover, more precisely a bidirectional spillover effect between Asian countries and Europe and American countries due to COVID-19.

A summary of prior literature exploring the relationship between fear/volatility indexes and news with stock markets over different time horizons, including COVID-19, can be found in Table 1.

Table 1. **Brief review of early studies of the relationship between fear indexes and stock markets**

Author(s)	Sample	Period	Quantitative Methods	Outcomes
Salisu and Akanni (2020)	OECD and BRICS countries	11.03.2020 - 30.04.2020	Homogenous panel data	The Global Fear Index (GFI) constructed is shown to be a better estimator for fear in the stock markets than Volatility Index (VIX).
Salisu *et al.* (2020)	24 major commodities	11.03.2020 - 18.05.2020	Predictive models	The Global Fear Index (GFI) constructed is show to be positively correlated with the price return of the commodities analyzed, an increase in the GFI resulting in an increase of commodity prices. As well the author noticed that due to the fact that the stock market is negatively correlated, commodities are a better safe-haven option than stock markets.
Yu *et al.* (2021)	BRICS and G7 countries	23.03.2020 - 29.01.2021	Granger Causality and DCC-GARCH	The correlation between GFI and selected stock markets fluctuates over time recording periods of increase and decreased correlation while after the announcement of the vaccines the correlation weakened. Chinese stock market shows the weakest correlation with GFI_China
Economou *et al.* (2018)	S&P500, FTSE, DAX30 and CBOE VIX, FTSE VIX, VDAX New VIX	2000 - 2014	Hidden co-integration (HC), Crouching Error Correction Model (CECMs),	For the US stock market results of overall asymmetry in reaction to CBOE VIX are found, while for UK and Germany contemporaneous asymmetry is detected regarding the time span of the adjustment process.
Zhu *et al.* (2019)	S&P500, NYSE and NASDAQ Composite, DIJA and EMV trackers, VIX	January 1990 - February 2019	GARCH-MIDAS, Detrended Fluctuation Analysis (DFA) and Multifractal-Detrended Cross-Correlation Analysis (MF-DCCA)	The US stock market volatilities are better predicted based on EMV trackers rather than VIX for a variety of time horizons.
Subramaniam and Chakraborty (2021)	S&P500, Russell1000ETF, Nasdaq100ETF, S&P500ETF, Nifty500, Ibovespa	March 2020 - August 2020	Regression models	The impact of the constructed COVID-19 fear index based on the Search Volume Index (SVI) from Google is (a) negative for stock markets returns with a persistence of up to 5 days for S&P500, Russell1000ETF, Nasdaq100ETF and S&P500ETF and (b) negative for stock markets returns for Nifty500, Ibovespa.

Author(s)	Sample	Period	Quantitative Methods	Outcomes
Smales (2022)	BRICS and G7 countries and corresponding volatility indexes	January 2001 - December 2020	Vector autoregressive (VAR) model, Granger causality test and Principal component analysis	The high level of uncertainty in US markets impacts global markets disseminating fear, however the reverse relationship is not applicable. Proof of increased interdependence across G7 markets in both GFC and COVID-19 economic crisis is found. In the GFC case US markets news was the greater influencer compared to COVID-19 when the effects are spread among several countries, but most notably within European markets.
Lyócsa *et al.* (2020)	S&P500, FTSE100, NIKKEI225, CAC40, NIFTY50 , S&P/TSX Composite, DAX, SMI, KOSPI and All Ordinaries	02.12.2029 - 30.04.2020	Heterogeneous autoregressive (HAR) model	Result show that the fear provoked by COVID-19 measured with the help of Google search volume activity for COVID-19, is correlated with the price index variation and can be used as a predictor to regarding future uncertainty on the stock markets. The authors also stated that these finding can be useful in dealing with risk management models.
Su *et al.* (2020)	Shanghai Composite Index	20.01.2020 - 31.08.2020	Predictive regressions	The constructed pandemic-induced fear (PIF) index based on internet searches in China related to COVID-19 has a substantial impact and is negatively correlated with the stock market returns. The PIF is a better alternative in determining stock market movements for China rather than the GFI (Salisu and Akanni, 2020), meaning that investors sentiment plays a more important role than the evolution of the pandemic itself.
Salisu and Vo (2020)	20 stocks market indexes (the most affected countries by COVID-19)	01.01.2020 - 30.03.2020	Panel data forecasting	The Google searches on health news concerning COVID-19 have a statistically significant affect and are negatively correlated with the stock market returns, which indicated that the stock market returns decline as more news regarding health issues due to the pandemic appear. The Google searches on health news concerning COVID-19 are a good predictor for stock market returns.

Source: Authors' work based on the literature review

3. Data and methodology

3.1. Sample selection

Given that the stock markets are tough of as a "*barometer of the economy*" reflecting its well-being or not, I will analyze the evolution of the most relevant European stock market indexes (EURONEXT100, CAC40, Gold Bullion Securities (GBS), EUROSTOXX50, DAX, MDAX, BET, BET-FI and BET-NG) against the evolution of new reported (a) cases of COVID-19, (b) deaths due to COVID_19 and (c) vaccination in order to immunize against the COVID-19 virus and in the final part of the article conclude if they have or not an influence on the stock market index close price evolution on their own, or if further analysis is necessary in order to assess the stock market reaction during the pandemics. For the moment I will take a look a quick look at the current situation compared to the GFC, given that the pandemic has led to a level of stress in stock markets that has never been seen since the GFC (Goldstein *et al.*, 2021).

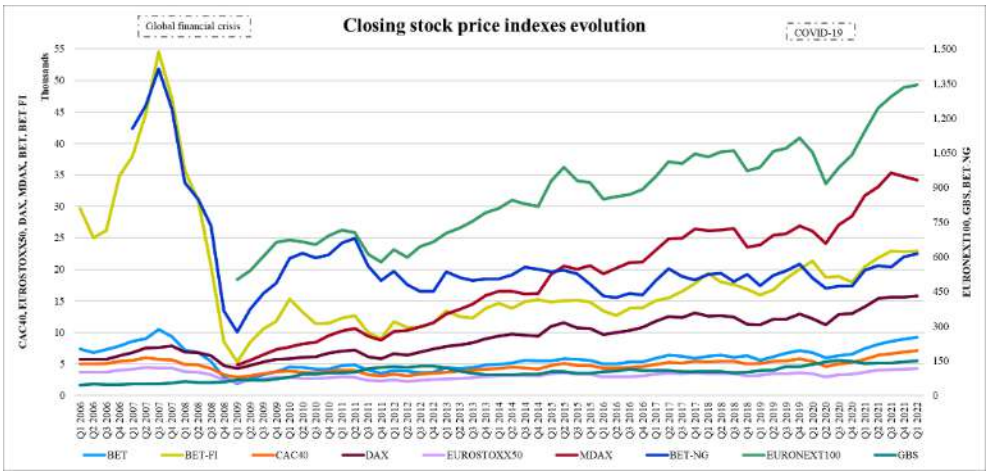


Figure 1: **Closing stock price indexes evolution**
Source: Authors own work

It can be noticed in Figure 1 that the shock registered in the stock market at the moment of the GFC is somehow comparable with the one generated by COVID-19 and in order to paint a picture I calculated the quarter-by-quarter evolution registered throughout Q1 2006 – Q1 2022 (January 2022), with the exception of EURONEXT100 and MDAX for which historical data before 2008 weren't available. The results indicated that Q4 2008 and Q2 2020 are the most representative periods and the statistics are as follows: (a) CAC40 -22.28%, -15.02%, (b) GBS 4.28%, 8.18%, (c) EUROSTOXX50 -23.82%, -12.45%, (d) DAX -24.17%, - 7.91%, (e) BET -46.66%, -11.71%, (f) BET-FI -58.39%, -12.29% and (g) BET-NG -50.25%, -8,59% and although the decrease for Q2 2020 isn't comparable to the one of Q4 2008 its still representative given that the GFC was rooted in the financial sector while the stock market crash registered in Q2 2020 has its origins in the medical sector and compared to the GFC the current situation represents an economic crisis, not a financial crisis (Wyplosz, 2020; Gourinchas, 2020).

When it comes to the statistical data for COVID-19 I chose four geographical regions, based on their geopolitical and economic importance as well as number of cases USA and EU, Italy because it was the epicenter of the pandemic in Europe and as Alesina and GIavazzi (2020) pointed out "*Italy today is on the frontline of this crisis*" and last, Romania. In Figure 2 are represented the evolution of new reported (a) cases of COVID-19, (b) deaths due to COVID_19 and (c) vaccinations in order to immunize against the COVID-19 between 1st January 2020 – 31st January 2022, and it can be noticed that there are several spikes in the shape of an upward V letter, which also coincide with the occurrence of new variants of COVID-19. I expect that related to the new reported cases of COVID-19 and new reported deaths due to COVID_19 the stock market will have an opposite reaction in the form of letter V and the new reported vaccinations to soften the curve, given that the growth in the number of people immunized against COVID-19 should allow governments to give up on restrictions and go back gradually to business as usual.

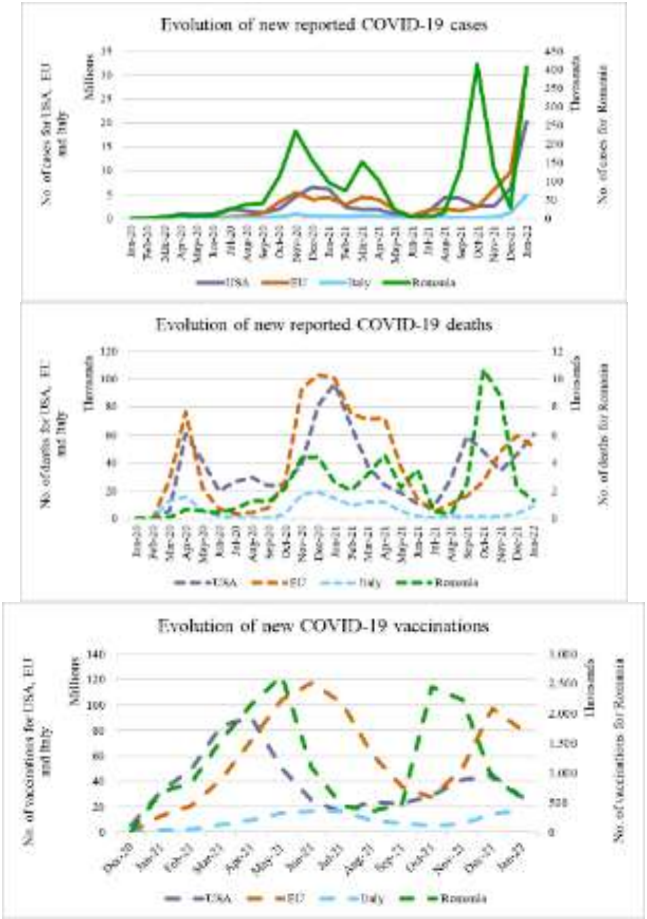


Figure 2. **COVID-19 statistics evolution**
Source: Author's own work

As it can be observed in Figure 5 from the Appendix, the stock market reaction to the COVID-19 statistics, especially when it comes to the number of new cases and deaths, has a W shape evolution alternating between periods of high and low volatility, also known as "*volatility clustering*" phenomenon.

When looking at a month-to-month evolution the highest volatility rate of the indexes is registered in March 2020 which happens to coincide with the first wave of COVID-19 infections and the month when WHO declared the sanitary crisis a pandemic. The decrease registered was between approximately -18% and -25% as follows: EURONEXT100 -23.87%, CAC40 -24.34%, EUROSTOXX50 -24.38%, DAX -24.73%, MDAX -24.08%, BET -19.08%, BET-FI -18.08% and BET-NG -19.65%, while GBS registered only -1.53%. Similar findings were noted by Duttilo *et al.* (2021) which through empirical testing found that the first wave of COVID-19 had a strong impact on volatility for 9 out of 16 of the selected stock market indexes from Europe.

The decrease registered for GBS could be accounted by the fact that gold is considered a "*store of value*" asset or a "*safe haven*" and investors turned their attention to it in order to assure some financial stability in time of economic distress and uncertainty which could explain the overall growth trend of this index in the first half of 2020. However, Choudhry *et al.* (2015) contradicts my initial assumption and found evidence of gold being a safe haven pre-GFC nor during GFC. Drake (2021) supports the findings of Choudhry *et al.* and suggests that gold shouldn't be consider a hedging possibility given the results obtained from empirical analysis between London Bullion market (January 1990 - March 2021) and the stock market returns during the GFC and COVID-19 pandemics. While Akhtaruzzaman *et al.* (2021) found evidence of gold being a safe haven and a good hedging option in the early stages of COVID-19 crisis (31.12.2019 - 16.03.2020) and a decrease in investors' interest for gold after the response of the Federal Reserve (17.03.2020 - 24.04.2020).

The sample period is 1st January 2020 - 31st January 2022. The selected variables are presented in Table 2.

Table 2. **Variable's description**

Variables	**Description**
EURONEXT100	EURONEXT100 reflects the price changes of top 100 companies traded in Europe, that are chosen based on liquidity, more precisely companies are eligible if they have a free float velocity of at least 20% in the 12 months before the Review. The maximum weight of its components is 10%.
CAC40	CAC40 reflects the price changes of top 40 companies listed on Euronext Paris with a free float velocity of at least 20% in the 12 months before the Review
Gold Bullion Securities	The price evolution of Gold Bullion Securities listed on the Euronext Paris Stock Market.
DAX	DAX is known as a benchmark index for the German equity market and measures the share performance of largest and most liquid German companies in terms of order book turnover and market capitalization. At the time of the analysis, it was composed of 40 companies.
MDAX	MDAX reflects the price changes of the largest and most liquid companies from classic and technology sectors listed in Prime

Variables	Description
	Standard and ranking directly below DAX shares. At the time of the analysis, it was composed of 50 companies.
EUROSTOXX 50	EUROSTOXX50 is a blue-chip consisting of 50 stocks covering the largest Supersector leaders in the EuroSTOXX600 index. The companies are selected based on the free-float market capitalization.
BET	BET is the first indexed developed by the Bucharest Stock Exchange (BVB), representing the reference index for the Romanian stock market and it was launched on September 1997. The BET Index number of constituents is variable between 10 and 20 most traded companies and at the time of the analysis, it was composed of 19 companies. It is a free float market capitalization weighted index, with the maximum weight of its components of 20%.
BET-FI	BET-FI (Bucharest Exchange Trading – Investment Funds) is the first sector index launched by BVB on October 2000 and it reflects the price changes of all financial investment companies and of other assimilated entities traded on BVB. At the time of the analysis, it was composed of 6 financial investment companies and other assimilated entities.
BET-NG	BET-NG (Bucharest Exchange Trading Energy & Related Utilities Index) is a sector index launched by BVB on July 2008 and it reflects the price changes of all energy and related utilities sector companies traded on BVB, with a maximum index weight of 30%.
new cases USA	Number of new confirmed cases of COVID-19 reported in USA.
new cases EU	Number of new confirmed cases of COVID-19 reported in EU.
new cases Italy	Number of new confirmed cases of COVID-19 reported in Italy.
new cases Romania	Number of new confirmed cases of COVID-19 reported in Romania.
new deaths USA	Number of new confirmed deaths of COVID-19 reported in USA.
new deaths EU	Number of new confirmed deaths of COVID-19 reported in EU.
new deaths Italy	Number of new confirmed deaths of COVID-19 reported in Italy.
new deaths Romania	Number of new confirmed deaths of COVID-19 reported in Romania.
new vaccination USA	Number of new people vaccinated against COVID-19 registered in USA.
new vaccination EU	Number of new people vaccinated against COVID-19 registered in EU.
new vaccination Italy	Number of new people vaccinated against COVID-19 registered in Italy.
new vaccination Romania	Number of new people vaccinated against COVID-19 registered in Romania.

Source: Authors own work, based on the information obtained from Euronext, Frankfurt Börse, Bucharest Stock Exchange and Our World in Data.

The data consists of daily observations. For the variable regarding stock market indices: (a) EURONEXT100, CAC40, Gold Bullion Securities, DAX, MDAX and EuroSTOXX50, the data source is The Wall Street Journal and (b) BET, BET-FI and BET-NG, the data

source is Bucharest Stock Exchange, for which the close price is expressed in EUR, whereas for the variable regarding the new number of new confirmed COVID-19 cases, deaths recorded caused by COVID-19 and people vaccinated against COVID-19, the data source was Our World in Data. The COVID-19 data series was completed with null values for the days without reporting for COVID-19 statistics.

3.2 Quantitative methods

In order to determine if there is a causality relationship between the evolution of new confirmed cases of COVID-19, new deaths due to COVID-19 and new vaccinations against COVID-19 reported in USA, EU, Italy and Romania and the selected stock market indexes, I will firstly perform a Granger Causality Test (Granger Clive, 1969) with **Hypothesis 1 (H1)** - *The evolution of COVID-19 negatively influences the close price evolution of the selected stock market indices* and **Hypothesis 2 (H2)** - *The evolution of COVID-19 adversely influences the close price evolution of the selected stock market indices*.

Secondly, I will analyze the relationship between the evolution of the calculated pandemic fear index and the selected stock market indices by applying a VAR model. For the pandemic fear index, I will choose the geographical region for which a causality relation is found present based on the Granger Causality Tests mentioned previously.

For the pandemic fear index, I will use global fear index (GFI) proposed by Salisu and Akanni (2020) which is composed of the reported cases index (RCI) and reported death index (RDI), that take into consideration the 14 incubation days defined by WHO (2020) in which symptoms can onset, computed as follows:

$$RCI_t = \left(\frac{\sum_i^N c_{i,t}}{\sum_i^N (c_{i,t} + c_{i,t-14})} \right) * 100$$

$$RDI_t = \left(\frac{\sum_i^N d_{i,t}}{\sum_i^N (d_{i,t} + d_{i,t-14})} \right) * 100$$

where i = 1, 2,….., N and t = 1, 2,……,T

The authors multiply the indices by 100 in order to provides a resulting value between 0 and 100, the values close to zero representing the lowest level of fear registered during the pandemic and an increase as the index tends towards 100. I will use the same computation of the pandemic fear index (FI) as the one proposed by the authors, as follows:

$$FI_t = [\,0{,}5(RCI_t + RDI_t)] \quad (1)$$

In order to capture better the correlation between the pandemic fear index and the stock indices I will improve the FI proposed by Salisu and Akanni (2020) by adding the variable number of people vaccinated and thus creating the reported vaccinations index (RVI), computed as follows:

$$RVI_t = \left(\frac{\sum_i^N v_{i,t}}{\sum_i^N (v_{i,t} + v_{i,t-14})} \right) * 100$$

Given that the author gave RCI and RDI equal weight in the fear index, I will apply the same reasoning resulting in a FI computed as follows:

$$FI_t = [\,{}^1\!/_3\,(RCI_t + RDI_t) - {}^1\!/_3\,RVI_t\,] \quad (2)$$

The main difference in the adjusted FI calculated based on the formula (2) compared with the one calculated based on formula (1) is that the RVI is deducted and not added up with RCI and RDI. The reason for which I used this approach is because an increase in the number of people vaccinated results in a greater deal of the population that is immunized to the virus, meaning that the economic activities can gradually return to business as usual and ultimately contributing to a decrease of the FI level. The authors Salisu and Akanni (2020) proposed that in order to avoid the zero weights problem to choose as starting date for the fear index calculation the date for which the number of deaths exceeds 10, so in order to establish the period for which I can calculate the FI, I will as well take into account the date for recorded no. of deaths due to COVID-19 >10, respectively the for recorded no. of vaccinations against COVID-19 >10, to which I added 14 days (accounting for the incubation period).

This article is the first one that takes into consideration another important variable, the number of new vaccinations, that could better reflect the evolution of the stock market indices selected throughout the evolution of the COVID-19 pandemic and also it spans over a bigger period of time compared to other articles.

4. Empirical results

For the empirical analysis I used EViews 10 program, five-day week timeframe, dlog-transformed data for the stock market indexes and log-transformed data for the new confirmed cases of COVID-19, new deaths due to COVID-19 and new vaccinations against COVID-19 reported in USA, EU, Italy and Romania and as well for the pandemic fear index (FI).

4.1. Pairwise Granger Causality Test

In order to determine if there is a causality relation between variables, I ran the Granger Causality Test with 2 lags applied at the 5% level of significance. The full results for all Granger Causality Tests can be found in Tables 6 and 7 from the Appendix.

Table 3. **Granger Causality Test – new cases**

Pairwise Granger Causality Tests
Date: 03/30/22 Time: 20:38
Sample: 1/01/2020 1/31/2022
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DLOG_EURONEXT100 does not Granger Cause LOG_NEW_CASES_USA	176	0.51485	0.598500
LOG_NEW_CASES_USA does not Granger Cause DLOG_EURONEXT100		4.02534	**0.019600**
DLOG_CAC40 does not Granger Cause LOG_NEW_CASES_USA	193	0.44849	0.639300
LOG_NEW_CASES_USA does not Granger Cause DLOG_CAC40		3.81486	**0.023800**
DLOG_EUROSTOXX50 does not Granger Cause LOG_NEW_CASES_USA	193	0.59575	0.552200
LOG_NEW_CASES_USA does not Granger Cause DLOG_EUROSTOXX50		5.19689	**0.006400**
DLOG_DAX does not Granger Cause LOG_NEW_CASES_USA	187	0.40004	0.670900
LOG_NEW_CASES_USA does not Granger Cause DLOG_DAX		5.03767	**0.007400**
DLOG_BET does not Granger Cause LOG_NEW_CASES_USA	179	1.02972	0.359300
LOG_NEW_CASES_USA does not Granger Cause DLOG_BET		7.32165	**0.000900**
DLOG_BET_NG does not Granger Cause LOG_NEW_CASES_USA	179	1.41794	0.245000
LOG_NEW_CASES_USA does not Granger Cause DLOG_BET_NG		3.72649	**0.026000**
DLOG_EURONEXT100 does not Granger Cause LOG_NEW_CASES_EU	178	2.71822	0.068800
LOG_NEW_CASES_EU does not Granger Cause DLOG_EURONEXT100		3.0205	**0.051400**
DLOG_CAC40 does not Granger Cause LOG_NEW_CASES_EU	195	3.70199	0.026500
LOG_NEW_CASES_EU does not Granger Cause DLOG_CAC40		3.19163	**0.043300**
DLOG_EUROSTOXX50 does not Granger Cause LOG_NEW_CASES_EU	195	4.29795	0.014900
LOG_NEW_CASES_EU does not Granger Cause DLOG_EUROSTOXX50		3.72678	**0.025800**
DLOG_BET_NG does not Granger Cause LOG_NEW_CASES_EU	181	2.56608	0.079700
LOG_NEW_CASES_EU does not Granger Cause DLOG_BET_NG		4.47267	**0.012700**
DLOG_BET does not Granger Cause LOG_NEW_CASES_ITALY	180	1.14378	0.321000
LOG_NEW_CASES_ITALY does not Granger Cause DLOG_BET		3.03872	**0.050400**
DLOG_EURONEXT100 does not Granger Cause LOG_NEW_CASES_ROMANIA	175	4.82037	0.009200
LOG_NEW_CASES_ROMANIA does not Granger Cause DLOG_EURONEXT100		8.28703	**0.000400**
DLOG_CAC40 does not Granger Cause LOG_NEW_CASES_ROMANIA	192	4.98499	0.007800
LOG_NEW_CASES_ROMANIA does not Granger Cause DLOG_CAC40		10.0175	**0.000070**
DLOG_EUROSTOXX50 does not Granger Cause LOG_NEW_CASES_ROMANIA	192	5.38506	0.005300
LOG_NEW_CASES_ROMANIA does not Granger Cause DLOG_EUROSTOXX50		8.55309	**0.000300**
DLOG_DAX does not Granger Cause LOG_NEW_CASES_ROMANIA	186	6.78898	0.001400
LOG_NEW_CASES_ROMANIA does not Granger Cause DLOG_DAX		6.85364	**0.001400**
DLOG_MDAX does not Granger Cause LOG_NEW_CASES_ROMANIA	186	4.31274	0.014800
LOG_NEW_CASES_ROMANIA does not Granger Cause DLOG_MDAX		7.04508	**0.001100**

Source: Author's own work

In Table 3 are presented the summarized results obtained only for the cases where a causality relation is present between the number of new cases of COVID-19 reported and the stock market indexes.

For the number of new cases reported in USA a causality relation is found for almost all indexes analyzed with the exception of GBS, MDAX and BET-FI. Similar results are obtained for the cases registered in EU to which EUROSTOXX50 is added to the exceptions.

However, when it comes to Italy although it was the epicenter of the pandemic in Europe only with BET is there a causality relation found present at a 5,04% level, which could be explained by the fact that the stock market had time to adapt after the shock received from USA and the number of cases registered in Italy is overall less weighted than those registered at EU level.

Regarding the new cases recorded for COVID-19 in Romania a causality relation can be noticed with EURONEXT100, CAC40, EUROSTOXX50, DAX and MDAX however it's a very weak one given that the level of significance is less than 0.14%, which is expected given that the Bucharest Stock Exchange Market has became an emerging market on 21st September 2020 (BNE IntelliNews, 2020).

For the GBS index there is no causality relation found, present, respectively the volatility outcome can't be forecast with the help of new cases of COVID-19 reported related to any geographical regions, which in end is a result that I expected to obtain given that from all the chosen stock market indexes in March 2020 when the largest shock was recorded since the GFC, GBS registered the lowest decrease compared to the previous month (-1.53%).

As it can be seen in Table 4, a shift in the numbers of causality relation is recorded when it comes to the new number of deaths due to COVID-19 reported compared to the number of new cases of COVID-19 reported.

For the number of new deaths registered in the USA (to which MDAX is added) and EU the causality relations remain the same as for the case of number of new cases reported.

However, in the case of Italy a causality relation is found present for MDAX, BET and BET-NG index, resulting that the number of new deaths reported have a greater impact compared to the number of cases, especially for Romania stock market indexes, whereas no causality relation is found between the number of deaths reported in Romania with any of the stock market indexes.

No causality relation is found for GBS and BET-FI with the number of new deaths reported in any of the geographical regions, results consistent with the ones obtained previously for the number of new cases reported.

When it comes to the new vaccinations against COVID-19 reported it is expected to find less cases of a causality relation.

The results obtained, presented in Table 7 from the Appendix, show that for USA there is a causality relation except for GBS and BET-FI however a very weak one given that the level of significance is between 0.001% - 0.002%, while for the new vaccinations against COVID-19 reported in EU, Italy and Romania no causality relation was found with any of the stock market indexes.

Given the results obtained, I can draw the conclusion that the COVID-19 statistics for USA present the biggest number of causal relations with the analyzed indexes, an increase of these (especially the number of new cases and deaths) it results in increased volatility especially at the beginning of the pandemic. A similar correlation relation between the increase of USA reported COVID-19 cases and deaths and volatility was found by Albulescu (2021) for S&P500 index and Mazur *et al.* (2021) for S&P1500 index.

Table 4. **Granger Causality Test – New deaths**

Pairwise Granger Causality Tests
Date: 03/30/22 Time: 20:39
Sample: 1/01/2020 1/31/2022
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DLOG_EURONEXT100 does not Granger Cause LOG_NEW_DEATHS_USA	176	0.03881	0.961900
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_EURONEXT100		10.0992	**0.000070**
DLOG_CAC40 does not Granger Cause LOG_NEW_DEATHS_USA	193	0.0608	0.941000
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_CAC40		9.54708	**0.000100**
DLOG_EUROSTOXX50 does not Granger Cause LOG_NEW_DEATHS_USA	193	0.03508	0.965500
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_EUROSTOXX50		10.9801	**0.000030**
DLOG_DAX does not Granger Cause LOG_NEW_DEATHS_USA	187	0.11763	0.889100
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_DAX		10.0369	**0.000070**
DLOG_MDAX does not Granger Cause LOG_NEW_DEATHS_USA	187	0.2212	0.801800
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_MDAX		8.27702	**0.000400**
DLOG_BET does not Granger Cause LOG_NEW_DEATHS_USA	179	0.14466	0.865400
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_BET		10.4071	**0.000050**
DLOG_BET_NG does not Granger Cause LOG_NEW_DEATHS_USA	179	0.13996	0.869500
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_BET_NG		9.07411	**0.000200**
DLOG_EURONEXT100 does not Granger Cause LOG_NEW_DEATHS_EU	178	1.2399	0.292000
LOG_NEW_DEATHS_EU does not Granger Cause DLOG_EURONEXT100		7.47497	**0.000800**
DLOG_CAC40 does not Granger Cause LOG_NEW_DEATHS_EU	195	1.65826	0.193200
LOG_NEW_DEATHS_EU does not Granger Cause DLOG_CAC40		7.18762	**0.001000**
DLOG_DAX does not Granger Cause LOG_NEW_DEATHS_EU	189	1.30428	0.273900
LOG_NEW_DEATHS_EU does not Granger Cause DLOG_DAX		8.33142	**0.000300**
DLOG_MDAX does not Granger Cause LOG_NEW_DEATHS_EU	189	0.62202	0.538000
LOG_NEW_DEATHS_EU does not Granger Cause DLOG_MDAX		7.25841	**0.000900**
DLOG_BET does not Granger Cause LOG_NEW_DEATHS_EU	181	0.07023	0.932200
LOG_NEW_DEATHS_EU does not Granger Cause DLOG_BET		6.99164	**0.001200**
DLOG_BET_NG does not Granger Cause LOG_NEW_DEATHS_EU	181	0.33591	0.715100
LOG_NEW_DEATHS_EU does not Granger Cause DLOG_BET_NG		5.16284	**0.006600**
DLOG_MDAX does not Granger Cause LOG_NEW_DEATHS_ITALY	187	0.32464	0.723200
LOG_NEW_DEATHS_ITALY does not Granger Cause DLOG_MDAX		3.52651	**0.031400**
DLOG_BET does not Granger Cause LOG_NEW_DEATHS_ITALY	179	0.79892	0.451500
LOG_NEW_DEATHS_ITALY does not Granger Cause DLOG_BET		3.77839	**0.024800**
DLOG_BET_NG does not Granger Cause LOG_NEW_DEATHS_ITALY	179	0.82568	0.439600
LOG_NEW_DEATHS_ITALY does not Granger Cause DLOG_BET_NG		4.03058	**0.019400**

Source: Authors own work

Regarding the causality relation of COVID-19 statistics concerning new vaccinations it can be observed a substantial decrease, result that I anticipated and similar with the findings of Yu *et al.* (2021) whom noticed as well a decrease in the causal relation between the pandemic and the stock market after the vaccines were announced, but against the pandemic fear index.

The generally weak level of correlation with COVID_19 statistics obtained for the chosen Romanian stock market indices, reflects that fact that, at least over a longer time frame, emerging markets were less affected than developed ones, contrary to the findings of Harjoto *et al*. (2021) and Harjoto and Rossi (2021), but given that Romania's stock market has becomed an emerging one only since 21st September 2020 this could account for the

difference in results. However, it is consistent with the findings of Gherghina *et al.* (2021) which noticed that the effects of the pandemic on large stock markets were transmitted to other small stock markets, like Romania.

Distinct from the above, it is noted that for the GBS index there is no causal relationship found present and corroborated with the fact that in Q1 2020, when the largest decline in capital markets was recorded, GBS fell only 1,53% in March compared to February, compared to the rest of the indices analyzed, which saw declines between approximately 19% to 25%, a level similar to the 2008 financial crisis. These findings reflect that the GBS index of all those analyzed is a safe haven asset for investors, similar with the findings of Akhtaruzzaman *et al.* (2021).

4.2. Pandemic Fear Index

Based on the Pairwise Granger Causality Test results obtained previously, for the VAR model analysis I will calculate and use the pandemic fear index of USA, which is calculated based on formula (1) in the period 26.02.2020 - 27.12.2020 given that the first date when the number of deaths reported exceeds 10 is 12/03/2020 to which the 14 days of incubations was added resulting in a start date of 26/03/2020 and formula (2) in the period 28.02.2020 - 31.01.2022 given that the first date when the number of vaccinations reported exceeds 10 is 14/12/2020 to which the 14 days of incubations was added resulting in a start date of 28/12/2020 and an end date of 27/12/2020 for the FI calculation based on formula (1).

For the VAR model I used for computation Standard VAR, estimations sample 26.03.2020 - 31.01.2022 and Lag Intervals 1 1 based on the results obtained for the Akaike information criterion and Hannan-Quinn information criterion from VAR Lag Order Selection Criteria, presented in Table 5 and AR Root Graph which provides proof of no roots lying outside the unit circle, meaning that VAR satisfies the stability condition, presented in Figure 3.

For the Impulse response I used analytic response standard errors and Cholesky – dof. adjusted for impulse definition for 10 periods. Given the results obtained we can observe that there are four distinct situations of the shock registered by the (price) volatility of the stock market indexes to the pandemic fear index (FI): (a) the stock market indexes EURONEXT100, CAC40, EUROSTOXX50, DAX, BET and BET-NG register a decrease in the first two periods and afterwards remain overall constant, (b) MDAX is constant in the first two periods, decreased in the third period and afterwards remains overall constant, (c) BET-FI is overall constant throughout all periods and (d) GBS registers an increase in the first two periods and afterwards remains overall constant. The results obtained corresponding to (a) reflects the contagion effect on capital markets, especially at the beginning of the COVID-19 pandemic, similar with the findings of Liu *et al.* (2021) and Okorie and Lin (2021).

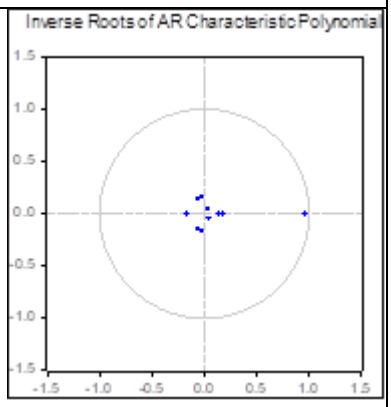
Table 5. **VAR Lag Order Selection Criteria**

VAR Lag Order Selection Criteria
Endogenous variables: FI_USA_SCENARIO_B DLOG_EURONEXT100 DLOG_CAC40 DLOG_GBS DLOG_EUROSTOXX50 DLOG_DAX DLOG_MDAX DLOG_BET DLOG_BET_FI DLOG_BET_NG
Exogenous variables: C
Date: 03/30/22 Time: 23:22
Sample: 3/26/2020 1/31/2022
Included observations: 69

Lag	LogL	LR	FPE	AIC	SC	HQ
0	2158.2	NA	4.30E-40	-62.26665	-61.94287*	-62.1382
1	2311.858	258.3244	9.32e-41*	-63.82197*	-60.26035	-62.40896
2	2411.179	138.1864*	1.13E-40	-63.8023	-57.00285	-61.10473
3	2497.11	94.64812	2.77E-40	-63.39449	-53.3572	-59.41236

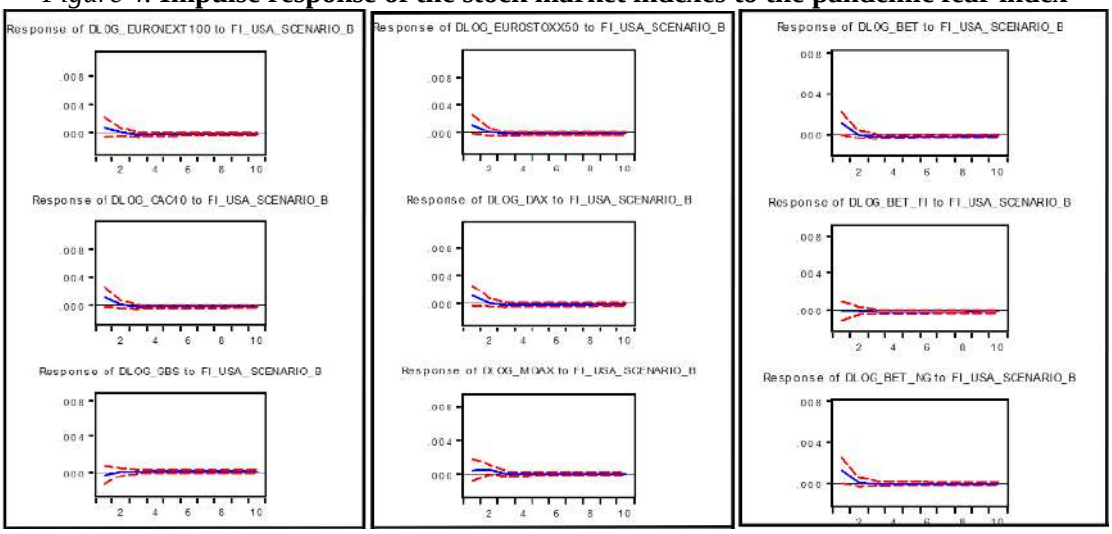
* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Figure 3. **AR Roots Graph**



Source: Author's own work

Figure 4. **Impulse response of the stock market indexes to the pandemic fear index**



Source: Author's own work

The results obtained from the impulse response of the stock market indexes to the FI are consistent with the evolution to of the stock market indexes related to the COVID-19 statistics in USA, presented in Figure 5, when a significant decrease of the indexes is noticed in the first quarter of 2020 after which the indexes have an overall constant growth and as well with my initial assumption that the increase in the number of vaccinations will help stabilize the economy given that starting with the third period the stock market indexes are constant as response to FI.

When looking at the results obtained from the Variance decomposition using Cholesky (d. f. adjusted) Factors for five periods, presented in Table 8 in the Appendix, it can be noticed that the variability of the stock market indexes selected is very little explained by FI USA, given that the minimum and maximum values are as follows: EURONEXT100 0,50% - 0,61%, CAC40 0,93% - 1,12%, GBS 0,13% - 0,24%, EUROSTOXX50 0,96% - 1,11%, DAX 0,94% - 1,02%, MDAX 0,21% - 0,45%, BET 1,49% - 1,64%, BET-FI 0,02% - 0,24%, BET-NG 1,52% - 1,59%.

The results of Granger Causality Test under VAR, presented in Table 9 in the Appendix, show no causal relation between FI USA and the selected stock market index and these findings are as well supported by Gherghina *et al.* (2021) for BET index.

5. Concluding remarks

This research is the first that takes into consideration the number of new vaccinations reported for the calculation of the pandemic fear index and as well it covers a very extensive period of time.

Given the results obtained from the Granger Causality tests from all geographical regions selected, USA COVID-19 statistics are the most significant, especially for the new cases reported given the 0,09% - 2,6% probability for causal relation with the stock market indexes. The Granger Causality Test results for new vaccinations reported present the weakest correlation with the stock market indexes similar with the findings of Yu *et al.*(2021) which noticed that the correlation between the GFI and BRICS and G7 stock markets weakened after the vaccine announcement.

The results obtained from the VAR model - impulse response analysis show a negative correlation with the stock market in the first two periods similar with the findings of Salisu *et al.* (2020) which analyzed the relation between GFI and the stock market for the first wave of the pandemic. However, according to the impulse response analysis starting with the third period and as well the fact that the shocks recorded by the stock market indexes can be very little explained by the FI USA as shown by the results obtained from the variance decomposition results, we can draw the final conclusion that the stock market does not take into account long-term economic fundamentals, highlighting the decoupling of stock exchanges from the real economy and COVID-19 pandemic, similar with the findings of Armeanu (2020).

Although the whole world is dealing with an economic crisis, the current pandemic can be viewed as well as an opportunity for new industries and technologies to develop, old industries to evolve and econometric models used for analyzing and forecasting to be adapted in order to better predict shocks in the economy by taking into account variables from the continuous changes that the world faces. Further analysis is needed in order to assess the impact of the pandemic on the economy.

The study limitations are the fact that the analysis takes into consideration only the capital market reactions to the COVID-19 statistics and not as well the effects of the government

measures taken in order to avoid the spread of the virus and as well help contain it, measures that according to Capelle-Blancard and Desroziers (2020), Fahlenbrach *et al.* (2020) and Ramelli and Wagner (2020) had a big impact on the economy and stock markets volatility as well.

Regarding future research directions I will turn my attention to other economic variables, such as inflation, consumer price index, GBP, by taking into account as well the measures taken by the governments during COVID-19 pandemic and the impact of the war in Ukraine in order to assess the current economic situation. My goal is to determine is we are confronting a new economic crisis and if so, how bad will it be compared to the Global Financial Crisis.

References

Ahmad, W., Kutan, A.M. & Gupta, S. (2021) „Black swan events and COVID-19 outbreak: Sector level evidence from the US, UK, and European stock markets" *International Review of Economics and Finance*, vol. 75: 546-557, https://doi.org/10.1016/j.iref.2021.04.007

Al-Awadhi, A.M., Alsaifi, K., Al-Awadhi, A. & Alhammadi, S. (2020) „Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns" *Journal of Behavioral and Experimental Finance*, vol. 27: 100326, https://doi.org/10.1016/j.jbef.2020.100326

Albulescu, C.T. (2021) „COVID-19 and the United States financial markets' volatility" *Finance Research Letters*, vol. 38: 101699, https://doi.org/10.1016/j.frl.2020.101699

Alesina, A. & Giavazzi, F. (2020) „The EU must support the member at the centre of the COVID-19 crisis", pg. 54 *Mitigating the COVID Economic Crisis: Act Fast and Do Whatever It Takes, CEPR Press VoxEU.org eBook*, https://voxeu.org/

Akhtaruzzaman, Md., Boubaker, S., Lucey, B.M. & Sensoy, A. (2021) „Is gold a hedge or a safe-haven asset in the COVID–19 crisis?" *Economic Modelling*, vol. 102: 105588, https://doi.org/10.1016/j.econmod.2021.105588

Akhtaruzzaman, Md., Boubaker, S. & Sensoy, A. (2021) „Financial contagion during COVID–19 crisis" *Finance Research Letters*, vol. 38: 101604, https://doi.org/10.1016/j.frl.2020.101604

Armeanu, Ș.D. (2020) „Impactul COVID-19 asupra pieței de capital", available on-line at https://www.capital.ro/impactul-covid-19-asupra-pietelor-de-capital.html (Accessed on 12.11.2021)

Aslam, F., Ferreira, P., Ali, H. & Kauser, S. (2021) „Herding behavior during the Covid-19 pandemic: a comparison between Asian and European stock markets based on intraday multifractality" *Eurasian Economic Review*, https://doi.org/10.1007/s40822-021-00191-4

Baek, S., Mohanty, S.K. & Glambosky, M. (2020) „COVID-19 and stock market volatility: An industry level analysis" *Finance Research Letters*, vol. 37: 101748, https://doi.org/10.1016/j.frl.2020.101748

Baker, S.R., Bloom, N., Davis, S.J., Kost, K., Sammon, M. & Viratyosin, T. (2020) „The Unprecedented Stock Market Reaction to COVID-19" *The Review of Asset Pricing Studies*, vol. 10, no. 4: 742-758, https://doi.org/10.1093/rapstu/raaa008

Baldwin R. & Weder di Mauro, B. (2020) „Introduction", pg. 1 *Mitigating the COVID Economic Crisis: Act Fast and Do Whatever It Takes CEPR Press VoxEU.org eBook*, https://voxeu.org/

Banerjee, A.K. (2021) „Futures market and the contagion effect of COVID-19 syndrome" *Finance Research Letters*, https://doi.org/10.1016/j.frl.2021.102018

Bharti, A.K. (2021) „Exploring Herding Behaviour in Indian Equity Market during COVID-19 Pandemic: Impact of Volatility and Government Response" *Sage Journals*, https://doi.org/10.1177/09763996211020687

BNE IntelliNews (2020) „Romania Officially Becomes an Emerging Market", available on-line at https://www.proshareng.com/news/Global%20Market%20/Romania-Officially-Becomes-an-Emerging-Market/53370# (accessed on 14.03.2022)
BÖRSE FRANKFURT, available on-line at https://www.boerse-frankfurt.de/en (accessed on 29.11.2021)
Bucharest Stock Exchange, available on-line at https://www.bvb.ro/ (accessed on 12.02.2021)
Capelle-Blancard, G. & Desroziers, A. (2020) „The Stock Market Is not the Economy? Insights from the COVID-19 Crisis" *CEPR Covid Economics*, http://dx.doi.org/10.2139/ssrn.3638208
Choudhry, T., Hassanb, S.S. & Shabi, S. (2015) „Relationship between gold and stock markets during the global financial crisis: Evidence from nonlinear causality tests" *International Review of Financial Analysis,* vol. 41: 247-256, http://dx.doi.org/10.1016/j.irfa.2015.03.011
Chowdhury, E. K., Khan, I. I. & Dhar, B.K. (2021) „Catastrophic impact of Covid-19 on the global stock markets and economic activities" *Business and Society Review*, https://doi.org/10.1111/basr.12219
Dhall, R. & Singh, B. (2020) „The COVID-19 Pandemic and Herding Behaviour: Evidence from India's Stock Market" *Sage Journals,* vol. 11, no. 3: 366-390, https://doi.org/10.1177/0976399620964635
Drake, P.P. (2022) „The gold-stock market relationship during COVID-19" *Finance Research Letters,* vol. 44: 102111, https://doi.org/10.1016/j.frl.2021.102111
Duttilo, P., Gattone, S.A. & Di Battista, T. (2021) „Volatility Modeling: An Overview of Equity Markets in the Euro Area during COVID-19 Pandemic" *Mathematics,* vol. 9: 1212, https://doi.org/10.3390/math9111212
Economou, F., Panagopoulos, Y. & Tsouma, E. (2018) „Uncovering asymmetries in the relationship between fear and the stock market using a hidden co-integration approach" *Research in International Business and Finance,* vol. 44: 459-470, http://dx.doi.org/10.1016/j.ribaf.2017.07.116
Engelhardt, N., Krause, M., Neukirchen, D. & Posch, P.N. (2021) „Trust and stock market volatility during the COVID-19 crisis" *Finance Research Letters*, vol. 38: 101873, ISSN 1544-6123, https://doi.org/10.1016/j.frl.2020.101873
Espinosa-Méndez, C. & Arias, J. (2021) „COVID-19 effect on herding behaviour in European capital markets" *Finance Research Letters,* vol. 38: 101787, https://doi.org/10.1016/j.frl.2020.101787
EURONEXT, available on-line at https://live.euronext.com/en (Aaccessed on 29.11.2021)
Fahlenbrach, R., Rageth, K. & Stulz, R.M. (2020) „How Valuable is Financial Flexibility when Revenue Stops? Evidence from the COVID-19 Crisis" *NBER Working Papers* 27106, http://www.nber.org/papers/w27106
Fei, T. & Liu, X. (2021) „Herding and market volatility", *International Review of Financial Analysis,* vol. 78: 101880, https://doi.org/10.1016/j.irfa.2021.101880
Ferreruela, S. & Mallor, T. (2021) „Herding in the bad times: The 2008 and COVID-19 crises" *North American Journal of Economics and Finance,* vol. 58: 101531, https://doi.org/10.1016/j.najef.2021.101531
Gherghina, Ș.C., Armeanu, D.Ș. & Joldeș, C.C. (2021) „COVID-19 Pandemic and Romanian Stock Market Volatility: A GARCH Approach" *Journal of Risk and Financial Management* 14: 341, https://doi.org/10.3390/jrfm14080341
Goldstein, I., Koijen, R.S.J. & Mueller, H.M. (2021) „COVID-19 and Its Impact on Financial Markets and the Real Economy" *The Review of Financial Studies,* vol. 34: 5135–5148, https://doi.org/10.1093/rfs/hhab085
Gourinchas, P.O. (2020) „Flattening the pandemic and recession curves", pg. 31 *Mitigating the COVID Economic Crisis: Act Fast and Do Whatever It Takes, CEPR Press VoxEU.org eBook,* https://voxeu.org/

Harjoto, M.A. & Rossi, F. (2021) „Market reaction to the COVID-19 pandemic: evidence from emerging markets" *International Journal of Emerging Markets*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/IJOEM-05-2020-0545

Harjoto, M.A., Rossi, F. & Paglia, J.K. (2021) „COVID-19: stock market reactions to the shock and the stimulus" *Applied Economics Letters*, vol. 28, no. 10: 795-801, https://doi.org/10.1080/13504851.2020.1781767

He, Q., Liu, J., Wang, S. & Yu, J. (2020) „The impact of COVID-19 on stock markets" *Economic and Political Studies*, vol. 8, no. 3: 275-288, https://doi.org/10.1080/20954816.2020.1757570

Kizys, R., Tzouvanas, P. & Donadelli, M. (2021) „From COVID-19 herd immunity to investor herding in international stock markets: The role of government and regulatory restrictions" *International Review of Financial Analysis*, vol. 74: 101663, https://doi.org/10.1016/j.irfa.2021.101663

Krugman, P. (2020) „The case for permanent stimulus", pg. 213, *Mitigating the COVID Economic Crisis: Act Fast and Do Whatever It Takes, CEPR Press VoxEU.org eBook*, https://voxeu.org/

Le, T.P.T.D. & Tran, H.L.M. (2021) „The Contagion Effect from U.S. Stock Market to the Vietnamese and the Philippine Stock Markets: The Evidence of DCC – GARCH Model" *Journal of Asian Finance, Economics and Business*, vol 8, no. 2: 0759-0770, https://doi.org/10.13106/jafeb.2021.vol8.no2.0759

Liu, Y., Wei, Y., Wang, Q. & Liu, Y. (2021) „International stock market risk contagion during the COVID-19 pandemic" *Finance Research Letters*, https://doi.org/10.1016/j.frl.2021.102145

Lyócsaa, Š., Baumöhl, E., Výrost, T. & Molnár, P. (2020) „Fear of the coronavirus and the stock markets" *Finance Research Letters*, vol. 36: 101735, https://doi.org/10.1016/j.frl.2020.101735

Mandaci, P.E. & Cagli, E.C. (2021) „Herding intensity and volatility in cryptocurrency markets during the COVID-19" *Finance Research Letters*, https://doi.org/10.1016/j.frl.2021.102382

Mazur, M., Dang, M. & l Vega, M. (2021) „COVID-19 and the march 2020 stock market crash. Evidence from S&P1500" *Finance Research Letters*, vol. 38: 101690, https://doi.org/10.1016/j.frl.2020.101690

Mnif, E., Jarbouib, A. & Mouakharc, K. (2020) „How the cryptocurrency market has performed during COVID 19? A multifractal analysis" *Finance Research Letters*, vol. 36: 101647, https://doi.org/10.1016/j.frl.2020.101647

Mishra, P. K. & Mishra, S. K. (2021) „Do Banking and Financial Services Sectors Show Herding Behaviour in Indian Stock Market Amid COVID-19 Pandemic? Insights from Quantile Regression Approach" *Sage Journals*, https://doi.org/10.1177/09763996211032356

Okorie, D.I. & Lin, B. (2021) „Stock markets and the COVID-19 fractal contagion effects" *Finance Research Letters*, vol. 38: 101640, https://doi.org/10.1016/j.frl.2020.101640

Our World in Data „Coronavirus (COVID-19) Cases", available on-line at https://ourworldindata.org/covid-cases (Accessed on 12.02.2021)

Ramelli, S. & Wagner, A.F. (2020) „Feverish Stock Price Reactions to COVID-19" *Review of Corporate Finance Studies*, vol. 9, no. 3: 622–655, Swiss Finance Institute Research Paper No. 20-12, http://dx.doi.org/10.2139/ssrn.3550274

Rubbaniy, G., Polyzos, S., Rizvi, S.K.A. & Tessema, A. (2021) „COVID-19, Lockdowns and herding towards a cryptocurrency market-specific implied volatility index" *Economics Letters*, vol. 207: 110017, https://doi.org/10.1016/j.econlet.2021.110017

Rubbaniy, G., Tee, K., Iren, P. & Abdennadher, S. (2021) „Investors' mood and herd investing: A quantile-on-quantile regression explanation from crypto market" *Finance Research Letters*, https://doi.org/10.1016/j.frl.2021.102585

Salisu, A.A. & Akanni, L.O. (2020) „Constructing a Global Fear Index for the COVID-19 Pandemic" *Emerging Markets Finance and Trade,* vol. 56, no. 10: 2310-2331, https://doi.org/10.1080/1540496X.2020.1785424

Salisu, A.A., Akanni, L. & Raheem, I. (2020) „The COVID-19 global fear index and the predictability of commodity price returns" *Journal of Behavioral and Experimental Finance,* vol. 27: 100383, https://doi.org/10.1016/j.jbef.2020.100383

Salisu, A.A. & Vo, X.V. (2020) „Predicting stock returns in the presence of COVID-19 pandemic: The role of health news" *International Review of Financial Analysis,* vol. 71: 101546, https://doi.org/10.1016/j.irfa.2020.101546

Smales, L.A. (2021) „Investor attention and the response of US stock market sectors to the COVID-19 crisis" *Review of Behavioral Finance,* vol. 13, no. 1, https://doi.org/10.1108/RBF-06-2020-0138

Smales, L.A. (2022) „Spreading the fear: The central role of CBOE VIX in global stock market uncertainty" *Global Finance Journal,* vol. 51: 100679, https://doi.org/10.1016/j.gfj.2021.100679

Subramaniam S. & Chakraborty, M. (2021) „COVID-19 fear index: does it matter for stock market returns?" *Review of Behavioral Finance,* vol. 13, no. 1, https://doi.org/10.1108/RBF-08-2020-0215

Su, Z., Liu, P. & Fang, T. (2021) „Pandemic-induced fear and stock market returns: Evidence from China" *Global Finance Journal*, https://doi.org/10.1016/j.gfj.2021.100644

Terry, M. (2021) „COVID-19 Death Toll Surpasses 1918 Spanish Flu", available on-line at https://www.biospace.com/article/the-united-states-grisly-milestone-more-covid-19-deaths-than-1918-spanish-flu/ (Accessed on 04.03.2022)

The Wall Street Journal, available on-line at Stock Market & Finance News - Wall Street Journal (wsj.com) (Accessed on 03.02.2021)

Vidal-Tomás, D., Ibáñez, A.M. & Farinós, J.E. (2019) „Herding in the cryptocurrency market: CSSD and CSAD approaches" *Finance Research Letters,* vol. 30: 181-186, https://doi.org/10.1016/j.frl.2018.09.008

WHO (2020) „*Archived: WHO Timeline - COVID-19*", available on-line at https://www.who.int/news/item/27-04-2020-who-timeline---covid-19 (Accessed on 18.12.2021).

WHO (2020) „Transmission of SARS-CoV-2: implications for infection prevention precautions", available on-line at https://www.who.int/news-room/commentaries/detail/transmission-of-sars-cov-2-implications-for-infection-prevention-precautions (Accessed on 12.02.2022)

Wyplosz, C. (2020) „So far, so good: And now don't be afraid of moral hazard" pg. 27 *Mitigating the COVID Economic Crisis: Act Fast and Do Whatever It Takes, CEPR Press VoxEU.org eBook,* https://voxeu.org/

Yarovaya, L., Matkovskyy, R. & Jalan, A. J. (2021) „The effects of a ''black swan" event (COVID-19) on herding behavior in cryptocurrency markets" *International Finance Markets Inst. Money,* vol. 75: 101321, https://doi.org/10.1016/j.intfin.2021.101321

Youssef, M., Mokni, K. & Ajmi, A.N. (2021) „Dynamic connectedness between stock markets in the presence of the COVID-19 pandemic: does economic policy uncertainty matter?" *Financial Innovation* vol. 7, no. 13, https://doi.org/10.1186/s40854-021-00227-3

Yu, X., Xiao, K. & Liu, J. (2021) „Dynamic co-movements of COVID-19 pandemic anxieties and stock market returns" *Finance Research Letters*, https://doi.org/10.1016/j.frl.2021.102219

Zarembaa, A., Kizysc, R., Aharond D.Y., & Demir, E. (2020) „Infected Markets: Novel Coronavirus,

Government Interventions, and Stock Return Volatility around the Globe" *Finance Research Letters,* vol. 35: 101597, https://doi.org/10.1016/j.frl.2020.101597

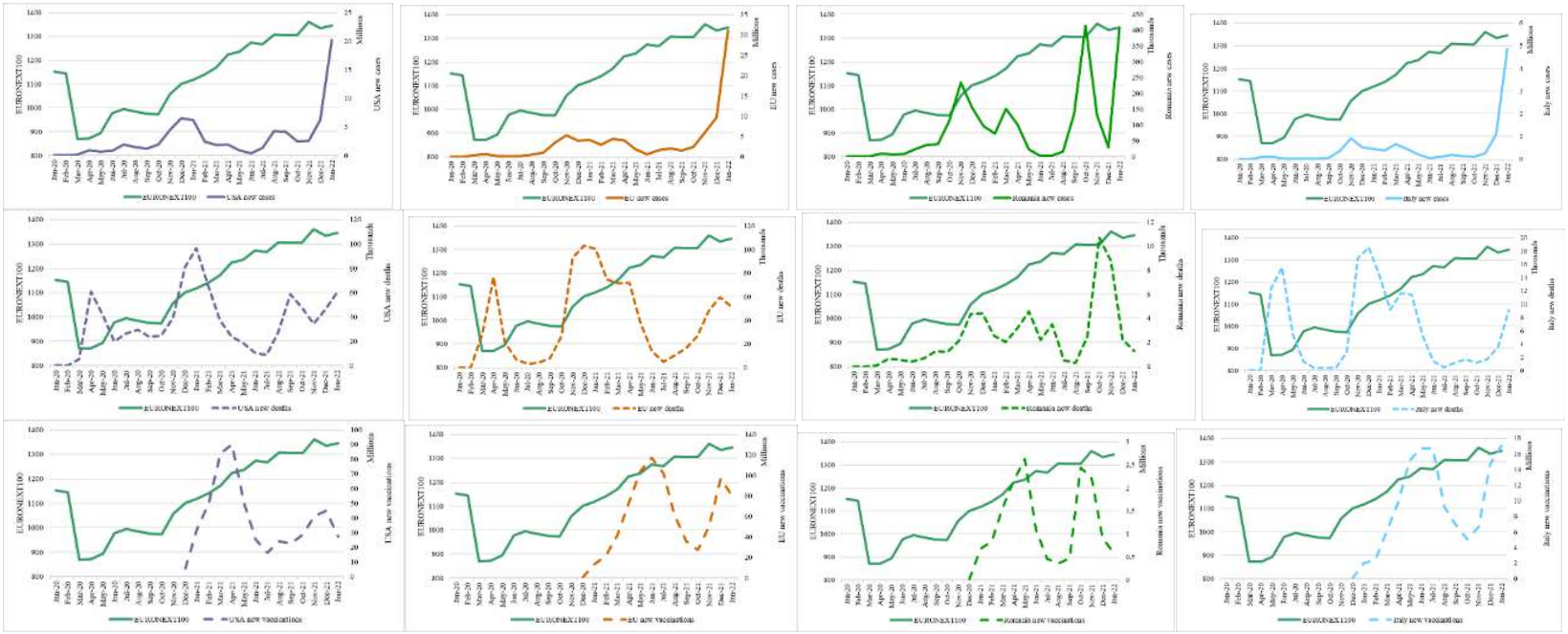
Zehri, C. (2021) „Stock market comovements: Evidence from the COVID-19 pandemic" *The Journal of Economic Asymmetries, vol.* 24: e00228, https://doi.org/10.1016/j.jeca.2021.e00228

Zhu, S., Liu, Q., Wanga, Y., Wei, Y. & Wei, G. (2019) „Which fear index matters for predicting US stock market volatilities: Text-counts or option-based measurement?" *Physica,* vol. A, no. 536: 122567, https://doi.org/10.1016/j.physa.2019.122567

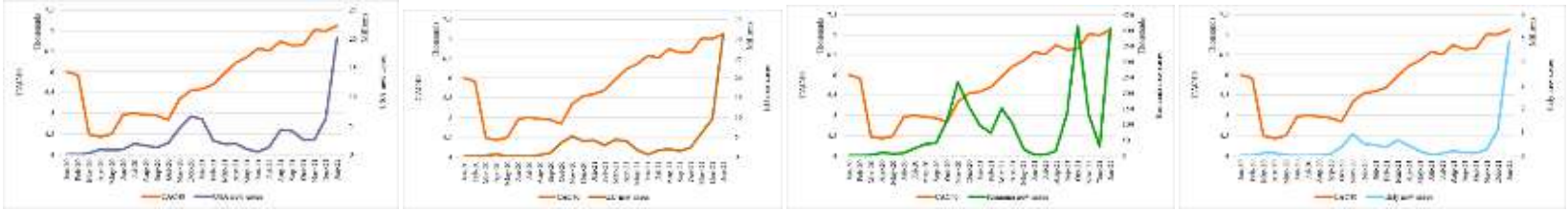
Appendix

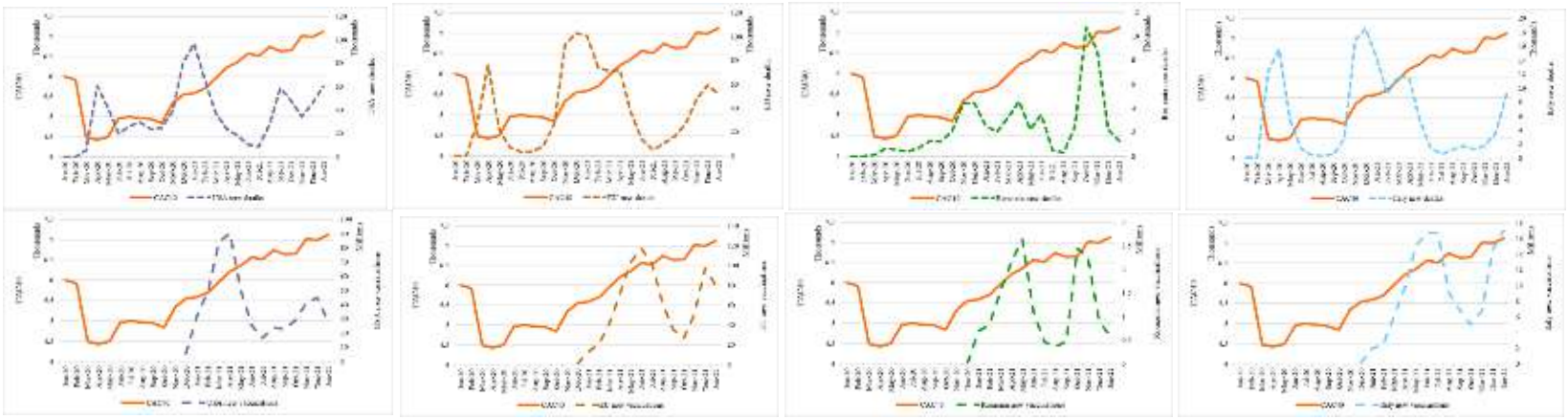
Figure 5. **The evolution of the daily stock market indices vs. COVID-19 statistics in USA, EU, Italy and Romania**

EURONEXT100

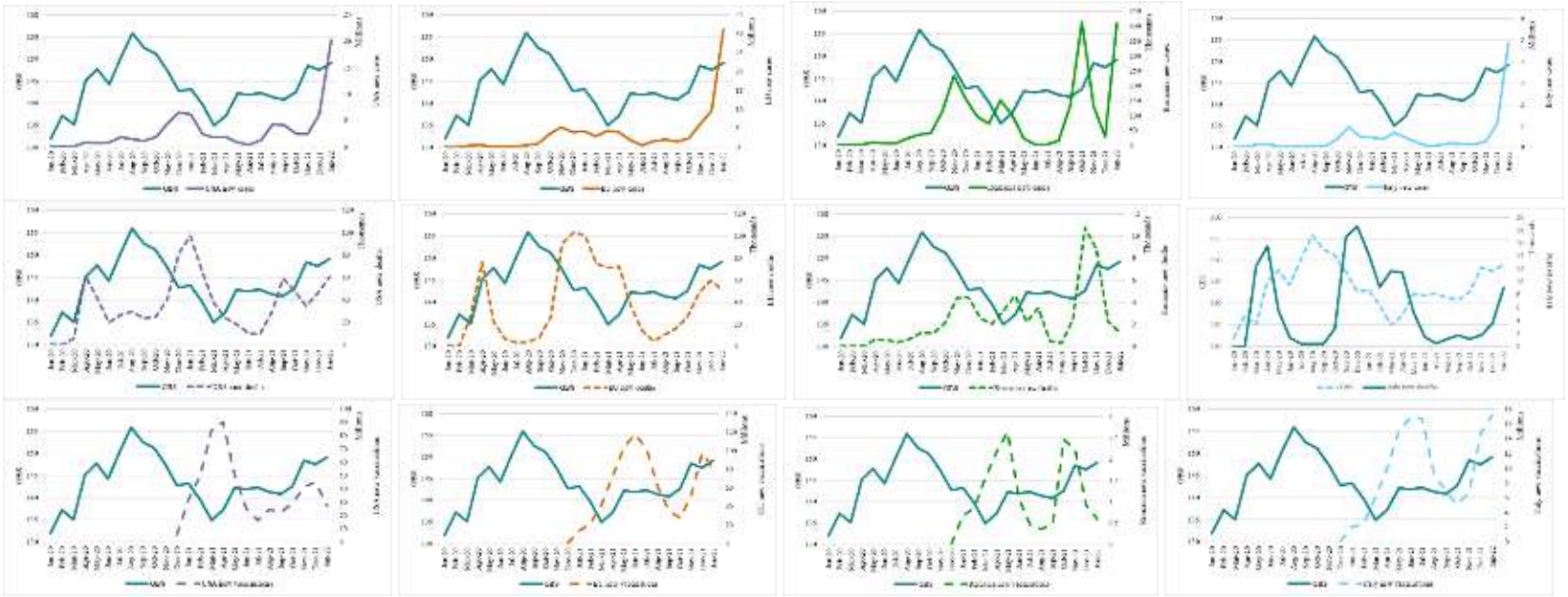


CAC40

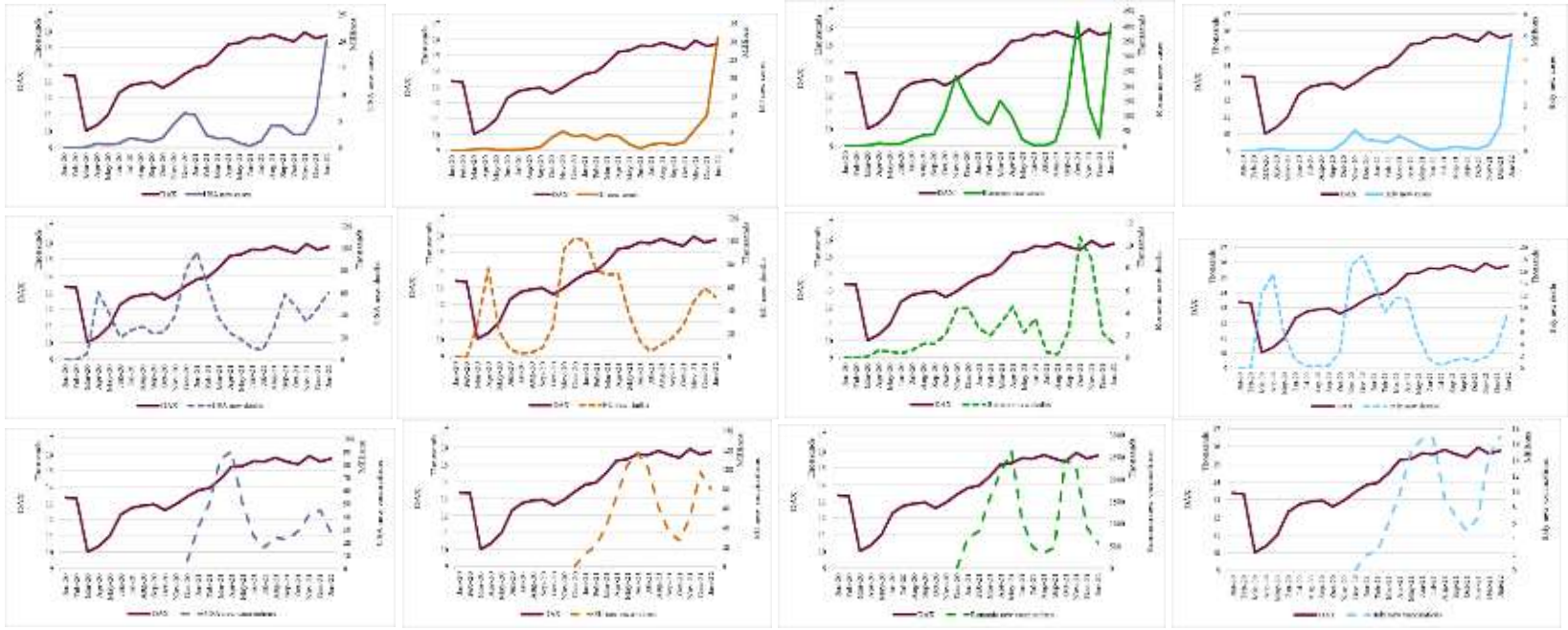




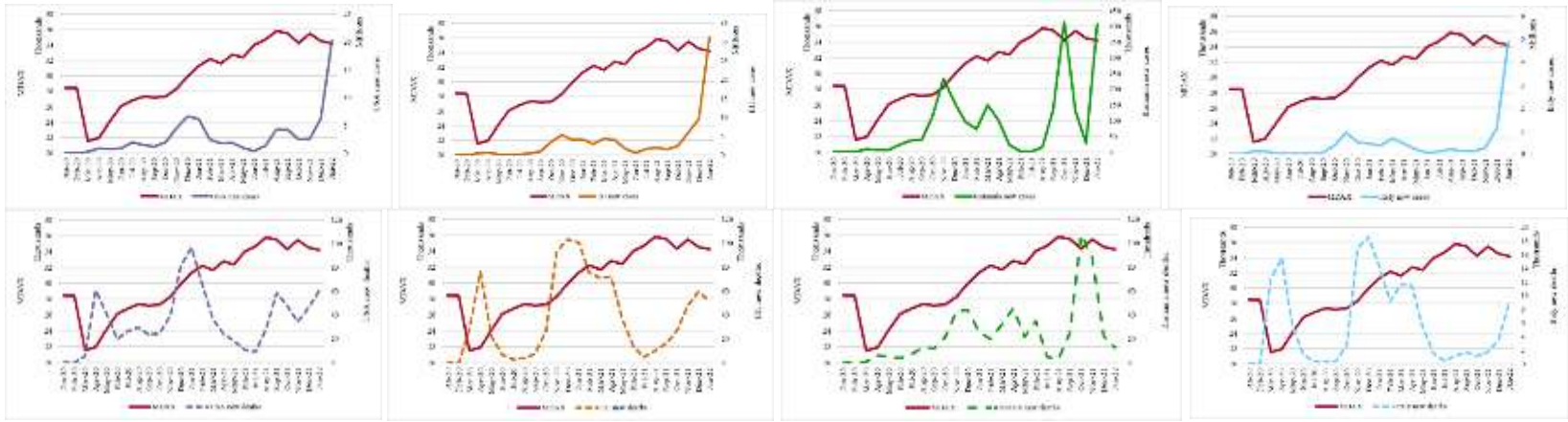
GBS

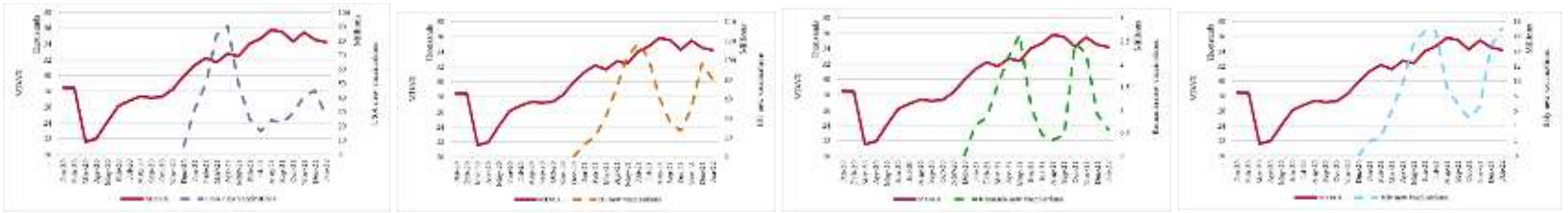


DAX

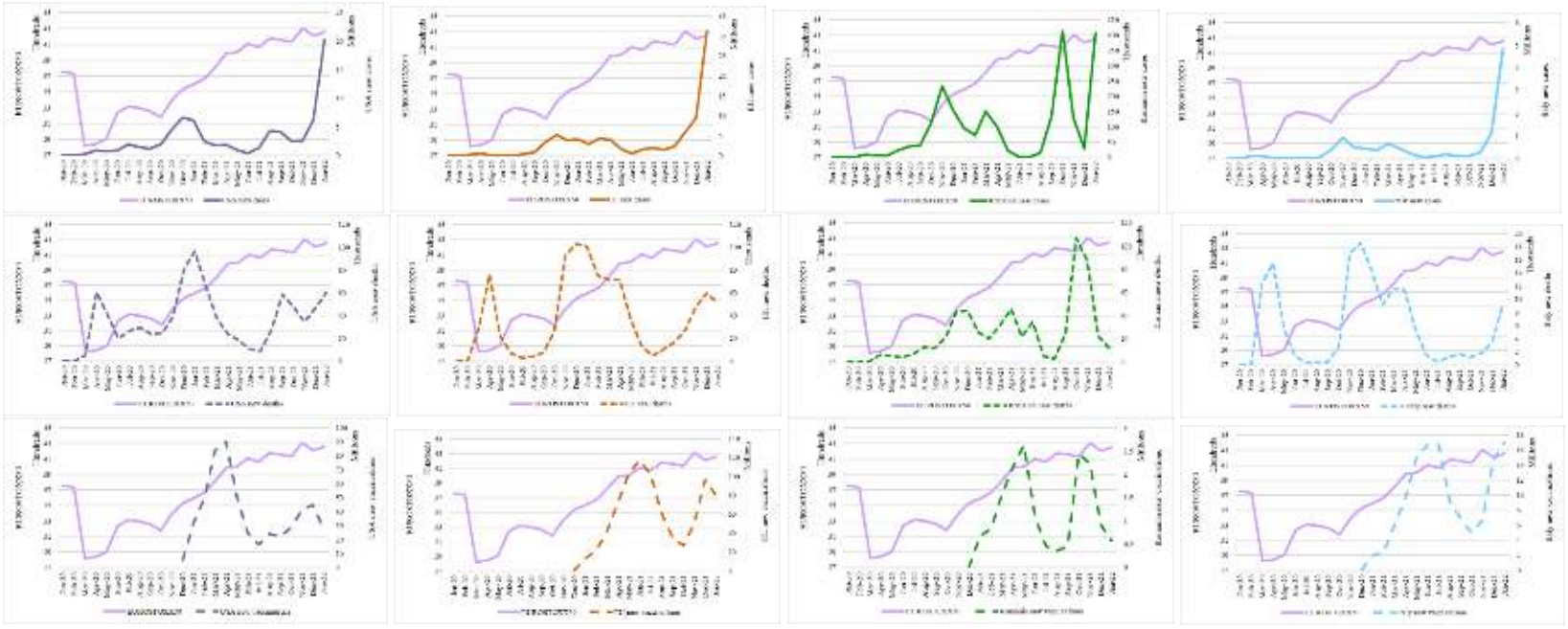


MDAX

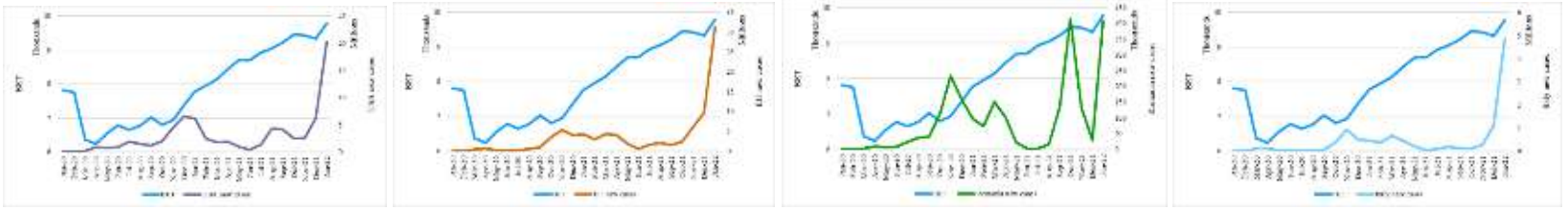


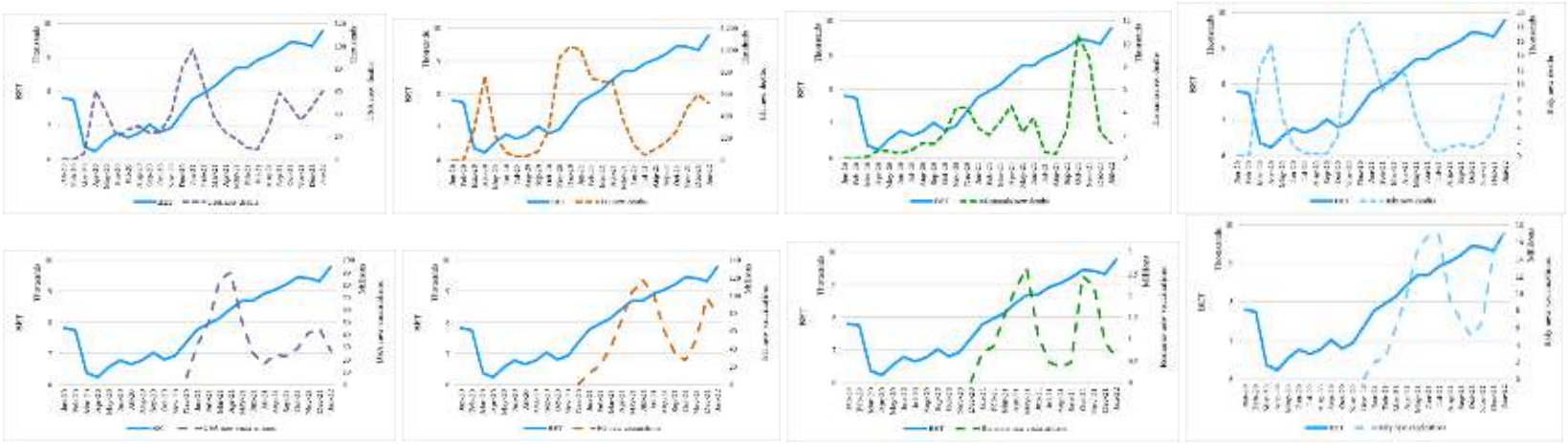


EUROSTOXX50

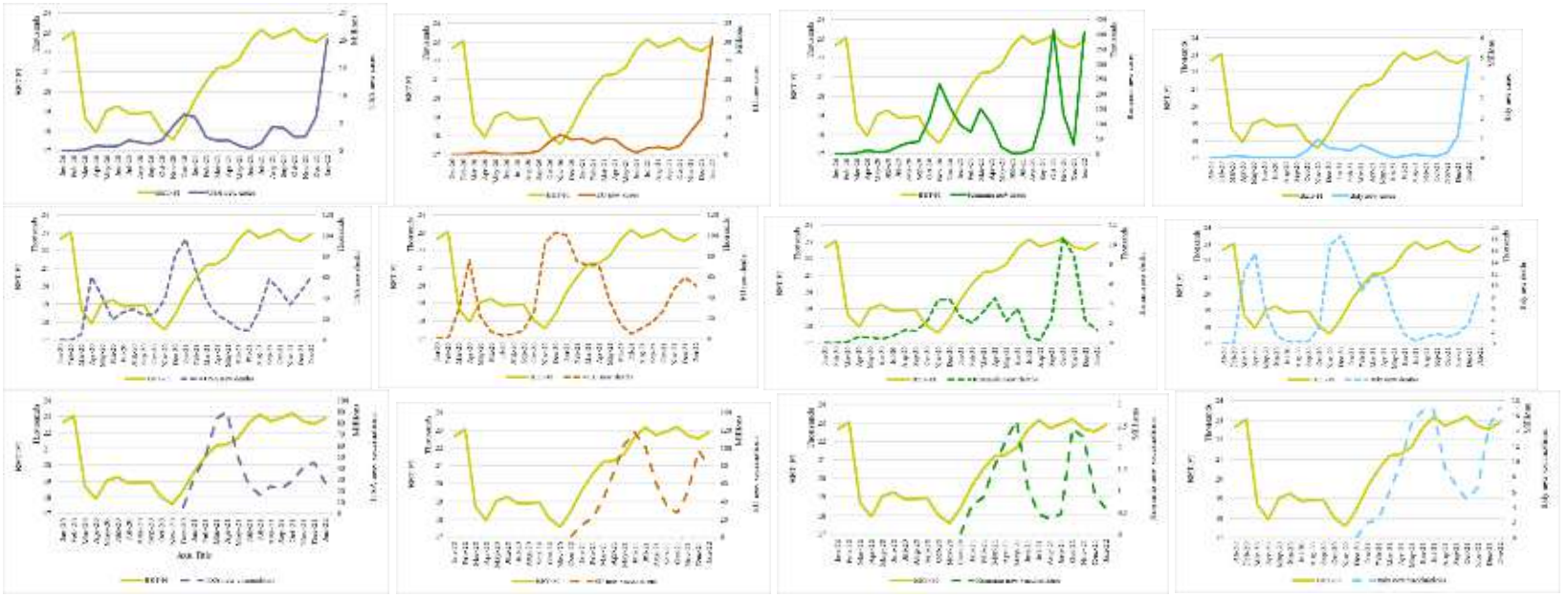


BET

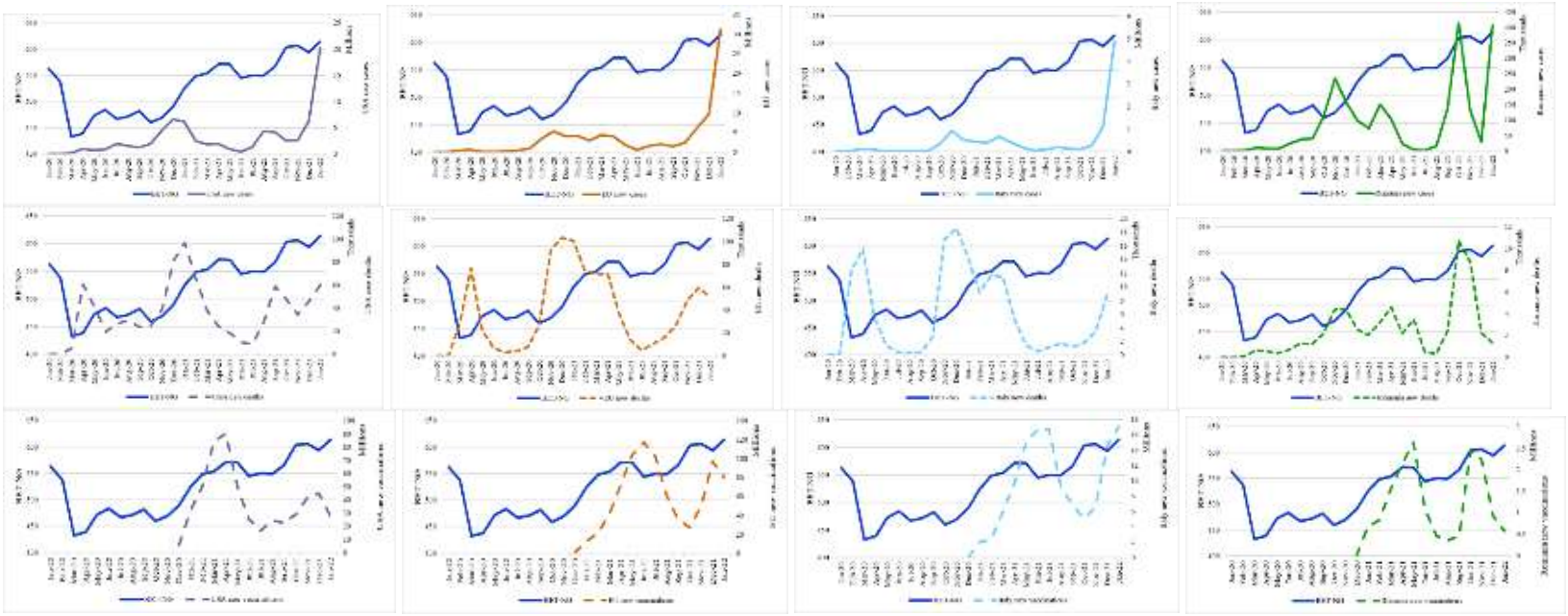




BET-FI



BET-NG



Legend

EURONEXT100 — DAX — BET

CAC40 — MDAX — BET-FI

GBS — EUROSTOXX50 — BET-NG

USA new cases — EU new cases — Italy new cases

USA new deaths — EU new deaths — Italy new deaths

USA new vaccinations — EU new vaccinations — Italy new vaccinations

Romania new cases — Romania new deaths — Romania new vaccinations

Source: Author's own work

Table 6. **Pairwise Granger Causality Test for new cases and deaths of COVID-19 reported**

Pairwise Granger Causality Tests
Date: 03/30/22 Time: 20:39
Sample: 1/01/2020 1/31/2022
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DLOG_EURONEXT100 does not Granger Cause LOG_NEW_DEATHS_USA	176	0.03881	0.961900
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_EURONEXT100		10.0992	**0.000070**
DLOG_CAC40 does not Granger Cause LOG_NEW_DEATHS_USA	193	0.0608	0.941000
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_CAC40		9.54708	**0.000100**
DLOG_GBS does not Granger Cause LOG_NEW_DEATHS_USA	193	0.81127	0.445800
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_GBS		1.2283	0.295100
DLOG_EUROSTOXX50 does not Granger Cause LOG_NEW_DEATHS_USA	193	0.03508	0.965500
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_EUROSTOXX50		10.9801	**0.000030**
DLOG_DAX does not Granger Cause LOG_NEW_DEATHS_USA	187	0.11763	0.889100
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_DAX		10.0369	**0.000070**
DLOG_MDAX does not Granger Cause LOG_NEW_DEATHS_USA	187	0.2212	0.801800
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_MDAX		8.27702	**0.000400**
DLOG_BET does not Granger Cause LOG_NEW_DEATHS_USA	179	0.14466	0.865400
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_BET		10.4071	**0.000050**
DLOG_BET_FI does not Granger Cause LOG_NEW_DEATHS_USA	179	1.26383	0.285200
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_BET_FI		0.45145	0.637400
DLOG_BET_NG does not Granger Cause LOG_NEW_DEATHS_USA	179	0.13996	0.869500
LOG_NEW_DEATHS_USA does not Granger Cause DLOG_BET_NG		9.07411	**0.000200**
DLOG_EURONEXT100 does not Granger Cause LOG_NEW_DEATHS_EU	178	1.2399	0.292000
LOG_NEW_DEATHS_EU does not Granger Cause DLOG_EURONEXT100		7.47497	**0.000800**
DLOG_CAC40 does not Granger Cause LOG_NEW_DEATHS_EU	195	1.65826	0.193200
LOG_NEW_DEATHS_EU does not Granger Cause DLOG_CAC40		7.18762	**0.001000**
DLOG_GBS does not Granger Cause LOG_NEW_DEATHS_EU	195	0.91287	0.403100
LOG_NEW_DEATHS_EU does not Granger Cause DLOG_GBS		0.80669	0.447900
DLOG_EUROSTOXX50 does not Granger Cause LOG_NEW_DEATHS_EU	195	1.61302	0.202000
LOG_NEW_DEATHS_EU does not Granger Cause DLOG_EUROSTOXX50		7.78503	**0.000600**
DLOG_DAX does not Granger Cause LOG_NEW_DEATHS_EU	189	1.30428	0.273900
LOG_NEW_DEATHS_EU does not Granger Cause DLOG_DAX		8.33142	**0.000300**
DLOG_MDAX does not Granger Cause LOG_NEW_DEATHS_EU	189	0.62202	0.538000
LOG_NEW_DEATHS_EU does not Granger Cause DLOG_MDAX		7.25841	**0.000900**
DLOG_BET does not Granger Cause LOG_NEW_DEATHS_EU	181	0.07023	0.932200
LOG_NEW_DEATHS_EU does not Granger Cause DLOG_BET		6.99164	**0.001200**
DLOG_BET_FI does not Granger Cause LOG_NEW_DEATHS_EU	181	1.98553	0.140400
LOG_NEW_DEATHS_EU does not Granger Cause DLOG_BET_FI		0.05555	0.946000
DLOG_BET_NG does not Granger Cause LOG_NEW_DEATHS_EU	181	0.33591	0.715100
LOG_NEW_DEATHS_EU does not Granger Cause DLOG_BET_NG		5.16284	**0.006600**
DLOG_EURONEXT100 does not Granger Cause LOG_NEW_DEATHS_ITALY	176	0.14169	0.868000
LOG_NEW_DEATHS_ITALY does not Granger Cause DLOG_EURONEXT100		2.90439	0.057500
DLOG_CAC40 does not Granger Cause LOG_NEW_DEATHS_ITALY	193	0.16592	0.847200
LOG_NEW_DEATHS_ITALY does not Granger Cause DLOG_CAC40		2.26884	0.106300
DLOG_GBS does not Granger Cause LOG_NEW_DEATHS_ITALY	193	1.17778	0.310200
LOG_NEW_DEATHS_ITALY does not Granger Cause DLOG_GBS		1.58667	0.207300
DLOG_EUROSTOXX50 does not Granger Cause LOG_NEW_DEATHS_ITALY	193	0.23811	0.788300
LOG_NEW_DEATHS_ITALY does not Granger Cause DLOG_EUROSTOXX50		2.44568	0.089400
DLOG_DAX does not Granger Cause LOG_NEW_DEATHS_ITALY	187	0.6513	0.522600
LOG_NEW_DEATHS_ITALY does not Granger Cause DLOG_DAX		2.57008	0.079300
DLOG_MDAX does not Granger Cause LOG_NEW_DEATHS_ITALY	187	0.32464	0.723200
LOG_NEW_DEATHS_ITALY does not Granger Cause DLOG_MDAX		3.52651	**0.031400**
DLOG_BET does not Granger Cause LOG_NEW_DEATHS_ITALY	179	0.79892	0.451500
LOG_NEW_DEATHS_ITALY does not Granger Cause DLOG_BET		3.77839	**0.024800**
DLOG_BET_FI does not Granger Cause LOG_NEW_DEATHS_ITALY	179	0.61827	0.540100
LOG_NEW_DEATHS_ITALY does not Granger Cause DLOG_BET_FI		0.30649	0.736400
DLOG_BET_NG does not Granger Cause LOG_NEW_DEATHS_ITALY	179	0.82568	0.439600
LOG_NEW_DEATHS_ITALY does not Granger Cause DLOG_BET_NG		4.03058	**0.019400**
DLOG_EURONEXT100 does not Granger Cause LOG_NEW_DEATHS_ROMANIA	170	0.28358	0.753500
LOG_NEW_DEATHS_ROMANIA does not Granger Cause DLOG_EURONEXT100		0.61066	0.544200
DLOG_CAC40 does not Granger Cause LOG_NEW_DEATHS_ROMANIA	187	0.40362	0.668500
LOG_NEW_DEATHS_ROMANIA does not Granger Cause DLOG_CAC40		0.94597	0.390200
DLOG_GBS does not Granger Cause LOG_NEW_DEATHS_ROMANIA	187	1.60595	0.203500
LOG_NEW_DEATHS_ROMANIA does not Granger Cause DLOG_GBS		0.11464	0.891800
DLOG_EUROSTOXX50 does not Granger Cause LOG_NEW_DEATHS_ROMANIA	187	0.59677	0.551700
LOG_NEW_DEATHS_ROMANIA does not Granger Cause DLOG_EUROSTOXX50		0.98675	0.374800
DLOG_DAX does not Granger Cause LOG_NEW_DEATHS_ROMANIA	181	0.42778	0.652600
LOG_NEW_DEATHS_ROMANIA does not Granger Cause DLOG_DAX		0.88662	0.413900
DLOG_MDAX does not Granger Cause LOG_NEW_DEATHS_ROMANIA	181	0.17245	0.841700
LOG_NEW_DEATHS_ROMANIA does not Granger Cause DLOG_MDAX		0.45871	0.632900
DLOG_BET does not Granger Cause LOG_NEW_DEATHS_ROMANIA	173	0.01215	0.987900
LOG_NEW_DEATHS_ROMANIA does not Granger Cause DLOG_BET		0.19242	0.825100
DLOG_BET_FI does not Granger Cause LOG_NEW_DEATHS_ROMANIA	173	0.47636	0.621900
LOG_NEW_DEATHS_ROMANIA does not Granger Cause DLOG_BET_FI		0.84762	0.430300
DLOG_BET_NG does not Granger Cause LOG_NEW_DEATHS_ROMANIA	173	0.9085	0.405100
LOG_NEW_DEATHS_ROMANIA does not Granger Cause DLOG_BET_NG		0.55348	0.576000

Source: Author's own work

Table 7. **Pairwise Granger Causality Test for new vaccination for COVID-19 reported**

Pairwise Granger Causality Tests
Date: 03/30/22 Time: 20:40
Sample: 1/01/2020 1/31/2022
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DLOG_EURONEXT100 does not Granger Cause LOG_NEW_VACCINATIONS_USA	99	0.944600	0.392500
LOG_NEW_VACCINATIONS_USA does not Granger Cause DLOG_EURONEXT100		12.143500	**0.000020**
DLOG_CAC40 does not Granger Cause LOG_NEW_VACCINATIONS_USA	114	0.189110	0.828000
LOG_NEW_VACCINATIONS_USA does not Granger Cause DLOG_CAC40		15.818200	**0.000001**
DLOG_GBS does not Granger Cause LOG_NEW_VACCINATIONS_USA	114	4.096370	0.019300
LOG_NEW_VACCINATIONS_USA does not Granger Cause DLOG_GBS		0.327910	0.721100
DLOG_EUROSTOXX50 does not Granger Cause LOG_NEW_VACCINATIONS_USA	114	0.553670	0.576400
LOG_NEW_VACCINATIONS_USA does not Granger Cause DLOG_EUROSTOXX50		15.681300	**0.000001**
DLOG_DAX does not Granger Cause LOG_NEW_VACCINATIONS_USA	109	2.468160	0.089700
LOG_NEW_VACCINATIONS_USA does not Granger Cause DLOG_DAX		14.598000	**0.000003**
DLOG_MDAX does not Granger Cause LOG_NEW_VACCINATIONS_USA	109	2.322900	0.103100
LOG_NEW_VACCINATIONS_USA does not Granger Cause DLOG_MDAX		9.521880	**0.000200**
DLOG_BET does not Granger Cause LOG_NEW_VACCINATIONS_USA	104	2.120080	0.125400
LOG_NEW_VACCINATIONS_USA does not Granger Cause DLOG_BET		14.184200	**0.000004**
DLOG_BET_FI does not Granger Cause LOG_NEW_VACCINATIONS_USA	104	0.055850	0.945700
LOG_NEW_VACCINATIONS_USA does not Granger Cause DLOG_BET_FI		0.835670	0.436600
DLOG_BET_NG does not Granger Cause LOG_NEW_VACCINATIONS_USA	104	1.525350	0.222600
LOG_NEW_VACCINATIONS_USA does not Granger Cause DLOG_BET_NG		13.156700	**0.000009**
LOG_NEW_VACCINATIONS_ITALY does not Granger Cause LOG_NEW_VACCINATION!	284	5.499210	0.004500
LOG_NEW_VACCINATIONS_EU does not Granger Cause LOG_NEW_VACCINATIONS_ITALY		4.388850	0.013300
LOG_NEW_VACCINATIONS_ROMANIA does not Granger Cause LOG_NEW_VACCINAT!	280	7.682230	0.000600
LOG_NEW_VACCINATIONS_EU does not Granger Cause LOG_NEW_VACCINATIONS_ROMANI		12.884300	0.000004
DLOG_EURONEXT100 does not Granger Cause LOG_NEW_VACCINATIONS_EU	98	0.412030	0.663500
LOG_NEW_VACCINATIONS_EU does not Granger Cause DLOG_EURONEXT100		0.409910	0.664900
DLOG_CAC40 does not Granger Cause LOG_NEW_VACCINATIONS_EU	113	0.998220	0.371900
LOG_NEW_VACCINATIONS_EU does not Granger Cause DLOG_CAC40		0.130180	0.878100
DLOG_GBS does not Granger Cause LOG_NEW_VACCINATIONS_EU	113	0.888880	0.414100
LOG_NEW_VACCINATIONS_EU does not Granger Cause DLOG_GBS		5.541090	0.005100
DLOG_EUROSTOXX50 does not Granger Cause LOG_NEW_VACCINATIONS_EU	113	1.193900	0.307000
LOG_NEW_VACCINATIONS_EU does not Granger Cause DLOG_EUROSTOXX50		0.193550	0.824300
DLOG_DAX does not Granger Cause LOG_NEW_VACCINATIONS_EU	108	0.399290	0.671800
LOG_NEW_VACCINATIONS_EU does not Granger Cause DLOG_DAX		0.202870	0.816700
DLOG_MDAX does not Granger Cause LOG_NEW_VACCINATIONS_EU	108	1.564300	0.214200
LOG_NEW_VACCINATIONS_EU does not Granger Cause DLOG_MDAX		0.662510	0.517700
DLOG_BET does not Granger Cause LOG_NEW_VACCINATIONS_EU	103	0.549350	0.579100
LOG_NEW_VACCINATIONS_EU does not Granger Cause DLOG_BET		0.161140	0.851400
DLOG_BET_FI does not Granger Cause LOG_NEW_VACCINATIONS_EU	103	0.485280	0.617000
LOG_NEW_VACCINATIONS_EU does not Granger Cause DLOG_BET_FI		0.370320	0.691500
DLOG_BET_NG does not Granger Cause LOG_NEW_VACCINATIONS_EU	103	1.279780	0.282700
LOG_NEW_VACCINATIONS_EU does not Granger Cause DLOG_BET_NG		0.241850	0.785600
DLOG_EURONEXT100 does not Granger Cause LOG_NEW_VACCINATIONS_ITALY	96	0.758600	0.471300
LOG_NEW_VACCINATIONS_ITALY does not Granger Cause DLOG_EURONEXT100		0.048550	0.952600
DLOG_CAC40 does not Granger Cause LOG_NEW_VACCINATIONS_ITALY	111	1.158420	0.317900
LOG_NEW_VACCINATIONS_ITALY does not Granger Cause DLOG_CAC40		0.161410	0.851200
DLOG_GBS does not Granger Cause LOG_NEW_VACCINATIONS_ITALY	111	1.432660	0.243300
LOG_NEW_VACCINATIONS_ITALY does not Granger Cause DLOG_GBS		0.990670	0.374700
DLOG_EUROSTOXX50 does not Granger Cause LOG_NEW_VACCINATIONS_ITALY	111	1.838770	0.164000
LOG_NEW_VACCINATIONS_ITALY does not Granger Cause DLOG_EUROSTOXX50		0.036270	0.964400
DLOG_DAX does not Granger Cause LOG_NEW_VACCINATIONS_ITALY	107	1.380340	0.256100
LOG_NEW_VACCINATIONS_ITALY does not Granger Cause DLOG_DAX		0.476430	0.622400
DLOG_MDAX does not Granger Cause LOG_NEW_VACCINATIONS_ITALY	107	1.967490	0.145100
LOG_NEW_VACCINATIONS_ITALY does not Granger Cause DLOG_MDAX		0.583200	0.560000
DLOG_BET does not Granger Cause LOG_NEW_VACCINATIONS_ITALY	102	0.799420	0.452500
LOG_NEW_VACCINATIONS_ITALY does not Granger Cause DLOG_BET		0.406760	0.666900
DLOG_BET_FI does not Granger Cause LOG_NEW_VACCINATIONS_ITALY	102	0.399990	0.671400
LOG_NEW_VACCINATIONS_ITALY does not Granger Cause DLOG_BET_FI		1.219170	0.300000
DLOG_BET_NG does not Granger Cause LOG_NEW_VACCINATIONS_ITALY	102	0.217350	0.805000
LOG_NEW_VACCINATIONS_ITALY does not Granger Cause DLOG_BET_NG		0.387920	0.679500
DLOG_EURONEXT100 does not Granger Cause LOG_NEW_VACCINATIONS_ROMANIA	95	1.608830	0.205800
LOG_NEW_VACCINATIONS_ROMANIA does not Granger Cause DLOG_EURONEXT100		1.709010	0.186900
DLOG_CAC40 does not Granger Cause LOG_NEW_VACCINATIONS_ROMANIA	110	0.907520	0.406700
LOG_NEW_VACCINATIONS_ROMANIA does not Granger Cause DLOG_CAC40		2.669480	0.074000
DLOG_GBS does not Granger Cause LOG_NEW_VACCINATIONS_ROMANIA	110	1.402160	0.250600
LOG_NEW_VACCINATIONS_ROMANIA does not Granger Cause DLOG_GBS		3.648800	0.029400
DLOG_EUROSTOXX50 does not Granger Cause LOG_NEW_VACCINATIONS_ROMANIA	110	1.052520	0.352700
LOG_NEW_VACCINATIONS_ROMANIA does not Granger Cause DLOG_EUROSTOXX50		1.794620	0.171200
DLOG_DAX does not Granger Cause LOG_NEW_VACCINATIONS_ROMANIA	106	2.848340	0.062600
LOG_NEW_VACCINATIONS_ROMANIA does not Granger Cause DLOG_DAX		1.654310	0.196400
DLOG_MDAX does not Granger Cause LOG_NEW_VACCINATIONS_ROMANIA	106	0.905280	0.407700
LOG_NEW_VACCINATIONS_ROMANIA does not Granger Cause DLOG_MDAX		1.440790	0.241600
DLOG_BET does not Granger Cause LOG_NEW_VACCINATIONS_ROMANIA	101	0.380050	0.684900
LOG_NEW_VACCINATIONS_ROMANIA does not Granger Cause DLOG_BET		0.353580	0.703100
DLOG_BET_FI does not Granger Cause LOG_NEW_VACCINATIONS_ROMANIA	101	1.380550	0.256400
LOG_NEW_VACCINATIONS_ROMANIA does not Granger Cause DLOG_BET_FI		2.097430	0.128400
DLOG_BET_NG does not Granger Cause LOG_NEW_VACCINATIONS_ROMANIA	101	0.024390	0.975900
LOG_NEW_VACCINATIONS_ROMANIA does not Granger Cause DLOG_BET_NG		1.476720	0.233500

Source: Author's own work

Table 8: **Variance Decomposition**

Variance Decomposition using Cholesky (d.f. adjusted) Factors

Variance Decomposition of FI_USA_SCENARIO_B:

Period	S.E.	FI_USA_SCENARIO_B	DLOG_EURONEXT100	DLOG_CAC40	DLOG_GBS	DLOG_EUROSTOXX50	DLOG_DAX	DLOG_MDAX	DLOG_BET	DLOG_BET_FI	DLOG_BET_NG
1	4.412437	100	0	0	0	0	0	0	0	0	0
2	6.123952	98.07494	0.000227	0.24438	0.432103	0.411155	0.295215	0.033709	0.027772	0.049153	0.431341
3	7.37329	97.51377	0.008602	0.341345	0.504779	0.51095	0.358748	0.039358	0.095116	0.049333	0.577999
4	8.365265	97.28513	0.011759	0.383406	0.532857	0.550244	0.379078	0.040604	0.122775	0.048866	0.645285
5	9.190143	97.14491	0.013385	0.408751	0.550984	0.57422	0.39217	0.041457	0.138338	0.04887	0.68691

Variance Decomposition of DLOG_EURONEXT100:

Period	S.E.	FI_USA_SCENARIO_B	DLOG_EURONEXT100	DLOG_CAC40	DLOG_GBS	DLOG_EUROSTOXX50	DLOG_DAX	DLOG_MDAX	DLOG_BET	DLOG_BET_FI	DLOG_BET_NG
1	0.010415	0.530197	99.4698	0	0	0	0	0	0	0	0
2	0.01072	0.508356	94.56394	1.897594	0.397168	0.114681	1.613607	0.46019	0.373406	0.038504	0.032549
3	0.010732	0.554231	94.34706	1.893205	0.437127	0.115188	1.620361	0.502288	0.453522	0.043534	0.033488
4	0.010734	0.587708	94.31274	1.892515	0.43718	0.115584	1.619772	0.502301	0.454797	0.043919	0.033486
5	0.010736	0.617704	94.28278	1.892114	0.43736	0.115892	1.619463	0.502147	0.454718	0.043949	0.03387

Variance Decomposition of DLOG_CAC40:

Period	S.E.	FI_USA_SCENARIO_B	DLOG_EURONEXT100	DLOG_CAC40	DLOG_GBS	DLOG_EUROSTOXX50	DLOG_DAX	DLOG_MDAX	DLOG_BET	DLOG_BET_FI	DLOG_BET_NG
1	0.011162	0.982941	94.41974	4.597315	0	0	0	0	0	0	0
2	0.011447	0.935659	90.38207	6.61705	0.168666	0.02423	1.335585	0.153107	0.301515	0.052573	0.02955
3	0.011463	1.011381	90.13874	6.598774	0.215699	0.024526	1.346804	0.202342	0.37748	0.054494	0.029759
4	0.011466	1.068686	90.08351	6.594854	0.21605	0.024898	1.346006	0.202453	0.378632	0.055124	0.029785
5	0.011469	1.120949	90.03357	6.591588	0.216415	0.025394	1.345591	0.20235	0.378555	0.055159	0.030432

Variance Decomposition of DLOG_GBS:

Period	S.E.	FI_USA_SCENARIO_B	DLOG_EURONEXT100	DLOG_CAC40	DLOG_GBS	DLOG_EUROSTOXX50	DLOG_DAX	DLOG_MDAX	DLOG_BET	DLOG_BET_FI	DLOG_BET_NG
1	0.008074	0.136447	0.403325	1.160003	98.30023	0	0	0	0	0	0
2	0.008313	0.137148	3.502194	1.103305	93.16401	0.004208	0.772703	0.104942	0.019552	0.448444	0.743498
3	0.008328	0.159813	3.529517	1.249071	92.88247	0.004197	0.818043	0.11246	0.027785	0.455196	0.761444
4	0.00833	0.204839	3.527387	1.248716	92.82911	0.004244	0.818215	0.115562	0.035094	0.45522	0.761612
5	0.008332	0.243042	3.526011	1.248377	92.79305	0.004261	0.817942	0.115538	0.035084	0.455104	0.761593

Variance Decomposition of DLOG_EUROSTOXX50:

Period	S.E.	FI_USA_SCENARIO_B	DLOG_EURONEXT100	DLOG_CAC40	DLOG_GBS	DLOG_EUROSTOXX50	DLOG_DAX	DLOG_MDAX	DLOG_BET	DLOG_BET_FI	DLOG_BET_NG
1	0.011098	1.015603	94.69012	0.601588	0.000245	3.692446	0	0	0	0	0
2	0.011395	0.963433	90.54725	2.243488	0.446553	3.579856	1.415094	0.412311	0.302998	0.072701	0.016316
3	0.011409	1.027951	90.33028	2.238088	0.482101	3.57149	1.422931	0.452658	0.380703	0.076851	0.016951
4	0.011412	1.076223	90.28389	2.236952	0.48216	3.569965	1.422213	0.452615	0.381797	0.077238	0.016944
5	0.011414	1.119784	90.24216	2.2362	0.482365	3.568776	1.421839	0.452416	0.381719	0.077257	0.017484

Variance Decomposition of DLOG_DAX:

Period	S.E.	FI_USA_SCENARIO_B	DLOG_EURONEXT100	DLOG_CAC40	DLOG_GBS	DLOG_EUROSTOXX50	DLOG_DAX	DLOG_MDAX	DLOG_BET	DLOG_BET_FI	DLOG_BET_NG
1	0.011264	0.994556	84.81834	0.505199	0.066098	8.298169	5.317633	0	0	0	0
2	0.011596	0.948424	80.80436	2.011761	0.804094	7.858147	6.414405	0.31544	0.661648	0.18117	0.000548
3	0.011611	0.984002	80.59842	2.006953	0.844991	7.837975	6.410276	0.359033	0.771914	0.185887	0.000554
4	0.011613	1.006876	80.5773	2.006425	0.844862	7.836711	6.408625	0.359158	0.773339	0.186108	0.000595
5	0.011614	1.026967	80.56001	2.00614	0.844916	7.835285	6.407395	0.359082	0.773207	0.186103	0.000899

Variance Decomposition of DLOG_MDAX:

Period	S.E.	FI_USA_SCENARIO_B	DLOG_EURONEXT100	DLOG_CAC40	DLOG_GBS	DLOG_EUROSTOXX50	DLOG_DAX	DLOG_MDAX	DLOG_BET	DLOG_BET_FI	DLOG_BET_NG
1	0.00963	0.219193	75.4138	1.386161	0.117654	0.121452	2.909733	19.83201	0	0	0
2	0.010078	0.452505	69.1581	4.049629	1.548335	0.67527	4.323322	18.65028	1.092566	0.049886	0.000109
3	0.010091	0.451485	68.98333	4.039488	1.603805	0.674173	4.315566	18.65928	1.213044	0.059325	0.000505
4	0.010091	0.452781	68.97723	4.040099	1.604176	0.676672	4.316416	18.65764	1.214228	0.059362	0.001394
5	0.010091	0.454732	68.97585	4.040017	1.60415	0.676658	4.316325	18.65724	1.214264	0.05937	0.001395

Variance Decomposition of DLOG_BET:

Period	S.E.	FI_USA_SCENARIO_B	DLOG_EURONEXT100	DLOG_CAC40	DLOG_GBS	DLOG_EUROSTOXX50	DLOG_DAX	DLOG_MDAX	DLOG_BET	DLOG_BET_FI	DLOG_BET_NG
1	0.008767	1.545861	20.04641	0.084316	0.045069	0.802882	3.295153	0.261146	73.91916	0	0
2	0.008915	1.495714	19.51228	0.347872	0.344571	1.282922	4.058094	0.29758	71.57603	0.06998	1.014959
3	0.008923	1.560796	19.49962	0.355201	0.348711	1.280917	4.052615	0.298598	71.51194	0.076624	1.014975
4	0.008925	1.605666	19.49061	0.355195	0.348549	1.280324	4.050901	0.298576	71.479	0.076594	1.014584
5	0.008927	1.64724	19.48201	0.355286	0.348748	1.280081	4.049392	0.29846	71.44749	0.076614	1.014678

Variance Decomposition of DLOG_BET_FI:

Period	S.E.	FI_USA_SCENARIO_B	DLOG_EURONEXT100	DLOG_CAC40	DLOG_GBS	DLOG_EUROSTOXX50	DLOG_DAX	DLOG_MDAX	DLOG_BET	DLOG_BET_FI	DLOG_BET_NG
1	0.008436	0.023089	0.01821	0.298103	0.152501	0.01829	0.091982	1.529732	0.05115	97.81694	0
2	0.008601	0.043355	0.083268	0.526571	0.990704	0.770343	0.637	1.47918	0.160219	95.30577	0.003588
3	0.008611	0.118941	0.10516	0.548714	0.990132	0.824804	0.635663	1.501732	0.166995	95.09453	0.013332
4	0.008614	0.184165	0.105936	0.549607	0.993542	0.827927	0.637531	1.503247	0.166964	95.01684	0.014236
5	0.008617	0.248071	0.105902	0.549557	0.993198	0.828159	0.63743	1.502251	0.167219	94.9534	0.014814

Variance Decomposition of DLOG_BET_NG:

Period	S.E.	FI_USA_SCENARIO_B	DLOG_EURONEXT100	DLOG_CAC40	DLOG_GBS	DLOG_EUROSTOXX50	DLOG_DAX	DLOG_MDAX	DLOG_BET	DLOG_BET_FI	DLOG_BET_NG
1	0.00962	1.593252	11.85606	0.31392	0.042084	1.211362	1.937401	0.005908	55.26755	0.717167	27.0553
2	0.00985	1.520168	11.46506	0.590441	0.110047	1.58443	2.093104	0.164171	53.44406	0.7169	28.31163
3	0.009856	1.53477	11.47016	0.61188	0.115319	1.583526	2.095365	0.167954	53.4023	0.73204	28.28668
4	0.009857	1.545967	11.46886	0.611999	0.115532	1.583336	2.095457	0.168335	53.39521	0.732041	28.28326
5	0.009858	1.556986	11.46752	0.612019	0.115602	1.583208	2.095282	0.168322	53.38893	0.731973	28.28017

Cholesky Ordering: FI_USA_SCENARIO_B DLOG_EURONEXT100 DLOG_CAC40 DLOG_GBS DLOG_EUROSTOXX50 DLOG_DAX DLOG_MDAX DLOG_BET DLOG_BET_FI DLOG_BET_NG

Source: Author's own work

Table 9: **Granger Causality Test**

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 03/30/22 Time: 23:19
Sample: 3/26/2020 1/31/2022
Included observations: 244

Dependent variable: DLOG_EURONEXT100

Excluded	Chi-sq	df	Prob.
FI_USA_SCENARIO_B	1.06617	1	0.30180
DLOG_CAC40	3.10119	1	0.07820
DLOG_GBS	1.70540	1	0.19160
DLOG_EUROSTOXX50	5.31535	1	0.02110
DLOG_DAX	5.93030	1	0.01490
DLOG_MDAX	1.24033	1	0.26540
DLOG_BET	0.50564	1	0.47700
DLOG_BET_FI	0.10899	1	0.74130
DLOG_BET_NG	0.07144	1	0.78930
All	13.57299	9	0.13830

Dependent variable: DLOG_CAC40

Excluded	Chi-sq	df	Prob.
FI_USA_SCENARIO_B	1.95997	1	0.16150
DLOG_EURONEXT100	6.70355	1	0.00960
DLOG_GBS	0.83211	1	0.36170
DLOG_EUROSTOXX50	3.43875	1	0.06370
DLOG_DAX	4.30525	1	0.03800
DLOG_MDAX	0.41660	1	0.51860
DLOG_BET	0.42111	1	0.51640
DLOG_BET_FI	0.15747	1	0.69150
DLOG_BET_NG	0.06438	1	0.79970
All	14.81678	9	0.09610

Dependent variable: DLOG_GBS

Excluded	Chi-sq	df	Prob.
FI_USA_SCENARIO_B	3.35563	1	0.06700
DLOG_EURONEXT100	0.12341	1	0.72540
DLOG_CAC40	0.30215	1	0.58250
DLOG_EUROSTOXX50	0.97434	1	0.32360
DLOG_DAX	1.47723	1	0.22420
DLOG_MDAX	0.07313	1	0.78680
DLOG_BET	0.76621	1	0.38140
DLOG_BET_FI	2.57026	1	0.10890
DLOG_BET_NG	1.63270	1	0.20130
All	16.95072	9	0.04950

Dependent variable: DLOG_EUROSTOXX50

Excluded	Chi-sq	df	Prob.
FI_USA_SCENARIO_B	1.93528	1	0.16420
DLOG_EURONEXT100	7.37513	1	0.00660
DLOG_CAC40	2.81798	1	0.09320
DLOG_GBS	1.81110	1	0.17840
DLOG_DAX	5.09754	1	0.02400
DLOG_MDAX	1.05378	1	0.30460
DLOG_BET	0.36047	1	0.54820
DLOG_BET_FI	0.24121	1	0.62330
DLOG_BET_NG	0.03563	1	0.85030
All	13.94828	9	0.12420

Dependent variable: DLOG_DAX

Excluded	Chi-sq	df	Prob.
FI_USA_SCENARIO_B	0.81387	1	0.36700
DLOG_EURONEXT100	6.87985	1	0.00870
DLOG_CAC40	2.70004	1	0.10030
DLOG_GBS	2.78353	1	0.09520
DLOG_EUROSTOXX50	4.21058	1	0.04020
DLOG_MDAX	0.76580	1	0.38150
DLOG_BET	0.41421	1	0.51980
DLOG_BET_FI	0.72223	1	0.39540
DLOG_BET_NG	0.00120	1	0.97230
All	12.51560	9	0.18580

Dependent variable: DLOG_MDAX

Excluded	Chi-sq	df	Prob.
FI_USA_SCENARIO_B	0.63977	1	0.42380
DLOG_EURONEXT100	14.04154	1	0.00020
DLOG_CAC40	4.25068	1	0.03920
DLOG_GBS	5.40038	1	0.02010
DLOG_EUROSTOXX50	8.69623	1	0.00320
DLOG_DAX	7.10848	1	0.00770
DLOG_BET	0.73581	1	0.39100
DLOG_BET_FI	0.20496	1	0.65070
DLOG_BET_NG	0.00025	1	0.98750
All	20.20634	9	0.01670

Dependent variable: DLOG_BET

Excluded	Chi-sq	df	Prob.
FI_USA_SCENARIO_B	2.32546	1	0.12730
DLOG_EURONEXT100	1.68065	1	0.19480
DLOG_CAC40	0.05731	1	0.81080
DLOG_GBS	1.17348	1	0.27870
DLOG_EUROSTOXX50	2.88621	1	0.08930
DLOG_DAX	1.50504	1	0.21990
DLOG_MDAX	0.01217	1	0.91210
DLOG_BET_FI	0.70173	1	0.40220
DLOG_BET_NG	2.17400	1	0.14040
All	10.48410	9	0.31270

Dependent variable: DLOG_BET_FI

Excluded	Chi-sq	df	Prob.
FI_USA_SCENARIO_B	2.27726	1	0.13130
DLOG_EURONEXT100	0.40237	1	0.52590
DLOG_CAC40	2.05428	1	0.15180
DLOG_GBS	1.76058	1	0.18460
DLOG_EUROSTOXX50	3.65194	1	0.05600
DLOG_DAX	1.82414	1	0.17680
DLOG_MDAX	0.14862	1	0.69990
DLOG_BET	0.10086	1	0.75080
DLOG_BET_NG	0.00773	1	0.93000
All	9.14768	9	0.42380

Dependent variable: DLOG_BET_NG

Excluded	Chi-sq	df	Prob.
FI_USA_SCENARIO_B	0.81955	1	0.36530
DLOG_EURONEXT100	1.25674	1	0.26230
DLOG_CAC40	0.29041	1	0.59000
DLOG_GBS	0.27237	1	0.60170
DLOG_EUROSTOXX50	1.04370	1	0.30700
DLOG_DAX	0.25148	1	0.61600
DLOG_MDAX	0.12665	1	0.72190
DLOG_BET	6.36062	1	0.01170
DLOG_BET_FI	0.02267	1	0.88030
All	10.36181	9	0.32200

Source: Author's own work

Section 6

Sustainable Decisions in M&As Based on Audit Opinion and Financial Transparency. Empirical Evidence Regarding the Energy Sector from BRICS Countries

Ioan-Bogdan Robu
Constantin Toma
George-Marian Aevoae
Ionuț-Viorel Herghiligiu
Christiana Brigitte Sandu

Sustainable Decisions in M&As Based on Audit Opinion and Financial Transparency. Empirical Evidence Regarding the Energy Sector from BRICS Countries

Ioan-Bogdan Robu [a], Constantin Toma[a], George-Marian Aevoae[a10], Ionut-Viorel Herghiligiu[b], Christiana Brigitte Sandu[a]

[a] *„Alexandru Ioan Cuza" University of Iași, Romania*
[b] *„Gheorghe Asachi" Technical University of Iași, Romania*

Abstract: *BRICS countries are of high interest regarding M&As. When considering sustainable investment in energy companies located in these emerging economies, HDI and CO_2 emissions are important, mostly later in the year of the transaction. When adding the financial factors and the audit status of the target companies, we notice that the acquirors are focusing only on the audited companies. The audit status and, implicitly, the unqualified opinion on the financial statements is enough in certifying the quality of the financial information. This must be correlated with the transparency score, which is a significant variable for the year of the M&A and the year prior the transaction. When considering the type of deal, mergers and takeovers are not strategically appealing, the EU acquirors preferring alliances, and purchases of stakes (either leading to majority or minority acquisitions).*

Keywords: *Mergers and acquisitions, audit opinion, financial transparency, financial reporting, energy sector, BRICS*

1. Introduction

Economic globalization is the process which shapes the global economy, using mechanisms specific to market economy. Two main paths lead to business growth - either companies grow internally by using its resources, equities and internal investments, or firms pursue external growth strategies, by acquiring or merging with other firms (Andriuškevičius and Štreimikienė, 2021).

There is a well-known fact that cross-border mergers and acquisitions (CBM&As) are the main part of the foreign direct investment (henceforth FDI) and that they are motivated by a large range of expected outputs, like the need for specialized resources or market expansion of the multinational companies (henceforth MNEs) (Moeller and Schlingemann, 2005; Gregory and O'Donohoe, 2014; Very and Schweiger, 2001). CBM&As in the emerging markets have shown an increase in the past years, notably in BRIC countries, Eastern Europe and Africa, the countries from the first group being among of the most attractive markets in the world for these business concentrations (Smimou, 2015; Bekaert and Harvey, 2017). Andriuškevičius and Štreimikienė (2021) showed in their research that the focus on sustainable development in the energy industry has led to an increase in the M&A activities.

[10] *Corresponding author*: "Universitatea Alexandru Ioan Cuza" din Iași, Bulevardul Carol I, No. 11, 700506, Iaşi, România

The main feature of the current global political-economic context has become, since 2000s, the emergence of the economies of Brazil, Russia, India, and Republic of China, a group known under the abbreviation BRIC. Later, on April 13, 2011, in Beijing, South Africa was added to BRICs and, since then, the international organizations recognize the BRICS group in reports (Fletcher, 2011). The rise of the BRICS economies was accompanied by that of some mid-size economies, such as those of Turkey, Indonesia, the Philippines, Angola, Nigeria, or Vietnam (Becker, 2014). Their rapid expansion made them very attractive for investors worldwide, a fact that is reflected, mainly, in the value of the FDI which entered their economies.

The cross-border investing decisions of MNEs can be both described and analysed from a double perspective. On one hand, choosing a country to invest in must consider its sustainable approach, reflected in indexes that describe its attitude towards environment and population. Both Paris Agreement on Climate Change and UN Agenda for Sustainable Development represent the global commitments on a new "post-2015" era of sustainable development (Fuso Nerini*et al*., 2019). In this respect, the 17 UN Sustainable Development Goals are representative, because rapid economic growth is most likely to coincide with unsustainable levels of consumption, place excessive pressure on life support systems and foreshorten options for the future (May, 2008). It is of high importance because of its direct connection with many aspects of human life (Knox, 2009). Reports of Intergovernmental Panel on Climate Change show that planetary warming continued in 2020, setting a new record of about 1.5 degrees Celsius above the preindustrial period, which is a serious indication of rapid climate change. Many countries use green energy projects to safeguard their climate and several others have halted carbon energy production units (Ali *et al*., 2018). The European Union also included the climate action between its strategies related to energy, climate change, and environment. Thus, the investments made by the companies located in EU's developed economies should respond to climate strategies and targets considered as a response to the Paris Agreement.

As a result, the energy sector has had an interesting evolution during the years, considering the fact that energy demand, supply and pricing policy have enormous impact on social and economic development, the living standards and overall quality of life of the population. For over a century, fossil fuel (conventional) energy was an intrinsic part of the engine which led to economic growth, given the fact that energy is the foundation of human survival and development. In the last years, we witnessed the political pressure to develop the renewable energy sector.

Given the importance of the emerging markets in the nowadays economic context, the focus of the study represents the target companies located in BRICS countries, due to the potential of the national market and their performance.

For the current research, we analyse the factors which influence the choice for the target companies from the energy sector, compared to other sectors, in the case of 4.222 CBM&As involving European acquirers and BRICS targets. In the first place, we consider the macroeconomic factors (human development index – HDI and CO2 emissions) for the BRICS countries. In the next step of the analysis, we take into account ratios and data which characterize the target companies in the energy sector, compared to other sectors.

Following recent literature reviews on the choice for energy sector, compared to other sectors, the research questions (RQ) are settled as:

RQ1: How do the environmental (CO_2 emissions) and social (HDI) factors influence the choice for target companies from the energy sector, compared to other sectors, for the BRICS countries?

RQ2: Do financial factors contribute to the choice of an investment in a company from the energy sector, compared to a company not belonging to this sector?

Thus, the objective of the paper is focused on explaining the factors which determine the MNEs to invest in target companies from the energy sector, compared to other sectors, in the emerging economies of BRICS countries. After considering the environmental and social factors which characterize the target country, we consider a number of financial ratios (return on equity, return on capital employed, the growth rate for the market capitalization) and a transparency score for these companies, that have the potential of explaining the choice of the MNEs. On the other hand, we want to analyse if the audit opinion on the financial statements of the target company plays an important role in the growth strategy of an investor, or if it is not interested in investing in an audited company.

We use a database of 4.222 M&As which involve a target company located in one of the BRICS countries, in order to assess the influence of the two categories of factors on the choice to invest or not in the energy sector. The first part of the paper is dedicated to the analysis of the scientific literature, considering the following aspects: the strategic or speculative character of the investments in the energy sector, and the presentation of the influence factors of the MNEs' decision to invest or not in the energy sector in BRICS countries. Second part includes the presentation of the research methodology and design (data used, models for analysis, the populations and the sample to be analysed). The third part is dedicated to the results and the discussions of the study.

1.1 Defining the energy sector and its potential for investment

Although energy needs were modest prior to the industrial revolution, the evolution of the steam engine during the 17th and 18th centuries has opened a world of possibilities. Further, the need for energy increased due to coal-powered steam engines, electric generators, and hydroelectric plants introduced in the 19th century. Massive power stations, large coal mines, hydroelectric plants, powerlines, and nuclear power plants were the key driving forces of energy production and accessibility in the 20th century. But all this, although they answered to a stringent need for boosting the economy and enhancing economic development, have led to climate problems and, organically, to a need for a sustainable approach of all the economic processes.

According to the Global Industry Classification Standard, the energy industry consists of firms that are in the business of oil and gas, coal, and other consumable fuels' exploration, production, refining, marketing, storage, and transportation. Energy sector includes *non-renewable energy* (oil and petroleum products, gasoline, natural gas, diesel fuel, and nuclear. For the latter, there is a possibility to switch categories to renewable energy in the future, if the scientists will find a way to extract uranium from

seawater instead of from ore), and *renewable energy* (hydropower, solar power, and wind power).

There is a difference between renewable and sustainable energy. The first one is related to wind, solar and hydropower, namely natural sources of power which regenerate themselves, and the second one is related to the concept of low-carbon economy and the ways in which the pollution can decrease. In other words, we assist in a change in the sources of energy, from fossil (high carbon energy) to non-fossil (low carbon energy). For example, at this point, the nuclear energy is a sustainable energy because it produces zero CO_2, but it is not renewable because the uranium ore has a limited capacity to produce energy and becomes waste over time.

In order to enhance the domestic economy and the living conditions of the population, many countries have sacrificed the environment in exchange for the economic development (Shah *et al*., 2016). But blindly pursuing the economy, many ignored the cost of the environment and caused significant increase in energy consumption, which led, as we will prove, to a huge increase of CO_2 emission and to a climate change which seems hard to stop (Wang *et al.,* 2019). One of the key solutions to this problem is the investment in renewable energy.

Greenfield announcements in energy generation and distribution decreased by 13% to $99 billion in 2020, compared to 2019, as foreign investors continued to invest more in renewable energy power projects than in projects based on fossil fuels. Projects in renewable energy, which hit a record high in terms of both value and number in 2019, were not immune from the effect of the Covid-19 pandemic but showed resilience. Greenfield investment in renewables declined by only 5 per cent in value, to $88 billion, across 507 projects. All but one of the 10 highest value energy projects announced by foreign investors in 2020 were in the renewable energy industry (UNCTAD, 2021). The importance of the energy sector is underlined by the number and value of the projects developed worldwide. The most project finance deals in 2019 and 2020 covered the renewable energy industry and recorded an increase of 7% from 644 to 689 projects, but a decrease in value from 179 to 167 billion of dollars. The second position is occupied by the conventional energy industry, which recorded a decrease in both value (40%) and number (28%) in 2020, compared to 2019, as a consequence of the pandemic. The cross-border M&As in the energy sector did not occupy a relevant position in 2019 or 2020. As a part of the sustainable development goals investment, the projects in renewable energy recorded the less decrease of only 8%, despite the pandemic.

Table 1. **Forecast of worldwide electricity generation by different energy sources (in trillion kilowatt hours)**

Year	Oil	Growth rate (%)	Natural gas	Growth rate (%)	Coal	Growth rate (%)	Nuclear	Growth rate (%)	Renewables	Growth rate (%)
2018	0.74	-	5.75	-	8.65	-	2.64	-	6.99	-
2020	0.63	-14.86%	5.91	2.78%	8.5	-1.73%	2.71	2.65%	8.13	16.31%
2025	0.44	-30.16%	6.25	5.75%	8.57	0.82%	2.78	2.58%	10.19	25.34%
2030	0.32	-27.27%	6.65	6.40%	8.57	0.00%	3.04	9.35%	12.52	22.87%
2035	0.24	-25.00%	7.43	11.73%	8.57	0.00%	3.14	3.29%	14.66	17.09%
2040	0.19	-20.83%	8.1	9.02%	8.6	0.35%	3.28	4.46%	16.92	15.42%
2045	0.17	-10.53%	8.8	8.64%	8.9	3.49%	3.41	3.96%	19.56	15.60%
2050	0.17	0.00%	9.25	5.11%	9.6	7.87%	3.58	4.99%	21.66	10.74%

Source: Own processing after Andriuškevičius and Štreimikienė (2021).

The decrease of only 5% of the CO_2 emission worldwide, as a result of the lockdowns (Dlugokencky and Tans, 2020), it should trigger a signal alarm that the companies and countries should focus more on renewable energies. Data from Table 1 suggests that the need for fossil fuel will decrease and the investment in renewable energy will increase by 2050.

As we can notice from Table 1, at world's level, the trends of the future, in the energy sector, are oriented towards a replacement of the conventional sources of energy (oil, coal and natural gas) with low carbon energy sources (nuclear and renewable). In 2050, the renewable sources of energy will record an increase of 166.42% compared to the level recorded in 2020 representing 48.94% from World's Energy Sources. Their deployment is a major lever to decarbonise the power sector and mitigate the effects of climate change (Sinsel *et al*., 2020), fact which is confirmed by the data shown.

1.2 The choice for BRICS countries

Investing in the energy sector can be a challenge, which starts with the choice for a specific country. In our study case, we focus on the BRICS group, given its notoriety and potential for investment, knowing that it includes the fast-growing economies of Brazil, Russian Federation, India, China, and South Africa.

James O'Neil, in 2001, defined Brazil, Russia, India and China as the new vectors of the world's economic growth (Poli, 2015: 141; O'Neil, 2001), South Africa being added later to the group. According to the creator of the concept, the addition of South Africa to the group has weakened the "brick", so there has been a lot of discussion if BRICS is better than BRIC.

There are numerous studies that use macroeconomic indicators to compare BRICS countries, because they are considered to be relevant in describing the rapid growth of these nations. Prakash and Kumar (2017) realize a literature review on the main studies regarding the influence of macroeconomic indicators on the foreign direct investments (FDI) in India, compared to the rest of the BRICS countries. The choice for representing the BRICS countries in purchasing power parity terms is discussed by Güriș and Tiraşoğlu (2017), who assert that PPP approach is valid for Brazil and South Africa, but not valid for Russia, India and China, by Su *et al*. (2012), who consider it valid for all the countries, and by Chang *et al*. (2012), whose findings lead to the conclusion that PPP is not valid for Brazil but valid for the rest of the BRIC group. Purchasing power parity (PPP) is an economic theory that compares different countries' currencies through a "basket of goods" approach. According to this concept, two currencies are in equilibrium or at par when a basket of goods (taking into account the exchange rate) is priced the same in both countries.

BRICS recorded a GDP of 20,785.61 billion dollars in 2020, compared to 21,166.82 in 2019, accounting for 24.55% and 24.17%, respectively, of global GDP (World Bank, 2021). Given their importance, many countries invest in these emerging markets. FDI remains the largest and most constant external source of finance for developing economies – compared with portfolio investments, remittances, and official development assistance (UNCTAD, 2017) and companies from around the world are

targeting BRICS markets for future expansion. Proof in this matter is the fact that the FDI inflows in BRICS countries represented 25.9% from world's FDI in 2019 and 19.7% in 2020 (UNCTAD, 2021). The vast part of the FDI inflows is represented by the CBM&As, which justifies the objective of the present study.

Thus, BRICS has the potential to not only be the leading economies but also even financial centres of the future if they can truly leverage on their potential. All in all, the general idea is that investors with long-time horizons should look to the emerging economies of the BRICS as the markets to invest in the form of FDI, depending on the nature of the investment and the risk profile of the investor. Since CBM&As are receiving/investing amounts representing a big part of FDI, it is thus insightful and highly relevant to conduct research to determine what is at stake for investors in the form of acquiring firms on BRICS targets. As a result of the war in Ukraine, the position of the Russian Federation can be questioned, both as a member of the BRICS group and as a provider of fossil fuel.

The fifth-largest country in the world and the largest in South America, Brazil has a population of 212.61 million inhabitants which makes it the 6th country in the world. Considering its economy, Brazil reported a GDP decrease of -23.06%, in 2020, which made it occupy the 11th position in the world ranking of GDP. Its low inflation rates, fast growth of key economic sectors, and increased FDI have granted its place in the group of world's most notorious emerging economies (Ardichvili *et al.*, 2012).

Ranking 10th on the world ranking based on GDP, with a decrease of 12.09% in 2020, and ninth in the world population evidence, Russian Federation has roughly 16 mil. Km^2 and a density of population of 9 P/Km^2. The country consolidated, over the years, a strong position as the main fossil fuel supplier. Although its influence in Europe was diminished by Germany and Norway, there were some key events between Russia and China - long-term energy contract in 2013 and the "Polar Silk Road Initiative" proposed in 2017 –which may lead to the obvious conclusion that these two countries will belong to the same community in the future (Wang *et al*., 2022).

Russia was the world's third largest oil producer behind the United States and Saudi Arabia. Russia was also the world's largest exporter of oil to global markets and the second largest crude oil exporter behind Saudi Arabia. The invasion into the Ukraine by Russian troops on 24 February 2022 has resulted in a loss of oil supply to the market. The consequences are yet to be seen or quantified.

India is a country of great diversity, considering numerous aspects like geography, industry, religion, and many others. A review of India's current development challenges and policies could perhaps best begin from a long-run perspective, since 1950 when the country gained its independence. India's rapid growth has been accomplished, particularly since the reforms of the early 1990s, in what appears to be an economically sustainable way: low inflation (by international standards), no serious macroeconomic crises, and natural resources (World Bank, 2016). Its rapid development led to major greenhouse gas emissions, due to coal usage, but its renewable energy is competing strongly. Increasing access to electricity and clean cooking with liquefied petroleum gas have been priorities for energy in India. In 2020, India reported a GDP decrease of 7.33% and it is the fifth country in the world, based on GDP.

Out of the five countries, China is the only one which reported a GDP growth of 3.10% in 2020, considering the Covid-19 pandemic crisis. The value of its GDP makes it the first on the world ranking. This position has come with huge energy needs, which also made this country the greatest polluter in the world, considering its CO2 emissions. In recent years, the most important event for the sustainable development of China has been the incorporation of the principles of an ecological civilization into governmental policies. In 2016, The Development and Reform Commission of China released the "Green Development Index System" as the basis for assessing the implementation of ecological civilization (Wang *et al*., 2020).

Occupying 37th place on the world based on GDP evidence, South Africa reported a decrease of this indicator of 13.53% in 2020. Its rank, compared to the other four countries, justifies, from an objective point of view, the opinions of the economists and academia who consider that South Africa should not be part of the BRICS group, in contrast to the decision taken in 2011 to change BRIC to BRICS. In terms of GDP/capita, in 2019-2020, South Africa noticed a decrease of 6.5%.

2. Determinant factors for investing in energy sector

2.1. Environmental factors that contribute to the choice of an investment in a company in the energy sector

The Anthropocene is what defines Earth's most recent geologic period time. According to Crutzen (2000), the originator of the Anthropocene terminology, "The Anthropocene could be said to have started in the late eighteenth century when analyses of air trapped in polar ice showed the beginning of growing global concentrations of carbon dioxide and methane". It is difficult to understand when the Anthropocene started. The Anthropocene is distinguished as a new period either after or within the Holocene (the Earth's weather for the recent approximately 11,700 years since the end of the last major glacial advance). Zalasiewicz *et al*. (2008) argue that is best identified at the beginning of the Industrial Revolution, agreeing with Crutzen (2000) on this topic. Some findings suggest that it has to do with the rise of farming and the global spread of human populations in the latter stages of the first Agricultural Revolution. The Anthropocene is also known as "the age of humans" and consists of overwhelming global evidence that atmospheric, geologic, hydrologic, biosphere, and other earth system processes are being altered by humans.

Investing in a low-carbon economy seems to be the most ethical solution for a higher Anthropocene lifespan. Global carbon dioxide emissions from fuels and industry reached a record high in 2019 of 36.7 billion metric tons of CO_2. The Covid-19 pandemic caused a plummet of five percent to 34.81 billion metric tons (Friedlingstein *et al*., 2021). In the mentioned research, major global events cause emission reductions, i.e., the 2009 global recession caused worldwide CO_2 emissions to fall by approximately 460 million metric tons. Over the years, the main cause for the rise in CO_2 emissions is the energy sector. Speculative studies suggest that the global energy demand is expected to continue increasing in the coming decades as a consequence of the continuously growing population and economy (Qiu *et al.*, 2021; Lowe and Drummond, 2022; Scott *et al*., 2022).

When an investor considers purchasing an interest stake in a company located in BRICS countries, he should consider the environment influence of his decision. Thus, if the investor has a sustainable approach on his investment, he should consider the BRICS countries position regarding their CO_2 emissions.

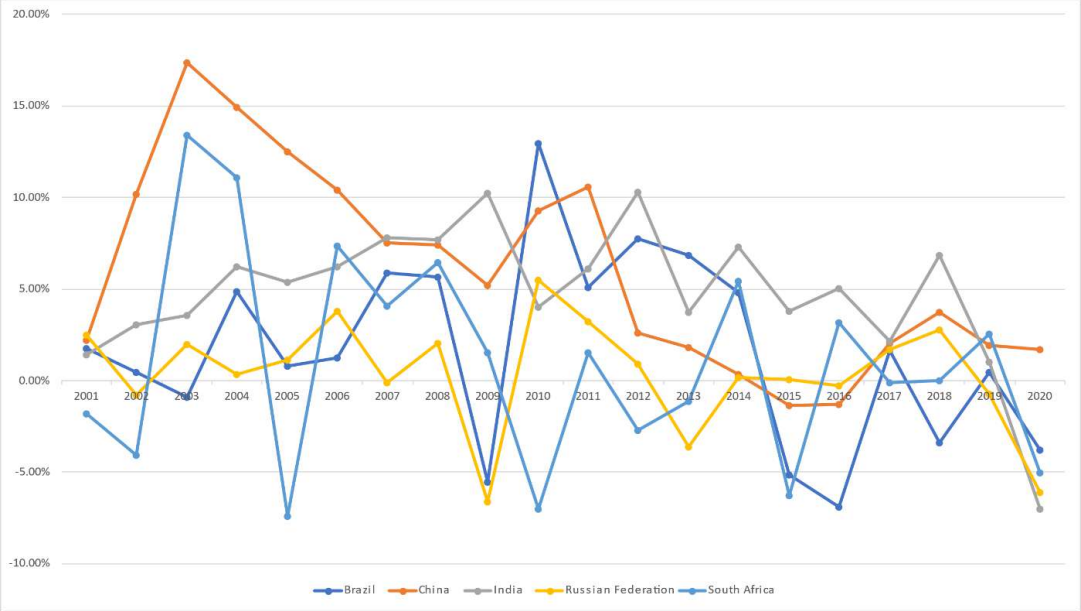


Figure 1. **BRICS emissions in percentages of MtCO2**
Source: Own processing after Friedlingstein *et al*. (2021), Andrew and Peters (2021).

The climate change and the preoccupation for reducing the greenhouse gas emissions is a challenge for the entire world and the Paris Climate Agreement and the UN SDGs are a proof that the whole planet tries to unlock synergies in order to reduce CO_2 emissions. As we can notice in figure 1, all BRICS countries recorded significant struggles in reducing the CO_2 emissions during the last 20 years. Nonetheless, China and India account for the majority of the CO_2 emissions. Moreover, India recorded permanent increases for 19 years until 2020, when it recorded maximum decrease of 7.01%. Given the fact that China is one of the most powerful countries in the world, and the first in the GDP ranking, it is the single one that recorded an increase of CO_2 despite the pandemic (1.70%). Out of the five countries, the Russian Federation is the one with the "cleanest approach" with a constant evolution of CO_2 emissions with small increases and significant decreases including 2020 (6.09%).

In Table 2, the growth in the CO_2 emissions is presented, considering the peaks (the highest increase and lowest decrease) but also the mean, considering the period 2001-2020 (since the recognition of the BRICS group).

Table 2. **The descriptive statistics of the CO_2 emissions in BRICS countries**

	Country			Country		
	Coal	**Gas**	**Oil**	**Coal**	**Gas**	**Oil**
		Brazil			**Russian Federation**	
MIN	-0.21	-0.74	-0.93	-0.08	-0.94	-0.95
MAX	3.92	0.34	0.09	0.07	0.08	0.08
MEAN	0.2108	0.0386	-0.0323	-0.0036	-0.038	-0.0352
		India			**China**	
Min	-0.64	-0.99	-0.82	-0.78	-0.2	-0.44

	Country			Country		
	Coal	**Gas**	**Oil**	**Coal**	**Gas**	**Oil**
Max	0.14	0.79	0.11	0.19	0.25	0.15
Mean	0.0237	0.0176	-0.0014	0.0207	0.1299	0.0229
	South Africa			**BRICS**		
Min	-0.89	-0.4	-0.88	-0.89	-0.99	-0.95
Max	0.1	1.58	0.91	3.92	1.58	0.91
Mean	-0.034	0.1013	0.0238	0.0435	0.0486	-0.0044

Source: Own processing using Our World in Data (2022)

China ranks the first place, being considered the most polluting country in the world, with 10.668 $MtCO_2$ in 2020. Pollution comes from oil – 1.612 $MtCO_2$ (rank 2), gas – 605 $MtCO_2$ (rank 4), and coal – 7.421 $MtCO_2$. Despite the Covid-19 pandemic, the pollution in China increased in 2020 compared to 2019 with 1.7%. The density of the population was 153 P/Km2 in 2020. Although China is the country which is polluting most in the world, the pollution per capita puts her in the 34th position in 2020 with 7.4 t CO_2/person.

Brazil ranks 12 in the world with 467$MtCO_2$ in 2020. Pollution comes from oil – 306 $MtCO_2$ (rank 8), gas – 53 (rank 29), and coal – 55 (rank 17). Considering the population density, in 2020, the pollution was 2.1 t CO_2/person (rank 71), and 2.1 t CO_2/person in 2019 (rank 73). The maximum pollution was reached in 2014, with a value of 2.8t CO_2/person. In the year 2020, Brazil recorded a decrease of 3.79% in the pollution with CO_2. Considering the three conventional energy sources, the maximum for coal is reached in Brazil, unexpectedly, in 2020, although the entire world was in lockdown (392.21%, from 62.07 to 305.51 $MtCO_2$).

CO_2 emission levels in India dropped for the first time in four decades in the year ending March 2020. In 2019-2020, there was a decrease emission per capita of 8.2%. The country ranks the fourth place, in the top of most polluting countries, with 2,442$MtCO_2$ in 2020. Pollution comes from oil – 603 $MtCO_2$ (rank 4), gas – 127 (rank 11), and coal – 1,588 (rank 2). There should be taken into consideration the fact that India has one of the densest populations on the world (464 P/Km^2 in 2020). In 2020, India recorded a positive record for the group, a decrease in pollution from gas of 98.70%.

After a decrease of 6.4% of the CO_2 emissions per capita in 2019-2020, Russian Federation ranks 5 in 2020, with 1,577$MtCO_2$. Pollution comes from oil – 389 $MtCO_2$ (rank 5), gas – 748 (rank 3), and coal – 357 (rank 7). Considering its population, Russia is the most polluted country in BRICS, with 11 t CO_2/person in 2020 (rank 22). Despite holding one of the biggest oil reserves in the world, of 107.2 billion barrels, which represents nearly 6.2% of the total global reserves (World Bank, 2021), in 2020, the pollution from this conventional energy source decreased with a record value of 94.91%.

South Africa recorded a 5.3% decrease in pollution in 2019-2020 and reached 452 MtCO2 in 2020. Pollution comes from oil – 37 $MtCO_2$ (rank 32), gas – 7.9 (rank 29), and coal – 394 (rank 6). Considering the pollution per person and the density of the population of 49 P/Km^2 in 2020, South Africa outranks China, with 7.6 t CO_2/person in 2020. The country holds the record, in 2004, for the highest increase in CO_2 emissions from gas, of 157.71%. Also, the country holds the record for the highest

increase in pollution from oil, in 2006, of 90.72%, and the highest decrease from coal, in 2020, of 89.43%.

The pollution of an economy comes from its CO_2 emissions. We notice that the BRICS countries, although being very desirable for investments, also occupy the first ranks in this department, which means they should reconsider their energy-related policy and reorient towards renewable sources and the status of low-carbon economy (LCE).

A LCE is an economy based on energy sources that produce low levels of CO_2. The benefits of such an economy can be substantial for both developed and developing countries. Considering that, until the end of the century, the energy needs will increase with 300% (Wang *et al.*, 2022), there are designs and implementations of low-emission development strategies (LEDS), but the way to a LCE is still a challenge (Darda *et al*., 2019). The goal is to reduce greenhouse gas emissions and achieve social, economic, and environmental success. To this extent, government policies must urgently implement sustainable transportation (Zhao *et al*., 2020), waste management strategies (Kanagaraj *et al*., 2015; Zorpas, 2020), sustainable tourism (Brady *et al*, 2007; Gulpin and Gulpin, 2011), and develop technologies which lead to decreases of CO_2 emissions. Concerning the latter, one of the common concerns is related to the concerns over the volatility of the price of crude oil (Omri and Nguyen, 2014).

Table 3. **The descriptive statistics of the renewable energy sources**

	Country			Country		
	Hydropower	**Solar**	**Wind**	**Hydropower**	**Solar**	**Wind**
	Brazil			**Russian Federation**		
Min	-0.12	0	-0.08333	-0.06939	0	0
Max	0.072276	7.756757	7.172414	0.1288	12	8.2738
Mean	0.01451	0.928258	0.644893	0.0143562	1.5505839	0.7409408
	India			**China**		
Min	-0.12138	-0.16979	0.0281	-0.02714	0.13442	0.10677
Max	0.18186	7.61839	0.47797	0.28065	2.0415	1.09823
Mean	0.0444478	1.0469801	0.1926605	0.0989543	0.6368951	0.4328454
	South Africa			**BRICS**		
Min	-0.70059	0	0	-0.70059	-0.16979	-0.08333
Max	1.17513	22.14651	24.29528	1.17513	22.14651	24.29528
Mean	0.0901358	1.5044851	1.4642846	0.0524807	1.1334404	0.6951248

Source: Own processing using Our World in Data (2022)

The leading countries for installed renewable energy in 2020 were China, the U.S., and Brazil. China was leading in renewable energy installations with a capacity of around 895 gigawatts, Brazil was a lot behind with 150 gigawatts, and India also can be found in the top ten ranking, on the fourth position, with 134 gigawatts, in the BRICS group, the leading position belongs to South Africa, with records for solar and wind-based energy.

2.2. Social factors for choosing to invest in the energy sector

The main indicator, used to evaluate the investment in human capital, is HDI (Human Development Index), which is a composite index, consisting of three main indicators: health, education, and level of economic well-being of the population.

There are opinions who consider that, although GDP is a fair measurement of the economic development, a sustainable approach should also put on the same ranking, the Human Development, in order to measure progress, freedom, and people's opportunity to live the life they want. The industrial revolution which started at the beginning of 20th century used energy as "fuel for development", but this came with a climate crisis, biodiversity collapse and rise of the oceans, as negative consequences of people shaping the planet instead of planet shaping people. The age of humans (the Anthropocene), although achieving incredible progress in the last hundred years, is focusing now majorly on both survival of the individual and the planet.

The care for the planet has imposed the care for the individuals, and the Covid-19 pandemic showed us the weaknesses in social, economic, and political systems on the planet (Human Development Report, 2020).

Table 4. **The evolution of the HDI in BRICS countries**

Year	Brazil	China	India	Russian Federation	South Africa	BRICS
2001	0.88%	1.36%	0.81%	0.83%	-3.17%	0.13%
2002	1.16%	1.68%	1.40%	0.82%	1.31%	1.25%
2003	-0.57%	1.98%	2.37%	1.09%	0.00%	0.88%
2004	0.43%	1.62%	1.74%	0.81%	0.00%	0.88%
2005	0.29%	1.91%	1.71%	0.67%	0.48%	0.96%
2006	0.29%	2.03%	1.87%	0.93%	0.64%	1.11%
2007	0.57%	2.14%	1.65%	1.18%	0.96%	1.28%
2008	1.56%	1.65%	1.44%	0.78%	2.22%	1.50%
2009	0.28%	1.33%	1.07%	-0.26%	1.39%	0.71%
2010	1.11%	1.75%	1.76%	1.03%	1.37%	1.38%
2011	0.55%	1.14%	1.55%	1.15%	0.15%	0.90%
2012	0.55%	1.27%	1.53%	1.01%	1.50%	1.15%
2013	2.45%	1.12%	1.17%	0.50%	1.48%	1.33%
2014	0.40%	0.97%	1.99%	0.62%	1.17%	0.98%
2015	0.00%	1.09%	1.30%	0.25%	1.15%	0.72%
2016	0.26%	0.95%	0.96%	0.74%	0.29%	0.63%
2017	0.40%	0.54%	1.59%	0.61%	0.28%	0.66%
2018	0.13%	0.67%	0.31%	0.37%	0.28%	0.35%
2019	0.39%	0.79%	0.47%	0.12%	0.28%	0.41%

Source: Human Development Report, 2020

As it can be noticed in Table 4, HDI recorded a permanent increase in the last 10 years, and in the previous years since its implementation there are few instances when the standard of living decreased (i.e., Brazil in 2003 recorded a decrease of 0.57%, Russian Federation in 2009 a decrease of 0.26%, and South Africa in 2001 a decrease of 0.17%). Overall, the BRICS group recorded a constant growth of this index, which means that the status of emerging markets and the economic development were reflected in an increase in the well-being of the population. The data from the table confirm the description of these countries. Brazil and China are ones of the largest countries in the world and their position is quite similar (ranking 84 and 85, respectively, in HDI ranking), despite the fact that China recorded an improvement in the last 10 years in its living conditions. This is the result of both high industrialization and the care for sustainable development, as data referring to renewable energy show. For India, there is a constant and significant increase of the index, but, due to its precarious living conditions, it ranks last in the group (occupying the 131st position in HDI ranking). For Russian Federation, there were constant increases in the 2010's, but in the last years the

increases were insignificant, yet it ranks 1st in the group (occupying the 52nd position in HDI ranking). The position of South Africa is quite low, considering its permanent interest for renewable energy and its privileged status in African countries (it ranks 114 for HDI).

2.3. Financial factors that contribute to the choice for an investment in the energy sector. The role of auditing in choosing sustainable target companies

When choosing a target company, an acquirer has two perspectives: a non-financial one, which is related to the target company's attitude towards environment, community, and people, and a financial one, which can lead to potential synergies.

The external audit enhances the credibility of the disclosed financial figures, provided by a company that involves in M&As and can also offer a proper insight on the value of the bidding company, especially when we discuss the methods of payment chosen by the acquirer (Faccio and Masulis, 2005; Bouwman *et al*., 2009).

The trust in the external audit in proving an unqualified opinion on the target company's financial number is also analyzed by Xie *et al*. (2013), who assert that companies which are audited by Big N auditors are more probable to being acquired in a M&A transaction, especially the ones with high information risk (reflected in low accruals quality), due to high assurance and insurance values provided by the auditors. The assertion is also sustained by the study of Lim and Lee (2015), who found a direct relationship between the quality of the financial information provided by the target company and the success of the M&A, measured in the announcement returns recorded by the acquirers. Chang and Sun (2009) show that a high-quality external financial statement audit also mitigates information asymmetry and, hence, reduces the impact of market-timing behavior on the company's capital structure.

3. Why invest in the energy sector in BRICS countries?

The geographic scope of M&A shows two different dynamics: a trend towards the creation of pan-world players and an opposite trend towards the establishment of "national champions" (Verde, 2008). In the energy sector, there is a tendency towards concentration (Guo *et al*., 2021). Oil is a strategic natural resource, thus making the M&As in the sector commercial transactions, but also a response to geopolitical games (Yergin, 2011).

While in the 1980s, US and Europe encouraged their MNEs to expand globally, to unify the upstream and downstream enterprises through M&As in the present the M&A rationale is shifting from resource acquisition to technical know-how to obtain deep-water reserves, coalbed methane, shale gas, and other unconventional technologies. In this new environment, investment competition is increasing between international and national companies in the sector (Waterworth and Bradshaw, 2018; Guo *et al*., 2021). In this context, the number and competitive relationships of the companies in the energy sector is expected to change accordingly.

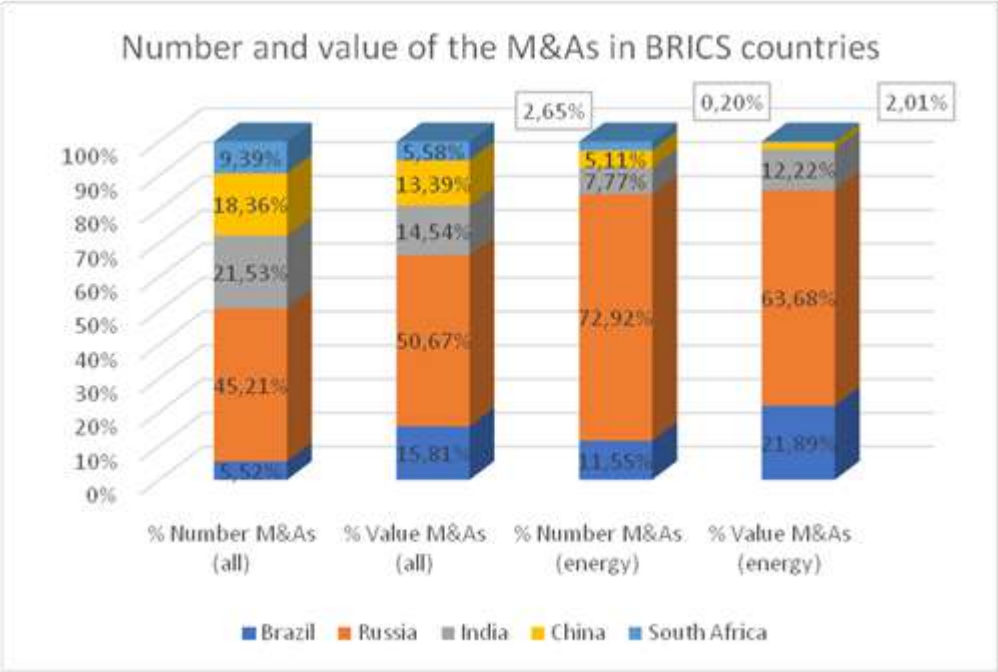


Figure 2. **The number and value of M&As in BRICS countries in 2010-2018 (all and energy sector)**

According to Figure 2, Brazil holds the second position as number and value of the M&As in the energy sector, as target country, and it is an important country to be invested in, given its stable energy policies and support of wind and solar power development by tendering specific tariffs for energy generation, as we can also notice in Table 3. Russia, one of the countries with the biggest oil reserves in the world, holds the first rank in the five countries, considering the value and number of M&As in the energy sector, fact that makes it desirable for investors. It also needs improvement in its legal and regulatory framework with more incentives in energy policies. Although not being very active on the M&A market, China is improving upon wind and hydropower, but it needs strong policy measures to control on its increased CO_2 emissions. India needs revision in energy policy and requires extra incentives and consumer specific energy policies for research-infrastructure and energy generation technologies. South Africa increased its renewable energy sources, as Table 3 shows, and it must reduce gas and oilCO_2 emissions. Yet, it is far for the values recorded by the other countries in the group.

BRICS countries need to redefine their energy policies based upon their existing geographical, economical, societal, and environmental conditions. Also, they have the potential to reshape the energy sector in the world, but also the energy policies, given their potential and their sustainable approach towards the sources of energy (Pathak and Shah, 2019).

4. Research hypotheses

Talking about investing in M&As, the factors which motivate the acquirers to pursue an external growth strategy are multiple. Given the EU and UN approach towards climate change, any measure which sustains a clean environment must be saluted. Considering this, the paper assesses the influence of both non-financial and financial factors on the decision of the investors to pursue a M&A in the energy sector.

Based on previous assumptions, we propose first two hypotheses to be tested and validated:

H_1: *The environmental and social factors significantly influence the choice for investing in a company from the energy sector, compared to one which does not operate in this sector, located in BRICS countries*.

This hypothesis responds to the first research question.

H_2: *The financial factors significantly influence the choice for investing in a company from the energy sector, compared to one which does not operate in this sector, located in BRICS countries*.

This hypothesis responds to the second research question, proposed in the introduction of the paper.

5. Research methodology

5.1. Target population, analysed sample and data source

To test and validate the proposed research hypotheses, the study analyses the empirical data related to 4,222 M&As with known purchased stake. To confirm the research hypotheses, the data regarding M&As were gathered from two databases, for the 2005-2018 period, considering only the target companies from BRICS countries. The information regarding the deals representing M&As was collected from the Zephyr database; financial information was collected from Orbis database.

5.2. Models proposed for analysis and data source

To test and validate the four hypotheses, the method used is logistic regression, in order to analyse the choice for the energy sector (or not), based on specific independent variables.

The probability (p) of choosing to invest in a company in the energy sector is significantly influenced by:

$$Log\left(\frac{p}{1-p}\right) = f(coutry - BRICS; HDI; CO_2\ emissions) \qquad \text{Eq. (1)}$$

- variables are considered for a period between the time of the M&A and 3 years before the M&A. The 3 years period is used in other studies, and it is representative in analysing the growth operations (Mehrotra and Sahay, 2022; Mun *et al.*, 2021).

Based on the estimated probability *(p)* from the logistic regression, we use the predicted from eq. (1) to consider the influence of the factors related to financial performance:

$$Predicted\ (p) = g(financial\ performance) \qquad \text{Eq. (2)}$$

where financial performance can be explained by the following factors:

$$Predicted\ (p) = g(audit\ status; ROE; ROCE; MC\ growth; Z_{transparency\ score}) \quad \text{Eq. (3)}$$

where:

$MC\ growth = \frac{MC_i - MC_{i-1}}{MC_{i-1}}$ as market capitalisation growth

and

$Z_{transparency\ score}$ = the estimated discretionary accruals using operating cash flow (Dechow & Dichev, 2002)

For testing and validating the proposed hypotheses, data analysis would be performed using the statistical SPSS 26.0.

6. Results and discussions

In our sample of interest, according to Table 5, which consists of the companies that are targeted by the EU acquirers in the BRICS countries, 334 are from the energy sector. Most of them are from the Russian Federation (53.89%), but this is to be expected given the natural resources of this emerging economy. Russian Federation is known as the second largest exporter of oil and fossil-based fuels (Astrov, 2010) and it has a strategy in the energy sector known as "Energy strategy until 2030". The second place belongs to India, with 20.36%. India's power sector is one of the most diversified in the world, including a wide range of sources from conventional ones (coal, lignite, natural gas, oil) to non-conventional sources, such as wind, solar and agricultural waste. The last place is held by Brazil with only 8 companies (2.32%), but this is explained by the fact that its top exports are soybeans, iron ore, raw sugar, and meat (Brazil exports, 2022). Despite this, the probability for choosing an energy target company reaches the maximum value for Brazil, and this can be explained by the fact that is an unexplored market. The lowest value is recorded for South Africa, a possible explanation is due to the fact that its major resource are diamonds since 1868 when the Kimberley diamond strike imposed this emerging economy as the world leader in diamond production.

< Insert Table 5 here >

Considering our first hypothesis and results from Table 6, we notice that the choice for target companies from the energy sector in BRICS countries is a significant variable next to HDI scores, and CO2 emissions, three years before the M&A. The choice for BRICS underlines once again their potential as the world's most visible and powerful emerging economies. This can be a strategy for EU acquirors which consider and plan their investments years before the transaction effectively takes place. Considering the social factors, we also notice that the CO2 emissions for the year of the M&A is a significant variable at 5% (sig. = 0.014), which means that despite this controversial investment which can be polluting, the EU acquirors are interested in the well-being of the population.

< Insert Table 6 here >

According to data from Table 7, 8 and 9, we can see a profile of the target companies in the energy sector based on their financial data at the country level. Although the Russian companies record highest ROE for the year of the M&A and prior to the event, in average the best position is held by China three years before the M&A (16.03%). The situation changed in the year of the M&A, and the year before the M&A when we see that the most profitable companies are in South Africa. Also, in average, the Russian companies rank last considering the efficiency of using shareholders' equity for obtaining profits. Actually, in all the four years considered, the Russian companies are, on average, inefficient in exploiting their equity. The situation is similar for the return on capital employed (ROCE). In the case of market capitalization, Brazil records the best situation followed by China in all four years. The last ranking position is held by India, but this is to be expected given the fact that its capital market is in continuous expansion (Vishal, 2020). When describing our sample of interest (target companies in energy sector) we must take into account their audit status given the strategic importance of energy as a driver for all other industries. In the four years, all the 334 companies were audited and the Russian Federation ranks first for the companies with "qualified" audit opinion on their financial statements.

< Insert Tables 7, 8 and 9 here >

Starting from all the M&As that focused on BRICS target companies with acquirors from the EU (4,222 transactions), in Table 11 we can observe the audit status of the target companies (not only the energy ones) and its evolution in the four years span. One thing that seems interesting is that most of the companies from the sample are unaudited (3,574 companies, representing 84.65%), but none of them is from energy sector. Thus, considering the data from Table 10, it is highly recommended that the companies from energy sectors to be audited.

< Insert Tables 10 and 11 here >

Considering the data from Table 12 and our second study hypothesis, the audit status is a variable of high importance when choosing between target companies in energy sector compared to other sectors. Thus, the acquirors from the EU tend to choose companies which are audited two to one year prior the M&A event. For the year of the transaction, the acquirors do not prefer a company with a qualified opinion on their financial statements, but an unaudited one. Considering the influence of the financial factors, the only variable of interest is the return of the capital employed, two years before the M&A. This situation can be translated in the importance of the sector as a whole, acquirers not paying too much importance to the financial data reported by the target companies.

< Insert Tables 12 here >

The audit status and, implicitly, the unqualified opinion on the financial statements is enough in certifying the quality of the financial information. This must be correlated with the transparency score, which is a significant variable for the year of the M&A and the year prior the transaction. When considering the type of deal, mergers and takeovers are not strategically appealing, the EU acquirors preferring alliances, and purchases of stakes (either leading to majority or minority acquisitions). This is due to certain

country laws given the fact that the energy sector is of major importance at the country level.

7. Conclusions

The energy sector is a sector with high potential for all the countries in the world and the BRICS emerging economies are key strategic countries due to their geographical position and ways of exploiting different sources of energy. All BRICS countries present high potential for exploiting renewable energy (hydropower, solar, and wind), also we assist to a transition to sustainable energy (non-fossil).

In the case of our M&A sample, the environmental and social factors don't assert a constant significant influence in choosing a target company from energy sector except the emissions of carbon dioxide. On the other hand, the audit opinion on the financial statements prove that is highly significant especially the unqualified one. Actually, there are no target companies chosen for M&A which are not audited, and this can be explained by the strategic potential of the sector as a driver for all the other industries. Also, the results show that the financial data of the target companies have less to no influence on the choice for the target companies in the energy sector.

The EU acquirors are interested in BRICS as countries with the most potential for M&As in the energy sector. Also, Brazil takes the lead in the probability for external growth strategies known as M&As despite the fact that at this point that the most transactions are made with the Russian Federation companies. Up until now, EU states have been importing 2.2 million barrels per day (bpd) of crude oil from Russia and 1.2 million bpd of oil products. Given the soaring price of oil, this has been earning Russia over $1m (£800,000) a day. In its latest attempt to punish Russia for its invasion of Ukraine, the European Union is to ban all imports of oil from Russia that are brought in by sea (31 May 2022). It says this could cut the amount of oil that EU countries import from Russia by up to 90%, reducing the amount of money the Russian government makes from oil sales.

Acknowledgments

This work was supported by a grant of the Romanian Ministry of Education and Research, CNCS - UEFISCDI, project number PN-III-P1-1.1-TE-2019-1642, within PNCDI III.

References

Ali, A., Tufa, R.A., Macedonio, F., Curcio, E., &Drioli, E. (2018) "Membrane technology in renewable-energy-driven desalination", *Renewable and Sustainable Energy Reviews*, Vol. 81: 1-21.

Andriuškevičius, K. & Štreimikienė, D. (2021) "Developments and Trends of Mergers and Acquisitions in the Energy Industry", *Energies*, Vol. 14, No. 8: 2158.

Ardichvili, A., Zavyalova, E., & Minina, V. (2012) "Human capital development: comparative analysis of BRICs", *European Journal of Training and Development*, Vol. 36, No. 2/3: 213-233.

Becker, U. (2014) *Introduction to BRIC,* in Becker, U. (ed.), *The BRICs and Emerging Economies in Comparative Perspective. Political economy, liberalisation and institutional change,* Routledge, Taylor and Francis Group: London.

Bekaert, G. & Harvey, C.R. (2017) "Emerging equity markets in a globalizing world*",* available on-line at: http://ssrn.com/abstract=2344817.

Bouwman, C., Fuller, K., & Nain, A. (2009) "Market Valuation and Acquisition Quality: Empirical Evidence", *The Review of Financial Studies,* Vol. 22, No. 2: 633-679.

Brady, D., Kaya, Y., & Beckfield, J. (2007) "Reassessing the effect of economic growth on well-being in less-developed countries, 1980–2003", Studies in Comparative International Development, Vol. 42: 1-35.

Chang, J. & Lian Sun, H. (2009) "Crossed-listed Foreign Firms' Earnings Informativeness, Earnings Management and Disclosures of Corporate Governance Information under SOX", *The International Journal of Accounting*, Vol. 44: 1-32.

Chang, T., Lee, C., & Hung, K. (2012) "Can the PPP Stand on the BRICS? The ADL Test for Threshold Cointegration", *Applied Economics Letters,* Vol. 19, No.12: 1123-1127.

Crutzen, P. J. (2002) "Geology of mankind", *Nature,* Vol. 415: 23.

Darda, S., Papalas, T., & Zabaniotou, A. (2019) "Biofuels journey in Europe: Currently the way to low carbon economy sustainability is still a challenge", *Journal of Cleaner Production,* Vol. 208: 575-588.

Dechow, P. & Dichev, I. (2002) „The quality of accruals and earnings: The role of accrual estimation errors", *The Accounting Review*, Vol. 77 (Supplement): 35-59.

Dlugokencky, E. & Tans, P. (2020) "Trends in atmospheric carbon dioxide, National Oceanic & Atmospheric Administration, Earth System Research Laboratory (NOAA/ESRL)", available on-line at http://www.esrl.noaa.gov/gmd/ccgg/trends/global.html.

Drymbetas, E. & Kyriazopoulos, G. (2014) "Short-term Stock Price Behaviour around European Cross-border Bank M&As", *Journal of Applied Finance & Banking*, Vol. 4, No. 3: 47-70.

Faccio, M. & Masulis, R. (2005) "The Choice of payment Method in European Mergers and Acquisitions", *The Journal of Finance*, Vol. 60, No. 3: 1345-1388.

Fletcher, O. (2011) "China Seeks Heft for "BRICS", available on-line at https://www.wsj.com/articles/SB10001424052748703841904576256413453368944.

Friedlingstein *et al*. (2021), "Global Carbon Budget", available on-line at https://essd.copernicus.org/preprints/essd-2021-386/.

Gilpin, R. & Gilpin, J.M. (2011) *Global Political Economy: Understanding the International Economic Order,* Princeton University Press: Princeton, NJ, USA.

Gregory, A. & O'Donohoe, S. (2014) "Do cross border and domestic acquisitions differ? Evidence from the acquisition of UK targets", *International Review of Financial Analysis*, Vol. 31: 61-69.

Guo, Y., Yang, Y., & Wang, C. (2021) "Global energy networks: Geographies of mergers and acquisitions of worldwide oil companies", *Renewable and Sustainable Energy Reviews*, Vol. 139: 110698.

Güriş, B. & Tiraşoğlu, M. (2018) "The Validity of Purchasing Power Parity in BRICS Countries", *Prague Economic Papers, University of Economics,* Vol. 4: 417-426.

Kanagaraj, J., Senthilvelan, T., Panda, R.C., & Kavitha, S. (2015) "Eco-friendly waste management strategies for greener environment towards sustainable development in leather industry: a comprehensive review", *Journal of Cleaner Production,* Vol.89: 1-17.

Knox, J.H. (2009) "Climate change and human rights law", *Virginia Journal of International Law*, Vol. 50: 163.

Lim, J. & Lee, J. (2015) "Financial reporting quality of target companies and acquirer returns: evidence from Korea", *International journal of accounting & information management*, Vol. 23, No. 1: 16-41.

Lowe, R.J., & Drummond, P. (2022) "Solar, wind and logistic substitution in global energy supply to 2050–Barriers and implications", *Renewable and Sustainable Energy Reviews*, Vol. 153: 111720.

Lugo-Morin, D.R. (2021) "Global Future: Low-Carbon Economy or High-Carbon Economy?", *World*, Vol. 2, No. 2: 175-193.
May, P.H. (2008) "Overcoming contradictions between growth and sustainability: Institutional innovation in the BRICS", *Chinese Journal of Population Resources and Environment*, Vol. 6, No. 3: 3-13.
Mardiros, D.N., & Dicu, R.M. (2015) "Progressive Landmarks Regarding the Budgetary Expenses at the Main Authorized Credit Officers", *Audit Financiar*, Vol. 13, No. 129: 102-112.
Mehrotra, A., & Sahay, A. (2022) "Financial Performance of Firms Pre-and Post-M&A: A Study of Selected Indian Acquirers", *Vision*, 09722629221087367.
Moeller, S. & Schlingemann, F. (2005) "Global diversification and bidder gains: A comparison between cross-border and domestic acquisitions", *Journal of banking & Finance,* Vol. 29, No. 3: 533-564.
Mun, S. G., Koh, Y., & Jang, S. (2021) "Which Type of M&A Makes an Acquiring Restaurant Firm a Star? Profit-Driven Versus Growth-Driven M&A", *Cornell Hospitality Quarterly*, Vol. 63, No.3: 369-384.
Nerini, F.F., Sovacool, B., Hughes, N., Cozzi, L., Cosgrave, E., Howells, M., Tavoni, M., Tomei, J., Zerriffi H. & Milligan, B. (2019) "Connecting climate action with other Sustainable Development Goals", *Nature Sustainability*, Vol. 2, No. 8: 674-680.
Omri, A., & Nguyen, D.K. (2014) "On the determinants of renewable energy consumption: International evidence", *Energy*, Vol. 72: 554-560.
Prakash, A. & Kumar, G. (2017) "The effect of macroeconomic indicators on foreign direct investment of BRICS countries – an insight into econometric models", *Journal on Management Studies,* Vol. 3, No. 1: 440-446.
Qiu, S., Lei, T., Wu, J., & Bi, S. (2021) "Energy demand and supply planning of China through 2060" *Energy*, Vol. 234: 121193.
Scott, K., Smith, C.J., Lowe, J.A., & Carreras, L.G. (2022) "Demand vs supply-side approaches to mitigation: What final energy demand assumptions are made to meet 1.5 and 2° C targets?", *Global Environmental Change*, Vol. 72: 102448.
Shah, K.U., Arjoon, S. & Rambocas, M. (2016) "Aligning corporate social responsibility with green economy development pathways in developing countries", *Sustainable Development*, Vol. 24, No. 4: 237-253.
Shen, C.-H., Chen, Y., Hsu, H.-H. & Lin, C.-Y. (2019) "Banking Crises and Market Timing: Evidence from M&As in the Banking Sector", *Journal of Financial Services Research*, Vol. 57: 315-347.
Smimou, K. (2015) "Regional equity market conditions and cross-border mergers and acquisitions (M & A): Evidence from the BRIC, Eastern Europe, and Africa", *International Journal of Emerging Markets,* Vol. 10, No. 3: 535-559.
Su, C., Chang, H., Chang, T. & Lee, C. (2012) "Purchasing Power Parity for BRICS: Linear and Nonlinear Unit Root Tests with Stationary Covariates", *Applied Economics Letters,* Vol. 19, No. 16: 1587-1591.
UNCTAD (2021) "World Investment Report. Investing in sustainable recovery", available on-line at https://unctad.org/system/files/official-document/wir2021_en.pdf.
UNCTAD (2017) "World Investment Report. Investment and the Digital Economy", available on-line at https://unctad.org/en/PublicationsLibrary/wir2017_en.pdf.
United Nations Development Programme (2020), "Human Development Report", available on-line at https://report.hdr.undp.org/.
Verde, S. (2008) "Everybody merges with somebody – The wave of M&As in the energy industry and the EU merger policy", *Energy policy*, Vol. 36, No. 3: 1125-1133.
Very, P. & Schweiger, D. (2001) "The acquisition process as a learning process: Evidence from a study of critical problems and solutions in domestic and cross-border deals", *Journal of World Business*, Vol. 36, No. 1: 11-31.
Vishal, C. (2020) "Fpi/fii investment trends in India financial markets", *International Journal of Advanced Research in Management and Social Sciences*, Vol. 9, No. 2: 30-37.

Wang, Q., Jiang, R. & Zhan, L. (2019) “Is decoupling economic growth from fuel consumption possible in developing countries? A comparison of China and India”, *Journal of Cleaner Production*, Vol. 229: 806-817.

Wang, W. (2005) “An evaluation of the Balanced Scorecard® in equity valuation”, *Journal of Intellectual Capital*, Vol. 6, No. 2: 206-221.

Wang, W., Fan, L. W., & Zhou, P. (2022) “Evolution of global fossil fuel trade dependencies”, *Energy*, Vol. 238: 121924.

Wang, Y., Lu, Y., He, G., Wang, C., Yuan, J. & Cao, X. (2020) “Spatial variability of sustainable development goals in China: A provincial level evaluation”, *Environmental Development*, Vol. 35: 100483.

Waterworth, A., & Bradshaw, M. J. (2018) “Unconventional trade-offs? National oil companies, foreign investment and oil and gas development in Argentina and Brazil”, *Energy policy*, Vol. 122: 7-16.

Xie, Z., Yi, H.S. & Zhang, Y. (2013) “The value of Big N target auditors in corporate takeovers”, *Auditing: A Journal of Practice & Theory*, Vol. 32, No. 3: 141-169.

Yergin, D. (2011) *The prize: The epic quest for oil, money & power*, New York: Simon and Schuster Inc.

Zalasiewicz, J., Williams, M., Smith, A., Barry, T.L., Coe, A.L., Bown, P.R., Brenchley, P., Cantrill, D., Gale, A., Gibbard, P., Gregory, F.J., Hounslow, M.W., Kerr, A.C., Pearson, P., Knox, R., Powell, J., Waters, C., Marshall, J., Oates, M., Rawson, P. & Stone, P. (2008) “Are we now living in the Anthropocene?”, Vol. 18, No. 2: 4-8. Available on-line at https://www.geosociety.org/gsatoday/archive/18/2/pdf/i1052-5173-18-2-4.pdf.

Zhao, X., Ke, Y., Zuo, J., Xiong, W., & Wu, P. (2020) “Evaluation of sustainable transport research in 2000–2019”, *Journal of Cleaner Production*, Vol. 256: 120404.

Zorpas, A. A. (2020) “Strategy development in the framework of waste management”, *Science of the total environment*, Vol. 716: 137088.

Appendixes

Table 5. **The descriptive statistics related to the predicted probability (*p*) of choosing to invest in a company in the energy sector from BRICS**

Predicted probability by target country	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1 - Brazil	8	,3692036	,04381650	,01549147	,3325721	,4058351	,29915	,42583
2 - Russian Federation	180	,3198821	,02529769	,00188558	,3161613	,3236029	,29583	,36531
3 - India	68	,3900826	,00878574	,00106543	,3879560	,3922092	,37970	,40158
4 - China	19	,2879549	,00767221	,00176013	,2842570	,2916527	,27238	,30855
5 - South Africa	59	,2793150	,00914234	,00119023	,2769325	,2816975	,26229	,28446
Total	334	,3263735	,04230715	,00231494	,3218198	,3309273	,26229	,42583

Table 6. **The parameters estimate for the variables included in Eq (1) related to the probability (*p*) of choosing to invest in a company in the energy sector**

		B	S.E.	Wald	df	Sig.	Exp(B)
Eq(1)[a]	**Target_country**	**-,151**	**,046**	**10,670**	**1**	**,001***	**,860**
	HDIscores3yearsbefore	**-18,008**	**11,034**	**2,663**	**1**	**,005***	**,000**
	HDIscores2yearsbefore	21,711	16,845	1,661	1	,197	2685757444,992
	HDIscores1yearbefore	5,102	16,494	,096	1	,757	164,399
	HDIscoresyearofthe MA	-12,090	11,953	1,023	1	,312	,000
	CO2emissionspercapita3yearsbefore	**-,301**	**,126**	**5,703**	**1**	**,017***	**,740**
	CO2emissionspercapita2yearsbefore	-,135	,175	,593	1	,441	,874
	CO2emissionspercapita1yearbefore	,124	,163	,580	1	,446	1,132
	CO2emissionspercapitayearofthe MA	**,339**	**,139**	**5,994**	**1**	**,014***	**1,404**
	Constant	1,903	,702	7,341	1	,007	6,707

Variable(s) entered in the the eq(1): Target_country, HDIscores3yearsbefore, HDIscores2yearsbefore, HDIscores1yearbefore, HDIscoresyearofthe, CO2emissionspercapita3yearsbefore, CO2emissionspercapita2yearsbefore, CO2emissionspercapita1yearbefore, CO2emissionspercapitayearofthe.

* Significant values for 5% risk level

Table 7. **The descriptive statistics of ROE for the companies from BRICS**

		N	Mean	Std. Deviation	Minimum	Maximum
ROE using P/L before tax (%) 3 years before M&A	Brazil	8	4,4963750	22,18295841	-42,72500	35,60700
	Russian Federation	180	-9,4574414	103,98192043	-625,86400	120,93880
	India	68	11,4952103	35,21337891	-245,31470	62,01700
	China	19	16,0280526	13,38602066	-8,77800	52,93500
	South Africa	59	14,4048486	97,86371243	-711,66500	76,23000
	Total	334	,8075596	88,74798413	-711,66500	120,93880
ROE using P/L before tax (%) 2 years before M&A	Brazil	8	8,0516250	18,39045705	-18,41200	32,42000
	Russian Federation	180	-16,1543712	104,15798779	-625,86400	120,50800
	India	68	7,5078480	67,32403497	-524,76234	61,66600
	China	19	16,8813684	11,67606568	-7,72800	48,77800
	South Africa	59	32,2033729	24,36090993	-2,98200	124,58400
	Total	334	-,3356142	84,94407492	-625,86400	124,58400
ROE using P/L before tax (%) 1 year before M&A	Brazil	8	2,9012500	20,43912072	-36,25900	32,92200
	Russian Federation	180	-8,8739126	94,83963868	-644,29477	606,24200
	India	68	19,3627704	39,55201025	-138,89000	213,57100
	China	19	17,2962105	7,69232539	1,03800	33,56600
	South Africa	59	22,1523220	26,73508520	-100,90800	66,04100

		N	Mean	Std. Deviation	Minimum	Maximum
	Total	334	4,1263147	74,11073787	-644,29477	606,24200
ROE using P/L before tax (%) year of M&A	Brazil	8	-4,9881250	35,96709870	-81,60900	32,80800
	Russian Federation	180	-4,3866436	106,57048970	-823,65339	636,29500
	India	68	2,3454536	46,83346738	-210,45600	51,95700
	China	19	16,1743684	10,77120281	-8,95200	39,42700
	South Africa	59	19,4696610	26,10807992	-119,23700	61,76600
	Total	334	2,3533323	82,38393036	-823,65339	636,29500

Table 8. **The descriptive statistics of ROCE for the companies from BRICS**

		N	Mean	Std. Deviation	Minimum	Maximum
ROCE using P/L before tax (%) 3 years before M&A	Brazil	8	21,4129418	26,43420883	-4,80500	69,38481
	Russian Federation	180	9,6453958	43,55633227	-334,12100	95,49500
	India	68	15,2212255	32,75710924	-217,44200	65,83000
	China	19	13,6036316	8,02506773	-,27500	32,53800
	South Africa	59	22,3934068	17,73208770	-26,02200	68,45300
	Total	334	13,5395153	36,50717961	-334,12100	95,49500
ROCE using P/L before tax (%) 2 years before M&A	Brazil	8	23,6243408	40,35560946	-4,22400	119,54673
	Russian Federation	180	-2,1473116	103,01620367	-860,45600	58,35482
	India	68	7,2095612	102,74288101	-812,25800	77,33960
	China	19	14,2904211	6,72572803	-1,87100	30,40800
	South Africa	59	24,7143680	15,58262238	-,05400	67,59800
	Total	334	6,0550734	89,53778243	-860,45600	119,54673
ROCE using P/L before tax (%) 1 year before M&A	Brazil	8	29,6110068	56,49121652	-5,55000	166,38705
	Russian Federation	180	1,0769368	77,32075949	-514,28600	492,75000
	India	68	18,9187457	28,36422109	-65,21200	182,82900
	China	19	15,9964211	6,84405673	5,43700	29,79800
	South Africa	59	18,9026441	20,49383667	-62,40400	69,70800
	Total	334	9,3904173	60,02125409	-514,28600	492,75000
ROCE using P/L before tax (%) year of M&A	Brazil	8	37,9489060	82,02709900	-10,27900	238,15725
	Russian Federation	180	3,5401156	90,94477885	-860,45600	501,15300
	India	68	10,2897907	26,44523298	-92,97328	94,85100
	China	19	14,8113158	9,44562997	-3,36400	38,84000
	South Africa	59	17,1936949	16,93003730	-41,74000	87,88500
	Total	334	8,7914995	69,52126967	-860,45600	501,15300

Table 9. **The descriptive statistics of MC for the companies from BRICS**

		N	Mean	Std. Deviation	Minimum	Maximum
Market capitalisation 3 years before M&A	Brazil	8	9766,56490	1415423,89159445	-745,08999	45085,65494
	Russian Federation	180	6280,85433	3812325,64418526	-29230,02444	45164,62495
	India	68	1100,24436	60 2811,73180042	-208,64797	22721,54147
	China	19	8675,75529	9019032,43310002	532,37160	67064,76560
	South Africa	59	1886,71120	79 2753,33570371	-49,96468	20210,90269
	Total	334	4669,63541	3610773,69535773	-29230,02444	67064,76560
Market capitalisation 2 years before M&A	Brazil	8	814522,99	4965528251,28871100	-377,94845	83578,19537
	Russian Federation	180	7261,86712	9714244,87355946	-19237,58988	42454,14908
	India	68	1439,31711	12 4577,91758039	8,75068	37802,91477
	China	19	8575,26684	3618407,31148438	776,78990	70568,24973
	South Africa	59	2040,24947	36 4267,80312060	7,15653	33115,99319
	Total	334	5402,68980	7212696,80497674	-19237,58988	83578,19537

		N	Mean	Std. Deviation	Minimum	Maximum
Market capitalisation 1 year before M&A	Brazil	8	13234,975130427	171,61617374	-860,6805879	661,94833
	Russian Federation	180	6356,830206512	959,12253845	-18534,83260	57222,89968
	India	68	1851,7648343	4625,90937955	-39,3898837	044,01830
	China	19	11346,124114823	419,12391343	1023,2418679	743,53601
	South Africa	59	2469,2084923	7709,84022587	4,7838459	835,81741
	Total	334	5201,463790912	575,30777000	-18534,83260	79743,53601
Market capitalization year of M&A	Brazil	8	10966,258121522	541,29044362	-371,7310865	996,04004
	Russian Federation	180	5874,888114711	806,31170194	-18052,80688	44722,03317
	India	68	1844,5085718	4413,65191614	49,5911733	825,10213
	China	19	9916,519531219	326,40071228	1149,0583267	064,76560
	South Africa	59	2352,7855263	6915,90325515	4,5443553	807,90199
	Total	334	4784,026124711	132,11141216	-18052,80688	67064,76560

Table 10. **Audit status for the companies from BRICS**

		Audit status 3 years before M&A		
		Qualified	Unqualified	Total
Target_country	Brazil	0	8	8
	Russian Federation	15	165	180
	India	0	68	68
	China	0	19	19
	South Africa	0	59	59
Total		15	319	334

		Audit status 2 years before M&A		
		Qualified	Unqualified	Total
Target_country	Brazil	0	8	8
	Russian Federation	11	169	180
	India	1	67	68
	China	0	19	19
	South Africa	0	59	59
Total		12	322	334

		Audit status 1 year before M&A		
		Qualified	Unqualified	Total
Target_country	Brazil	0	8	8
	Russian Federation	10	170	180
	India	3	65	68
	China	0	19	19
	South Africa	0	59	59
Total		13	321	334

		Audit status year of M&A		
		Qualified	Unqualified	Total
Target_country_ctg	Brazil	0	8	8
	Russian Federation	13	167	180
	India	7	61	68
	China	0	19	19
	South Africa	0	59	59
Total		20	314	334

Table 11. **The descriptive statistics related to the predicted probability (*p*) of choosing to invest in a company in the energy by audit status**

Audit status 2 years before M&A	Audit status 1 year before M&A	Audit status year of M&A	Typeofdeal_ctg	Mean	Std. Deviation	N
Qualified	Qualified	Qualified	Majority stake	,4015772	.	1
			Minority stake	,3252177	,01027991	3
			Total	,3443076	,03909152	4
		Unqualified	Minority stake	,3520095	,01243686	7
			Total	,3520095	,01243686	7
		Total	Majority stake	,4015772	.	1
			Minority stake	,3439720	,01714900	10
			Total	,3492088	,02379809	11
	Unqualified	Qualified	Minority stake	,2958288	.	1
			Total	,2958288	.	1
		Unqualified	Minority stake	,3292106	,02108509	14
			Total	,3292106	,02108509	14
		Total	Minority stake	,3269852	,02207069	15
			Total	,3269852	,02207069	15
	Total	Qualified	Majority stake	,4015772	.	1
			Minority stake	,3178705	,01692271	4
			Total	,3346118	,04020136	5
		Unqualified	Minority stake	,3368103	,02136972	21
			Total	,3368103	,02136972	21
		Total	Majority stake	,4015772	.	1
			Minority stake	,3337799	,02160027	25
			Total	,3363875	,02499393	26
Unqualified	Qualified	Qualified	Minority stake	,3681318	,04377919	10
			Total	,3681318	,04377919	10
		Unqualified	Minority stake	,3464813	,05301409	3
			Total	,3464813	,05301409	3
		Total	Minority stake	,3631355	,04467686	13
			Total	,3631355	,04467686	13
	Unqualified	Qualified	Majority stake	,3051716	,00708051	3
			Minority stake	,3761211	,02677297	10
			Total	,3597481	,03891007	13
		Unqualified	Majority stake	,3467805	,04216675	41
			Minority stake	,3228901	,04830388	376
			Takeover	,3420775	,05797402	2
			Total	,3253194	,04820017	419
		Unaudited	Minority stake	,3147408	,03789128	7
			Takeover	,2622895	.	1
			Total	,3081844	,03968041	8
		Total	Majority stake	,3439436	,04205794	44
			Minority stake	,3240994	,04839953	393
			Takeover	,3154815	,06166471	3
			Total	,3260251	,04815148	440
	Unaudited	Unqualified	Minority stake	,3594843	,02941426	5
			Total	,3594843	,02941426	5
		Unaudited	Takeover	,2769744	,01271769	3
			Total	,2769744	,01271769	3
		Total	Minority stake	,3594843	,02941426	5
			Takeover	,2769744	,01271769	3
			Total	,3285431	,04862254	8
	Total	Qualified	Majority stake	,3051716	,00708051	3
			Minority stake	,3721265	,03555561	20
			Total	,3633932	,04034778	23
		Unqualified	Majority stake	,3467805	,04216675	41
			Minority stake	,3235509	,04826639	384
			Takeover	,3420775	,05797402	2

Audit status 2 years before M&A	Audit status 1 year before M&A	Audit status year of M&A	Typeofdeal_ctg	Mean	Std. Deviation	N
			Total	,3258682	,04814040	427
		Unaudited	Minority stake	,3147408	,03789128	7
			Takeover	,2733031	,01271763	4
			Total	,2996726	,03670213	11
		Total	Majority stake	,3439436	,04205794	44
			Minority stake	,3257646	,04865531	411
			Takeover	,2962279	,04506162	6
			Total	,3271153	,04835911	461
Unaudited	Qualified	Qualified	Minority stake	,3763679	,04855006	2
			Total	,3763679	,04855006	2
		Unqualified	Minority stake	,2441920	.	1
			Total	,2441920	.	1
		Total	Minority stake	,3323093	,08367824	3
			Total	,3323093	,08367824	3
	Unqualified	Qualified	Majority stake	,3010837	.	1
			Minority stake	,4130672	,02597725	3
			Total	,3850714	,05987453	4
		Unqualified	Majority stake	,3625823	,07478975	8
			Minority stake	,3902915	,06363049	54
			Takeover	,4106980	.	1
			Total	,3870968	,06471512	63
		Unaudited	Minority stake	,3755828	,07308638	6
			Total	,3755828	,07308638	6
		Total	Majority stake	,3557491	,07290096	9
			Minority stake	,3899752	,06292522	63
			Takeover	,4106980	.	1
			Total	,3860394	,06431823	73
	Unaudited	Qualified	Majority stake	,3850515	,06083052	2
			Minority stake	,3470081	,03970970	6
			Total	,3565190	,04432929	8
		Unqualified	Majority stake	,3622481	,04715466	15
			Minority stake	,3517903	,04273669	60
			Takeover	,3359213	,08891372	2
			Total	,3534153	,04423849	77
		Unaudited	Alliances	,4139661	,03724310	19
			Majority stake	,3729032	,04943341	808
			Merger	,3877523	,03174508	2
			Minority stake	,3842055	,04834736	1781
			Takeover	,3672139	,05342981	964
			Total	,3772274	,05055577	3574
		Total	Alliances	,4139661	,03724310	19
			Majority stake	,3727389	,04937523	825
			Merger	,3877523	,03174508	2
			Minority stake	,3830317	,04851610	1847
			Takeover	,3671491	,05347005	966
			Total	,3766811	,05053208	3659
	Total	Qualified	Majority stake	,3570623	,06481032	3
			Minority stake	,3703624	,04517390	11
			Total	,3675124	,04741351	14
		Unqualified	Majority stake	,3623643	,05652232	23
			Minority stake	,3689335	,05774826	115
			Takeover	,3608469	,07626715	3
			Total	,3676899	,05751169	141
		Unaudited	Alliances	,4139661	,03724310	19
			Majority stake	,3729032	,04943341	808
			Merger	,3877523	,03174508	2
			Minority stake	,3841765	,04842332	1787

Audit status 2 years before M&A	Audit status 1 year before M&A	Audit status year of M&A	Typeofdeal_ctg	Mean	Std. Deviation	N
			Takeover	,3672139	,05342981	964
			Total	,3772247	,05058723	3580
		Total	Alliances	,4139661	,03724310	19
			Majority stake	,3725556	,04965580	834
			Merger	,3877523	,03174508	2
			Minority stake	,3831808	,04913130	1913
			Takeover	,3671941	,05346071	967
			Total	,3768283	,05087542	3735
Total	Qualified	Qualified	Majority stake	,4015772	.	1
			Minority stake	,3606471	,04195087	15
			Total	,3632053	,04180018	16
		Unqualified	Minority stake	,3407002	,04105904	11
			Total	,3407002	,04105904	11
		Total	Majority stake	,4015772	.	1
			Minority stake	,3522081	,04196270	26
			Total	,3540366	,04223048	27
	Unqualified	Qualified	Majority stake	,3041496	,00613190	4
			Minority stake	,3783030	,03749464	14
			Total	,3618244	,04569461	18
		Unqualified	Majority stake	,3493604	,04829324	49
			Minority stake	,3312869	,05437758	444
			Takeover	,3649510	,05700953	3
			Total	,3332760	,05404464	496
		Unaudited	Minority stake	,3428217	,06277080	13
			Takeover	,2622895	.	1
			Total	,3370694	,06403381	14
		Total	Majority stake	,3459483	,04796216	53
			Minority stake	,3330028	,05470938	471
			Takeover	,3392856	,06929338	4
			Total	,3343498	,05421285	528
	Unaudited	Qualified	Majority stake	,3850515	,06083052	2
			Minority stake	,3470081	,03970970	6
			Total	,3565190	,04432929	8
		Unqualified	Majority stake	,3622481	,04715466	15
			Minority stake	,3523821	,04173822	65
			Takeover	,3359213	,08891372	2
			Total	,3537854	,04337165	82
		Unaudited	Alliances	,4139661	,03724310	19
			Majority stake	,3729032	,04943341	808
			Merger	,3877523	,03174508	2
			Minority stake	,3842055	,04834736	1781
			Takeover	,3669339	,05358568	967
			Total	,3771433	,05061874	3577
		Total	Alliances	,4139661	,03724310	19
			Majority stake	,3727389	,04937523	825
			Merger	,3877523	,03174508	2
			Minority stake	,3829681	,04848522	1852
			Takeover	,3668699	,05362501	969
			Total	,3765760	,05057152	3667
	Total	Qualified	Majority stake	,3411827	,05290779	7
			Minority stake	,3653714	,04040157	35
			Total	,3613399	,04297084	42
		Unqualified	Majority stake	,3523810	,04797233	64
			Minority stake	,3341229	,05311103	520
			Takeover	,3533391	,06208279	5
			Total	,3362699	,05289017	589
		Unaudited	Alliances	,4139661	,03724310	19

Audit status 2 years before M&A	Audit status 1 year before M&A	Audit status year of M&A	Typeofdeal_ctg	Mean	Std. Deviation	N
			Majority stake	,3729032	,04943341	808
			Merger	,3877523	,03174508	2
			Minority stake	,3839056	,04857177	1794
			Takeover	,3668258	,05366347	968
			Total	,3769871	,05072820	3591
		Total	Alliances	,4139661	,03724310	19
			Majority stake	,3711564	,04965864	879
			Merger	,3877523	,03174508	2
			Minority stake	,3726090	,05361921	2349
			Takeover	,3667565	,05368190	973
			Total	,3711511	,05287712	4222

Table 12. **The parameters estimate for the variables included in Eq (3) related to the probability (*p*) of choosing to invest in a company in the energy sector**

					95% Confidence Interval	
Parameter	B	Std. Error	t	Sig.	Lower Bound	Upper Bound
Intercept	,368	,002	220,021	,000	,365	,371
[Auditstatus2yearsbefore= qualified]	***-,051***	***,012***	***-4,200***	***,000***	***-,075***	***-,027***
[Auditstatus2yearsbefore= unqualified]	***-,053***	***,006***	***-8,990***	***,000***	***-,064***	***-,041***
[Auditstatus2yearsbefore=unaudited]	***0[a]***	***.***	***.***	***.***	***.***	***.***
[Auditstatus1yearbefore=qualified]	***,028***	***,014***	***2,078***	***,038***	***,002***	***,055***
[Auditstatus1yearbefore=unqualified]	***,017***	***,007***	***2,419***	***,016***	***,003***	***,031***
[Auditstatus1yearbefore=unaudited]	0[a]	.	.	.	.	.
[Auditstatusyearof= qualified]	-,003	,010	-,267	,789	-,021	,016
[Auditstatusyearof=unqualified]	**-,021**	**,005**	**-4,000**	**,000**	**-,031**	**-,011**
[Auditstatusyearof=unaudited]	**0[a]**	**.**	**.**	**.**	**.**	**.**
[Typeofdeal_ctg= Alliances]	**,047**	**,012**	**4,032**	**,000**	**,024**	**,069**
[Typeofdeal_ctg= Majority]	**,007**	**,002**	**2,998**	**,003**	**,002**	**,012**
[Typeofdeal_ctg= Merger]	,021	,035	,589	,556	-,048	,090
[Typeofdeal_ctg= Minority]	**,016**	**,002**	**8,079**	**,000**	**,012**	**,020**
[Typeofdeal_ctg= Takeover]	0[a]	.	.	.	.	.
ROEusingPLbeforetax2yearsbefore	4,518E-5	2,805E-5	1,611	,107	-9,814E-6	,000
ROEusingPLbeforetax1yearbefore	2,174E-6	3,368E-5	,065	,949	-6,386E-5	6,821E-5
ROEusingPLbeforetaxyearof	-9,025E-6	3,318E-5	-,272	,786	-7,408E-5	5,603E-5
ROCEusingPLbeforetax2yearsbefore	**-9,055E-5**	**4,265E-5**	**-2,123**	**,034**	**,000**	**-6,935E-6**
ROCEusingPLbeforetax1yearbefore	1,907E-5	6,474E-5	,295	,768	,000	,000
ROCEusingPLbeforetaxyearof	-3,680E-5	5,200E-5	-,708	,479	,000	6,514E-5
MC growth 3y before	**,000**	**9,175E-5**	**1,921**	**,055**	**-3,672E-6**	**,000**
MC growth 2y before	-1,766E-5	,000	-,164	,870	,000	,000
MC growth 1y before	8,856E-5	,000	,397	,691	,000	,001
$Z_{\text{transparency score}}$ 1y before	,001	,001	1,519	,129	,000	,003
$Z_{\text{transparency score}}$ 2y before	**-,002**	**,001**	**-2,440**	**,015**	**-,003**	**,000**
$Z_{\text{transparency score}}$ 3y before	**,002**	**,001**	**1,939**	**,050**	**-1,648E-5**	**,003**

a. This parameter is set to zero because it is redundant.

* Significant values for 5% risk level

Section 7

The Link Between Uncertainty Avoidance and Regulatory Focus in Research on Accounting Conservatism

Daniela Artemisa Calu[a], Olga Grzybek[b], Elena-Mirela Nichita[a, 11], Viorel Avram[a], and Dana Maria Boldeanu[a]

[a] *Bucharest University of Economic Studies, Romania*
[b] *University of Economics in Katowice, Poland*

Abstract:

Research question: *This study investigates the opportunity of adding the regulatory focus theory (individual characteristic) to the uncertainty avoidance (societal characteristic) when financial information governed by conservatism (at firm level) is communicated to external users.*

Motivation: *Hofstede's cultural dimensions* (1980) *refer to the culture of a society as a whole, not to individuals within that culture. Consequently, Hofstede's cultural dimensions should only be applied to analyses at a country level without assuming that what is true of a higher level is always true of lower levels (so-called ecological fallacy; McSweeney, 2016). On the contrary, the regulatory focus theory (Higgins, 1997, 1998) addresses the motivations that individuals have in goal pursuit.*

Idea: *Many accounting papers investigate the link between cultural dimension 'uncertainty avoidance' with accounting conservatism as posited by Gray (1988). However, cultural dimensions may not be appropriate when accounting conservatism is measured at a firm level. Instead, we propose the usage of regulatory focus, which may improve analysis.*

Data: *This study critically examines the letters to shareholders and annual reports published in 2021 (covering the period April 2020-March 2021) by two companies, operating in the airline industry characterised by the highest and lowest scores in respect to uncertainty avoidance.*

Tools: *The content analysis of letters to shareholders and annual reports, complemented by the analysis based on the binary dictionary of regulatory focus theory are applied in investigating the link between uncertainty avoidance and communication of business information (regulatory focus), respectively the communication of business information (regulatory focus) and conservatism included in the letters to shareholders and financial statements.*

Findings: *The findings underline the association between the use of prevention words and the avoidance of uncertainty and a lack of correlation between the use of promotion words and the avoidance of uncertainty existing in the two countries. This aspect could be correlated with the manager's focus on promotion, his educational background, and other individual aspects. We suggest that the regulatory focus theory may be the missing building block to distinguish between culture (macro level) and personality of the manager (micro level) in communication with stakeholders.*

Contribution: *Our results suggest a link between uncertainty avoidance and prevention focus, which may be used to distinguish between the impact of culture and individual characteristics in decision-making. This should facilitate more conclusive inferences*

[11] *Corresponding author*: Accounting and Auditing Department, Bucharest University of Economic Studies; 6, Piața Romană, 1st district, Bucharest, 010374 Romania.

about the impact of culture on communicating business information subject to accounting conservatism.

Keywords: *Uncertainty avoidance, regulatory focus theory, accounting conservatism, airline industry, Covid-19.*

1. Introduction

The Covid-19 pandemic (2020) created a pertinent background to stress the uncertainty avoidance dimension, regulatory focus theory, and conservatism in the annual reports, as the main tool of communicating information.

Research on the influence of national culture on accounting values has been developing since Gray's (1988) conceptual paper, which explains international differences in accounting by differences in cultural factors. Gray (1988) links the cultural dimensions proposed by Hofstede (1980) to the accounting values. However, culture is a characteristic of society (nations) as a whole, whereas the development of accounting systems in practice is influenced by values at the accounting subcultural (organisation, profession) level. It is assumed that societal values are expressed at the level of the accounting subculture and the value systems of accountants are related to and may be derived from societal values (Gray, 1988).

Much research investigates the impact of culture on accounting values, expecting that companies in different countries, even complying with the same accounting standards, apply these standards in a different way (Gierusz *et al.*, 2022) and, in turn, report different degrees of conservatism (Guermazi and Halioui, 2020). Nevertheless, Gray's framework is primarily concerned with the effect of culture on a country's set of financial reporting rules (Tsakumis, 2007) and may or may not be equally applicable to accountants' financial reporting decisions. Much research, especially archival ones, assumes that accountants apply financial reporting rules in a fashion consistent with their cultural values (Kanagaretnam *et al.* 2014; Guermazi and Halioui, 2020; Wronski and Klann, 2020) and use Hofstede's cultural dimensions (publicly available) to capture the influence of culture on accounting conservatism. However, relationships identified at one level (here – relationships hypothesised at a society level by Gray) cannot be attributed to every level (McSweeney, 2016). The degree of conservatism at a firm level varies because of managers' judgement. Relying on national-level values to describe the action of individuals or organisations may be misleading (McSweeney, 2016). Decision making by individuals reflects both culture and personal characteristics.

In this context, the aim of this paper is to investigate the link between uncertainty avoidance (societal dimension) and the chairman/CEO's regulatory focus (individual dimension) to identify if the accounting conservatism is appropriately captured in their communication. We focus on one dimension of culture uncertainty avoidance, because it has a closely related counterpart at the individual level, the CEO's regulatory focus (de Bock and van Kenhove, 2010). Uncertainty avoidance as a cultural dimension is characteristic of a society in which a company operates and reflects the extent to which people feel uncomfortable with uncertain, unknown, or ambiguous situations (Guermazi and Halioui, 2020). CEO's regulatory focus accounts for individual differences in how people view their goals - as achieving positive outcomes or rather avoiding negative outcomes (Gamache *et al.*, 2015), with the latter concept being

particularly similar to uncertainty avoidance. Finally, according to Gray (1988), conservatism is "a preference for a cautious approach to measurement to cope with the uncertainty of future events as opposed to a more optimistic laissez-faire, risk-taking approach". All these concepts seem interrelated, but they refer to different levels of measurement. Culture and conservatism in a country accounting system (accounting standards) reflect country-level, while regulatory focus and conservatism in financial statements reflect firm-level measurement.

The advantage of using regulatory focus is that it can be measured by content analysis, which does not require accurate managers' self-assessment as in the case of surveys. On the contrary, content analysis allows us to measure regulatory focus indirectly looking at the usage of specific words (Gamache *et al.*, 2015). Additionally, dictionaries, which capture CEO's promotion and prevention focus in content analysis, are well validated and broadly used in the academic literature (Gamache *et al.*, 2015; Kashmiri *et al.*, 2019; Jiang *et al.*, 2020; Scoresby *et al.*, 2021; Iglesias, 2022).

We argue that the CEO's regulatory focus reflects both the uncertainty avoidance levels common to the society from which the CEO comes and the individual personality characteristics of the CEO. What, in fact, influences on managerial decisions and - in turn - conservatism levels in financial statements, is CEO's regulatory focus, not only uncertainty avoidance. There is much evidence that regulatory focus varies between cultures (Oushan *et al.*, 2007). Thus, we expect these two to be interrelated but not the same. We argue that including the CEO's regulatory focus can advance the understanding of factors influencing conservatism and enable more conclusive inferences about the impact of culture versus personal characteristics on accounting decisions.

The remainder of this paper is structured as follows: the literature review section provides relevant insights regarding the accounting conservatism under the cultural dimensions developed by Hofstede and regulatory focus theory in financial reporting, in the particular context, the Covid-19 pandemic. The research methodology section describes the methods and materials used in the research. The results section highlights our findings, and the conclusion section summarises the results, points out the limitations, and opens the window towards future research in the field of conservatism associated with the regulatory focus theory.

2. Literature review

Today, in the Covid-19 pandemic period (2020), the quality of accounting information and related disclosures in financial and non-financial statements is more important for capital markets, investors, and stakeholders. Along with the health crisis generated by Covid-19, different aspects of culture (ie, ethnicity and demography) could influence businesses and accounting disclosure practices and other professional services (Haniffa and Cooke, 2002).

Communication of information regarding business performance is the main goal of financial accounting. Many channels of communication are available to fulfil this objective: financial reports, non-financial reports, press releases, management disclosure, and analysis and presentations.

Bhatia (2012) noted that corporate annual reports encompass four different discourses, namely, 'the accounting discourse' realised by financial statements which are validated and certified by a public accountant and auditor, the 'discourse of finance' prepared by the company's financial specialists, 'the public relations' discourse, in the form of the chairman's letter to shareholders, aiming to assure shareholders that the performance of the company is strong and will, in the future, be even stronger, or, if the company has performed badly, that improvement is just around the corner and 'the legal disclaimer', which stresses a shadow of doubt over the company's predictions.

The letters to shareholders, unstructured and highly personalised documents, shaped by chairman/CEO self-biased beliefs (Hooghiemstra, 2010), are part of annual reporting reflecting their views on business performance. Bartlett and Chandler (1997) show that of the various sections of the annual report, the letter to the shareholders is the most thoroughly read by private investors and ranked second in overall importance. The main interest of shareholders is the current and foreseeable financial performance of companies and the letters written by chairman/CEOs point out these aspects in a positive light. The information asymmetry between chairman/CEO and shareholders may be attenuated by the financial reporting conservatism (LaFond and Watts, 2008). Basu (1997) argues that accounting conservatism is reflecting bad news more quickly than good news. Moreover, he demonstrates the optimistic attitude of the market when unexpected events occur: earnings declines are more likely to be temporary and earnings increases are more likely to be persistent. In difficult times, there is evidence of the existence of a significantly positive and economically meaningful relation between conservatism and firm stock performance (Francis *et al*., 2013). The academic work of Cui *et al.* (2021) underscores that Chinese companies listed on the Shanghai and Shenzhen Stock Exchanges are applying more conditionally conservative reporting and have lower declines in stock return performance during the Covid-19 outbreak compared to other firms. Managers have an essential role in implementing conservatism policies in financial reporting (Zhong and Li, 2017): Managers can use their discretion to produce high-quality accounting statements that accurately reflect the economic circumstances, and, as well, they can also exploit their discretion to report accounting numbers that are in line with their own incentives and reduce firms' value.

It makes intuitive sense that the environment in which the companies operate affects financial reporting practices and disclosure. In a large-scale cross-cultural study, Hofstede (1980) revealed significant national differences in work-related values, and consequently, he defined the cultural dimensions: uncertainty avoidance, individualism, power distance, masculinity, and indulgence (former added in 2010). These cultural values have been widely used in accounting and other social science research. In connection with uncertainty avoidance as part of the cultural dimension, Gray (1988) stated that this dimension is the most positively related to accounting conservatism. The Salter and Lewis study (2011) supports the assumptions of Gray (1988), Doupnik, and Tsakumis (2004); respectively, Doupnik and Riccio (2006) emphasise that culture is related to the conservative application of accounting rules in financial statements. Furthermore, based on the empirical results of several studies (Salter *et al.*, 2012; Zahid *et al.*, 2018; Wronski and Klann, 2020), conservatism is important because it contributes to the regulatory processes of accounting, and promotes the publication of higher quality financial statements.

The findings of Hsieh *et al.* (2019) suggest that firms facing greater ambiguity (prospectors) exhibit significantly higher levels of accounting conservatism. The distinction between 'prospectors' and 'defenders' (Hsieh *et al.*, 2019) reflects the business strategy of a company and the ambiguity arising from its innovative activities measured by a few financial characteristics. Thus, the strategy measure indicates if a company is exposed to a great level of ambiguity, understood as outcome uncertainty (Bentley *et al.*, 2013). In this context, companies face a particular level of ambiguity due to their innovative actions.

Two opposite ways of pursuing goals are approaching pleasure and avoiding pain (Higgins, 1997). These different ways of regulating pleasure and pain, called 'regulatory focus', have a major impact on people's feelings, thoughts and actions (Higgins, 1998). Self-regulation with a promotion focus is concerned with advancement, growth, and accomplishment. On the contrary, self-regulation with a prevention focus is concerned with protection, safety, and responsibility. These strategic human tendencies reflect their motivation and determine decision-making.

The regulatory foci account for individual differences in how people view their goals - as achieving positive outcomes or rather avoiding negative outcomes (Gamache *et al.*, 2015), with the latter concept being particularly similar to uncertainty avoidance. It is argued that prevention focus is associated with a conservative approach that seeks to reduce uncertainty (Gamache *et al.*, 2015). However, uncertainty avoidance as a cultural dimension reflects the higher society level whereas regulatory focus reflects the lower firm level. There is much evidence that regulatory focus varies across cultures (Oushan *et al.*, 2007), so these two are likely associated.

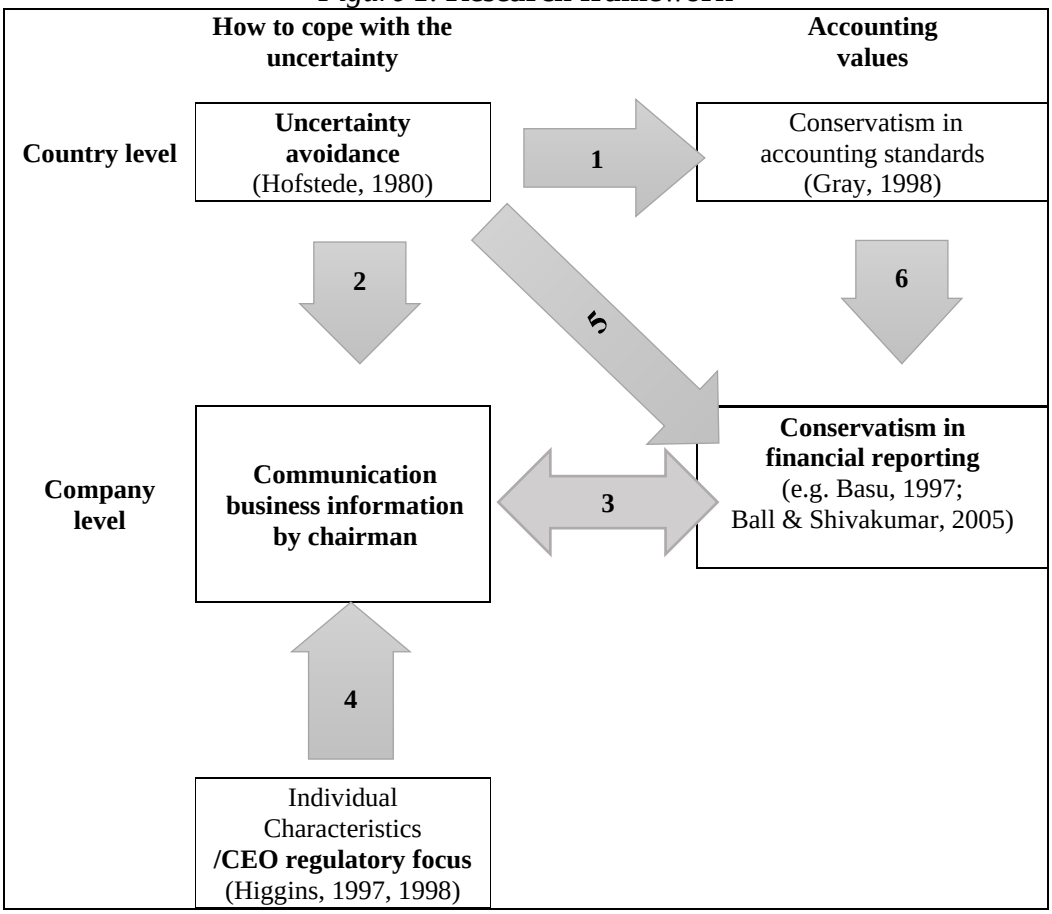
The regulatory focus theory (Higgins, 1997; 1998) is used in the management literature to investigate how management motivation impacts on different business phenomena and activities such as firms' acquisitions (Gamache *et al.*, 2015), engagement with key stakeholders (Gamache *et al*., 2020), taking managerial risk (Mount and Baer, 2021) and investment in R&D decisions (Ahmadi *et al.*, 2017; Scoresby *et al.*, 2021). Although there are a few measures of regulatory foci based on questionnaires (see: Ouschan *et al.*, 2007 for the review), it is argued that implicit or indirect measures are the most efficient (Johnson and Steinman, 2009). As such, Gamache *et al*. (2015) introduce the content analysis of CEO's annual letters to shareholders, arguing that the primary author of the letter or at least highly involved in its drafting is the CEO. In their paper, Gamache *et al.* (2015) provide well-validated dictionaries for promotion and prevention foci, which are already widely used in the literature (Kashmiri *et al.*, 2019; Gamache *et al.*, 2020; Jiang *et al.*, 2020; Scoresby *et al.*, 2021; Iglesias, 2022).

We use Gamache *et al.* (2015) proposal in the subsequent section to investigate the link between uncertainty avoidance at the society level and regulatory focus at an individual level under the umbrella of conservatism and to identify if there are significant differences between the way information is communicated by company management through annual reports in countries where the degree of uncertainty avoidance index (Hofstede *et al*., 2010) is very high, respectively very low, immediately after the declaration of the Covid-19 pandemic. We propose the following research question: are the individual values of the chairman/CEO the same as societal values for the whole society?

3. Research methodology

This study investigates the opportunity of adding the regulatory focus theory (individual characteristics) to uncertainty avoidance (societal characteristic) when financial information governed by accounting conservatism (at the firm level) is communicated to external users. Starting from the gaps identified in the literature, we proposed the following research framework (Figure 1):

Figure 1. **Research framework**



For the investigation of links 2 and 3 (Figure 1), we applied the content analysis of annual reports (Steenkamp and Northcott, 2007). This methodology aims to accurately characterise the message conveyed by descriptive information.

In many finance and accounting research, content analysis examines how the market reacts to qualitative information by quantifying document tone. A plethora of academic works examine how the market reacts to the tone of newspaper articles, statutory filings, or tone of speech used in letters to shareholders (Tetlock *et al.*, 2008; Feldman *et al.*, 2010; Loughran and McDonald, 2011; Hadro *et al*., 2017).

Additionally, we used regulatory focus theory (Higgins, 1997; 1998) and the dictionary of promotion and prevention words (Gamache *et al.*, 2015). We also captured alternative tenses of the words (Table 1).

Table 1. **Regulatory Focus Words**

Promotion Words		**Prevention Words**	
Accomplish	Improve	Accuracy	Obligation
Achieve	Increase	Afraid	Ought
Advancement	Momentum	Careful	Pain
Aspiration	Obtain	Anxious	Prevent
Aspire	Optimistic	Avoid	Protect
Attain	Progress	Conservative	Responsible
Desire	Promoting	Defend	Risk
Earn	Promotion	Duty	Safety
Expand	Speed	Escape	Security
Gain	Swift	Escaping	Threat
Grow	Toward	Evade	Vigilance
Hope	Velocity	Fail	
Hoping	Wish	Fear	
Ideal		Loss	

Source: Gamache *et al*., 2015

We select two countries where the degree of uncertainty avoidance index (UA) (Hofstede *et al.*, 2010) is very high - Japan (UA = 92), respectively, very low - Singapore (UA = 8). The analysed period is April 1, 2020 - March 31, 2021, the first annual report after the coronavirus pandemic was declared. The industry chosen for our research was airlines because it is one of the most affected by Covid-19 and it is likely to continue to decline. To select the two companies analysed, we started from Wikipedia's ranking of the largest airlines in the world (https://en.wikipedia.org/wiki/Largest_airlines_in_the_world). The criteria for selecting the annual reports analysed were as follows: (i) the uncertainty avoidance index for the country in which the parent company is headquartered is the largest and the smallest, respectively; (ii) there is information available in English; (iii) the reporting date is similar (March 31); (iv) the chairman/CEO is native and educated mostly in the country of origin of the parent company. As a result of applying these selection criteria, two companies remained: Singapore Airlines (SIA) from Singapore (the country with the lowest avoidance uncertainty index of the countries included in Hofstede's ranking - 8) and All Nippon Airways (ANA) from Japan (the country with the highest uncertainty avoidance index - 92).

For the analysis of link 2 (Figure 1), the sections analysed in the two annual reports were: 'Management Message' (ANA), respectively 'Resilience (Covid-19)' and 'Chairman's Letter to Shareholders' (SIA). We tested the use of each promotion and prevention word in the analysed sections of each report and selected the sentences in which those words are used. Subsequently, we counted the frequency with which each word in the dictionary was used. For each promotion word, we assign the score + 1, and for each prevention word we assigned the score -1. Finally, we established a communication index, calculated by summing the total scores obtained for each word.

For the analysis of link 3 (Figure 1), we looked for the words that are found in verbal probability expressions. These indicate the existence of conservatism: 'probable', 'reasonable assurance', 'reasonable certainty', 'no longer probable', 'remote', 'virtually certain' (Doupnik and Riccio, 2006). Subsequently, we examined all annual reports for other words that are usually associated with accounting conservatism: 'impairment', 'provision', 'contingent/contingency'. The investigation continues with the identification of the changes in the values of these elements and other financial

information (liabilities, profit/loss) at the group level, compared to the prior reporting period to the declaration of the Covid-19 pandemic.

4. Results

Because of the content analysis, we identified the following particularities regarding the investigated relationship presented in Figure 1.

4.1. The link between uncertainty avoidance - communication of business information / regulatory focus by chairman/CEO

The ANA report analysed section ('Management Message') contains 3,553 words and is signed by Shinya Katanozaka, Chief Executive Officer and President. On the other hand, SIA presents the management message in two sections: 'Resilience (Covid-19)' and 'Chairman's Letter to Shareholders'. The number of words used is 4,742 and the signer is Peter Seah Lim Huat, Chairman. To interpret the information communicated by the presidents of the two companies, we present some relevant information about them (Table 2).

Table 2. **Information about Chairman/CEO**

Shinya Katanozaka (ANA, Japan)	**Peter Seah Lim Huat (SIA, Singapore)**
Chief Executive Officer and President since April 1, 2015. Nationality: Japanese A graduate of Faculty of Law, Tokyo University Joined ANA in 1979 and has remained with the carrier for 36 years of his working life (http://www.orientaviation.com/articles/1266/winning-over-the--cosmopolitan-young) Special Knowledge, Experience and Skills: - Corporate Management, Experience Leader - Airlines Business, Safety - Personnel, Human Resources Development - Global and Long-Term Strategy	Chairperson since January 1, 2017. Nationality: Singaporean A graduate of NUS Business School, National University of Singapore Has been at the head of 13 different companies (https://www.marketscreener.com/business-leaders/Lim-Huat-Seah-4293/biography/) Board committee(s) served to: - Chairman of the Board Executive Committee - Board Compensation and Chairman - Industrial Relations Committee - Board Nominating Committee Chairman - Board Safety and Risk Committee Member

The content analysis showed that, in total (promotion and prevention words), the communication indexes of the two companies are 38 for ANA, respectively, 32 for SIA. In both cases, the positive tone of the messages (use of promotion words) predominated. The tendency to use predominantly optimistic words can be justified by an individual behaviour focused on promotion explained by regulatory focus theory (Higgins, 1997, 1998). A detailed analysis of the words used by the presidents of the two companies highlights the following status quo (Table 3).

Table 3. **Communication index**

Promotion			Prevention		
Words	**Communication Index**		**Words**	**Communication Index**	
	ANA	**SIA**		**ANA**	**SIA**
Achieve	+2	+4	Loss	-4	-3
Attain	n/a	+2	Pain	n/a	-3
Desire	+1	n/a	Prevent	-2	n/a
Expand	+3	+4	Protect	-3	n/a
Gain	n/a	+1	Responsible	-1	n/a
Grow	+12	+9	Risk	-2	n/a
Hope	+5	n/a	Safety	-14	-8
Improve	+4	+2	Security	-2	n/a
Increase	+3	+5			
Momentum	+1	n/a			
Progress	+2	+2			
Swift	n/a	+1			
Toward	+3	+1			
Wish	+2	+1			
Total	**+38**	**+32**	**Total**	**-28**	**-14**

Regarding the positive tone of the messages, the situation is a balanced one. The two companies registered similar indexes of communication based on promotion words (ANA + 38 and SIA +32), even if the uncertainty avoidance indexes are diametrically opposed (Japan 92 and Singapore 8). This aspect is in line with other research (Deegan and Gordon, 1996; Deegan and Rankin, 1996; Holder-Webb *et al.*, 2009; Hahn and Lülfs, 2014; Calu *et al.*, 2015) which found that, in various reports, the communication of positive information predominates. Moreover, we note that in the case of ANA, the percentage of promotion words in total words of the analysed documents is higher than in the case of SIA (1.07% versus 0.67%).

The situation is different concerning communicating information with negative connotations (use of prevention words): the Japanese company has used prevention words several times in its management message, while the Singaporean company has used these terms a few times less. It is interesting to note that this aspect is not associated with the total number of words used in the analysed sections. In the case of ANA, the percentage of prevention words in total words of the analysed documents is higher than in the case of SIA (0.79% versus 0.3%). This can be justified based on the cultural differences between the countries in which the two companies operate, respectively, the two company presidents were born and educated. A high level of the uncertainty avoidance index is associated with a general preference for predictability and low risk taking (Hofstede *et al.*, 2010).

According to the regulatory focus theory, our survival depends on two needs: security and growth (Cui and Ye, 2017). People can adopt a *promotion focus* (focus on 'growth') or a *prevention focus* (focus on 'safety' and 'security') (Rietzschel and Ritter, 2018). In the analysed sections, the words most often used by the two companies are 'safety' (14 times ANA versus 8 times SIA) and 'grow' (12 times ANA compared to 9 times SIA).

The contexts in which 'safety' is used are presented in Appendix 1. Both companies follow the same pattern regarding the communicating information to their stakeholders. We note the association with Covid-19, health (Health and Safety), customers,

business/travel experience, and relaxation activities (food, beverages, or facilities). What is different is the extent to which a particular aspect is emphasised (the percentages of 'safety' in total words are: ANA - 0,39% and SIA 0,17%). At first glance, in the case of ANA, the very frequent use of 'safety' seems to be related only to a high degree of uncertainty avoidance (Japan - 92). We observe that there is an intensive use of 'safety' (8 times) in the context of the field of activity (e.g., safety is 'the foundation of our business') in the case of the information provided by the Japanese company. However, this word also appears very frequently in the SIA message. Actually, the frequent use of 'safety' is also a consequence of the fact that airline is considered a safety-critical industry (Baron and Pate-Cornell, 1999; Amalberti, 2001; Kontogiannis, 2011; Wears, 2012). Messages that include 'safety' often appear in industry communication. For example, the message 'safety is the highest priority of all involved in aviation' appears on the *International Air Transport Association*'s website (https://www.iata.org/en/youandiata/travelers/aviation-safety/).

The area analysed has the distinctiveness of the existence of airline safety ratings (https://www.airlineratings.com/airline-rating/). According to this ranking, each airline is the subject of a comprehensive analysis which also includes information regarding Covid-19 compliance data. Both companies scored as many points as possible in this rating and used combinations of the words 'Covid-19' and 'safety' in the same paragraph:

> 'We declared our position on protecting employee health and jobs, putting into place a complete program to deal with *Covid-19.* Our employees are responsible for ensuring *safety*' (ANA, 2021, p. 4).
>
> 'When the *Covid-19* pandemic first hit, the SIA Group took immediate steps to implement a series of health and *safety* initiatives across various touchpoints of the customer journey' (SIA, 2021, p. 8).

An analysis of the phrases in which positive and negative words were used shows that in the messages published by the Japanese company, the word 'Covid-19' was used several times (10 times it was associated with promotion words and 9 times associated with prevention words). On the other hand, in the message sent by the Singaporean company, the word 'Covid-19' was used only 4 times (2 times associated with promotion words and 2 times associated with prevention words). The preference for the publication of information with negative connotations by the president of a company in a country with a high uncertainty avoidance index could be motivated by the fact that the moderate disclosure of negative information has a positive effect on trustworthiness (Jahn and Brühl, 2019).

The development of corporate social responsibility (CSR) reporting by companies around the world inherently brings into question the presentation of specific issues, such as occupational health and safety. This can rather be associated with a transparent presentation of sustainability issues. Therefore, in this context, the use of 'safety' has positive connotations.

Our finding regarding the frequent use of the 'safety' in both reports is in line with the results of a recent study on airlines' marketing messages in the middle of Covid-19, which found that airlines focused mainly on safety on board and at the airport (Johansson, 2021). Consequently, the frequent use of the 'safety' in communications

made by company presidents should not be interpreted as a prevention focus, but as an industry-specific message.

The use of ‘grow’ and its derivatives is associated with a variety of different contexts (Appendix 2). The first aspect noticed is that the professional background of the chairperson / CEO puts his mark on the information communicated by him to the stakeholders. In the message sent by the chairman of SIA (with studies in business), in half of the cases, this word is associated with financial information: revenue growth (2 times), ‘KrisShop grew its sales 121% year-on-year in its pivot to cushion the loss of travel retail’ respectively ‘the average transaction value recording 25% higher year-on year’. On the other hand, the CEO of ANA (with studies in law) associates ‘grow’ with financial information only once ‘grew revenue (...), narrowing operating loss by a significant margin’. Rather, we note the intention to communicate in a positive way, by associating with a promotion word, aspects that have negatively affected the company, but for which there is a belief that they can be changed: ‘return to a growth trajectory’, ‘was forced to change our growth strategies’, ‘some industries (...) have grown steadily, even during the Covid-19 pandemic’.

Each of the two companies used broadly the same promotion words (Figure 2). Extra words used by the chairperson of SIA were ‘attain’, ‘gain’ and ‘swift’. Two of these words are related to financial performance: ‘regaining financial sustainability’ and ‘swiftly cut expenditure’. This preference to communicate positive information in the financial field is correlated with the economic studies in the field and implicitly with the personality of the chairperson. Extra words used by the CEO of ANA were ‘desire’, ‘hope’ and ‘momentum’. All these words are used to give the message an optimistic tone: ‘desire to board a plane and travel as soon as possible’, ‘gather momentum as a group to overcome the Covid-19 pandemic’ and ‘Hardship Now, Yet Hope for the Future’. The use of an optimistic tone by a person born and educated in a culture with a very high degree of uncertainty may be related to the focus on promotion rather than prevention.

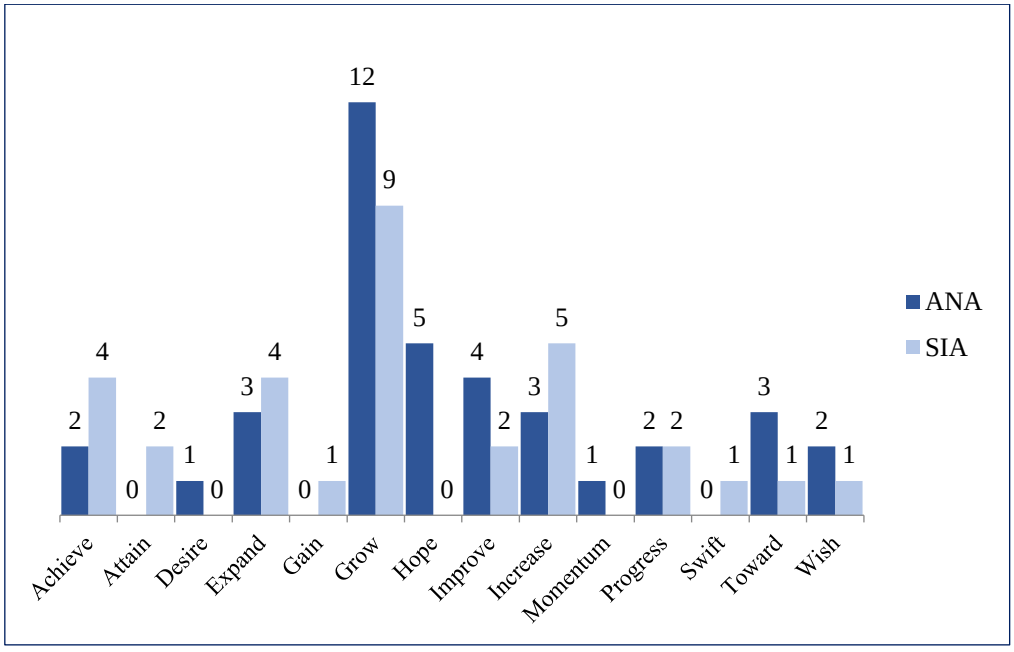


Figure 2. **Promotion words**

Regarding the prevention words (Figure 3), we note that in the case of SIA, the chairperson of the company used only three such words ('loss', 'pain' and 'safety'). On the other hand, the CEO of ANA, from a country with a very high degree of avoidance of uncertainty (UA = 92), used eight different words ('loss', 'prevent', 'protect', 'responsible', 'risk', 'safety' and 'security'). The SIA chairman uses a single extra prevention word: 'pain(full)': 'extremely painful step of releasing around 2,000 staff' and 'amid the pain and uncertainty, the pandemic brought out an unwavering resilience in our people'. On the other hand, the CEO of the company ANA uses much more words from the prevention words category, in different contexts: 'prevent accidents and incidents', 'prevent and control the spread of infections', 'we must protect for the future', 'I declared my intent to protect the jobs of our employees', 'our employees are responsible for ensuring safety', 'we approached this process from the perspective of consistent, comprehensive risk management', 'a large number of our employees took the initiative to operate the flights at their own risk', 'other fields such as food safety and information security. Given that the message is addressed mainly to the population of a country where the avoidance of uncertainty is high, we can note that the use of words in the category of prevention role has the role of showing that the rules are followed.

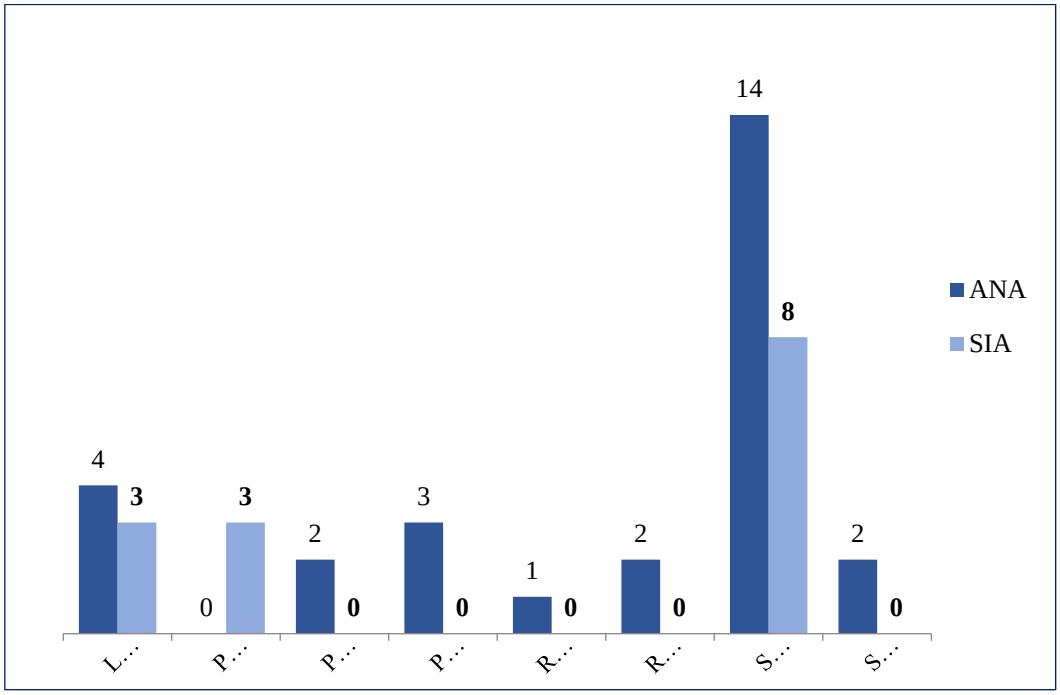


Figure 3. **Prevention words**

An interesting aspect is the way the communication is performed. Kashima and Kashima (1998) found a strong correlation between the use of multiple second-person pronoun languages and uncertainty avoidance. In the ANA report, the address is in the first person ('I', 'we', 'myself'), while in the SIA report, the address is in the third person (SIA became; SIA introduced, etc.). In our case, 'you' is used only once in the 'Management Message' of ANA CEO's and 'your' twice, so it is not a cultural feature. A similar situation exists in the case of the message sent by the chairperson of SIA: 'you' does not appear, and 'your' appears only once. Asay *et al.* (2018) find that investors' beliefs align more closely with the CEO's assertion when the disclosure contains more personal pronouns (we and I). We consider that the intense use of

personal pronouns in the first person (we (109), I (23), my (8), and myself (1)) in the communication made by the CEO of ANA with the shareholders depends on the personality of the president (individual characteristics) rather than cultural values. Therefore, the use of these pronouns seems to have more to do with the tone of the president's message.

4.2. The link between communication business information (regulatory focus) - conservatism in financial reporting by chairman/CEO

Following the analysis of the annual reports, we notice that there are quite a few differences between the two companies analysed in terms of words that are usually associated with accounting conservatism (Table 4) and financial reporting (Table 5). However, as expected, in both cases there is a negative trend of profit / loss reported in the annual statements.

Table 4. **Words usually associated with conservatism**

Words frequency	ANA	SIA
'Contingent/contingency'	7	36
'Impairment	40	120
'Provision(s)	5	55
'Probable'	0	22
'Reasonable assurance'	0	3
'Reasonable certainty'	0	0
'No longer probable'	0	1
'Remote'	1	0
'Virtually certain'	0	0

A first point to note is that words indicating higher conservatism were used, contrary to expectations, in Singapore, the country with the lowest uncertainty avoidance index. The only word used only in the ANA report is 'remote', but the context is unrelated to accounting: 'remote work'. One possible explanation for the absence of words that are found in verbal probability expressions in the ANA report is that they were proposed by Doupnik and Riccio (2006) based on IFRS. Another explanation is that the regulatory focus theory influences accounting conservatism (link 3, Figure 1).

Table 5. **Financial information**

	ANA	SIA		
Information / Year	2021	2020	2021	2020
Impairment loss (Total)	-86,350	-	-1,938.4	75.8
Impairment of property, plant and equipment	-	-	2	14.2
Impairment of amount owing by a joint venture company	-	-	12.6	61.6
Impairment of aircraft	-	-	-1,734.3	-
Impairment of base maintenance assets	-	-	-36.9	-
Impairment of goodwill	-	-	-170.4	-
Impairment of intangible assets	-	-	-11.4	-
Impairment loss	-86,350	-	-	-
Provisions - Total	-	-	1,394	1,354.7
Total liabilities	2,195,563	1,491,283	37,581.3	33,712.8
Profit / (Loss) for the financial year	(407,690)	25,919	(4,283.4)	(169.4)

*all data in USD

Conservatism implies, among others, a tendency to accelerate the recognition of liabilities and other items that decrease net income (e.g., expenses, losses) (Doupnik and Riccio, 2006). In 2021, ANA reported an increase in debt and a very large increase in impairment losses. These increases may indicate high conservatism. Given that the period in which the increase was recorded is the one affected by the Covid-19 pandemic, most likely other economic factors also influenced this change. On the other hand, based on an analysis of the provision-to-liability ratio, Feleagă *et al.* (2010) concluded that countries classified as 'conservative' do assign a significantly higher degree of uncertainty to their total amount of liability. In the case of ANA, the value of the provisions presented among the debts remained zero. At a first glance, non-recognition of provisions among liabilities is a situation that seems to contradict the relationship presented in Figure 1, link 6: conservatism in accounting standards influences conservatism in financial reporting. However, conservatism decreased in Japan over 1981–2008, and there was little support for the existence of conservatism at the end of this period (Moy *et al*., 2020). Therefore, this may not be a contradiction. In the case of SIA, the decrease in provisions has a small value and is mainly due to the decrease in the write-back of provision for early lease termination. On the other hand, SIA recorded a significant increase in impairment losses, most of which were due to impairment of aircraft. Convergence of IFRS enhances conditional conservatism in Singapore (Marzuki and Wahab, 2018).

5. Conclusions

The aim of this paper is to investigate the link between uncertainty avoidance and CEO's regulatory focus expressed in management messages to the shareholders in annual reports and to identify if the accounting conservatism is captured in their communication. We focus on the uncertainty avoidance - the cultural dimension of Hofstede (1998) as a societal value because it has a closely related counterpart at the individual level, the CEO's regulatory focus (de Bock and van Kenhove, 2010). A plethora of researchers adapt cultural dimensions (society/country level) at a firm level, which may be not appropriate, therefore we propose to add regulatory focus as a missing building block in other's research. The regulatory focus theory (Higgins, 1997, 1998) is used in the management literature to investigate how the management's motivation impacts on different business phenomena and activities like firms' acquisitions (Gamache *et al.*, 2015), engagement with key stakeholders (Gamache *et al.*, 2020), managerial risk taking (Mount and Baer, 2021) and investment in R&D decisions (Ahmadi *et al.*, 2017; Scoresby *et al.*, 2021). Higgins' theory is based on two divergent self-regulations, namely, the promotion focus, which is concerned with advancement, growth, and accomplishment, and prevention focus which is concerned with protection, safety, and responsibility.

This paper employs a content analysis of annual reports of two companies operating in the airline industry headquartered in Japan the country characterised by the lowest uncertainty avoidance index (UA=8), respectively, in Singapore the country characterised by the highest uncertainty avoidance index (UA=92). The dictionary of Gamache *et al*. (2015) was applied to assess the prevention and promotion orientation of the chairman/CEO in their letters to shareholders and in the annual reports.

The findings of the analysis of how promotion and prevention words are used in the message of management of the two companies highlight an association between the use

of prevention words and the avoidance of uncertainty. By contrast, the use of promotion words in the analysed reports is not correlated with the avoidance of the uncertainty existing in the two countries. This aspect could be correlated with the manager's focus on promotion, the type of his education, and other individual characteristics.

We argue that the chairman/CEO's regulatory focus reflects both the uncertainty avoidance levels common to the society the chairman/CEO comes from and the individual personality characteristics of CEO (link 2 and link 4, Figure 1). What, in fact, influences communication business information/regulatory focus and - in turn - conservatism levels in financial statements is the chairman/CEO's regulatory focus, not only uncertainty avoidance (link 3, Figure 1). Although these two are interrelated, they are not the same. In a recent paper, Kurman *et al.* (2015) conclude that regulatory focus varies across cultures. According to our findings, the chairman/CEO's regulatory focus is influencing the tone of speech used in letters to shareholders, but is not capturing in full the accounting conservatism illustrated in financial statements.

Regarding the positive tone of the messages (promotion focus), the situation is a balanced one. The two companies registered similar indexes of communication based on promotion words (ANA + 38 and SIA +32), even if the uncertainty avoidance indexes are diametrically opposed (Japan: UA=92 and Singapore: UA=8). This conclusion is in line with other research papers (Deegan and Gordon, 1996; Deegan and Rankin, 1996; Holder-Webb *et al.*, 2009; Hahn and Lülfs, 2014; Calu *et al*., 2015) which found that, in various reports, the communication of positive information predominates.

The educational background of the chairman/CEO shapes the tone of communication through its vocabulary: the message sent by the chairman of SIA (with studies in business) prefers an optimistic discourse fulfilled with the word 'grow' associated with financial information: revenue growth (2 times), 'KrisShop grew its sales 121% year-on-year in its pivot to cushion the loss of travel retail' respectively 'the average transaction value recording 25% higher year-on year'. On the other hand, the chairman/CEO of ANA (with studies in law) associates 'growth/grow' with financial information only once 'grew revenue (...) narrowing operating loss by a significant margin'.

The chairpersons could use the results of our research / CEOs of other companies to adapt the tone of the message sent. Equally, the aspects observed in our research could be useful for current and potential investors in airlines to interpret some existing nuances in the message of the chairperson / CEO in crisis conditions. This academic work may advance the understanding of factors influencing conservatism and enable more conclusive inferences about the impact of culture vs. personal characteristics on accounting decisions.

Our study is subject to limitations that provide opportunities for future research. One limitation of the research is that we only analysed the reports from one year after the declaration of the Covid -19 pandemic.

In the future, the research should be extended to cover a longer period and several countries. The conditional and unconditional conservatism concepts may be added

to the study for a refined capture of connections between regulatory focus and communication of business information to stakeholders.

The findings of this paper suggest that researchers should keep culture as an important variable in accounting research, but to be aware that individual profiles may influence the vocabulary used in the communication of financials compliant with conservatism and an advanced methodology is required to achieve qualitative and accurate results. The results also suggest that focus regulatory theory influences accounting conservatism (link 2, Figure 1).

References

Ahmadi, S., Khanagha, S., Berchicci, L. & Jansen, J.J. (2017) "Are managers motivated to explore in the face of a new technological change? The role of regulatory focus, fit, and complexity of decision-making", *Journal of Management Studies*, vol. 54, no.2: 209-237

Amalberti, R. (2001) „The paradoxes of almost totally safe transportation systems", *Safety Science*, vol. 37, no. 2-3: 109-126

Asay, H.S, Libby, R. & Rennekamp, K.M. (2018) „Do features that associate managers with a message magnify investors' reactions to narrative disclosures?", *Accounting Organizations and Society*, vol. 68: 1-14

Baron, M.M. & Elisabeth Pate-Cornell, M. (1999) „Designing risk-management strategies for critical engineering systems", *IEEE Transactions on Engineering Management*, vol. 46, no. 1: 87-100

Bartlett, S.A. & Chandler, R.A. (1997) „The corporate report and the private shareholder: Lee and Tweedie twenty years on", *British Accounting Review*, vol.29: 245-261

Basu, S. (1997) „The conservatism principle and the asymmetric timeliness of earnings", *Journal of Accounting and Economics*, vol. 24, no. 1: 3-37

Bentley, K.A., Omer, T.C. & Sharp, N.Y. (2013) "Business strategy, financial reporting irregularities, and audit effort", *Contemporary Accounting Research*, vol. 30, issue 2**,** Summer (June): 780-817

Bhatia, V. (2012) *Creative exploitation of socio-pragmatic space in professional discourse,* in R.H. Jones (ed.) Discourse and Creativity. Harlow: Pearson

Calu, A., Negrei, C.M., Calu, D.A. & Avram, V. (2015) „Reporting of non-financial performance indicators - a useful tool for a sustainable marketing strategy", *Amfiteatru Economic*, vol. 17: 977-993

Cui, L., Kent, P., Kim, S. & Li, S. (2021) „Accounting conservatism and firm performance during the COVID-19 pandemic", *Accounting & Finance*, vol. 61, no. 4: 5543–5579

Cui, W. & Ye, M. (2017) „An introduction of regulatory focus theory and its recently related research", *Psychology*, vol. 8, no. 6: 837-847

de Bock, T. & van Kenhove, P. (2010) „Consumer Ethics: the role of self-regulatory focus", *Journal of Business Ethics*, vol. 97, no. 2: 241-255

Deegan, C. & Gordon, B. (1996) „A study of the environmental disclosure practices of Australian corporations", *Accounting and Business Research*, vol. 26, no. 3: 187-199

Deegan, C. & Rankin, M. (1996) „Do Australian companies report environmental news objectively?", *Accounting, Auditing & Accountability Journal*, vol. 9, no. 2: 50-67

Doupnik, T.S. & Riccio, E.L. (2006) „The influence of conservatism and secrecy on the interpretation of verbal probability expressions in the Anglo and Latin cultural areas", *The International Journal of Accounting*, vol. 41: 237-261

Doupnik, T.S. & Tsakumis, G.T. (2004) „A critical review of tests of Gray's theory of cultural relevance and suggestions for future research", *Journal of Accounting Literature*, vol. 23, no. 1: 1-48

Feldman, R., Govindaraj, S., Livnat, J. & Segal, B. (2010) „Management's tone change, post earnings announcement drift and accruals", R*eview of Accounting Studies,* vol. 15, no. 4: 915-95

Feleagă, L., Dragomir, V.D. & Feleagă, N. (2010) „National Accounting Culture and the recognition of provisions: An Application of the prudence principle". *Crises et nouvelles problématiques de la Valeur,* May 2010, Nice, France. pp.CD-ROM. ffhal-00481581f

Francis, B., Hasan, I. & Wu, Q. (2013) „The benefits of conservative accounting to shareholders: evidence from the financial crisis", *Accounting Horizons,* vol. 27, no. 2

Gamache, D.L., McNamara, G., Mannor, M.J. & Johnson, R.E. (2015) „Motivated to acquire? The impact of CEO regulatory focus on firm acquisitions'', *Academy of Management Journal,* vol. 58, no. 4: 1261-1282

Gamache, D.L., Neville, F., Bundy, J. & Short, C.E. (2020) „Serving differently: CEO regulatory focus and firm stakeholder strategy", *Strategic Management Journal,* vol. 41, no. 7: 1305-1335.

Gierusz, J., Kolesnik, K., Silska-Gembka, S. & Zamojska, A. (2022) „The influence of culture on accounting judgement – Evidence from Poland and the United Kingdom", *Cogent Business & Management,* vol. 9, no. 1: 1-29

Gray, S.J. (1988) „Towards a theory of cultural influence on the development of accounting systems internationally", *Abacus,* vol. 24, no. 1: 1-15

Guermazi, W. & Halioui, K. (2020) „Do differences in national cultures affect cross-country conditional conservatism behavior under IFRS?", *Research in International Business and Finance,* vol. 52: 1-13

Hadro, D., Klimczak, K.M. & Pauka, M. (2017) Impression management in letters to shareholders: evidence from Poland", *Accounting in Europe,* vol. 14, no.3: 305-330

Hahn, R. & Lülfs, R. (2014) „Legitimizing negative aspects in GRI-oriented sustainability reporting: A qualitative analysis of corporate disclosure strategies", *Journal of Business Ethics,* vol. 123, no. 3: 401-420

Haniffa, R.M. & Cooke, T.E. (2002) „Culture, Corporate Governance and Disclosure in Malaysian Corporations", *Abacus,* vol. 38, no. 3: 317-349

Higgins, E.T. (1997) „Beyond pleasure and pain", *American Psychologist,* vol. 52: 1280-1300

Higgins, E.T. (1998) „Promotion and prevention: Regulatory focus as a motivational principle. In M. P. Zanna (Ed.)", *Advances in Experimental Social Psychology,* vol. 30: 1-46. New York: Academic Press

Hofstede, G. (1980) *Culture's Consequences – International Differences in Work-Related Values*. London: SAGE Publications

Hofstede, G., Hofstede, G.J. & Minkov, M. (2010). *Cultures and organizations: Software of the mind,* (10th ed.), McGraw-Hill.

Holder-Webb, L., Cohen, J. R., Nath, L. & Wood, D. (2009) „The supply of corporate social responsibility disclosures among U.S. Firms", *Journal of Business Ethics,* vol. 84, no. 4: 497-527

Hooghiemstra, R. (2010) „Letters to the shareholders: a content analysis comparison of letters written by CEOs in the United States and Japan", *International Journal of Accounting,* vol. 45, no. 3: 275-300

Hsieh, C.C., Ma, Z. & Novoselov, K.E. (2019) „Accounting conservatism, business strategy, and ambiguity", *Accounting, Organizations and Society,* vol. 74: 41-55

Iglesias, J.L.C. (2022) „Resisting pulling the plug: the role of CEO regulatory focus and board independence in store closure activity", *International Journal of Organizational Analysis*. vol. *ahead-of-print,* no. *ahead-of-print*.

Jahn, J. & Brühl, R. (2019) „Can bad news be good? On the positive and negative effects of including moderately negative information in CSR disclosures", *Journal of Business Research,* vol. 97: 117-128

Jiang, W., Wang, L., Chu, Z. & Zheng, C. (2020) „How does CEO regulatory focus matter? The impacts of CEO promotion and prevention focus on firm strategic change", *Group & Organization Management,* vol. 45, no. 3: 386-416

Johansson, M. (2021) „A Study on Airlines' Marketing Messages in the Middle of Covid-19", available on-line at https://www.theseus.fi/handle/10024/511688

Johnson, R. E., & Steinman, L. (2009) „The use of implicit measures for organizational research: An empirical example", *Canadian Journal of Behavioural Science,* vol. 41, no. 4: 202-212

Kanagaretnam, K., Lim, C.Y. & Lobo, G.J. (2014) „Influence of National Culture on Accounting Conservatism and Risk-Taking in the Banking Industry", *The Accounting Review,* vol. 89, no. 3: 1115-1149

Kashima, E.S. & Kashima, Y. (1998) „Culture and language: the case of cultural dimensions and personal pronoun use", *Journal of Cross-Cultural Psychology,* vol. 29, no. 3: 461-486

Kashmiri, S., Gala, P. & Nicol, C.D. (2019) „Seeking pleasure or avoiding pain: Influence of CEO regulatory focus on firms' advertising, R&D, and marketing controversies", *Journal of Business Research,* vol. 105: 227–242

Kontogiannis, T. (2011) „A systems perspective of managing error recovery and tactical re-planning of operating teams in safety critical domains", *Journal of Safety Research,* vol. 42: 73-85

LaFond, R. & Watts, R.L. (2008) „The information role of conservatism", *The Accounting Review,* vol. 83, no. 2: 447-478

Loughran, T. & Mcdonald B. (2011) „When is a liability not a liability? Textual analysis, dictionaries, and 10-ks", *The Journal of Finance,* vol. 66, no. 1: 35-65

Marzuki, M.M. & Wahab, E.A.A (2018) „International financial reporting standards and conservatism in the Association of Southeast Asian Nations Countries Evidence from Jurisdiction Corruption Index", *Asian Review of Accounting,* vol. 26, no. 4: 487-510.

McSweeney, B. (2016) „Collective cultural mind programming: escaping from the cage", *Journal of Organizational Change Management,* vol. 29, no. 1: 68-80

Mount, M. & Baer, M. (2021) „CEOs' Regulatory Focus and Risk-Taking When Firms Perform Below and Above the Bar", *Journal of Management,* vol. XX, no. X: 1-29

Moy, M. Heaney, T., Tarca, A. & Zyl, W. (2020) „Conditional accounting conservatism: Exploring the impact of changes in institutional frameworks in four countries", *Journal of Contemporary Accounting and Economics,* vol. 16, no. 3: 1-21

Ouschan, L., Boldero J.M., Kashima, Y., Wakimoto, R., & Kashima, E.S. (2007) „Regulatory Focus Strategies Scale: A measure of individual differences in the endorsement of regulatory strategies", *Asian Journal of Social Psychology*, vol. 10, no. 4.: 243-257, DOI: 10.1111/j.1467-839X.2007.00233.x

Rietzschel, E.F. & Ritter, S.M. (2018) „*Individual Creativity in the Workplace",* Chapter I: Moving from Creativity to Innovation", 3-34. New York: Academic Press

Salter S.B. & Lewis, P.A. (2011) „Shades of Gray: An empirical examination of Gray's model of culture and income measurement practices using 20-F data", *Advances in Accounting,* vol. 27, no. 1: 132-142

Salter, S.B., Kang, T., Gotti, G. & Doupnik, T.S. (2012) „The Role of Social Values, Accounting Values and Institutions in Determining Accounting Conservatism", *Management International Review*, vol. 53, no. 4: 607-632

Scoresby, R.B., Withers, M.C. & Ireland, R.D. (2021) „The effect of CEO regulatory focus on changes to investments in R&D", *Journal of Product Innovation Management*, vol. 38, no. 4: 401-420

Steenkamp, N. & Northcott, D. (2007) „Content analysis in accounting research: The practical challenges", *Australian Accounting Review,* vol. 17, no. 43: 12-25

Tetlock, P.C., Saar-Tsechansky, M. & Macskassy, S. (2008) „More Than Words: Quantifying Language to Measure Firms' Fundamentals", *The Journal of Finance*, vol. LXIII, no. 3

Tsakumis, G.T. (2007) „The influence of culture on accountants' application of financial reporting rules", *Abacus,* vol. 43, no. 1: 27-48

Wears, R.L. (2012) „Rethinking healthcare as a safety–critical industry", *Work,* vol.41: 4560-4563

Wronski, P.G. & Klann, R.C. (2020) „Accounting conservatism and national culture", *Brazilian Business Review*, vol. 17, no. 3: 344-361

Zahid, R.M.A., Țaran, A. & Simga-Mugan, F.N.C. (2018) „Cultural values and financial reporting practices: contemporary tendencies in Eastern European countries", *Eastern Journal of European Studies*, vol. 9, no. 2: 89-109

Zhong, Y. & Li, W. (2017) „Accounting conservatism: a literature review", *Australian Accounting Review*, vol. 27, no. 2: 195-213

Appendix 1. **Use of the prevention word 'safety'**

ANA, 2021, pp. 3-9	SIA, 2021, pp. 8-18
We declared our position on protecting employee health and jobs, putting into place a complete program to deal with Covid-19. Our employees are responsible for ensuring *safety*'. 'We will continue to change in response to the changing needs of our customers and social issues. (...) I am talking about *Safety* and *Human Resources*.' '*Safety* is our promise to the public and is the foundation of our business. As an airline group, and as critical social infrastructure, *safety* is absolutely essential. We place the highest priority on *safety*, even as times change. The ANA Group engages in a culture of *safety* at all times (...) We will spare no investment in handing down this culture of *safety* to the next generation. Employees discuss how to prevent accidents and incidents, which raises our awareness of *safety*. (...) ANA Group observed a moment of silence and renewed our commitment to *safety*. But a culture of s*afety* is not built overnight. We will continue our diligent efforts, together with our employees.' 'Our pursuit of *safety* is not limited to aircraft operations, but extends to numerous other fields such as food *safety* and information *security*.' 'In Japan, vaccinations have been progressing rapidly over the past few months. The ANA Group was the first company in Japan to begin vaccinating employees at work. (...) our group will make a contribution to society by mobilising the wisdom and efforts of humankind to bring a conclusion to Covid-19. In doing so, we will restore *safety* and security to our daily lives.' 'The ANA Group employs 46,000 people around the world—people who work diligently on a daily basis to ensure the *safety* of our aircraft and operations. I am proud of our employees who fulfil their roles in dealing with Covid-19, even as we operate under declarations of a state of emergency in Japan'.	'Regardless of the climate we operate in, robust health and *safety* standards remain a vital part of our world-class service promise. When the Covid-19 pandemic first hit, the SIA Group took immediate steps to implement a series of health and *safety* initiatives across various touchpoints of the customer journey.' 'There is little doubt that the travelling experience would be markedly different in the new operating environment as the world deals with the presence of the Covid-19 virus (...) the Group reimagined and designed a travel experience to integrate health and *safety* measures, regulatory requirements and digital initiatives for a seamless end-to-end customer journey.' 'We were also among the first in the industry to vaccinate our frontlines, including cabin crew and pilots, providing added *safety* and reassurance for both our customers and staff.' 'Comprising staff from various functions, worked tirelessly to put in place measures such as the Covid-19 Information Centre on the SIA website, where customers can easily access information on updated travel advisories, refund and rebooking policies, as well as health and *safety* measures.' 'Through our internal customer research studies, SIA identified two new priorities: health and *safety* measures, and delivering a seamless travel experience'. 'SIA received a 'Diamond' rating in the APEX Health *Safety* powered by SimpliFlying audit of global airlines' 'The Airline continues to invest in key infrastructural initiatives in preparation for recovery. (...) The new lounges will feature enhanced hygiene and *safety* measures, upgraded facilities, a 30% increase in space, as well as a newly curated selection of food and beverages.'

Appendix 2. **Use of the promotion word 'grow'**

ANA, 2021, pp. 3-9	SIA, 2021, pp. 8-18
'Aiming to return to a *growth* trajectory in the post-Covid-19 era'	'When most aircraft were grounded and air travel remained muted, the SIA Group pivoted to find new ways to generate non-flying revenue *growth*'
'The global pandemic led to significant restrictions on social and economic activities (...) ANA Group was forced to change our growth strategies'	'Seize *growth* opportunities in the new and fast-changing aviation environment'
'I want to look back (…) dealing with *Covid-19* under my leadership. I also want to discuss what we intend to do to return to a *growth* trajectory in the future.'	'Vistara's fleet *growth* plans remain on track (...) and the airline is expecting the number to increase'
'Measures that will lead to a return to *growth* in the future'	'SIA continues to actively pursue new engines of revenue *growth*'
'The *growth* of future generations'	'Traffic to KrisShop.com *grew* 120% year-on year, with the average transaction value recording 25% higher year-on year.'
'We improved cost competitiveness and pursued *growth* strategies focused on our international business'	'Despite the *growing* pace of vaccination exercises around the world, the situation has not abated'
'Some industries in the world have *grown* steadily, even during the Covid-19 pandemic'	'KrisShop grew its sales 121% year-on-year in its pivot to cushion the loss of travel retail'
'In the process of *growing* our international business, we have encountered many overseas cultures and business practices'	'Travel restrictions grew stiffer across the world as the year progressed.
'I believe fulfilling our mission inspired by the idea to serve our stakeholders and to serve the future will naturally lead to sustainable *growth* for the ANA Group'	
'We are an airline group that has *grown* together with our passengers and customers'	
'We revenue in our cargo business and engaged in consistent cost management, narrowing operating loss by a significant margin compared to the same period in the previous fiscal year'	

Ethics in Reporting of the Other Comprehensive Income: The Case of Listed European Companies

Claudia- Mihaela Rapan [a,12] and Andreia Manea [a]

[a] *Bucharest University of Economic Studies, Romania*

Abstract: *The aim of this study is to provide empirical evidence regarding the value relevance of ethics in reporting of the other comprehensive income: the case of listed European companies (France, Germany, Spain and Italy). The current research hypotheses of the study are whether the other comprehensive income in the context of the code of business ethics and other relevant ethical variables, such as Business Ethics Controversies and relevant ethical scores, has value relevance for investors. The concept of 'value relevance' is considered an important quality parameter that brings usefulness to the accounting information and non-financial information for investors by providing the relevant information in order to evaluate the company through its stock price.*

Keywords: *Other comprehensive income, value relevance, share price, business ethics.*

1. Introduction

An important part of the literature discloses studies on the quality of financial information, considered important to the stakeholders in order to understand the current economic status and future strategies and how it intends to achieve (Tucker, 2015).

The concept of 'value relevance' is considered an important quality variable that provides usefulness to the accounting information for investors by bringing the relevant information to assesses the company value through its stock price (Barth *et al*., 2001). Additionally, the contribution of value relevance of non-financial information was disclosed in different studies, including the impact of the ethical aspects that may have on the value relevance of accounting variables. The instability of international stock exchange markets influenced by different external factors highlighted the value relevance of other non-financial parameters (e.g., ethics rating, corporate sustainability assessment). The need of an ethical and behavioral approach related to financial performance, strengthens the relationship between other non-financial parameters, respectively corporate social responsibility, and market investor behavior (Landi and Sciarelli, 2019).

The value relevance of ethical aspects was studied by including matters such as those related to reputation for sustainability leadership corelated with the market valuation (i.e., book value of equity or net income) (Lourenco *et al*., 2013), proving the strong interconnection. Also, conducting business considering the ethical norms is positively corelated to shareholder value (Kaspereit and Lopatta, 2016). Ethics is no longer saw as just compliance with laws and regulations but influence the perception of the quality

[12] *Corresponding author:* Accounting Doctoral School, The Bucharest University of Economic Studies, 6 Piața Romană, 1st district, Bucharest, 010374 Romania.

of financial reporting. The studies disclosed how important it is for a company to concentrate resources on the effectiveness of controls in order to implement ethical and socially responsible behavior (Curtis,1998).

2. Literature review

There are different studies that sustain the link between the companies' performance such as comprehensive income and the code of ethics, but there are others that highlight that there is no strong relationship. In the context of evolution of the capital markets, the disclosure of comparable financial information, based on homogeneous quality standards, such as International Financial Reporting Standards (IFRS) became significant for investors, banks and other creditors in investment decision taking and for risk management. For a proper investment decision regarding the capital markets, the information must be disclosed in an understandable and comparable way so that user to be able to create projections on the future cash flows (Suprayogi and Barokah, 2019). It was studied that comprehensive income contributes to the evaluation of the company's performance; thus, the acquired assets influence the company's performance together with the sales margins, but also with the expected price changes (Chambers, 1994).

Depending on the type of financial information user, the relevance of financial information differs thus based on several studies managers are focus in comprehensive income, while investors will show their interested in return on investment and while creditors will conclude they analysis on the company's performance from a solvency perspective. (Firescu, 2015). Financial information is creating value relevance for investors and relation between capital market values and book values (Felthman and Ohlson ,1995).

The focus of the existing investors but also of potential investors, is over the inherent risk and return on their existing or potential investments, generating an overall image over the future performance of the company, and allows the users to create prediction over the company's capability to generate future cash flows (Van Z. and Whittington, 2006). According to De Beelde and Van Cawenberge (2008) the profit / result is computed as a difference between the carrying amount of equity at the end of the financial period compared with the one at the beginning of the period, by excluding the shareholders' operations. This theory was named as clean surplus accounting theory. Based on the relevant studies, it was concluded that the comprehensive income is significant as an indicator of companies' performance (Gazzolaa and Ameliob, 2014) (Frendzel and Szychta, 2013) and is more relevant for the users than the net result.

One of the studies that sustain the relationship is the study of Caserio C. and Napoli F, (2017) proving empirical evidence on the value relevance of the codes of ethics of Italian listed companies and the price per share. The code of ethics is seen as a "summary" of ethical variables: the whole set of variables related to ethics. The hypotheses of the study state that the code of ethics can provide a relevant value by adopting it, but also by its quality, affecting the value of companies in front of investors and therefore the price of shares. Thus, companies should incorporate in their business strategy the adoption of a code of ethics or the improvement of the quality of the existing one in order to contribute to the increase of the companies' value.

A more recent study shows that ethics is not yet a reliable and is not influencing significant the Italian stock exchange markets, even though the socially responsible investment growth positively over past decade. Investors seem not to consider as a significant component in taking the decisions, the indicators related to corporate social responsibility; therefore, the contribution to the value of the share price of the listed companies is not influenced by the highly stakeholder-oriented behavior (Landi and Sciarelli, 2019).

Recent literature detailed the influence of environmental, social and ethical behaviors on competitive strategies and companies' performance. Clarkson *et al*. (2011) disclosed through a study that companies with non-financial disclosures tended to have a better environmental performance.

3. Research methodology

The sample consists of companies listed on European stock exchanges (France, Germany, Italy and Spain) with financial information reported for the financial period ended between 2017 and 2021. The financial information for 2021 is limited to those companies that reported by 31 March 2022.

In order to be included in the sample, a company must be a company that prepares financial statements in accordance with International Financial Reporting Standards (or "IFRS") and has disclosed in the financial statements' other comprehensive income.
All the companies included in the population reported consolidated financial statements and are companies that activate in different industries and also in the financial sector, respectively banks.

Data collection, including OCI, was performed by using and querying the Thomson Reuters (Refinitiv) platform for the financial period 2017 - 2021. The sample consists in:

- Companies listed on large European stock exchange markets: 1,245 company-year observations, out of which: 584 from Germany, 278 from Italy, 227 from France and 156 from Spain.
- In the sample were included only the companies that reported OCI.
- The companies with missing data were not included in the sample.

The sample also contains:

- The share price that is the latest available closing price of each financial year.
- Policy Business Ethics: If the company *i* at the end of financial year *t* has a "code of conduct that it strives to maintain the highest level of general business ethics including information on respecting general business ethics or integrity and information from the code of conduct section." (Refinitiv, Thomson Reuters data base)
- Improvement Tools Business Ethics: How the company *i* at the end of financial year *t* have appropriate "communication tools (whistle blower, ombudsman, suggestion box, hotline, newsletter, website, etc.) to improve general business ethics including:

    - Consider internal improvement and communication tools with respect to general business ethics;
    - Information from the code of conduct include 3 elements; (1) policy on business ethics, (2) reporting line for violation of code and (3) the action was taken for improvement on such violation information from the code of conduct section" (Refinitiv, Thomson Reuters data base)
- Policy Business Ethics Score and Improvement Tools Business Ethics: "Percentile rank scoring methodology – to eliminate hidden layers of calculations. This methodology enables Refinitiv/ Thomson Reuters to produce a score between 0 and 100, as well as easy-to understand letter grades;" (Refinitiv)
- Business Ethics Controversies:" Number of controversies published in the media linked to business ethics in general, political contributions or bribery and corruption; Default value of all controversy measures is 0 and all recent controversies are counted in the latest closed fiscal year and no controversy is double-counted." (Refinitiv, Thomson Reuters data base)

The current research hypotheses of the study are whether the other comprehensive income in the context of the code of business ethics and other relevant ethical matters, including scores, has value relevance for investors.

Ohlson (1995) developed a pricing model used to analyze the changes in the value relevance of earnings, book value, and the components of other comprehensive income.

By using a linear regression disclosing the relationship between the independent variables and the dependent variables (book value and earnings).

For the current study the model was customized, and the following was tested:

$$Pit = \alpha_1 + \alpha_2 \text{ OCI it} + \varepsilon it \quad (1)$$

Where:
Pit = the share price of company i that is the latest available closing price of each year.
OCI it = the other comprehensive income of company i at the end of financial year t.
εit = other value relevant information of company i at the end of financial year t.

Since the Policy Business Ethics (PBE) is a relevant information for investors, it was included in the hypothesis:

$$Pit = \alpha_1 + \alpha_2 \text{ OCI it} + \alpha_3 \text{ PBE it} + \varepsilon it \quad (2)$$

Where:

PBE= Policy Business Ethics – is a dummy variable. If the company i at the end of financial year t describe in the code of conduct that it strives to maintain the highest level of general business ethics then is 1 – yes/true or otherwise 0 – no/false.

$$P_{it} = \alpha_1 + \alpha_2 \text{ OCI it} + \alpha_3 \text{ PBE Score it} + \varepsilon it \quad (3)$$

Where:

PBE Score =Policy Business Ethics Score – the variable assesses the percentage (up to 100) haw the company i at the end of financial year t describe in the code of conduct that it strives to maintain the highest level of general business;

$$P_{it} = \alpha_1 + \alpha_2 \text{ OCI it} + \alpha_3 \text{ PBE Score it} + \alpha_4 \text{ ITBE Score it} + \varepsilon it \quad (4)$$

Where:
ITBE Score = Improvement Tools Business Ethics Score: the variable assesses the percentage (up to 100) haw the company i at the end of financial year t have appropriate communication tools (whistle blower, ombudsman, suggestion box, hotline, newsletter, website, etc.) to improve general business ethics.

$$P_{it} = \alpha_1 + \alpha_2 \text{ OCI it} + \alpha_3 \text{ BEC e it} + \varepsilon it \quad (5)$$

Where:
BEC = Business Ethics Controversies: Number of controversies published in the financial year t for the company i.

4. Empirical study

The purpose of this study is to analyze the value relevance of other comprehensive and companies' ethical indicators based on evidence from European Stock Exchange for the companies' financial performance during 2017 and 2021 and the impact in share price.

We used STATA to perform the research and to test the hypotheses.

For the outliers related to OCI and Share price variables we used Winsor command for 1% and 99% of the population: winsor2 [independent variable], replace cut (1 99).

Table 1 provides descriptive statistics for each variable included in the study, the maximum, the minimum, the mean, and the standard deviation of each variable.

Table 1. **Descriptive statistics for variables used in the analysis**

```
. summarize OCI SharePrice PBE ITPBE PBEScore ITPBEScore BEC

    Variable |        Obs        Mean    Std. dev.       Min        Max
-------------+---------------------------------------------------------
         OCI |      1,245     8592437    3.29e+08  -1.21e+09   2.21e+09
  SharePrice |      1,214    43.26849    74.70974       .073      484.8
         PBE |      1,245    .5349398    .4989782          0          1
       ITPBE |      1,245      .42249    .4941542          0          1
    PBEScore |      1,245    32.36012    30.29411          0   72.83654
-------------+---------------------------------------------------------
 ITPBEScore |      1,245    27.83363    32.67511          0    80.7047
         BEC |      1,245    .1791165    1.198558          0         23

.
```

Table 2. **Value Relevance of other comprehensive income**

```
. regress SharePrice OCI
```

Source	SS	df	MS	Number of obs	=	1,214
				F(1, 1212)	=	1.42
Model	7922.25783	1	7922.25783	Prob > F	=	0.2337
Residual	6762492.76	1,212	5579.61449	R-squared	=	0.0012
				Adj R-squared	=	0.0003
Total	6770415.02	1,213	5581.54577	Root MSE	=	74.697

SharePrice	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
OCI	7.67e-09	6.43e-09	1.19	0.234	-4.96e-09	2.03e-08
_cons	43.19892	2.144637	20.14	0.000	38.99131	47.40653

Table 2 shows the model summary in equation (1) using linear regression.

The P value is 77%, thus 77% confidence, thus the hypothesis null is rejected, our variable OCI is significant statistical on the share price.

The R- squared is 0.12% near zero thus is not contradicting the null hypothesis, thus has certain explanatory power, thus 0.12% of OCI is explaining the share price, the remaining 99.88% is not explained.

The relation between the share price and OCI is a positively correlation with each other, and thus if one unit increase in OCI a 7.67 increase in share price.

Table 3. **Value Relevance of other comprehensive income and Policy Business Ethics**

```
. regress SharePrice OCI PBE
```

Source	SS	df	MS	Number of obs	=	1,214
				F(2, 1211)	=	19.65
Model	212790.637	2	106395.319	Prob > F	=	0.0000
Residual	6557624.38	1,211	5415.04904	R-squared	=	0.0314
				Adj R-squared	=	0.0298
Total	6770415.02	1,213	5581.54577	Root MSE	=	73.587

SharePrice	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
OCI	7.43e-09	6.34e-09	1.17	0.242	-5.01e-09	1.99e-08
PBE	26.10524	4.244156	6.15	0.000	17.77852	34.43195
_cons	28.87977	3.143778	9.19	0.000	22.71191	35.04763

Table 3 shows the model summary in equation (2) using linear regression.

The P value is 99%, thus 99% confidence, thus the hypothesis null is rejected, our variables OCI and PBE (Business Ethics) are significant statistical on the determination of share price.

The R- squared is 3.1%, thus has certain explanatory power, thus 3.1% of OCI and PBE are explaining the share price, the remaining 96.9% is not explained.

The relation between the share price with OCI and respectively with PBE is positively correlations with each other, and thus if one unit increase in OCI determines a 7.43 increase in share price and if one unit increase in PBE determines a 26.1 increase in share price.

Table 4. **Value Relevance of other comprehensive income, Policy Business Ethics Score**

```
. regress SharePrice OCI PBEScore
```

Source	SS	df	MS		
Model	206053.512	2	103026.756	Number of obs	= 1,214
Residual	6564361.51	1,211	5420.61231	F(2, 1211)	= 19.01
Total	6770415.02	1,213	5581.54577	Prob > F	= 0.0000
				R-squared	= 0.0304
				Adj R-squared	= 0.0288
				Root MSE	= 73.625

SharePrice	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
OCI	7.62e-09	6.34e-09	1.20	0.230	-4.82e-09	2.01e-08
PBEScore	.4227998	.069933	6.05	0.000	.2855964	.5600031
_cons	29.16812	3.139159	9.29	0.000	23.00933	35.32691

Table 4 shows the model summary in equation (3) using linear regression.

The P value is 99%, thus 99% confidence, thus the hypothesis null is rejected, our variables OCI and PBE Score (Business Ethics Score) are significant statistical on the determination of share price.

The R- squared is 3.04%, thus has certain explanatory power, thus 3.04% of OCI and PBE Score are explaining the share price, the remaining 96.96% is not explained.

The relation between the share price and OCI and respectively PBE Score is positively correlation with each other, and thus if one unit increase in OCI determines a 7.62 increase in share price and if one unit increase in PBE Score determines a 0.42 increase in share price.

Table 5 shows the model summary in equation (4) using linear regression.

The P value is 99%, thus 99% confidence, thus the hypothesis null is rejected, our variables OCI, PBE Score (Business Ethics Score) and ITPBE Score (Improvement Tools Business Ethics Score) are significant statistical on the determination of share price.

The R- squared is 3.20%, thus has certain explanatory power, thus 3.20% of OCI, PBE Score and ITPBE Score are explaining the share price, the remaining 96.8% is not explained.

Table 5. **Value Relevance of other comprehensive income, Policy Business Ethics Score and Improvement Tools Business Ethics Score**

```
. regress SharePrice OCI PBEScore ITPBEScore
```

Source	SS	df	MS	Number of obs	=	1,214
				F(3, 1210)	=	13.34
Model	216760.27	3	72253.4232	Prob > F	=	0.0000
Residual	6553654.75	1,210	5416.24359	R-squared	=	0.0320
				Adj R-squared	=	0.0296
Total	6770415.02	1,213	5581.54577	Root MSE	=	73.595

SharePrice	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
OCI	7.59e-09	6.34e-09	1.20	0.232	-4.85e-09	2.00e-08
PBEScore	.5516614	.1152686	4.79	0.000	.3255129	.7778099
ITPBEScore	-.1494412	.1062895	-1.41	0.160	-.3579733	.059091
_cons	29.15765	3.137903	9.29	0.000	23.00132	35.31399

The relation between the share price and OCI, PBE Score is a positively correlation with each other, and thus if one unit increase in OCI determines a 7.59 increase in share price and if one unit increase in PBE Score determines a 0.55 increase in share price. The relation between the share price and ITPBE Score is a negatively correlation with each other, if one unit increase in ITPBE Score determines a 0.149 decrease in share price.

Table 6. **Value Relevance of other comprehensive income and Business Ethics Controversies Score**

```
. regress SharePrice OCI BEC
```

Source	SS	df	MS	Number of obs	=	1,214
				F(2, 1211)	=	3.17
Model	35284.788	2	17642.394	Prob > F	=	0.0423
Residual	6735130.23	1,211	5561.62695	R-squared	=	0.0052
				Adj R-squared	=	0.0036
Total	6770415.02	1,213	5581.54577	Root MSE	=	74.576

SharePrice	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
OCI	8.64e-09	6.44e-09	1.34	0.180	-3.99e-09	2.13e-08
BEC	3.923229	1.76875	2.22	0.027	.4530744	7.393383
_cons	42.46943	2.166288	19.60	0.000	38.21934	46.71952

Table 6 shows the model summary in equation (5) using linear regression.

The P value is 95.77%, thus 95.77% confidence, thus the hypothesis null is rejected, our variables OCI and BEC (Business Ethics Controversies) are significant statistical on the determination of share price.

The R- squared is 0.52%, thus has certain explanatory power, thus 0.52% of OCI and BEC are explaining the share price, the remaining 99.48% is not explained.

The relation between the share price and OCI and respectively BEC Score is positively correlation with each other, and thus if one unit increase in OCI determines a 8.64 increase in share price and if one unit increase in BEC determines a 3.92 increase in share price.

5. Conclusions

This study opens up a critical and noteworthy topic for accounting: ethics and OCI, disclosing a statistical linkage between a management commitment to ethical and socially responsible behavior and favorable corporate financial performance.

These results disclose the probability that investors will show more interest in a company that discloses other comprehensive income correlated with its materiality of it and the Company's attention to its code of ethics and other variables related.

There were several research studies that focus on the correlation between single ethic-related variables and their value relevance while, in the current research, we analyze the association between Policy Business Ethics and variables related, other comprehensive income, and value relevance.

Some users think that OCI is confusing and see it as a black hole for anything that is an accounting issue. There is a lack of clarity among users about the roles of profit or loss and OCI, and when OCI items should or should not be reclassified to profit or loss. A common misunderstanding is that the distinction is based upon realized versus unrealized gains. This lack of a consistent basis for determining how items should be presented has led to an inconsistent use of OCI.

6. Future research directions

Future research may investigate the value relevance of the same period 2017 - 2021 but to extend it to companies listed on emerging stock exchange markets. In order to conclude whether the other comprehensive income and the scores related to ethics are important and are relevant information for investors on European capital markets, quantitative research should be prepared based on value relevance of these information by using different econometric models that have tested the relevance of the other comprehensive income.

For the future research we will include in the population companies that are listed on emerging European capital markets and are using as accounting framework IFRS. The data to be use will be extracted from databases (e.g., Thomson Reuters Eikon, Orbis, etc.) or collected manually, as appropriate from the annual financial statements.

References

Barth, M., Beaver, W., & Landsman, W. (2001) "The relevance of the value relevance literature for financial accounting standard setting: another view", *Journal of Accounting and Economics*, vol. 31, no. 1: 77-104, available on-line at:

Caserio, C., & Napoli, F. (2017). "Value relevance and codes of ethics: an empirical analysis of Italian listed companies", *International Journal of Business Governance and Ethics*, vol. 12, no. 1: 1-20, available on-line at doi:10.1504/ijbge.2017.085238

Chambers, R.J. (1994) "Accounting, Evaluation and Economic Behavior", pp. 215-348, available on-line at https://ses.library.usyd.edu.au/handle/2123/2379 on 12 March 2020;

Clarkson, P., Li, Y., Richardson, G., & Vasvari, F. (2011), "Does it really pay to be green? Determinants and consequences of proactive environmental strategies", *Journal of Accounting and Public Policy*, vol. 30, no. 2: 122-144 available on-line at doi:10.1016/j.jaccpubpol.2010.09.013

Curtis, C. (1998) "A Study of The Link Between a Corporation's Financial Performance and Its Commitment to Ethics", *Journal of Business Ethics*, vol. 17: 1509-1516 available on-line at https://doi.org/10.1023/A:1006020402881

De Beelde, I. & Van Cawenberge, P. (2008) "Does the Comprehensive Income Matrix Make Unsophisticated Users Overemphasize Fair Value Income?", *Maandschrift Accountancy & Bedrijfskunde*, vol. 28, no. 7: 31-40;

Felthman, G. & Ohlson, J. (1995) "Valuation and Clean Surplus Accounting for Operating and Financial Activities", *Contemporary Accounting Research*, vol.11: 690-730;

Firescu, V. (2015), "Comprehensive income, a new dimension in performance", *Procedia Economics and Finance*, vol. 20: 218-223;

Frendzel, M. & Szychta, A. (2013), "Comprehensive Income Reporting: Empirical Evidence from the Warsaw Stock Exchange", *Challenges for finance and accounting*, vol. 82, no. 4, available on-line at https://www.socsc.ktu.lt/index.php/Social/article/view/6603 on 12 March 2021;

Gazzolaa, P. & Ameliob, S. (2014), "The impact of comprehensive income on the financial ratios in a period of crises", *Procedia Economics and Finance*, vol. 12: 174-183;

Landi, G. & Sciarelli, M. (2019). "Towards a more ethical market: the impact of ESG rating on corporate financial performance", *Social Responsibility Journal*, vol. 15, no. 1: 11-27, available on-line at doi:10.1108/SRJ-11-2017-0254

Lourenco, I.C., Callen, J.L., Branco, M.C., & Curto, J.D. (2013) 'The value relevance of reputation for sustainability leadership', *Journal of Business Ethics*, vol. 119, no. 1: 17-28, available on-line at doi: 10.1007/s10551-012-1617-7

Kaspereit, T. & Lopatta, K. (2016) 'The value relevance of SAM's corporate sustainability ranking and GRI sustainability reporting in the European stock markets', *Business Ethics: A European Review*, vol. 25, no. 1: 1-24.

Ohlson, J.A (1995) "Earnings, book values, and dividends in security valuation", *Contemporary Accounting Research*, vol.18, no. 1: 107-120;

Refinitv, https://eikon.refinitiv.com/, https://www.refinitiv.com/en/sustainable-finance/esg-scores#methodology

Suprayogi, B.S. & Barokah, Z. (2019) "Does Comprehensive Income Predict Future Cashflow Better Than Net Income?", *The Indonesian Journal of Accounting Research*, vol. 22, no. 2: 287-304;

Tucker, J.W. (2015) 'The relation between disclosure quality and reporting quality: a discussion of Cassell, Myers, and Seidel (2015)', *Accounting, Organizations and Society*, vol. 46: 39-43, available on-line at doi.org/10.1016/j.aos.2015.05.002.

Van Zijl, T. & Whittington, G. (2006) "Deprival value and fair value: a reinterpretation and a reconciliation", *Accounting and Business Research*, vol. 36, 2:121-130.

Reporting on Human Resources Management (HRM) Practices and Corporate Characteristics: A Romanian Healthcare Industry Case Study

Ana-Maria Bratu[13, a]

[a] *Bucharest University of Economic Studies, Romania*

Abstract: *Given the commitment of companies to sustainable development, the requirements for stepping up the reporting of human resource management practices have increased. The main objective of the research is to analyse the area of human resource information reporting in a healthcare company. This study explores defining elements related to human resource management awareness and behaviour. To achieve the proposed objective, data were collected from the annual report of a Romanian company listed on the Bucharest Stock Exchange for a period of five years (2016-2020). The extracted information is analysed through a critical interpretation in order to identify the level of reporting on the practices related to human resources management, and the changes that occurred throughout the pandemic period. The findings show that there is an increasing interest in the transparency of human resource information. The most important changes observed over the targeted period are related to reporting on auditor type and employee remuneration, while both the size and the financial performance increased over the time. Other information on human resources practices were reported: employees health and safety, employment of women, employees with disabilities, employees' training, employees' remuneration, employee profiles.*

Keywords: *Human resource management, healthcare industry, human resource accounting disclosure, Romania, annual reports.*

1. Introduction

The concept of human resource management has developed in both practice and scientific research (Aust *et al*., 2020). Human resource management can be defined as a process of planning human resources to enable the company to achieve its goals. This planning process involves the existence of practices that are considered to be consistent and effective in achieving results. In other words, the system of practices, which reflects the actual activities, is closely related to the company's performance (Boon *et al*., 2019).

The main component of human resource management in a company is human capital. The latter can be defined as a knowledge base that people form over the course of time to produce goods and services. A company needs to invest as much as possible in human capital in order to increase opportunities and develop a competitive advantage (Cakar *et al*., 2021).

[13] *Corresponding author:* Doctoral School of Accounting, Bucharest University of Economic Studies; 6 Piața Romană, 1st District, Bucharest, 010374 Romania

In order to understand whether a company is focusing on human resources as a key issue, this research aims to understand the importance of human resource management practices and whether these practices have a positive and significant impact on the organisation. The purpose of this paper is to examine the extent of human resource disclosure practices by assessing the degree of disclosure of human resource information in annual reports that contribute to the development of knowledge on the main items that a company should report when it comes to human resource and the level of transparency on reporting all the provided aspects. This study is important to reveal the level of reporting of human resource information in a listed company in the Romanian healthcare industry. According to Figure 1, considering the selected countries, Romania ranks last in the reporting of the human resource index. Hence the interest in observing and highlighting corporate behaviour regarding human resources in a Romanian listed company.

The synthesis made in the area of corporate HR awareness and behaviour underpins the development of the research propositions/questions for this study. Thus, the way and the extent of the process of presenting the issues related to the inclusion of human capital in the realisation of a company's business model is followed.

RQ1. To what extent do the various corporate reporting channels/ documents/ instruments incorporate the issues identified in the literature as affecting human capital?

RQ2. Which aspects are taken into account by Romanian healthcare companies regarding the reporting of human resources management practices?

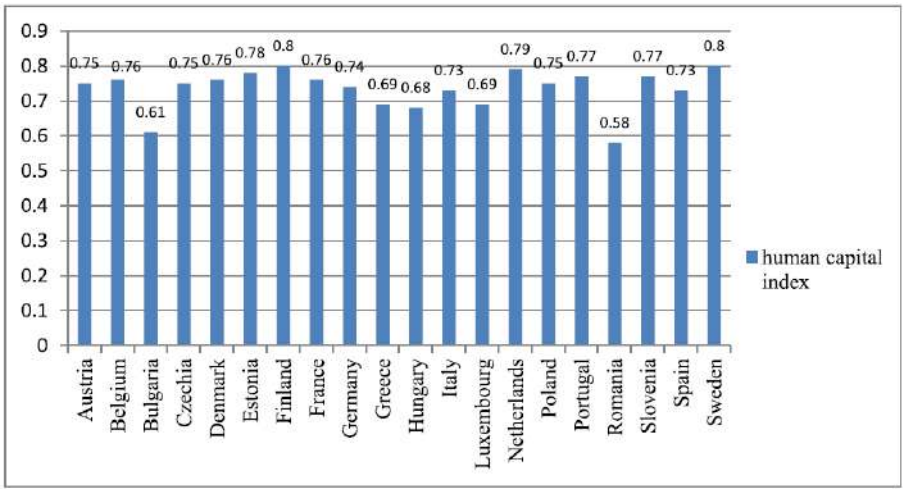


Figure 1. **Human capital index of selected EU countries**
Source: Cakar *et al*., 2021: 3

In order to have economic growth, part of a company's investment must go to human capital. Therefore, the footprint of human capital on the business environment is a topic of interest, which requires research at a global and individual level. For this research, an in-depth analysis of the specific case of a company providing services in the healthcare sector is envisaged. The data collection source for this research was mainly annual reports. The information collected was complemented by the analysis of other documents published on the company's website. At the same time, data on the COVID-

19 pandemic were collected and checked that were relevant to the elements analysed in terms of human resources management.

This article consists of the following main sections. The second section presents information on human resources and the importance of this information for companies' annual reporting. The third section provides elements of the research methodology and is followed by the one containing the results of the study. In the final section, conclusions are drawn, research results are discussed and recommendations for the future research are provided.

2. Literature review

Although a lot of academic research has been carried out on HR in recent years, there are still issues that lack a clear definition, such as corporate HR analysis and reporting (Margherita, 2020). Human resource management and corporate governance are two components of the business model that, intertwined, aid in the adoption of best practices in decision making and at the same time ensure the interest of stakeholders. Over time, people have unfortunately become inclined to believe that governance exists only at top management level, while it includes, without a doubt, a wide array of organisational units, including human resources. Since members of management are the main decision-makers, it is they who shape beliefs and attitudes towards human resources. Therefore, leadership unequivocally influences the effectiveness and involvement of human resource management in company strategy (Lima and Galleli, 2021). "Corporate governance is a means of maintaining a balance between economic and social goals and between individual and community goals" (Modupeola and Christian, 2021: 176). It can also be defined as a system through which companies are managed with the aim of creating value and meeting stakeholder requirements. Therefore, corporate governance is considered a key factor in determining the degree and attention paid to the information presented on human resources, and the relationship between the two plays an important role in a company's performance (Modupeola and Christian, 2021). Moreover, human resource management is perceived to have a mediating function between corporate governance and company performance. Thus, this raises the level of approach to reporting this information and companies are forced to pay more attention to human resource indicators (Hutomo and Pudjiarti, 2018).

Human resource analysis is a fact-based approach. The use of these facts together with an analysis based on advanced methods and techniques to improve strategy provides governance with useful information that assures organisational success. Human resource analysis takes into account variables such as risk, performance, experience, the level of commitment and culture. These components are of utmost importance to the members of the corporate boards (Margherita, 2020). Two decades ago, the concept of *talent management* was developed. It involves efforts to ensure strategic actions and activities that, by engaging human resources "in the right job, at the right place and at the right cost", lead to the achievement of competitive advantage (Claus, 2019:208). In other words, talent management is the core of strategic HR practice (Claus, 2019).

According to Pham (2021), the human resource in a company is the main aspect without which other resources cannot be used effectively. Therefore, human resource is a basic source through which the company ensures sustainable development. Although over time through studies companies' state that human resource is the most important, it has

been shown that few companies use human resource measurement concepts in their annual reports. Because of this, among the problems found in the literature is that of stakeholders who have expressed dissatisfaction with the lack of certain information disclosed in this type of reporting. Another problem found in the literature on important indicators for human resource management refers to information on the employment of women, employment of people with disabilities and employee health and safety. These indicators are directly related to the financial aspects of the company's business sector. Thus, organizations prefer to reduce investments to minimise the effect of the conditions of the sector to which it belongs (Surdu *et al*., 2020). Also, the indicator on disclosure of remuneration policies is also questioned lately in HRM research, showing that there is a lack of information in the reports. The reasons why a company does not want to mention such information are related to lack of resources, lack of knowledge and awareness, poor performance and fear of negative publicity (Heta *et al*., 2021).

Company growth implies planning in terms of human resource management. This planning involves actions such as recruitment, training, assessment and rewarding, thus succeeding in maintaining employees' interest and making the most of their potential. However, there are ongoing downsides in developing human resource management. One of the main causes is an outdated HR management policy. In order to ensure the safe development of the company, this management concept should be updated to become 'people-oriented' and the focus should be on innovation and development. In order to succeed in persuading employees to devote themselves to work, they should be provided with optimistic conditions for development and a sense of belonging (Zhou, 2021). There are contributing factors that, when overlapped, favour co-creation. This is called management innovation. Co-creation represents added value for the company and is linked to human resource management through the development of social responsibility strategies (Ulvenblad and Barth, 2021). In recent years co-creation of value has become a very interesting topic and this has given rise to various conceptions of value creation for the company. Through this concept companies can understand how to better evaluate the usefulness of the resources they offer to employees and how they could develop certain techniques to create value on both sides (Boukis and Kabadayi, 2020).

One of the key points for a company to develop human resource strategies is the interest and implementation of social responsibility practices. To ensure long-term success, it is important for a company to adapt its strategy to the changing environment and technological shifts. Sustainable human resource management is based on fostering a culture of trust and cooperation, and then nurturing employee commitment that translates into loyalty. The key to success in developing human resource management practices is adequate human capital training. Training means helping employees by upgrading their knowledge and skills to successfully perform a particular task (Piwowar-Sulej, 2021). Moreover, the implementation of social responsibility practices goes beyond organisational boundaries. In other words, the adoption of these strategies is not limited to responsibility for the people within the company, but they also impact the communities in which they operate (Aust *et al*., 2020).

In order to have economic growth, it is imperative that part of the investment goes to human capital. Therefore, the footprint of human capital on the business environment is a topic of interest that requires research at global and individual level. For this research, an in-depth analysis of the specific case of a company providing services in

the healthcare sector is envisaged. It has been shown that the human capital development process brings about innovations related to environmental protection. With this in mind, many studies have shown that more developed countries have more developed human capital, and the more developed the human capital, the more developed the processes related to social responsibility, environmental protection and sustainable development (Cakar *et al*., 2021).

3. Research methodology

A case study is used to shed light on the topic under discussion. The case study is a detailed method of investigation and research of a single case. It generates an appropriate form of knowledge through observation and understanding of certain phenomena. However, criticism of case studies refers to the fact that a theory cannot be generated through the lens of a single study (Widdowson, 2011). A case study is an empirical inquiry whereby a phenomenon is investigated using multiple sources. These studies are useful when a problem or situation needs to be understood by analysing the information provided. There are three types of case study methodology: exploratory, descriptive, and explanatory (Noor, 2008).

Annual reports are important sources of information and are mandatory for companies. Through them, financial and non-financial aspects can be identified and an overview can be created for stakeholders (Surdu *et al*., 2020). A company needs to show interest in reporting and sustainable HRM (human resources management) practices to improve the relationship with stakeholders. The way it is written and the quality of the information found in a report can determine an investor to direct their investment towards the company. The company can also build a brand image and an excellent reputation. There is external, as well as internal reporting pressure in HR policies, strategies, and employee behaviour. As far as the European Union is concerned, there are numerous non-financial reporting standards (Hronova and Spacek, 2021) the requirements of which are integrated into companies' annual reports.

The research methodology applied to the data collected for this study is based on a critical analysis of reporting practices concerning human resources. This research is positioned within the framework of empirical, archival research. A company's annual report was used to collect data on the company's descriptive, size and performance characteristics, as well as on human resources reported information. The purpose of this study is to investigate the practice related to reporting human resource management practices for a company in Romania. Quantitative and qualitative data used in this study were manually collected for the 2016-2020 period, from the annual reports of Medlife SA, a company listed on the Bucharest Stock Exchange.

Table 1. **Recent studies on human resources reporting**

Authors	***Heta* et al.*, 2021***	***Hronova and Spacek, 2021***	***Pham* et al.*, 2021***	***Surdu* et al.*, 2020***	***Ullah et al., 2019***
Country	Finland	Czech Republic	Vietnam	Turkey	Bangladesh
Sample	43 Finnish listed companies	Traditional literature review	204 non-financial companies listed on the Vietnam Stock Exchange	54 insurance companies in Turkey for the period 2007-2017	277 insurance companies in Bangladesh for the period 2008-2014
Aspects analysed	Employees' remuneration	Auditor type, profitability, employee health and safety, employment of women, employees with disabilities, employees' training, employees' remuneration	Industry, company age, auditor type, firm size, profitability, social responsibility	Company age, firm size, social responsibility, employee health and safety, employment of women, employees with disabilities, employees' training, employees' remuneration, employee profiles	Industry, company age, employment of women
Data source	Company website	Annual report, literature review	Annual report	Annual report	Annual report
Dependent variables	Human resource disclosures	Human resource disclosures	Human resource disclosures	Human resource disclosures	CSR disclosure index
Findings	Remuneration and lack of transparency in reporting do not support the implementation of sustainability strategies and can hinder sustainable development.	Proper HR functioning within the organization can help in utilizing the HR tools. Information revealed based on the S-HRM Practices Model will impact investors.	The results revealed that the most influential variable for explaining company variation in HR disclosure is firm size followed by firm age and firm profitability.	The results indicate that the number of employees and the type of company have an effect on human resource disclosure. Employee training is the most disclosed item among the disclosures analysed in the annual reports.	The proportion of female directors on insurance boards is positively associated.

The Covid-19 pandemic has caused major transformations in many industries around the world. Social distancing has been implemented, but, at the same time, companies, employees, students, and other professionals had to adopt digitalization on a large scale, in their everyday lives. But what about the healthcare industry? The pandemic has brought many changes to this industry as well, and new implementation strategies bring about many improvements.

To determine the level of transparency associated with the main issues identified in the literature, general information related to indicators such as company size, company age, profitability, industry to which it belongs and auditor type was collected and analysed for the company included in the research (Pham *et al*., 2021). Other studies have used the method of identifying specifics on employee health and safety, employment of women, employment of people with disabilities, employee training, employee compensation and employee profiles to decide the information in the yearly human resource report (Surdu *et al*., 2020).

Studying the company's website to find the precise place where the annual reports and statements are published is one of the procedures taken in conducting the research. Annual reports and current reports are considered for additional and detailed information on a specific topic.

The importance of this study results from the specific activity of economic entities having the obligation to periodically publish financial statements as well as economic practices in Romanian companies regarding human resources management. The importance of human resource studies is reflected in the elements that an annual report produced by a company must contain. "The annual report is a document used by most public companies to disclose the important corporate information to shareholders and the general public" (Chaowang and Xiaofei, 2021: 84). Human resource is one of the main elements to be included in this type of reporting. Thus, the relevance of providing information on human resources is particularly important because it demonstrates the level of efficiency and effectiveness of the company. At the same time, reporting this type of information also contributes to the reputation of the organisation (Surdu *et al*., 2020).

4. Research results

The main objective is to identify and analyse longitudinally the most important issues in reporting human resource information in a healthcare company. It also looks at whether there are changes in the reporting of this information in a pandemic context.

4.1. Descriptive characteristics of the company

Medlife SA is a company that was established in 1996 according to the Romanian legislation, and the company's activity consists in providing medical services through a series of medical centres located in some of the largest cities of the country (Bucharest, Cluj, Timișoara, Iași, Galați).

The industry is a key indicator in the analysis of reporting on the characteristics of human resources. "MedLife is one of the largest healthcare providers in Romania, holding a significant market share at a national level." (Medlife SA Annual Report,

2020: 169). Medlife SA's main business lines are Corporate, Clinics, Hospitals, and Laboratories. In 2015 the company decided to expand into dentistry by opening a clinic and in 2016 it acquired the majority stake in Dent Estet. At the same time, the company also owns the Pharmacy business line. "As of 31 December 2020, the company owns 53 clinics, 10 hospitals, 33 laboratories, approximately 180 collection points, 12 dental clinics and 14 pharmacies" (Medlife SA Annual Report, 2020: 9).

The company age may have a positive influence on reporting through being a sign of development and growth. Mature companies have an advantage in that they would have more experience in terms of competitiveness. Thus, a mature company reports much more human resource information (Ullah *et al*., 2019). This variable can also be explained from a stakeholder perspective. Companies listed on the stock market for a longer period present a broader experience on social responsibility. Therefore, the capital market is an important influencing factor on the level of disclosures (Pham *et al*., 2021). In the 2016-2020 annual reports of Medlife SA, in the section on the company's presentation, there is information that the company was "founded in 1996, according to the Romanian legislation" (Medlife SA Annual Report, 2020: 136). Moreover, in 2016 the company was listed on the Romanian stock market. The private healthcare market is constantly developing due to certain changes that have occurred over time. The most important for this sector are those referring to private insurance from employers, quality of services, increasing living standards. Therefore, at the end of 2019, MedLife has a market share of 30.4%, being the second company after Unirea Medical Centre (Regina Maria) with 37.9% (Goldring Medlife SA analysis, 2021).

A significant link also exists in terms of *auditor type* and level of reporting. This link stems from the fact that an audit firm that belongs to the Big4 will always protect its reputation and strictly comply with reporting requirements (Pham *et al*., 2021). As for the independent auditor, for 2016-2018, the company does not present information on this issue. Instead, the annual report for 2019 and 2020 contains information on the independent auditor. This is Deloitte Audit S.R.L. which is part of Big4. At the beginning of the independent auditor's report, it is stated that "we have audited the consolidated financial statements of Medlife SA and its subsidiaries" (Medlife SA Annual Report, 2020: 65). The independent auditor's opinion on the statements reviewed is as follows: 'the accompanying consolidated financial statements present fairly, in all material respects, the consolidated financial position of the Group as of 31 December 2020' (Medlife SA Annual Report, 2020: 65). According to the 2016 annual report, the company mentions in the governance report under Section B "Responsibilities" in provision no. 1 that they have not established an Audit Committee. As of 2017, it states that "MedLife's Articles of Incorporation in conjunction with the Corporate Governance Charter provide for the existence of this committee, its structure, and its responsibilities. The Committee comprises 3 non-executive members, 2 of whom are independent" (MedLife Annual Report, 2017: 203).

The firm size is an important element in terms of human resources. This is important when considering the dissemination of information to stakeholders. Based on reporting on company size, stakeholders will tend to invest, and in this way, value is created in the company. It has been shown that "the extent of human resource reporting is positively associated with company size" (Surdu *et al*., 2020: 9). Studies that have included this research variable as a determinant of human resources in a company have

shown different results, but many authors have noted a positive effect (Pham *et al*., 2021).

Following the information extracted from MedLife's annual reports for the years 2016-2020, according to Table 2, it can be seen that to determine the size of the company, information on the number of employees, total assets, and turnover is reported. Regarding the number of employees, the company does not report concrete information, but an approximate number of employed or collaborating doctors and nurses, but from the perspective of total assets and turnover stakeholders can find a lot of information.

Table 2. **Evolution of the firm size variable.**

Firm size	2016	2017	2018	2019	2020
Employees	2,000 doctors and 1,300 assistants	2,200 doctors and 1,500 assistants	2,500 doctors and 1,800 assistants	approximately 3,000 doctors and 2,000 assistants	approximately 3,300 doctors and 2,000 assistants
Total assets (RON)	466,119,460	603,345,487	754,094,206	1,054,354,343	1,183,493,863
Sales (RON)	502,986,790	623,219,949	794,562,861	967,380,307	1,077,448,351

It can be seen that with the listing in 2016, Medlife SA has been growing year on year both in terms of the number of employees, total assets, and turnover. The average number of employees is 325 employees/year, noting that in the context of the COVID-19 pandemic for the year 2020, the company has not seen the highest growth, but has managed to fall within the average calculated for the years under review. For total assets, the company has seen growth for the 5 years analysed with an average of approximately 26.5%, but for the year 2020 considering the pandemic situation, the organisation has seen the lowest growth of all 5 years, being only 12%. Likewise, for the turnover, the company recorded an increase in 2020 of approximately 11.5%, with an average of 21%.

In terms of *financial performance*, the more profitable a company is, the more it wants and reports information to show this detail. This helps to maintain a true picture and ensure information transparency. The more profitable the company, the more detailed the performance information will be to enhance its value. However, in the studies published so far, opinions are divided on its relationship with human resources. The analysis by Pham *et al*. (2021) shows that profitability is positively correlated with the information presented by the companies analysed in human resource management reports. At the same time, Surdu *et al*. (2020) argue that the results on the link between human resource information reporting and financial performance obtained in previous studies are controversial. However, some studies present the idea that "the more profitable a company is, the more information is voluntarily disclosed" (Surdu *et al*., 2020: 8). Performance reporting pressures may challenge organisations to strive for HR reporting (Hronova and Spacek, 2021). In the annual reports for the years 2016-2020 for Medlife SA, there is a lot of information on profits, stating that since 2017 they have seen a significant increase compared to the previous year. For 2016, the company reports a loss of RON 1,241,990 due to a receivable recorded for CNAS (National Health Insurance House) for the period 2008-2010. From the information extracted

from the Medlife SA Annual Report (2020: 10), found in the section related to strategy and achievements, it is stated that "an expansion of the portfolio of units and services is envisaged, ensuring a profitable national coverage".

Table 3. **Evolution of the company's performance**

Performance indicators	2016	2017	2018	2019	2020
Profit (Loss)	(1,241,990)	8,731,625	16,782,637	16,785,485	63,763,684
ROA	-0.266%	1.447%	2.225%	1.592%	5.387%
ROE	-1.334%	5.207%	9.382%	8.112%	23.712%
Leverage	80.044%	72.211%	76.279%	80.376%	77.278%

For the company Medlife SA, in terms of profit for the years analysed, a significant increase is observed, especially in the year 2020. Even though in the year 2016 the company recorded a loss, for the following three years the company managed to have a considerable increase, especially in the year 2018 which recorded a 92% higher profit compared to 2017. The year 2020 is visibly the most profitable year for the company, with the increase compared to 2019 almost reaching triple. In terms of return on assets (ROA) and return on equity (ROE), the trends are similar to net income, but there is a difference regarding 2018-2019. For ROA there is a decrease of 0.633% and for ROE there is a decrease of 1.27%. Trends for the 2020 pandemic year are upward. In terms of leverage the year 2016 and the year 2019 show the highest increase, followed by the years 2017 and 2018, with the lowest values, and the year 2020 shows an average value between the year with the lowest and the year with the highest value.

Reporting on *social responsibility* is a relevant indicator for the relationship with human resources. Moreover, the importance of this indicator for research results from the fact that a company belonging to an environmentally sensitive industry will always disclose more information on environmental concerns. This concern for reporting details on this issue results from the pressures created by stakeholders. The absence of environmental information for stakeholders represents a lack of performance (Pham *et al*., 2021). For the years 2016-2018 there is a lack of information on the aspect related to environmental practices. At the same time, in the governance report published in the annual report, in provision no. 10 of section D "Adding value through investor relations" the company presents the idea that "the Board of Directors is discussing a Social Responsibility Policy, relevant elements to be published on the company's website". For 2019 and 2020 it is mentioned that there is an interest in obtaining environmental permits. The company is carrying out a project called "We Make Romania Green" through which they propose "that for every child born in MedLife maternity wards, the company will plant a dandelion in a deforested area in the Făgăraș mountains" (Medlife SA Annual Report, 2020: 150). They also created a set of rules for all employees whereby they must reduce electricity consumption, carry out selective collection (paper, plastic, electronics, waste), and reduce water consumption. For the 2020 annual report, some information on the COVID-19 pandemic has been added. In the chapter on Business Continuity, the company mentions that they have tried to reduce costs as much as possible to be able to pay employees' salaries and have reduced the salaries of the management team by 50% for 45 days. Another change found is that of protective measures for patients by implementing new rules on entering clinics through epidemiological triage, creating isolation spaces, creating disinfection procedures, and providing protective and disinfection equipment. However, "the company has assessed the impact of the Coronavirus pandemic on the business and believes that the financial

statements will not be significantly affected by this event" (Medlife SA Annual Report, 2020: 133).

4.2. Human resource management practices

When analysing information on *employee health and safety* there is a decreasing trend in reporting. One of the reasons could be related to financial conditions in the sector to which the company belongs (Surdu *et al*., 2020). According to Hronova and Spacek (2021), since 2017 a rule has been introduced in the European Union that companies with more than 500 employees are obliged to report to the European Parliament Directive 2014/95/EU. This reporting aims to support companies by using standards on disclosure of information with a social context including employee health and safety. According to the analysis of the reports from 2016-2018 MedLife company does not hold information on employee health and safety. Since 2019, generic information appears in the annual reports referring to the conclusion of insurance policies for doctors in case of malpractice and in the section on "Employee benefits" it is mentioned that "The Group makes payments to the Romanian State on behalf of its employees for the pension, health and unemployment fund" (Medlife SA Annual Report, 2019: 80).

The studies analysed have confirmed the idea that the information least presented through the reports is related to *disabled employees*, followed by information on the *employment of women* (Surdu *et al*., 2020). The GRI (Global Reporting Initiative) standards include some equality and non-discrimination issues. Thus, the main issues refer to "gender equality, racial injustice, gender pay and the wage gap, minorities, employment of minors and human rights" (Hronova and Spacek, 2021: 25). According to Surdu *et al*. (2020), the research results found that among the most detailed information is that related to *employee training* and professional development. This information helps current and potential employees as stakeholders to know better the company's policies on this issue. Employee training can also be an issue related to human resource development as an element of sustainable development not only for the organisation but also for community development (Hronova and Spacek, 2021). Regarding information related to the employment of women and people with disabilities, Medlife SA does not present any details about these issues. Nor is information related to employee training detailed in the report. As of 2019, there is some brief information on the development of a project called "We do Romania well" through which "the company has constantly organised or participated in medical events at which doctors from home and abroad have had the opportunity to share new knowledge, technologies or procedures" (Medlife SA Annual Report, 2019: 123).

Another aspect of sustainability can be defined through the "triple bottom line" concept which consists of three elements: "economic, social and environmental" (Heta *et al*., 2021:1). Transparency of sustainability information is a difficult goal for many companies to achieve, mainly due to the difficulty companies have in reporting remuneration policies (Heta *et al*., 2021). By 2017, the company Medlife SA states through its Governance Report that there is no Remuneration Committee and no *remuneration policy* has been developed, stating that "the remuneration policy is to be formalised during the next year" (Medlife SA Annual Report, 2017: 206). The year 2018 comes with a change regarding the Remuneration Committee, stating that it has been established. As of 2020, the company also introduces elements regarding the remuneration policy and details of this can be found on the company's website. Through

the remuneration policy report, the company states that it wants to establish a set of rules to achieve transparency of information for the Board of Directors and the Executive Committee. "The remuneration policy aims at: motivating Directors and Executives to ensure the development of the organisation, alignment with the interest of shareholders and stability of the remuneration structure" (Medlife SA Remuneration Policy, 2021: 3).

The analysis of human resource information also includes details on the *employee profile*, a component of human capital. Among the main elements that make it possible to measure human capital are those related to know-how, education, professional qualifications, employee engagement, career development, entrepreneurship, innovativeness, skills, training programs (Surdu *et al*., 2020: 4). Regarding the employee profiles, there is a brief presentation of the members of the Board of Directors and the Executive Committee in each report. For all the reports analysed from 2016-2020, information is presented on education, courses taken over time, and positions held before working in the company Medlife SA In the chapter on the details of the members of the Board of Directors, the 7 members appointed by the Ordinary General Meeting of Shareholders are presented, followed by details for each member. For example, for the Chairman of the Board of Directors it is mentioned that he has held this position since 2006 and "graduated from the University of Bucharest, Faculty of Mathematics and Computer Science, in 1995 and a series of postgraduate studies and specialisation courses offered by the Romanian Banking Institute, the Open University", then it is specified that "he previously held various positions in Credit Bank Romania S.A., respectively RoBank S.A., including credit inspector, head of the credit department, director of credit department and director of the corporate department" (Medlife SA Annual Report, 2016: 12).

5. Conclusions

Human resource information is one of the underlying drivers of the knowledge-based economy era and many human resource factors have been analysed in previous studies. Therefore, in order to meet the research objective, various aspects typical of the level of reporting on human resource management (HRM) practices in the context of a healthcare company were analysed. For this article, descriptive characteristics of the company have been analysed, which include industry variables, company age, auditor type, company size, financial performance, followed by human resource variables which include employee health and safety, employment of women, employment of people with disabilities, employee training, employee remuneration, and employee profiles. The results of content analysis of Medlife SA's annual report shows that information on human resources management practices were found for the most part, but there are also some weaknesses that the company should consider rectifying for future annual reports. Items such as employee health and safety, employment of people with disabilities, and employee training should be enhanced and the company should focus on them. This finding on how many elements is also supported in the study by Surdu *et al*. (2020). He argues that elements such as employment of disabled people, employee health and safety are the least presented aspects in corporate reports.

Nowadays, companies are undergoing far-reaching changes at a very fast pace. Innovation challenges organisations to continuous change at all levels, and pressure on profitability and employee performance put strain on HR efforts. However,

sustainability strategies lead to incremental development. In this development, human resource is of utmost importance. Many companies could not succeed without a well-developed human resource management strategy. Awareness of the importance of these strategies is vital for the development of the relationship with stakeholders (Hronova and Spacek, 2021). The importance of the literature on this topic is rendered by the review on transparency and sustainability practices.

Future research should explore more which defining elements are reportable and which of these show that HRM practices are effective for the company. This study identifies aspects that the company under-reported. It is therefore recommended to extend the analysis to other industries in order to see if HRM is in the focus of companies in Romania. Also, the scope of the research could be extended by increasing the sample and the period of analysis.

Acknowledgments: I appreciate the helpful comments and the constructive suggestions of Professor Camelia Iuliana Lungu, PhD coordinator during the planning and development of this research.

References

Aust, I., Matthews, B., & Muller-Camen, M. (2020) "Common Good HRM: A paradigm shift in Sustainable HRM?", *Human Resource Management Review*, vol. 30, no. 3: 1-11, available on-line at https://www-sciencedirect-com.am.e-nformation.ro/science/article/pii/S1053482218303917

Boon, C., Hartog, D.D., & Lepak, D., (2019) "A Systematic Review of Human Resource Management Systems and Their Measurement", *Journal of Management*, vol. 45, no. 6: 2498-2537, available on-line at https://journals.sagepub.com/doi/full/10.1177/0149206318818718

Boukis, A. & Kabadayi, S., (2020) "A classification of resources for employee-based value creation and a future research agenda", *European Management Journal*, vol. 38, no. 6: 863-873, available on-line at https://www-sciencedirect-com.am.e-nformation.ro/science/article/pii/S0263237320300633

Cakar, N.D., Gedikli, A., Erdogan, S., & Yildirim, D.C. (2021) "Exploring the nexus between human capital and environmental degradation: The case of EU countries", *Journal of Environmental Management*, vol. 295: 1-9, available on-line at https://www-sciencedirect-com.am.e-nformation.ro/science/article/pii/S0301479721011191

Chaowang, R. & Xiaofei, L. (2021) "A multi-dimensional analysis of the Management's Discussion and Analysis narratives in Chinese and American corporate annual reports", *English for Specific Purposes* vol. 62: 84–99, available on-line at https://www-sciencedirect-com.am.e-nformation.ro/science/article/pii/S0889490620300715

Claus, L. (2019) "HR disruption -Time already to reinvent talent management", *BRQ Business Research Quarterly*, vol: 22, no. 3: 207-215, available on-line at https://www-sciencedirect-com.am.e-nformation.ro/science/article/pii/S2340943619302129

Heta, H., Marko, J., & Antti, R. (2021) "Sustainability in executive remuneration - A missing link towards more sustainable firms?", *Journal of Cleaner Production*, no. 324: 1-11, available on-line at https://www-sciencedirect-com.am.e-nformation.ro/science/article/pii/S0959652621034107

Hronova, S. & Spacek, M. (2021) "Sustainable HRM Practices in Corporate Reporting", Economies, vol. 9, no. 2: 1-34, available on-line at https://www-webofscience-com.am.e-nformation.ro/wos/woscc/full-record/WOS:000665202000001

Hutomo, P.T.P. & Pudjiarti, E.S. (2018) "Corporate Governance and HRM Practice on Consumption Product Sector Listed in Indonesia Stock Exchange", *European Research*

Studies Journal, vol. XXI, no. 3: 132-142, available on-line at https://core.ac.uk/reader/162326520

Lima, L. & Galleli, B. (2021) "Human resources management and corporate governance: Integration perspectives and future directions", *European Management Journal*, vol. 39, no. 6: 731-744, available on-line at https://www-sciencedirect-com.am.e-nformation.ro/science/article/pii/S0263237321000323

Margherita, A. (2020) "Human resources analytics: A systematization of research topics and directions for future research", *Human Resource Management Review*, vol. 32, no. 2: 1-13, available on-line at https://www-sciencedirect-com.am.e-nformation.ro/science/article/pii/S1053482220300681

Medlife SA (2020) "Raport anual Medlife SA", available on-line at https://www.medlife.ro/sites/default/files/2021-04/RO%20Raport%20anual%202020_-combined.pdf

Medlife SA (2021) "Politica privind remunerarea Medlife SA", available on-line at https://www.medlife.ro/sites/default/files/2021-03/Final_Politica%20ML%20privind%20remuneratia_2021.pdf

Modupeola, B.B. & Christian, M.L. (2021) "Corporate Governance and Human Resources Accounting Disclosure (HRAD) in Listed Financial Firms in Nigeria", *International Journal of Business & Law Research*, vol. 9, no. 1: 174-184, available on-line at https://seahipaj.org/journals-ci/mar-2021/IJBLR/full/IJBLR-M-18-2021.pdf

Noor, K.B.M. (2008) "Case Study: A Strategic Research Methodology", *American Journal of Applied Sciences*, vol. 5, no. 11: 1602-1604, available on-line at https://www.researchgate.net/profile/Khairul-Baharein-Noor/publication/26517241_Case_Study_A_Strategic_Research_Methodology/links/5462bd800cf2c0c6aec1b83e/Case-Study-A-Strategic-Research-Methodology.pdf

Pham, D.H., Chu, T.H., Nguyen, T.M.G., Nguyen, T.H.L., & Nguyen, T.N. (2021) "Determinants of Human Resource Accounting Disclosures: Empirical Evidence from Vietnamese Listed Companies", *Journal of Asian Finance, Economics and Business*, vol. 8, no. 7: 129–137, available on-line at https://www.koreascience.or.kr/article/JAKO202118057813275.page

Piwowar-Suej, K. (2021) "Human resources development as an element of sustainable HRM - with the focus on production engineers", *Journal of Cleaner Production*, vol. 278: 1-14, available on-line at https://www-sciencedirect-com.am.e-nformation.ro/science/article/pii/S0959652620340531

Surdu, F.B., Caliskan, A.O., & Esen, E. (2020) "Human Resource Disclosures in Corporate Annual Reports of Insurance Companies: A Case of Developing Country", Faculty of Economics and Administrative Sciences, Business Administration Department, Istanbul, *Sustainability*, vol. 12, no. 8: 1-20 available on-line at https://www-webofscience-com.am.e-nformation.ro/wos/woscc/full-record/WOS:000535598700385

Ullah, S., Muttakin, M.B., & Khan, A. (2019) "Corporate governance and corporate social responsibility disclosures in insurance companies", *International Journal of Accounting and Information*, vol. 27, no. 2: 284-300, available on-line at https://www-webofscience-com.am.e-nformation.ro/wos/woscc/full-record/WOS:000471757500005

Ulvenblad, P. & Barth, H. (2021) "Liability of smallness in SMEs – Using co-creation as a method for the 'fuzzy front end' of HRM practices in the forest industry", *Scandinavian Journal of Management*, vol. 37, no. 3: 1-9, available on-line at https://www-sciencedirect-com.am.e-nformation.ro/science/article/pii/S095652212100021X

Widdwson, M. (2011) "Case study research methodology", *International Journal of Transactional Analysis Research*, vol. 2, no. 1: 25-34, available on-line at http://usir.salford.ac.uk/id/eprint/30763/

Zhou, D. (2021) "Role of green data center in human resources development model", *Sustainable Computing: Informatics and Systems*, vol. 30: 1-7, available on-line at https://www-sciencedirect-com.am.e-nformation.ro/science/article/pii/S2210537920302158

Zoltani, J., Demian, C., & Stejerean, R. (2021) “Analiza MedLife SA, realizată în cadrul Departamentului de Analiză și Strategii de piață al SSIF Goldring SA”, available on-line at https://www.goldring.ro/wp-content/uploads/2021/02/Analiza-Goldring-MedLife.pdf

SECTION 8

Tangibility Specifics of Insolvent Companies

Dagmar Čámská

Jiří Klečka

ERP Software Space and Transformation Strategies

Casiana Maria Darie

Tangibility Specifics of Insolvent Companies

Dagmar Čámská [a,1] and Jiří Klečka [a]

[a] *University of Chemistry and Technology Prague, School of Business*

Abstract: *The paper deals with the tangibility of corporate assets. The research idea is based on an assumption that unhealthy companies tend to lower levels of tangibility in the comparison with the healthy enterprises. The carried-out analysis works with more than 3,000 healthy and 200 unhealthy Czech businesses belonging to three industry branches such as CZ-NACE 25 Manufacture of fabricated metal products except machinery and equipment, CZ-NACE 28 Manufacture of machinery and equipment, and CZ-NACE F Construction. The financial data included in annual reports of each enterprise were extracted from the prepaid corporate database Albertina. The applied tools are presented by specific indicators Tangibility 1, 2, and 3 which could be classified as methods of financial analysis, specifically the tool of vertical analysis. Descriptive statistics are applied as way how to aggregate data for the individual business units. The comparison between the healthy and unhealthy enterprises is provided by indices. The paper brings following findings. (1) The unhealthy businesses report the lower degree of tangibility one or two years before insolvency declaration. (2) There are differences between the analyzed industry branches. These outcomes could be included in models predicting financial distress and increase prediction accuracy and reliability. It also highlights that the belonging to the specific industry sector should be included into considerations. These findings could improve predictions which companies will go bankrupt and therefore stakeholders would know in advance that they are trading or that they are in other form of cooperation with an ailing partner.*

Keywords: *Tangibility of assets, industry branches, unhealthy enterprises, Czech Republic.*

1. Introduction

Business insolvencies belong to an unpleasant manifestation of entrepreneurial activities. However, it should be pointed out that corporate defaults just represent a natural phase of a business life cycle and it has been stated by European Commission, 2020 that many entrepreneurial entities have to exit the market in their beginnings of existence. Kaplinski (2008) highlights that business bankruptcy has an impact on many entities including different kinds of stakeholders (managers, employees, business partners, loan providers etc.). The risk of default could never be eliminated because of changing environment or insufficient entrepreneurship experience (Makropoulos *et al.*, 2020, Wilson *et al.*, 2014, and Pinkovetskaia *et al.*, 2020).

Although the risk of default could never be eliminated the efforts to predict this risk are very significant and could be found in research literature. Altman (1968) and Beaver (1966) could be classified as the ancestors of models predicting corporate financial

[1] *Corresponding author*: School of Business, University of Chemistry and Technology Prague; Jankovcova 23, Prague 7, 17000; email address: dagmar.camska@vscht.cz

distress. These traditional prediction tools work on the premise that financial ratios are able to forecast the future financial corporate situation (Beaver, 1966; Altman, 1968; Čámská, 2016; Schönfeld *et al.*, 2019, and others). If these forecasting methods are able to predict the future state of the world inputs from financial statements will have to change significantly in advance of the bankruptcy itself.

It corresponds with the idea that insolvencies are just a consequence of longer business development as stated in Schönfeld *et al.* (2018), Kislingerová (2013). Contrariwise, some current corporate bankruptcies are not the consequence of longer development but are caused by the current pandemic situation of COVID-19 (Florido-Benitez, 2021; Miyakawa *et al.*, 2021; and Torres *et al.*, 2022).

Traditional prediction tools and methods emphasize the long-term view through financial indicators as discussed aforementioned. The financial indicators usually describe profitability, leverage, asset turnover, and liquidity (Altman, 1968; Agerwal and Taffler, 2007; Čámská, 2016; Rybárová *et al.*, 2021). This paper will deal with untraditional approach to the default prediction. Instead of profitability, leverage, turnover, and liquidity ratios the attention will be paid to tangibility of assets. The decline in tangibility of assets belongs also to the consequences of long-term existential difficulties. Tangibility decrease can be classified as the manifestation of a long-term issue. The aim of this paper is if the corporate financial difficulties could not be detected via decreasing tangibility.

The paper is organized into the following sections. The Introduction is followed by Literature review which presents the topic in a broader context from the point of view of corporate insolvencies, models of predicting financial distress and their included indicators, moving to the influence of assets tangibility as one factor potentially influencing corporate exposure to bankruptcy. In the case of assets tangibility, industries' differences have to be pointed out and included in the own further carried out analysis. The section Research objective, methodology, and data explains the paper research idea, defines applied indicators and specifies data employed herein. The section Results and Discussion introduces outcomes of own analysis conducted and it provides possible explanations of received outcomes and observations. The last section Conclusions formulates main findings and potential ways of future research in this area.

2. Literature review

The creation of models predicting financial distress is based on the classification of businesses into two categories: healthy and unhealthy (Beaver, 1966; Altman, 1968; Agerwal and Taffler, 2007; Čámská, 2016; Schönfeld *et al.*, 2019; Rybárová, *et al.*, 2021, and others). The way of defining healthy and unhealthy companies can influence the received results and model's accuracy significantly (Vavrek *et al.*, 2021). The clear definition of the healthy and unhealthy businesses seems also relevant for this research therefore this topic will be solved in detail in the subsection Data.

This paper will work with the unhealthy enterprises in the form of the companies which declared insolvency according to applicable Insolvency Act No. 182/2006 Coll. in the Czech Republic. Experts such as Kislingerová *et al.* (2013), Smrčka *et al.* (2017), and Schönfeld (2018) declare that majority of the Czech companies announcing insolvency enters an insolvency proceeding almost without any property. The value of assets is

significantly reduced and often almost negligible according to Smrčka *et al.* (2017) and Čámská (2013). Such companies are called property empty. Property emptiness could be analyzed from the absolute and relative points of view. In the case of the absolute emptiness, the enterprises do not have almost any assets which could be monetized (Smrčka *et al.*, 2017).

The relative view on property emptiness is linked to the structure of corporate assets. Some kinds of assets can be monetized better than the others (Kislingerová *et al.*, 2013). The assets which have a physical nature are generally easier to be monetized although their liquidation value does not have to reach a satisfactory level (Dietrich, 2007). This paper highlights the asset tangibility and analyses in detail the assets which could be classified as tangible. Different levels of tangibility applied in the paper will be discussed in detail in the subsection Methodology. The asset tangibility itself creates the focus of research conducted by many experts.

As the literature review shows the asset tangibility can be examined from different angles. One area combines the structure of assets with an emphasis on the tangible assets with debt capacity and corporate leverage (Hall, 2012, Bonacim *et al.*, 2009, Dietrich, 2007). De Albuquerque *et al.* (2013) even considers asset tangibility as one of the determinants of corporate capital structure. Lei *et al.*, 2018 highlight that higher level of asset intangibility leads to constraints to borrow. The second area links the asset tangibility with international trade via corporate investments (Burke *et al.*, 2020) or via financial development (Hur *et al.*, 2007). The third area emphasizes the link to investment-cash flow sensitivity (Moshirian *et al.*, 2017, Guan *et al.*, 2021). It is also possible to analyze the relationship between asset tangibility and corporate returns as Doherty *et al.* (2010 and 2011). Asset tangibility and its connection to potential financial distress is addressed by Wen *et al.* (2020). The findings of this paper are that tangibility of assets negatively moderates the relationship between structure of debt maturity and the probability of financial default. The research was conducted on the agriculture enterprises.

The enterprises belonging to different industry sectors can report various values of outcome. The connection between the industry branch and potential profitability is highlighted by Bourgeois *et al.* (2014), Jackson *et al.* (2018), Lee and Alnahedh (2016). The belonging to the specific industry sector is also pointed out in the case of constructing, applying, and verifying the models predicting financial distress (Fairfield *et al.*, 2009; Chava and Jarrow, 2014; Čámská, 2016). The subsection Data will specify which industry sectors will be included in the research and the section Results and Discussion will provide an answer if the belonging to the industry sector is the relevant factor in the analysis conducted.

3. Research objective, methodology, and data

This section creates bases for own conducted research whose results will be presented further. The paper research idea is explained in detail. Methods applied herein are specified. Finally, the attention is paid to data employed in the research. The text is divided into separated subsections improving text orientation and increasing readers understanding.

3.1. Research objective

The companies often enter insolvency proceedings almost without any property in the Czech Republic as it is stated by Kislingerová *et al.* (2013) or Schönfeld *et al.* (2019). When the insolvency is declared the enterprises do not have any assets which could be sold. It has a consequence that creditors cannot be satisfied in cash from the monetization of the corporate assets (Smrčka *et al.*, 2017) and the level of satisfaction is negligible.

Authors such as Altman (1968), Beaver (1966), Korol and Korodi (2010), Čámská (2017) agree on that model predicting financial distress are able to forecast corporate bankruptcy in advance. Also, this research would point out, if the signals of coming property emptiness can be observed and can be detected in corporate financial statements especially in balance sheets.

First, there is no property for monetization and satisfaction of creditors at the end. This kind of observation is realized too late because it will be done when the insolvency is declared. When the insolvency is announced there would be already small chances that the enterprise could be saved, restructured, and reorganized from the legal point of view (Schönfeld, 2018). It has serious consequences not only for the enterprise and its employees but there are many related entities such as suppliers, customers, banks or other financial institutions. These stakeholders would like to avoid the risk to trade with the partner which could potentially go bankrupt. There is a need to detect signal of coming property emptiness.

Second, relative scarcity could happen in time earlier than the absolute property emptiness discussed aforementioned. The goal of enterprises is to transform inputs into outputs which are offered and sold to customer. These transformation processes require the existence and usage of production factors whose shortage causes difficulties and could lead to a reduced or even none offer to customers. The production factors could be analyzed from different angles. This paper goes to address the tangibility of production factors. Some production factors can be monitored via financial statements.

The analysis will be focused on the asset structure observed in the balance sheet. The research idea works with an assumption if a company has tangible production factors there is a higher probability that this company is able to fulfil going concern principle. Contrariwise, the companies which had to declare insolvency had tended to lower level of tangibility of production factors. The reduced level of tangibility would lead to the higher exposure of bankruptcy because a business entity is not prepared for its future transformation process and is unable to comply with going concern principle. The paper's aim is to detect the signals of coming property emptiness focusing on the degree of assets tangibility reported in financial statements. The following subsection will introduce indicators applied in the analysis.

3.2. Methodology

The research idea introduced above is based on the statement that the companies enter insolvency proceedings as property empty. The goal of the carried-out analysis is to discover if the coming insolvency and related absolute property emptiness can be predicted by relative asset emptiness. The relative asset emptiness is expressed by the degree of assets tangibility.

Assets consist of different items which are owned or managed by the business, are the result of previous actions, and should potentially provide future benefits (Strouhal *et al.*, 2014a). If the relative view is applied the structure of assets is analyzed. The structure of assets is just studied by the vertical analysis belonging to tools of the financial analysis as described in Jordan *et al.* (2011), Lee *et al*. (2016), or Strouhal *et al.* (2014a).

The vertical analysis is just a standard method which has to be adjusted to the paper's aim. The question which should be answered is the defining which assets can be considered tangible. Tangible fixed assets have the searched aim already in their name. Inventories have similar nature as the tangible fixed assets with the difference that they stay in the business entity for the period shorter than one year and they are consumed one-off. Cash and deposits in bank accounts do not seem as the tangible assets because they do not have the tangible nature. However, these items are disposable and can be immediately used as a resource for the payment of other tangible assets. This way of explanation proves why cash and deposits in bank accounts can be considered tangible for paper purposes. The analysis will deal with tangible fixed assets, inventories, bank accounts, and cash. The next paragraph presents indicators applied in analysis.

Tangible assets can be expressed by different asset groups therefore it is possible to distinguish different levels of assets tangibility. Different levels will be also highlighted in this research and therefore the analysis will be based on three indicators. The difference between these indicators is the width of assets included which are considered tangible. The specific indicators in the form of indices are defined below. Their denominator always contains the value of total assets. Numerators depend on the width. Tangibility 1 is the narrowest measure because it works only with tangible fixed assets. Tangibility 2 deals with the items having exclusively physical tangible nature. Contrariwise, Tangibility 3 is the broadest one because also deposits in bank accounts and cash are included.

Tangibility 1 = Tangible fixed assets/Total assets (1)

Tangibility 2 = (Tangible fixed assets + Inventories)/Total assets (2)

Tangibility 3 = (Tangible fixed assets + Inventories + Bank Accounts + Cash)/Total assets (3)

The indicators will be quantified for observations specified in the coming subsection. The results will be presented with the help of main descriptive statistics such as mean, median, standard deviation, minimum, maximum, 1st quartile, 3rd quartile. The data has been cleared in the way that illogical observations have been excluded. Outliers have not been eliminated because especially companies declaring insolvency reach extraordinary values of some indicators. Unhealthy financial conditions result in extreme values and their exclusion would not improve the research results. Instead of outliers' exclusion, the interpretation could be based on trimmed mean.

According to the literature review, first, differences between industry branches seem to be expected. An inter-industry comparison will be conducted. Second, the enterprises declaring insolvency should reach lower degrees of assets' tangibility therefore healthy

and unhealthy enterprises will be compared. The comparison is based on the expectation that healthy business entities should generally report higher levels of tangibility. The healthy entities would be taken as a standard and therefore unhealthy entities would be compared to them. Mathematically, indices of tangibility indicators will be quantified and equation specifying this approach is displayed below. This comparison will not be conducted on the bases of individual observations but on the bases of descriptive statistics.

Tangibility index = Tangibility of unhealthy companies/Tangibility of healthy companies (4)

3.3. Data

This subsection specifies data on which the conducted research is based. The research depends on published financial statements which were extracted from the Albertina database. This source serves as a prepaid database including financial and non-financial information about business entities established in the Czech Republic. The enterprises included in the final data sample have to accomplish a set of conditions which are explained in following paragraphs.

The selected companies meet three following criteria. The set of criteria consists of the belonging to a specific industry branch, healthy status of the selected enterprise which has to be classified in healthy financial conditions or unhealthy conditions resulting in insolvency, and availability of financial statements. These conditions have to explained and described in detail allowing the replication of the carried-out research.

First, the analysed business entities belong to specific industry sectors, CZ-NACE 25 Manufacture of fabricated metal products except machinery and equipment, CZ-NACE 28 Manufacture of machinery and equipment, and CZ-NACE F Construction. The selection of these industry branches is interrelated with the following criteria and leads to the satisfactory size of the data sample. Reduced number of insolvent enterprises belonging to the specific sector and limited availability of financial statements and are solved by the choice of appropriate industry branches.

Second, the business entities are included according to their healthy financial conditions. The paper deals with two groups of companies which can called healthy and unhealthy. Enterprises creating positive economic value added are classified as healthy in this research respecting recommendation provided by Jordan *et al.*, 2011. Unhealthy companies are presented by the entities which declared insolvency according to applicable Insolvency Act. These enterprises announced insolvency between 2014 and 2019. These years represent the time of economic expansion and overall economic stability how it is stated in Pieloch-Babiarz *et al.* (2021) or in Staehr and Uusküla (2021). The extracted financial statements report the accounting year one or two periods prior to the insolvency declaration. The statements of healthy companies should describe the same time moment and therefore the selected accounting year is 2017. The same time moment enables to compare the results of both kinds of companies considering the same external conditions. Despite the distance of 2017 the reliability of outputs is not reduced. Its main advantage is the period of stability which does not have to deal with the business consequences of COVID-19 (Florido-Benitez, 2021;

Miyakawa *et al.*, 2021; and Torres *et al.*, 2022). Another reason for 2017 selection is based on the last criteria.

Third, the paper must overcome the limited availability of financial data. Although the reporting of financial statement is obligatory in the Czech Republic many business entities do not fulfill legal requirements or they report too late. This is not only the general business issue solved by Strouhal *et al.* (2014b) but especially the issue of companies finishing in insolvency whose financial disclosure is extremely poor as verified in Bokšová and Randáková (2013). Companies generally tend to disclosure when they can benefit from as explained in Lardon and Deloof (2014). This benefit is mostly connected with the investors' point of view who prefer reliable, regular, and clear financial disclosure as written by Lawrence (2013). Enterprises' motives to disclosure seem to be different from providing information to investors in the Czech Republic because Czech financial statements are not primarily investor oriented (Alexander and Nobes, 2020). The poor Czech disclosure seems to be connected with the underdevelopment of local capital market which is highlighted by Musílek (2015).

Table 1 presents the final structure of the data sample employed herein. The number of enterprises in different subgroups is not influenced only by data availability discussed aforementioned but also by exposure of the specific industry branch to insolvency and especially by the size of industry sector. It is clearly visible from the table that if the number of healthy enterprises is higher the number of insolvent entities will be also higher. Some industry sectors have just more established business units than the others. Financial data of these companies will be applied in the conducted analysis whose results will be presented in the following section.

Table 1. **Structure of data sample**

Industry branch	Number of insolvent companies	Number of healthy companies
CZ-NACE 25	40	817
CZ-NACE 28	13	330
CZ-NACE F	150	2,144

Source: Own contribution based on Albertina database

4. Results and discussion

This section is dedicated to results received by the carried-out analysis. First, the companies fulfilling the conditions defined aforementioned were extracted from the corporate database Albertina. Second, the indicators of tangibility were calculated for each observation included in the data sample. Third, values of selected descriptive statistics were received using MS Excel. The purpose of application of the descriptive statistics is purely to display information in an aggregated way.

The results received will be displayed in tables. The industry point of view will be pointed out as first. The selected industry branches such as CZ-NACE 25 Manufacture of fabricated metal products except machinery and equipment, CZ-NACE 28 Manufacture of machinery and equipment, and CZ-NACE F Construction will be presented. At the beginning, the paper deals with a standard situation when the business entities are classified in healthy financial conditions. The non-standard situation of unhealthy enterprises will be highlighted subsequently. The final step will be the

comparison of results focusing on differences between the healthy and unhealthy enterprises.

Table 2 shows the results for the healthy companies belonging to CZ-NACE 25 Manufacture of fabricated metal products except machinery and equipment. Values of tangibility depend on the reported kind (applied indicator). On average, these companies reach Tangibility 1 around 30%, Tangibility 2 around 40%, and Tangibility 3 almost 60% (taken into consideration mean, median, and trimmed mean). Quartile characteristics accompanied by standard deviation prove that there are differences between business entities in the reached tangibility.

Table 2. **Healthy companies belonging to CZ-NACE 25**

	Tangibility 1	Tangibility 2	Tangibility 3
Mean	0.300	0.422	0.588
Median	0.279	0.443	0.665
Standard deviation	0.223	0.254	0.267
Minimum	0.000	0.000	0.000
Maximum	0.947	0.987	0.992
1st quartile	0.107	0.213	0.447
3rd quartile	0.459	0.628	0.785
Trimmed mean	0.294	0.421	0.594

Source: Own quantifications based on data included in Albertina database

Table 3 displays the results for the healthy companies belonging to CZ-NACE 28 Manufacture of machinery and equipment. On average, these companies reach Tangibility 1 below 30%, Tangibility 2 above 40%, and Tangibility 3 above 60% (taken into consideration mean, median, and trimmed mean). Again, differences between observations can be noted.

Table 3. **Healthy companies belonging to CZ-NACE 28**

	Tangibility 1	Tangibility 2	Tangibility 3
Mean	0.283	0.478	0.668
Median	0.269	0.515	0.724
Standard deviation	0.211	0.248	0.215
Minimum	0.000	0.000	0.000
Maximum	0.861	0.947	1.112
1st quartile	0.094	0.281	0.560
3rd quartile	0.447	0.672	0.831
Trimmed mean	0.278	0.479	0.677

Source: Own quantifications based on data included in Albertina database

The results for healthy companies belonging to CZ-NACE F are included in Table 4. Tangibility 1 reaches on average 20%. Tangibility 2 is around 30%. The broadest indicator Tangibility 3 moves to 50%. Differences between companies are observed as in the previous two cases.

After individual presentation of each industry sector, the comparison takes place. The results are clear and prove that sectoral specificities must be taken into consideration. However, the industry branches CZ-NACE 25 and CZ-NACE 28 report comparable levels of tangibility the industry branch CZ-NACE F reaches significantly lower degree

of all tangibility indicators. The detailed comparison between CZ-NACE 25 and CZ-NACE 28 shows that CZ-NACE 25 reports higher values of the analyzed indicators Tangibility 1 and 2. Contrariwise, CZ-NACE 28 reaches higher value of the indicator Tangibility 3 which is the broadest because of cash and bank accounts included.

Table 4. **Healthy companies belonging to CZ-NACE F**

	Tangibility 1	Tangibility 2	Tangibility 3
Mean	0.194	0.280	0.477
Median	0.136	0.231	0.502
Standard deviation	0.198	0.241	0.301
Minimum	0.000	0.000	0.000
Maximum	0.992	1.068	1.388
1st quartile	0.035	0.074	0.254
3rd quartile	0.298	0.427	0.718
Trimmed mean	0.183	0.271	0.478

Source: Own quantifications based on data included in Albertina database

Comments will continue with the focus on unhealthy enterprises. Unhealthy enterprises will be again divided into 3 subgroups according to their belonging to the specific industry branch. The first industry branch is CZ-NACE 25 Manufacture of fabricated metal products except machinery and equipment. As the second sector CZ-NACE 28 Manufacture of machinery and equipment is presented. CZ-NACE F Construction is introduced as the last.

The unhealthy companies belonging to CZ-NACE 25 are included in Table 5. These enterprises reach Tangibility 1 around 15%, Tangibility 2 below 30%, and Tangibility 3 moves around 30% (taken into consideration mean, median, and trimmed mean). According to quartile characteristics accompanied by standard deviation, differences between businesses can be again observed. Especially tangibility 3 reaches high standard deviation.

Table 5. **Unhealthy companies belonging to CZ-NACE 25**

	Tangibility 1	Tangibility 2	Tangibility 3
Mean	0.156	0.279	0.215
Median	0.093	0.155	0.261
Standard deviation	0.174	0.275	0.773
Minimum	0.000	0.000	0.000
Maximum	0.746	0.866	0.889
1st quartile	0.015	0.039	0.063
3rd quartile	0.252	0.465	0.494
Trimmed mean	0.145	0.271	0.317

Source: Own quantifications based on data included in Albertina database

Table 6 is dedicated to the unhealthy companies belonging to CZ-NACE 28. On average, these companies reach Tangibility 1 around 17%, Tangibility 2 above 50%, and Tangibility 3 below 60% (taken into consideration mean, median, and trimmed mean). Again, differences between observations can be noted but there are no significant differences between the analyzed indicators as in the case of Tangibility 3 reported in CZ-NACE 25. It should be also pointed out that the data sample of CZ-

NACE 28 contains the smallest number of the unhealthy enterprises. The size of the data sample could also influence the received results.

Table 6. **Unhealthy companies belonging to CZ-NACE 28**

	Tangibility 1	Tangibility 2	Tangibility 3
Mean	0.174	0.551	0.583
Median	0.084	0.652	0.688
Standard deviation	0.197	0.289	0.281
Minimum	0.000	0.000	0.007
Maximum	0.653	0.940	0.941
1st quartile	0.036	0.309	0.360
3rd quartile	0.260	0.808	0.817
Trimmed mean	0.174	0.551	0.583

Source: Own quantifications based on data included in Albertina database

The results for unhealthy enterprises belonging to CZ-NACE F are included in Table 7. Tangibility 1 is on average around 17%. Tangibility 2 reaches 30%. The broadest indicator Tangibility 3 moves to 40%. Differences between companies seem to be observed as in the previous two industry sectors.

Table 7. **Unhealthy companies belonging to CZ-NACE F**

	Tangibility 1	Tangibility 2	Tangibility 3
Mean	0.185	0.328	0.404
Median	0.076	0.267	0.376
Standard deviation	0.250	0.305	0.326
Minimum	0.000	0.353	0.168
Maximum	0.990	0.996	1.882
1st quartile	0.007	0.070	0.118
3rd quartile	0.254	0.531	0.625
Trimmed mean	0.172	0.325	0.395

Source: Own quantifications based on data included in Albertina database

The comparison of the industry branches can take place after individual presentations. In the case of the healthy enterprises, significant sectoral specificities have been observed. This situation does not occur again in the case of unhealthy businesses. The range of Tangibility 1 is between 15 and 17% for all industry branches. Tangibility 2 reaches 30% for CZ-NACE 25 and CZ-NACE F. For the same sectors, Tangibility 3 moves between 30% and 40%. CZ-NACE 28 reports exceptional values above 50% in the case of Tangibility 2 and Tangibility 3. It should be repeated that the data sample of the unhealthy entities belonging to CZ-NACE 28 is much smaller than for CZ-NACE 25 and CZ-NACE F. This is caused by the number of declared insolvencies and by the number of available financial statements. It should be recommended not to attach increased importance to high values of Tangibility 2 and Tangibility 3 in the industry branch CZ-NACE 28 Manufacture of machinery and equipment.

The last analyzed issue is the comparison between the healthy and unhealthy enterprises. The comparison is provided in the form of visualization included in Figure 1. Figure 1 contains indices quantified as the trimmed mean for unhealthy companies divided by the trimmed mean for healthy entities. This quantification is done for each defined indicator of tangibility (labelled as T1, T2, and T3) and for each industry sector

separately. The research idea is that the indicators of tangibility decrease significantly when the companies approach the insolvency declaration. This statement is fully valid for all tangibility indicators observed in the industry sector CZ-NACE 25 Manufacture of fabricated metal products except machinery and equipment. Tangibility 1 also decreases in CZ-NACE 28 Manufacture of machinery and equipment. Tangibility 1 decrease in CZ-NACE F Construction seems negligible. The indicator Tangibility 3 decreases in all industry sectors although the most rapid decline is connected with the already mentioned CZ-NACE 25. Exceptional values are observed in the case of the indicator Tangibility 2. The sector CZ-NACE 25 reports expected outcomes but other two industry branches do not report tangibility levels according to estimations. The unhealthy enterprises belonging to CZ-NACE 28 and CZ-NACE F reached higher values of Tangibility 2 than their healthy counterparts.

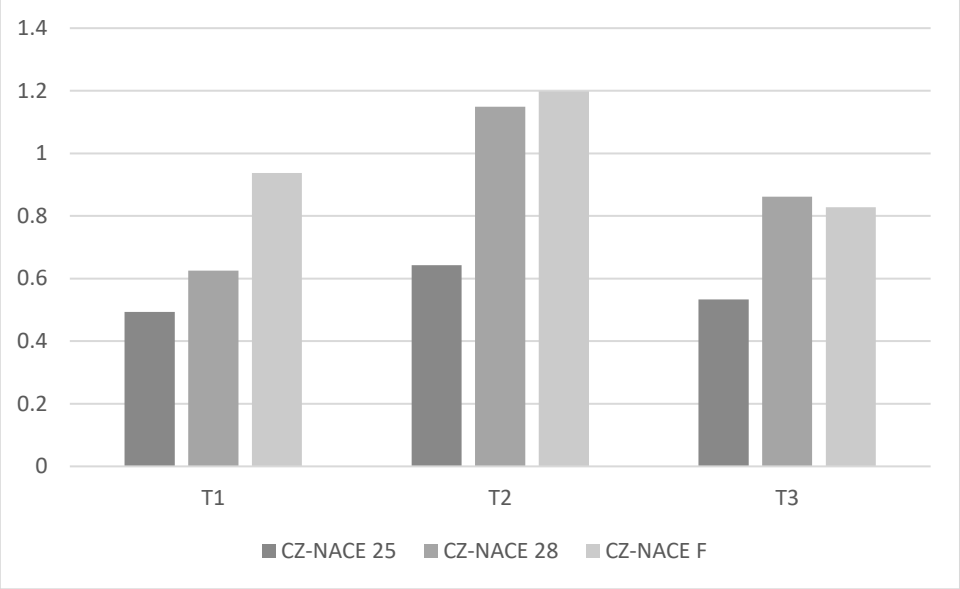


Figure 1. **Tangibility indices - Comparison between unhealthy and healthy enterprises**

Source: Own processing based on own quantifications

Outcomes received have confirmed that differences between industry branches are observable. This statement is consistent with the literature review which highlights the industry differences when models predicting financial distress are applied. The belonging to the specific industry sector should be respected because it is displayed in the length of the production cycle, assets and their structure needed for transformation processes.

The main research idea that the unhealthy enterprises would tend to the lower level of tangibility has been tested and proved. The difference in tangibility degrees between the healthy and unhealthy enterprises is the most observable in the case of industry sector reaching the highest values of the applied tangibility indicators. In this paper, the industry branch reporting the highest tangibility is CZ-NACE 25 Manufacture of fabricated metal products except machinery and equipment. Contrariwise, CZ-NACE F reaching the lowest tangibility in the group of the healthy companies do not show satisfactory decreases in tangibility for the group of the unhealthy enterprises.

The reasons for declining tangibility could be follows. Insolvency declaration is usually connected with ongoing operational and financial issues (Schönfeld *et al.*, 2018). The

enterprises in difficulties tend to the sale of their assets, to investment restrictions concluding in no new investment projects. These described tendencies would primarily influence the indicator Tangibility 1 and they would lead to the change in the structure of assets. When investments are restricted inventories and cash cannot be affected yet (Kislingerová, 2009). The impact on cash and inventories occurs later or different reasons can be a trigger. When the company has the difficulties to sell its products because of low quality, decrease in demand caused by competitors, customer preferences or their declining disposable income the number of inventories hold can rapidly grow. Higher level of inventories would influence the indicators Tangibility 2 and 3. The impact would not be negative as in the case of the investment restrictions but positive and therefore higher levels of tangibility would be observable.

Differences are not observable only in the area of the individual industry sectors but also in the area of the individual tangibility indicators. The indicators are influenced by the accounting data in which some companies reported negative items belonging to assets such as goodwill and bank accounts. This paper addresses the relative asset emptiness. The unhealthy companies declared insolvency one or two accounting years after they had reported the financial data applied in the research. The time of insolvency was already approaching. The issue is that the relative asset emptiness was already merging with the absolute asset emptiness. The impact of structural changes is highly influenced by the base value expressed as the value of total assets. Even a small change in tangibility can lead to outliers and exceptional observations when the total value of assets is coming to be negligible (the assumption of the absolute asset emptiness).

5. Conclusions

The main research idea that the companies which will announce insolvency tend to lower degree of asset tangibility has been confirmed. These enterprises can be classified as the relative property empty. The research was based on the comparison between the healthy and unhealthy business entities. Differences were observed in the area of various levels of tangibility and in the case of the industry sectors considered. If the sector has the higher degree of tangibility in the area of the healthy enterprises tangibility will decline more significantly in the case of the insolvent entities. These findings highlight the need that the belonging to the specific industry branch has to be respected when the analysis is conducted. The confirmed research idea proves that the declining tangibility could be used as one prediction factor included in models predicting financial distress.

The research has not focused on other factors which could help to predict coming financial default. According to this limitation it could not be answered if the declining tangibility is fully relevant early warning signal and if other factors such as profitability, leverage, and liquidity do not have higher prediction power. Other limitations are connected with the number of the analyzed industry branches and with the number of the insolvent companies included in the data sample. The limitation of the data size cannot be avoided because the number of insolvent companies is first generally limited, secondly limited because of the financial data availability, thirdly limited because of the reduced time horizon taken into consideration (comparability of overall economic conditions), and fourthly because of the requirement of the belonging to the specific industry sector (comparability of internal industry conditions).

The future ways of research could lead to the analysis of more industry branches and to the analysis of time development. It would be achievable to include more industry branches into the research. Time development is more arguable. The new research idea would be based on an assumption that companies which declared insolvency had had the standard degree of tangibility several accounting periods before insolvency announcement. Rapidity of decline could be examined. The necessary condition must be met that the financial statements are available for several periods before the insolvency declaration. The last option would be the relationship between the ongoing relative and absolute property emptiness.

Acknowledgments

The authors would like to acknowledge the institutional supported provided by their home university in the form of enabling research and teaching activities in the field of Economics and Management and related monetary grants.

References

Agarwal, V. & Taffler, R. (2007). „Twenty-five years of the Taffler z-score model: does it really have predictive ability?", *Accounting and Business Research*, 2007, vol. 37, no. 4: 285-300.

Alexander, D. & Nobes, C. (2020). *Financial Accounting. An International Introduction*, Harlow: Pearson Higher Education & Professional Group

Altman, E.I. (1968). „Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy", *Journal of Finance*, vol. 23, no. 4: 589-609

Beaver, W.H. (1966). „Financial ratios as predictors of failure", *Journal of accounting research*, vol. 4: 71-111.

Bokšová, J. & Randáková, M. (2013). „Zveřejňují podniky, které procházejí insolvenčním řízením, své účetní závěrky?", *Český finanční a účetní časopis*, vol. 8, no. 4: 164-171

Bonacim, C.A.G., Gaio, L.E., & Ambrozini, M.A. (2009). „Financial leverage and tangibility of assets of Brazilian companies of agribusiness in the post-real plan period", *Custos e agronegocio on line*, vol. 5, no. 2: 15-31

Bourgeois, L.J., Ganz, A., Gonce, A., & Nedell, K. (2014). „Profitability of industries and firms over time", *Journal of Strategy and Management*, vol. 7, no. 3: 210-225

Burke, O.L., Wang, M.Y., & Xu, X.L. (2020). „How does international trade affect US corporate investment? Evidence from the asset tangibility channel", *International Review of Economics & Finance*, vol. 70: 41-54

Čámská, D. (2013). „Basic Characteristics of Enterprises in Insolvency", In Jedlička, P. (Ed.). *Proceedings of the International Scientific Conference on Hradec Economic Days 2013 - Economic Development and Management Region* (pp. 83-88). Hradec Králové (Czech Republic): Gaudeamus

Čámská, D. (2016). „Accuracy of models predicting corporate bankruptcy in a selected industry branch", *Ekonomický časopis*, vol. 64, no. 4: 353-366

Čámská, D. (2017). „Time Postponents of Classical Corporate Bankruptcy Models", In Loster, T. & Pavelka, T. (Eds). *Proceedings of the 11th International Days of Statistics and Economics* (pp. 264-272). Slaný (Czech Republic): Melandrium Publishing.

Chava, S. & Jarrow, R. (2004). „Bankruptcy Prediction with Industry Effects", *Review of Finance*, vol. 8, no. 4: 537-569

Czech Republic (2006). Insolvency Act No. 182/2006 Coll.

de Albuquerque, A.A., Rios, L.S., & Silva, R.A. (2013). „Asset tangibility, profitability and firm size: Determinants of capital structure in publicity traded Brazilian companies", *Gestao e desenvolvimento*, vol. 10, no. 1: 87-100

Dietrich, D. (2007). „Asset tangibility and capital allocation", *Journal of Corporate Finance*, vol. 13, no. 5: 995-1007

Docherty, P., Chan, H., & Easton, S. (2010). „Tangibility and investment irreversibility in asset pricing", *Accounting and Finance*, vol. 50, no. 4: 809-827

Docherty, P., Chan, H., & Easton, S. (2011). „Asset tangibility, industry representation and the cross section of equity returns", *Australian Journal of Management*, vol. 36, no. 1: 75-87

European Commission (2020). „Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and The Committee of the Regions Entrepreneurship 2020 Action Plan, Reigniting the entrepreneurial spirit in Europe", available on-line at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52012DC0795 (accessed on 15 8 2021)

Fairfield, P.M., Rammath, S., & Yohn, T.L. (2009). „Do Industry-Level Analyses Improve Forecasts of Financial Performance?", *Journal of Accounting Research*, vol. 47, no. 1: 147-178

Florido-Benitez, L. (2021). „The effects of COVID-19 on Andalusian tourism and aviation sector", *Tourism Review*, vol. 76, no. 4: 829-857

Guan, F., Mittoo, U.R., & Zhang, Z. (2021). „Investment to Cash Flow Sensitivity: Evidence from Manufacturing and Energy Sectors", *Emerging Markets Finance and Trade*, vol. 57, no. 8: 2206-2229

Hall, T.W. (2012). „The collateral channel: Evidence on leverage and asset tangibility", *Journal of Corporate Finance*, vol. 18, no. 3: 570-583

Hur, J., Raj, M., & Riyanto, Y.E. (2006). „Finance and trade: A cross-country empirical analysis on the impact of financial development and asset tangibility on international trade", *World Development*, vol. 34, no. 10: 1728-1741

Jackson, A.B., Plumlee, M.A., & Rountree, B. R. (2018). „Decomposing the market, industry, and firm components of profitability: implications for forecasts of profitability", *Review of Accounting Studies*, vol. 23, no. 3: 1071-1095

Jordan, B., Westerfield, R., & Ross, S. (2011). *Corporate Finance Essentials*, New York: McGraw-Hill

Kaplinski, O. (2008). „Usefulness and Credibility of Scoring Methods in Construction Industry", *Journal of Civil Engineering and Management*, vol. 14, no. 1: 21-28

Kislingerová, E. (2009). *Podnik v časech krize*, Prague: Grada Publishing

Kislingerová, E., Richter, T., & Smrčka, L. (2013). *Insolvenční praxe v České republice v období 2008-2013*, Prague: C.H. Beck

Korol, T. & Korodi, A. (2010). „Predicting Bankruptcy with the Use of Macroeconomic Variables", *Economic computation and economic cybernetics studies and research*, vol. 44, no. 1: 201-221.

Lardon, A. & Deloof, M. (2014). „Financial disclosure by SMEs listed on a semi-regulated market: evidence from the Euronext Free Market", *Small Business Economics*, vol. 42, no. 2: 361-385

Lawrence, A. (2013). „Individual investors and financial disclosure", *Journal of Accounting and Economics*, vol. 56, no. 1: 130-147

Lee, G.K. & Alnahedh, M. (2016). „Industries' Potential for Interdependency and Profitability: A Panel of 135 Industries, 1988-1996", *Strategy Science*, vol. 1, no. 4: 285-308

Lee, A.C., Lee, J.C., & Lee, C.F. (2016). *Financial analysis, planning and forecasting: Theory and application*, Singapore: World Scientific Publishing Company

Lei, J., Qiu, J.P. & Wan, C. (2018). „Asset tangibility, cash holdings, and financial development", *Journal of Corporate Finance*, vol. 50: 223-242

Makropoulos, A., Weir, C., & Zhang, X. (2020). „An analysis of the determinants of failure processes in UK SMEs", *Journal of Small Business and Enterprise Development*, vol. 27, no. 3: 405-426

Miyakawa, D., Oikawa, K., & Ueda, K. (2021). „Firm Exit during the COVID-19 Pandemic: Evidence from Japan", Journal of the Japanese and International Economies, vol. 59: 17p

Moshirian, F., Nanda, V., Vadilyev, A., & Zhang, B.A. (2017). „What drives investment-cash flow sensitivity around the World? An asset tangibility Perspective", *Journal of Banking & Finance*, vol. 77: 1-17

Musílek, P. (2015). „Underdevelopment of Czech capital market", In M. Čulík (Ed.). *Financial Management of Firms and Financial Institutions: 10th International Scientific Conference, PTS I-IV* (pp. 859-867). Ostrava (Czech Republic): VŠB Tech Univ Ostrava.

Pieloch-Babiarz, A., Misztal, A., & Kowalska, M. (2021). „An impact of macroeconomic stabilization on the sustainable development of manufacturing enterprises: the case of Central and Eastern European Countries", *Environment, Development and Sustainability*, vol. 23. 8669-8698

Pinkovetskaia, I.S., Berezina N.V., & Sverdlikova, E.A. (2020). „The main reasons for the exit of entrepreneurs from business", *Amazonia Investiga*, vol. 9, no. 26: 68-73.

Rybárová, D., Majdůchová, H, Šťetka, P., & Luščíková, D. (2021). „Reliability and Accuracy of Alternative Default Prediction Models: Evidence from Slovakia", *International Journal of Financial Studies*, vol. 9, no. 4: 33p

Schönfeld, J., Kuděj, M., & Smrčka, L. (2018). „Financial Characteristics of PreMoratorium Companies", *Politicka Ekonomie*, vol. 67, no. 5: 490-510

Schönfeld, J., Kuděj, M., & Smrčka, L. (2019). „Financial Health of Enterprises Introducing Safeguard Procedure Based on Bankruptcy Models", *Journal of Business Economics And Management*, vol. 19, no. 5: 692-705

Smrčka, L, Čámská, D., Arltová, M., & Plaček, J. (2017). „Characteristics of Insolvency Proceedings of Enterprises with Virtual Address", *Politická ekonomie*, vol. 65, no. 3: 287-300

Staehr, K. & Uusküla, L. „Macroeconomic and macro-financial factors as leading indicators of non-performing loans: Evidence from the EU countries", *Journal of Economic Studies*, vol. 48, no. 3: 720-740

Strouhal, J., Bonaci, C.G., & Mustaţă (2014a). *International Accounting Practices*, Prague: University of Economics, Prague, Oeconomica Publishing House

Strouhal, J., Gurtviš, N., Nikitina-Kalamäe, M., Li, T.W., Lochman, A.-L., & Born, K. (2014b). „Are Companies Willing to Publicly Present their Financial Statements on Time? Case of Czech and Estonian TOP100 Companies.", In M. Čulík (Ed.). *Proceedings of the 7th International Scientific Conference on Managing and Modelling of Financial Risks Modelling of Financial Risks* (pp. 731-738). Ostrava (Czech Republic): VŠB Tech Univ Ostrava.

Torres, O., Benzari, A., Fisch, C., Mukerjee, J., Swalhi, A., & Thurik, R. (2022). „Risk of burnout in French entrepreneurs during the COVID-19 crisis", *Small Business Economics*, vol. 58: 717-739

Vavrek, R., Gundová, P., Kravčáková Vozárová, I., & Kotulič, R. (2021). „Altman model verification using a multi-criteria approach for Slovakian agricultural enterprises", *E+M Ekonomie a management*, vol. 24, no. 1: 146-164

Wen, X.Z., Hussain, R.Y., Saad, M., & Butt, R.S. (2020). „Interaction of asset tangibility on the relationship between leverage structure and financial distress in agriculture-linked non-financial firms", *Scientific papers-series Management Economic Engineering in Agriculture and Rural Development*, vol. 20, no. 3: 649-662

Wilson, N., Wright, M., & Altanlar, A. (2014). „The survival of newly-incorporated companies and founding director characteristics", International Small Business Journal: Researching Entrepreneurship, vol. 32, no. 7:733-758

ERP Software Space and Transformation Strategies

Casiana Maria Darie[a, 1]

Bucharest University of Economic Studies, Romania

Abstract: *Business process improvements should drive new technology. Therefore, this paper examines the adoption stage of ERP that can help organization to get strategic benefits. ERP software space increase the capabilities in the last few years to provide a better customer experience that made a greater visibility. Also, with the fast development of technology, traditional ERP lifecycle needs to be reviewed. Statistics of cloud technology show that is in continues escalation and businesses move from on-premises technology to accomplish expanded network, business efficiencies as elasticity and lower costs. This will be investigated through an in-depth case study at adoption ERP market analysis on cloud solutions. The paper provides an analyses of Romanian market trends of adoption Cloud -based solutions, distribution on year and type of companies that adopt these technologies who improve new operating models and become part of ERP software space.*

Keywords: *Enterprise resource planning (ERP), adoption rate, market analysis, ERP lifecycle, cloud software.*

1. Introduction

Enterprise Resource Planning emerged in the 1970s from material requirements planning (MRP) system. The origin of MRP came to be, when a lot of manufacturing organizations were finding that they were struggling with managing their entire manufacturing operation, with trouble tracking customer orders, parts and supplies that need to purchase, in fulfill customers demand. Theoretically MRP it was a way to handle and manage the manufacturing shop floor, prioritize orders and help organizations become more efficient and more effective.

ERP implementation project regularly involve the adoption decision, a good selection process of ERP package and vendor, implementation maintenance and evolution (Haddara and Zach, 2012).

According to Demi and Haddara (2018), ERP solutions evolved into cloud-based platforms, either as hybrid systems or true cloud ERP systems. The evidence of growing gap between cloud-based ERP and on-premises was also show to an industrial report from year 2018, where 60%-70% of companies believe to place their infrastructure in the cloud. Also, on article provided by Oracle (Biel, 2021) mention that Forrest Research estimates that 2020 cloud subscriptions for business application accounted 170 dollar billion on revenue. In the same study found that on an international survey of people who use ERP systems is indicated that 21% of companies use cloud, 64% use SaaS and only 15% using on-premises. On 2021 ERP Report made by Panorama

[1] *Corresponding author*: Bucharest University of Economic Studies; 6, Piața Romană, 1st District, Bucharest, 010374 Romania; email address: dariecasiana14@stud.ase.ro

Consulting Group (PCG, 2021), more than 53% of organizations that have an ERP solution use cloud-based than on-premises enterprise platforms (Vailshery, 2022).

Provider hosted cloud solutions generated 85% of total revenue in 2014, according to analyst at Allied Research Market (Deshmukh, 2016), and also, they said that cloud-based platforms would constitute 75% of market share by 2020.

Therefore, seems as a good theoretical lens to investigate the lifecycle of cloud-based ERP model and how ERP software space become a strategic transformation for organizations.

2. Literature background

Enterprise resources planning solutions combines all features packages containing sales, production, finance, HR (human resources), logistics and other modules to provide integration for the whole organization *(*Novais *et al.,* 2019*)*. Additionally, from 1990 until 2022, enterprises resources planning became the standard software, who take the place for other systems such as old MRP.

On a short analysis on the market the Enterprise Resource Planning, it is anticipated to exceed furthermore than 49.50$ US billion by 2025, and the main diving factors are associated with necessity for intelligibility in business processes, upward demand of ERP in medium and small enterprises and also the acquiescence of mobile applications and cloud-base solutions (MRE, 2022) (AMR, 2020).

The ERP Market is segmented on the positions of its deployment, purpose, region, enterprise size, and end user. Hence, the enterprise resource planning market is segmented on the lines of its deployment like on-premises and cloud-based solutions (MRE, 2022).

Common practice when purchasing on-premises ERP is that the software is supposed to exist as long as the organization (Haddara and Zach, 2012). Thus, it happens the opposite problem, in the meanwhile organization evolve while on-premises system it was static. It was a gap between the organizations new needs because of faster growth witch the system cannot deliver. Consequently, the entire system might to be replaced by another one with a better fit *(*Novais *et al.,* 2019*)*.

2.1. On-premises ERP

A major challenge of implementing ERP on-premises was always the limitation of customizing a huge software suite to fit with the organization needs (DeFranco, n.d.). Hence, setup required buying and installing those on-premises servers, then was need someone to configure and maintain many customizations, which takes a lot of months and millions of lines of code. Also, the system needed people to maintain and secure the hardware continuously and troubleshooting required engineers' teams.

Furthermore, only larger companies had accessible maintenance and high implementation, means the concept cannot scale. Most of employees that used essential processes had few workarounds, also processes were brittle. In the end user

noncompliance was by far the leading cause of Enterprise resources planning failure (DeFranco, n.d.).

The simple difference between cloud-based ERP and on-premises is about location. On-premises ERP solutions are installed locally on companies' servers and hardware and then managed by IT engineers while cloud-based ERP (SaaS or Software as a Service) is delivered as a service (Schwarz, 2016). Hence, data are managed in the cloud by the ERP retailer and accessed by users through web browser.

With on-premises model, the job of maintaining and securing the software is in business hands. IT engineers are not only needed for initial implementation but also, they have to be trained and supported as necessary to keep the software up to date. This means time-consuming for IT team. On-premises model, can involve time for organization to acquire approval and buy in from stakeholders before picking and deploying software.

Inevitably businesses should invest more money to maintain and update their software, sustain the supporting existing infrastructure, troubleshoot, and employ experts. With not these systematic updates and maintenance, system functionality, security and usability can fall off. Instead of growth and of helping them stay ahead, as Enterprise Resources Planning software is intended to do, this time consuming and financial investments of on-premises ERP can limit companies (Christiansen *et al.*, 2022).

2.2 Cloud ERP

In Megahed *et al*. (2019), companies are encouraged to move to the public, mixed or private cloud-based solutions and spoke about importance of the SaaS as well as building a cloud solution.

In this scenario, problems are developed by analyzing data, shortening the problem, and coding it correctly to solve those problems. Creating cloud solutions that encounter customer requirements, cloud supply constraints, with short time and lower costs for solution access. In this paper, the authors estimate the effectiveness of cloud-based solutions and the effectiveness of all kinds of cloud (private, public, or hybrid), both approaches on local environments (Taylor, 2020).

Cloud-based (CB) ERP can be fully hosted by a third-party vendor and accessed online without local installation (Uppström *et al.*, 2015). On Forbes post in 2018, shows that cloud computing has changed the way all works and consume software, and has become so pervasive, companies even run-on cloud or are moving to it. Furthermore, on 2021 report made by Panorama Consulting Group, 53,10% organizations are selecting cloud systems instead of on-premises. While on-premises systems require manual upgrades, many other cloud-based solutions receive automatic updated with minimal time and effort form the vendor (PCG, 2020). Also, some cloud-based solutions, like Dynamics 365 receive notification when new updates are released and allow organizations to choose when or if they accept those new features. The report also attests that absence of information or knowledge about cloud ERP was the most shared reason for choosing on-premises systems, but costs were also a major factor (MRE, 2022).

Cloud ERP system is rather young concept that make barriers to organizations that still learning about its limitation and advantages, and which are concern about risk of data loss and security levels.

These insights enhance the importance of a literature review on the current body of knowledge on factors influencing the transformation strategies to adopt cloud ERP.

3. Research methodology

In order to achieve the objectives established for this study, this research aims to identify growth trend on cloud embracing in Romanian organizations. Using dimensions on enterprise size were choose Small Enterprises (SE) with 10 to 49 employees, Medium Enterprises (ME) with 50 to 249 employees and Large Enterprises (LE) thru 250 employees or more who acquire hosting for the enterprise's database (as a CB service).

Data sets were treated on unit of measure "percentage of enterprises" and annual time frequency. Thus, the general research objectives set out were:

- **OBJ1.** Identifying any significant differences between SE, ME and LE;
- **OBJ2.** Evaluating whether, between the two period (2016 – 2018 and 2021), there was any significant change regarding the cloud adoption.

4. Results and discussions

In *Table 1*. were identify that LE gather the most adoption of CB in last year 2021 with 15% of enterprises, unlike ME that have only 9% on the same year, means difference of 6% percentages on those two and also taking into consideration that SE have just 7% percentages of enterprises and that making a huge difference between LE and SE with a half of percentages.

It is good to note that LE have the biggest percentages in all analyses years unlike SE who were in 2018 almost 5% percentages of enterprises choose Cloud Based solution with just 1% percentage low from ME with 6% percentage at the same year.

Table 1. **Percentage of enterprises adopted CB service**

TIME	SE	ME	LE
2021	7	9	15
2020	4	7	13
2018	5	6	12
2017	3	5	11
2016	3	5	8

Source: Own data processing published on www.insse.ro

Furthermore, looking on year distribution is clearly that LE have a persistent boost on the last few years with approximate 1% percentages of enterprises per year in addition, unlike SE who experienced a variation thru last year, for example in 2018 choosing CB solution shows 5% percentages growth from 3% on year 2017, but with 1% percentages diminution in 2020 was found just 4% percentages of enterprises. Distribution of ME is also not far away from SE, it is good to note that have not know a variation in those

year and seems to be in a continues escalation but differ from SE with an average approximately 2% percentages in last 3 years analysis.

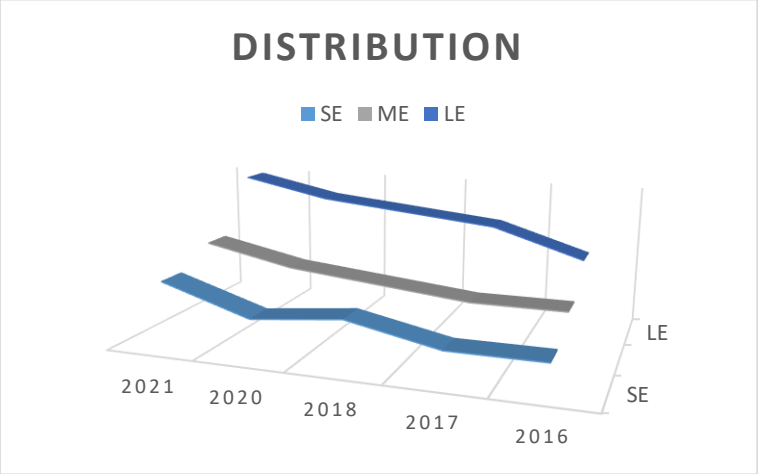


Figure 1. **Year distribution**
Source: Own data processing published on www.insse.ro

5. Conclusions

This paper provides a general overview of growth trend on cloud in Romanian organizations. It can be seen from afar that even we talk about Small Enterprises or Medium or Large Enterprises, all embraces CB solution equally. Year after year another 1% percentage of enterprises give up or move to Cloud-based solution operating models that become part of ERP software space.

Also, in several studies it is mentioned that ERP systems has grew up dramatically in recent years and COVID has changed the competitive landscape, and many organizations have been fortunate to simply remain profitable. Maybe also this situation maintains the grown also in adoption CB solution and in next years we will see more that 1% percentages switching per year.

By analyzing the paper data and inspecting its results can summarized as follows:

1. OBJ1 was fulfilled, were identified significant differences between SE, ME and LE, noting that Large Enterprises have the most adoption rate, that is true because have a greater purchasing power and biggest purposes to develop fast in technologies.
2. The significant change was observed in OBJ2 concerning 2018 and 2021 to SE for that decrease of 1% percentages, but also were covered by 3% percentages between 2020 and 2021.

Selections of digital changes have revealed for most of the last decade. The years 2020/2021 are one of the direct influences of their acceleration and of the changes felt on the traditional ways of working (Darie and Braga, 2021).

It is important to note that all type of enterprises form Romanian country make significant changes on technologies, like adoption of Cloud-based solution which affects ERP lifecycle, and that it may be essential to conduct more research on enterprises type that take this decision more in depth or even outside the country.

References

AMR - Allied Market Research (2020), "Global ERP Software Market to Garner $78.41 Billion by 2026 at 10.2% CAGR: AMR", available on-line at: https://www.globenewswire.com/news-release/2020/02/11/1983055/0/en/Global-ERP-Software-Market-to-Garner-78-41-Billion-by-2026-at-10-2-CAGR-AMR.html (Accessed April 2022).

Biel, J. (2021), available on-line at: https://www.netsuite.com/portal/resource/articles/erp/erp-statistics.Sht ml, (Accessed April 2022).

Christiansen, V., Haddara, M., & Langseth, M. (2022) "Factors Affecting Cloud ERP Adoption Decisions in Organizations", *Procedia Computer Science*, vol. 196: 255-262.

Darie, C.M. & Braga F.V. (2021), "Adoption of decision support systems in Romania versus European Union Countries", Annals – Economy Series, Constantin Brâncuşi University, vol. 6: 74-82, December 2021.

DeFranco, L. (n.d.), The Story of ERP: From On-Prem to SaaS and Beyond, https://blog.abacus.com/story-of-cloud-erp/.

Demi, S., Haddara, M. (2018) "Do Cloud ERP Systems Retire? An ERP Lifecycle Perspective", *Procedia Computer Science*, vol. 138: 587-594.

Deshmukh, D. (2016), "Provider-Hosted Cloud Solutions to Dominate Personal Cloud Market till 2020", available on-line at: https://blog.alliedmarketresearch.com/provider-hosted-cloud-solutions-to-dominate-personal-cloud-market-till-2020-market-176 (Accessed April 2022).

Haddara, M. & Zach O. (2012) "ERP in SMEs: An Extended Literature Review", *International Journal of Information Sciences*, vol. 2, no. 6: 106-116.

MRE - Market Research Engine (2022), "ERP (Enterprise Resource Planning) Software Market Size, Share, Analysis Report", available on-line at: https://www.marketresearchengine.com/reportdetails/erp-enterprise-resource-planning-software-market (Accessed April 2022).

Megahed, A., Nazeem, A., Yin, P., Tata, S., Nezhad, H.R.M., & Nakamura, T. (2019) "Optimizing cloud solutioning design", *Future Generation Computer Systems*, vol. 91: 86-95.

Novais, L., Maqueira, J.M., & Ortiz-Bas, A. (2019) "A Systematic Literature Review of Cloud Computing Use in Supply Chain Integration." *Computers & Industrial Engineering*, vol. 129, no. 296: 314.

PCG - Panorama Consulting Group (2020), "An Independent Perspective on ERP Systems & Digital Technology. The 2020 ERP Report", available online at: https://www.panorama-consulting.com/services/erp-software-selection/ (Accessed April 2022).

PCG - Panorama Consulting Group (2021), "An Independent Perspective on ERP Systems & Digital Technology. The 2020 ERP Report", available online at: https://www.panorama-consulting.com/services/erp-software-selection/ (Accessed April 2022).

Schwarz, L. (2016) "How Cloud ERP Compares to On-premises ERP", available on-line at: https://www.netsuite.com/portal/resource/articles/on-premise-cloud-erp.shtml (Accessed April 2022).

Taylor, M. (2020), "The Debate Between Cloud v/s On-Premise ERP Solution – ControlERP", available on-line at: https://www.controlerp.com/cloud-v-s-on-premise-erp-solution/ (Accessed April 2022).

Uppström E., Lönn C.M., Hoffsten M., Thorström, J. editors (2015) "New implications for customization of ERP systems", 48th Hawaii International Conference on System Sciences.

Vailshery, L.S. (2022), "Global ERP software market share by company 2021", available on-line at: https://www.statista.com/statistics/249637/erp-software-market-share-by-company/ (Accessed April 2022).

DELEGATES

George-Marian Aevoae	Alexandru Ioan Cuza University of Iași, Romania
Cătălin Nicolae Albu	Bucharest University of Economic Studies, Romania
Nadia Albu	Bucharest University of Economic Studies, Romania
Jaan Alver	Tallinn University of Technology, Estonia
Ion Anghel	Bucharest University of Economic Studies, Romania
Viorel Avram	Bucharest University of Economic Studies, Romania
Sabin-Alexandru Băbeanu	Bucharest University of Economic Studies, Romania
Anna Bialek-Jaworska	University of Warsaw, Poland
Oana Bogdan	West University of Timișoara, Romania
Dana M. Boldeanu	Bucharest University of Economic Studies, Romania
Ana-Maria Bratu	Bucharest University of Economic Studies, Romania
Valentin Burcă	West University of Timișoara, Romania
Dagmar Camska	University of Chemistry and Technology Prague, Czech Republic
Alina Cristina Căldăraru	Bucharest University of Economic Studies, Romania
Daniela Artemisa Calu	Bucharest University of Economic Studies, Romania
Alexandru Chirigiu	KPMG, Romania
Charles H. Cho	Schulich Business School, Canada
Casiana C.D. Darie	Bucharest University of Economic Studies, Romania

Aura Emanuela Domil	West University of Timișoara, Romania
Voicu Dragomir	Bucharest University of Economic Studies, Romania
Mădălina Dumitru	Bucharest University of Economic Studies, Romania
Giorgiana-Roxana Ene	Bucharest University of Economic Studies, Romania
Silvia Feldiorean	ACCA, Romania
Marie Fiserova	Prague University of Economics and Business, Czech Republic
Andrei Filip	ESSEC Business School, France
Alessandro Ghio	University of Laval, Canada
Milena Gralewska	University of Warsaw, Poland
Olga Grzybek	University of Economics in Katowice, Poland
Gina Raluca Gușe	Bucharest University of Economic Studies, Romania
Encarna Guillamon-Saorin	Universidad Carlos III de Madrid, Spain
Dominika Hadro	Lodz University of Technology, Poland
Ionuț Viorel Herghiligiu	Gheorghe Asachi Technical University of Iaşi, Romania
Sebastian Hoffmann	HHL Leipzig, Germany
Mihaela Ionaşcu	Bucharest University of Economic Studies, Romania
Liliana Ionescu-Feleagă	Bucharest University of Economic Studies, Romania
Costel Istrate	Alexandru Ioan Cuza University of Iași, Romania
Irena Jindrichovska	Metropolitan University Prague, Czech Republic

Gabriel Jinga	Bucharest University of Economic Studies, Romania
Gifty Kenetey	Tomas Bata University in Zlin, Czech Republic
Linda Kidwell	Nova Southeastern University, USA
Jiri Klecka	University of Chemistry and Technology Prague, Czech Republic
Karol M Klimczak	Lodz University of Technology, Poland
Joanna Krasodomska	Cracow University of Economics, Poland
Dana Kubickova	Metropolitan University Prague, Czech Republic
Alexey Litvinenko	Tallinn University of Technology, Estonia
Camelia Iuliana Lungu	Bucharest University of Economic Studies, Romania
Andreia Otilia Manea	Bucharest University of Economic Studies, Romania
Marian Dragoș Mangiuc	Bucharest University of Economic Studies, Romania
Ewa W. Maruszewska	University of Economics in Katowice, Poland
Ana Marques	University of East Anglia, UK
Liviu Matac	Bucharest University of Economic Studies, Romania
Dorel Mateș	West University of Timișoara, Romania
Marcel Meyer	Lodz University of Technology, Poland
Ciprian Mihăilescu	CAFR, Romania
Catalin Mos	Babeș-Bolyai University of Cluj-Napoca, Romania
Carly Moulang	Monash University, Australia

Mirela Nichita	Bucharest University of Economic Studies, Romania
Marta Nowak	Wrocław University of Economics and Business, Poland
Loredana Pamfile	Bucharest University of Economic Studies, Romania
Adriana Florina Popa	Bucharest University of Economic Studies, Romania
Boris Popesko	Tomas Bata University in Zlin, Czech Republic
Vlad Andrei Porumb	University of Manchester, UK
Claudia- Mihaela Rapan	Bucharest University of Economic Studies, Romania
Ioan-Bogdan Robu	Alexandru Ioan Cuza University of Iași, Romania
Maria (Wieczynska) Rykaczewski	Arizona State University, USA
Daniela Nicoleta Sahlian	Bucharest University of Economic Studies, Romania
Christiana Brigitte Sandu	Alexandru Ioan Cuza University of Iași, Romania
Maria-Silvia Săndulescu	Bucharest University of Economic Studies, Romania
Ashish Singh	Tomas Bata University in Zlin, Czech Republic
George Marian Ștefan	Bucharest University of Economic Studies, Romania
Paulina Szymanek (Bancerz)	University of Warsaw, Poland
Marta Tache	Bucharest University of Economic Studies, Romania
Constantin Toma	Alexandru Ioan Cuza University of Iași, Romania
Daniela Livia Trașcă	Bucharest University of Economic Studies, Romania
Maria Vulcheva	Florida International University, USA

Marcel Vulpoi	VTM, Romania