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24105 Kiel (Germany)
E-Mail: [rights\[at\]zbw.eu](mailto:rights[at]zbw.eu)
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Book of Proceedings

Editors:

Humberto Nuno Ribeiro, Katerina Fotova Cikovic, Ivana Kovac

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Humberto Nuno Ribeiro, University of Aveiro, Portugal

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NEW INTEGRATED MODEL TO INVESTIGATE THE IMPACT OF AUGMENTED REALITY ON CONSUMERS SATISFACTION AND PURCHASE INTENTION

Faisal Aburub

University of Petra, Amman, Jordan

faburub@uop.edu.jo

ABSTRACT

In recent years, AR has appeared as a vital marketing technique, making the hotels improve the way the guests perceive the environment they in. This research will explore the impact of augmented reality on and purchase intention and consumer satisfaction. Consequently, the research will integrate the Uses and Gratifications model with Technology Acceptance Model to investigate the effect of mobile augmented reality on consumer satisfaction and purchase intentions. An empirical investigation has been conducted in hotel sector in Jordan. The results show that AR has significant impact on customer significant and purchase intention.

Keywords: *Usage and Gratification approach, TAM model, Augmented Reality*

1. INTRODUCTION

Nowadays, hotels aim to attract many guests, retain and give them great experience. Hotels are willing to use many methods and techniques to do that. One of these techniques is Augmented Reality (AR). In recent years, AR has appeared as a vital marketing technique, making the hotels improve the way the guests perceive the environment they in (Whang et al., 2021). AR can be considered as valuable technology to hotels as they provide physical environment to the customers, which can be extremely improved through AR. Moreover, AR enhance customers' experience of exploring hotels and its nearby area. According to Yavuz et al. (2021), AR is a quickly developing technology, and the number of users of this type of technology is growing day by day. Many large organizations have started using AR in different businesses. In 2019, the global market of AR was around \$10.7 billion. In 2024, this expected to reach \$72.7 billion (Osatuyi & Xu, 2021). The popularity and growing of AR drive many industries to integrate AR technologies into their business models. Furthermore, AR has become ubiquitous as the huge spread use of tablets and smartphones. According to Hackl & Wolfe (2017), AR technologies improve users experience by using computer vision and object recognition to impose electronic contents like audio, videos and graphics onto users' physical environment. Moreover, the widespread use of smartphones devices has led to development mobile augmented reality (MAR), with emergence of MAR technologies, travelers can access to many tourists' sites related to their travel choices directly from their devices. According to Do et al. (2020), MAR technologies enhance tourists experience and this may lead to significant potential for building the tourism industry and increasing opportunities for promoting tourists related retail. Therefore, AR has received big attention from both practitioners and academics. Many researches have conducted to review impact of AR on different industries such as healthcare, manufacturing, hospitality and education (de Souza Cardoso et al., 2020; Ng et al., 2019). According to McLean & Wilson (2019), some organizations like Amazon and Target have offered to search using images taken by mobile AR, this makes users to take a photo of a product using their smart devices and use that photo to search for the product within the mobile apps. Accordingly, researchers have investigated many approaches such as the Technology Acceptance Model, and the Stimulus-Organism-Response (SOR) framework (Do et al., 2020; Knag, 2014; Yang, 2013), to help practitioners to understand why and how organizations adopt AR. Although, the previous studies were important and explained set of aspects of why adopting the AR. Most of these aspects focused on the AR itself or the operator of the AR or sociological

aspects of users. For example, security and trust. Value of experiential consumers' engagement needs more research and investigation. Accordingly, the "Use and Gratification" (U&G) approach which was proposed by Katz (1974), showed that consumers' engagement experiences with the surrounding media can be a source of a number of benefits, and this could be a foundation for motivation to use AR (Alnawas & Aburub, 2016). Empirical research is required to investigate more for these benefits and to know what are the changes that faces operators of AR to attract and retain more costumers. Few studies examine the effect of augmented reality on consumer satisfaction and purchase intentions, particularly in the hotels sector. This research will explore the impact of augmented reality on and purchase intention and consumer satisfaction. Consequently, the research will integrate the Uses and Gratifications model with Technology Acceptance Model to investigate the effect of mobile augmented reality on consumer satisfaction and purchase intentions. An empirical investigation will be performed on the hotel sector in Jordan.

2. LITERATURE SURVEY

2.1. Augmented Reality

AR can be defined as a technology that allows "computer generated imaginary to approximately overlay physical objects in real-time" (De Lima et al., 2022). AR can combine real and virtual objects, interact in real-time, and registered in real world. As fast development of AR, currently there are many forms AR. AR can be applied not only on computer devices but also on smartphones, tablets, wearable glasses, helmetetc. AR can be considered as a communication tool that enhance product presentation by adding virtual object in the real environment, improve consumer information processing, and enrich customer experience (Fan et al., 2020). According to Sung (2021), mobile augmented reality can increase engagement of customers' senses and effects their behavior, perception, and judgment. This can be performed through the sensory interfaces such as augmented 3D visual effects and sounds and touchscreen items. This can also contribute in building brand awareness, and leading to profits.

2.2. Technology Acceptance Model (TAM)

TAM model which was proposed by (Davis, 1989) provides a mean to explore the adoption and communication of new ideas and innovations. TAM uses two measures to predict the users' decision for accepting or rejecting new technologies. These measures are Perceived Usefulness and Perceived Ease of Use. TAM model is widely used in many research areas particularly information technology to investigate the users' responses. Consequently, few studies have been conducted to investigate the acceptance of AR I hotel sector (Do et al., 2020). This research integrates TAM and U&G models to develop a new research model for investigating the impact of AR on customer satisfaction and intention to purchase within hotels sector.

2.3. The Use and Gratification Approach (U&G)

U&G approach clarifies the audience's role in selecting a specific type of information technologies and proposes technology users to be driven by personal needs and gratification-seeking motives (Alnawas & Aburub, 2016). Based on U&G approach, four types of benefits can audience derive from using sort type of technology or media as follows: hedonic benefits, cognitive benefits, personal integrative benefits, and social integrative benefits.

2.3.1. Hedonic Benefits

This benefit may include enhancing pleasure experience, escaping from problems, gaining enjoyment and having fun (Calder et al., 2009). In terms of augmented reality context, it indicates the ability of AR to make customers feel relaxed, have fun while engaged, obtain enjoyment, and make them not want to stop using AR.

2.3.2. *Cognitive Benefits*

It may include gaining information to increase the understanding of the situation, self-education and learning, knowing about related events in surrounding, society and the world, acquiring a sense of security through information, obtaining advice and decision choices (Calder et al., 2009). In terms of augmented reality context, cognitive benefits can be the ability of AR to precisely describe and visualize the product, help customers to collect required information to learn more about product, and stimulate the customers to think about the products or services in different way.

2.3.3. *Personal Integrative Benefits*

It may include enhancing credibility and confidence of persons and finding reinforcement for personal values (Calder et al., 2009). In terms of augmented reality context, it indicates the ability of AR to enhance confidence, status and credibility of customers.

2.3.4. *Social Integrative Benefits*

It may include obtaining sense of belonging, making persons connecting with friends, society and families, finding common ground with others for discussion (Calder et al., 2009). In terms of augmented reality context, to what extent AR promotes values that are similar to their customers and make them feel a part of their society.

3. RESEARCH HYPOTHESES

Based on intensive reading and analysis of literature about augmented reality and its relation to customer satisfaction and purchase intention, the following hypotheses are proposed:

- H1: Perceived usefulness has a positive impact on customer satisfaction of using AR.
- H2: Perceived ease of use has a positive impact on customer satisfaction of using AR.
- H3: Hedonic benefits offered by using AR has a positive impact on customer satisfaction.
- H4: Cognitive benefits offered by using AR has a positive impact on customer satisfaction.
- H5: Personal integrative benefits offered by using AR has a positive impact on customer satisfaction.
- H6: Social integrative benefits offered by using AR has a positive impact on customer satisfaction.
- H7: Perceived usefulness has a positive impact on purchase intention of using AR.
- H8: Perceived ease of use has a positive impact on purchase intention of using AR.
- H9: Hedonic benefits offered by using AR has a positive impact on purchase intention.
- H10: Cognitive benefits offered by using AR has a positive impact on purchase intention.
- H11: Personal integrative benefits offered by using AR has a positive impact on purchase intention.
- H12: Social integrative benefits offered by using AR has a positive impact on purchase intention.
- H13: Customer satisfaction has a positive impact on purchase intention of using AR.

Figure 1 shows research model

Figure following on the next page

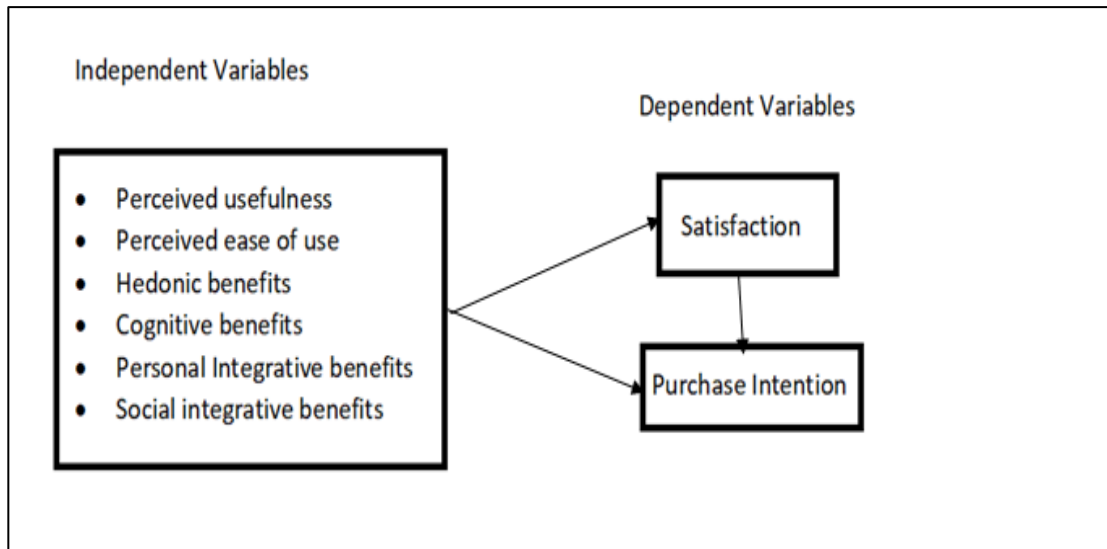


Figure 1: Research Model

4. RESEARCH METHODOLOGY

4.1. Item Generation

This research used and adapted items from studies Koufaris (2002), Calder et al. (2009), Khalifa & Liu (2007), Spears & Singh (2004), and Nambisan and Baron (2007) to measure the 8 constructs namely: Hedonic benefits, cognitive benefits, personal integrative benefits, social integrative benefits, customer intention, and purchase intention.

4.2. Data Collection

Data were collected using questionnaire. A purposive sample was used. Only respondents who had experience in using AR were selected. The questionnaires have been distributed to 370 respondents. Thirty-six questionnaires were excluded due to their incompleteness. Furthermore, 334 questions were usable questionnaires. 58.4% of participants were male and 41.6% were females.

4.3. Hypotheses Testing:

AMOS was used to test the proposed hypotheses as follows:

The results support H1 ($\gamma = 0.325$, $P \leq 0.05$, $R^2 = 0.54$), H2 ($\gamma = 0.291$, $P \leq 0.05$, $R^2 = 0.48$), H3 ($\gamma = 0.331$, $P \leq 0.05$, $R^2 = 0.49$), and H4 ($\gamma = 0.289$, $P \leq 0.05$, $R^2 = 0.51$) confirming positive association between perceived usefulness, perceived ease of use, hedonic benefits, and cognitive benefits with customer satisfaction using AR in the Jordanian hotel sector. Moreover, the results did not support H5 ($\gamma = 0.05$, $P \geq 0.05$) and H6 ($\gamma = 0.06$, $P \geq 0.05$). Therefore, the relationship between personal and social integrative benefit with customer satisfaction using AR in the Jordanian hotel sector is not significant. The results also support H7 ($\gamma = 0.335$, $P \leq 0.05$, $R^2 = 0.55$), H8 ($\gamma = 0.298$, $P \leq 0.05$, $R^2 = 0.49$), H9 ($\gamma = 0.328$, $P \leq 0.05$, $R^2 = 0.51$), and H10 ($\gamma = 0.288$, $P \leq 0.05$, $R^2 = 0.52$) confirming positive association between perceived usefulness, perceived ease of use, hedonic benefits, and cognitive benefits with purchase intention using AR in the Jordanian hotel sector. Moreover, the results did not support H11 ($\gamma = 0.04$, $P \geq 0.05$) and H12 ($\gamma = 0.05$, $P \geq 0.05$). Therefore, the relationship between personal and social integrative benefit with purchase intention using AR in the Jordanian hotel sector is not significant. The results also support H13 ($\gamma = 0.345$, $P \leq 0.05$, $R^2 = 0.53$), confirming positive association between customer satisfaction and purchase intention using AR in the Jordanian Hotel Sector. Table 1 summarizes the findings of research hypothesizes

Hypotheses	γ	Sig. Level	R ²
H1: Usefulness → Satisfaction	0.325	0.05	0.54
H2: Ease of Use → Satisfaction	0.291	0.05	0.48
H3: Hedonic benefits → Satisfaction	0.331	0.05	0.49
H4: Cognitive benefits → Satisfaction	0.289	0.05	0.51
H5: Personal integrative benefits → Satisfaction	0.060	Insignificant	-
H6: Social integrative benefits → Satisfaction	0.050	Insignificant	-
H7: Usefulness → Purchase intention	0.335	0.05	0.55
H8: Ease of Use → Purchase intention	0.298	0.05	0.49
H9: Hedonic benefits → Purchase intention	0.328	0.05	0.51
H10: Cognitive benefits → Purchase intention	0.288	0.05	0.52
H11: Personal integrative benefits → Purchase intention	0.040	Insignificant	-
H12: Social integrative benefits → Purchase intention	0.050	Insignificant	-
H13: Satisfaction → Purchase intention	0.345	0.05	0.53

Table 1: Hypotheses testing

5. CONCLUSION

New research model has been developed using TAM model and U&G approach, to investigate the impact of AR on customer satisfaction and purchase intention within Jordanian hotel sector. The results show that perceived usefulness, perceived ease of use, hedonic benefits, and cognitive benefits have positive relationship with customer satisfaction and purchase intention. While, personal and social integrative benefits do not have significant relationship with satisfaction and purchase intention. Based on that, design of AR must contain both hedonistic aspects, which aim to provide self-fulfilling value to the consumer and cognitive elements, which aim to provide instrumental value to the consumer. This research also investigated aspects related to related to customers actual interactions with AR not properties of AR or sponsor of it.

LITERATURE:

1. Alnawas, I., & Aburub, F. (2016). The effect of benefits generated from interacting with branded mobile apps on consumer satisfaction and purchase intentions. *Journal of Retailing and Consumer Services*, 31, 313-322.
2. Calder, B. J., Malthouse, E. C., & Schaedel, U. (2009). An experimental study of the relationship between online engagement and advertising effectiveness. *Journal of interactive marketing*, 23(4), 321-331.
3. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.
4. De Lima, C. B., Walton, S., & Owen, T. (2022). A critical outlook at Augmented Reality and its adoption in education. *Computers and Education Open*, 100103.
5. de Souza Cardoso, L. F., Mariano, F. C. M. Q., & Zorzal, E. R. (2020). A survey of industrial augmented reality. *Computers & Industrial Engineering*, 139, 106159.
6. Do, H. N., Shih, W., & Ha, Q. A. (2020). Effects of mobile augmented reality apps on impulse buying behavior: An investigation in the tourism field. *Heliyon*, 6(8), e04667.
7. Fan, X., Chai, Z., Deng, N., & Dong, X. (2020). Adoption of augmented reality in online retailing and consumers' product attitude: A cognitive perspective. *Journal of Retailing and Consumer Services*, 53, 101986.
8. Hackl, C., & Wolfe, S. G. (2017). *Marketing new realities: An introduction to virtual reality & augmented reality marketing, branding, & communications*.
9. Kang, S. (2014). Factors influencing intention of mobile application use. *International Journal of Mobile Communications*, 12(4), 360-379.

10. Katz, E., Blumler, J., Gurevitch, M., (1974). Utilization of mass communication by the individual. In: Blumler, J. G., Katz, E. (Eds.), *The Uses of Mass Communications: Current Perspectives on Gratifications Research*. Sage, Beverly Hills, pp.19–32.
11. Khalifa, M., & Liu, V. (2007). Online consumer retention: contingent effects of online shopping habit and online shopping experience. *European Journal of Information Systems*, 16(6), 780-792.
12. Koufaris, M. (2002). Applying the technology acceptance model and flow theory to online consumer behavior. *Information systems research*, 13(2), 205-223.
13. McLean, G., & Wilson, A. (2019). Shopping in the digital world: Examining customer engagement through augmented reality mobile applications. *Computers in Human Behavior*, 101, 210-224.
14. Nambisan, S., & Baron, R. A. (2007). Interactions in virtual customer environments: Implications for product support and customer relationship management. *Journal of interactive marketing*, 21(2), 42-62.
15. Ng, Y. L., Ma, F., Ho, F. K., Ip, P., & Fu, K. W. (2019). Effectiveness of virtual and augmented reality-enhanced exercise on physical activity, psychological outcomes, and physical performance: A systematic review and meta-analysis of randomized controlled trials. *Computers in Human Behavior*, 99, 278-291.
16. Qin, H., Osatuyi, B., & Xu, L. (2021). How mobile augmented reality applications affect continuous use and purchase intentions: A cognition-affect-conation perspective. *Journal of Retailing and Consumer Services*, 63, 102680.
17. Spears, N., & Singh, S. N. (2004). Measuring attitude toward the brand and purchase intentions. *Journal of current issues & research in advertising*, 26(2), 53-66.
18. Sung, E.C., 2021. The effects of augmented reality mobile app advertising: Viral marketing via shared social experience. *Journal of Business Research*, 122, pp.75-87.
19. Whang, J. B., Song, J. H., Choi, B., & Lee, J. H. (2021). The effect of augmented reality on purchase intention of beauty products: The roles of consumers' control. *Journal of Business Research*, 133, 275-284.
20. Yang, H. C. (2013). Bon Appétit for apps: young American consumers' acceptance of mobile applications. *Journal of Computer Information Systems*, 53(3), 85-96.
21. Yavuz, M., Çorbacıoğlu, E., Başoğlu, A. N., Daim, T. U., & Shaygan, A. (2021). Augmented reality technology adoption: Case of a mobile application in Turkey. *Technology in Society*, 66, 101598.

THE GROWTH PATH OF THE REGION LAGGING BEHIND: THE CASE OF THE OSIJEK-BARANJA COUNTY

Dula Borozan

*Josip Juraj Strossmayer University of Osijek, Faculty of Economics in Osijek, Croatia
borozan@efos.hr*

ABSTRACT

Revealing the economic specificities and development potential of areas on a smaller geographic scale is increasingly attracting research attention. This is especially important for lagging regions to support their sustainable economic growth and development. This paper aims to explore, discuss and provide empirical evidence of the gross domestic product (GDP) growth pathway of the Osijek-Baranja County in order to identify its main economic challenges. This county is located in the north-east of the Republic of Croatia. It belongs to the low-income regions, i.e., small lagging-behind regions, whose average GDP per capita was less than 50% of the European Union average in the period 2000-2019. The results obtained from the analysis of the official county-level statistical data on GgDP and gross value added of its most influential industries indicate that human capital, natural resources, technology and the prevailing value system remain the most important explanatory factors behind its economic performance and growth trajectory.

Keywords: *gross domestic product, human capital, industry, low-income region, NUTS3 level*

1. INTRODUCTION

According to NUTS 3 (Nomenclature of Territorial Units for Statistics) applied by Eurostat (2017), Croatia is subdivided into 21 units of regional self-government - counties (including Zagreb, the capital, with the status of a city and a county). The counties consist of cities and municipalities responsible for a whole range of activities, such as education, health care, physical planning, socio-economic development, etc. (for details, see Koprić, 2007; Đulabić, 2012). One of these counties, which this paper will focus on, is Osijek-Baranja County (OBC). It is located in the north-east of the Republic of Croatia, Eastern Croatia, and covers 4,156 km² of its territory. It is one of the largest and most densely populated Croatian counties with 258,026 inhabitants living in 7 cities, 35 municipalities and 263 settlements (Croatian Bureau of Statistics, CBS, 2021 Census). In terms of population, OBC ranks the fifth among 21 Croatian counties. This is not only a good indicator of the demographic resource at its disposal, but also of its economic and market potential. Its largest city – Osijek is the fourth largest city in the country (the 2021 Census) and the cultural, political, historical, business and university center of Eastern Croatia. Such a position gives it a special development role and importance in Eastern Croatia and Croatia in general, which is additionally supported by the OBC's abundance of natural resources (e.g., fertile and arable agricultural land, water resources and forests) and its relatively good transport connections, in particular considering the main existing and planned pan-European transport corridors (corridor X and Vc), as well as the Danube route and Osijek airport. However, in economic terms, the county is located on the periphery of Croatia, which represents a major development challenge due to the pronounced centralistic and urban/industrial agglomeration tendencies towards the capital. In addition, its low rates of development, burdened by a number of serious demographic (Živić, 2017) and socio-economic drawbacks (Borozan, 2003; Borozan and Barković, 2003; Lončar and Marinković, 2015; Matišić and Pejnović, 2015; Marošević, 2020), indicate that OBC has neither economically optimally valorized, nor used its development resources. This observation is supported by the fact that OBC belongs to a low-income regions, i.e., small lagging regions, with an average gross domestic product (GDP) per capita less than 50% of the EU average in the period 2000-

2019. For a definition of a region lagging behind, see European Commission (2017). The low level of income and slower development make it necessary (i) to strategically evaluate the resources available to it and (ii), in accordance with European and global contemporary trends, to define and steer its development path toward one that ensures sustainable prosperity through smart specialization and the promotion of an innovative and creative culture. The main aim of this paper is to explore, discuss, and provide empirical evidence of the GDP growth pathway of OBC in the last decade in order to detect its main economic challenges. Awareness of the challenges is important because it can help economic policy authorities to create applicable development programs aimed at fostering economic growth and reducing pronounced regional disparities in Croatia (for the analysis of regional disparities, see Botrić et al., 2018; Rabar and Grbin, 2019). Regional analyses at the NUTS3 level are lacking at the European level (Kilroy and Ganau, 2020), and this deficiency is particularly pronounced in Croatia. This fact is surprising, especially considering that harmonized regional development and the reduction of regional disparities are the goals of the European Union (EU) and each of its member states. Furthermore, analyses at the NUTS3 level are very important; especially with regard to social cohesion and the achievement of the United Nations Development Sustainable Goals. Although empirical analyses at the NUTS2 level are more common (Iammarino et al., 2018); they do not for the discovery of the economic specificities and development potential of lower scale territories. At the EU NUTS3 level, there are fewer empirical studies dealing with economic analyses (e.g., Kilroy and Ganau, 2020, Postiglione et al., 2020; López-Villuendas et al., 2020), which is also the case for Croatia (e.g., Đokić et al., 2016; Jakšić, 2017; Botrić et al., 2018; Puljiz and Rukavina, 2022), Eastern Croatia (Lončar and Marinković, 2015; Matišić and Pejnović, 2015; Živić, 2017; Marošević, 2020), and the OBC in particular (Borozan, 2003; Borozan and Barković, 2003). The theoretical framework of this paper is outlined by new endogenous growth theories, which consider human capital, knowledge, research and development, and social capital as the fundamental drivers of growth, as well as clustering and specialization theories, which consider the economic associations of individual economic agents and smart specializations as the driving force behind creating a green economy and, more generally, a sustainable society. The theoretical framework is completed by theories that highlight the importance of innovation and entrepreneurship, that is, ideas about the need to change the value system to one that values hard work and local initiatives, cultural diversity, knowledge accumulation, constant innovation and technological advancement, as well as the protection of the natural environment. Methodologically, the paper is based on the analysis of statistical data published by the CBS, the Financial Agency (FINA) and the Croatian Chamber of Commerce, the County Chamber of Osijek (CCOS). Organizationally, this paper consists of four sections. The next section presents and discusses the GDP growth path of OBC, while Section 3 briefly portrays the challenges faced by the industries that contribute the most to OBC's gross value added. The last section provides a conclusion.

2. THE DEVELOPMENT BASIS OF THE OSIJEK-BARANJA COUNTY

2.1. Economic performance

Economic achievements of OBC are considered by analyzing the trend in the basic synthetic economic indicator, GDP, over the period 2000-2019. One should bear in mind that it stems in part from its achievements in the 1980s, i.e., a pre-war and pre-transition period, already characterized by a slowdown in economic growth due to the onset of deindustrialization, structural issues, and political, social, and economic crises in general. The achievements of this century were also directly influenced by the break-up of the former Yugoslavia, the war (1991-1995) that took place on its territory, and the occupation of more than 40% of its territory by 1998. As a result, the 1990s saw massive direct and indirect demographic and economic war damages with far-reaching economic consequences.

In addition, this decade was also marked by the transition processes that were followed by numerous privatization manipulations and frauds, legal insecurity, an unentrepreneurial atmosphere, and the isolation of the county. All of them harmed the economy of OBC (for details, see Borozan and Barković, 2003; Lončar and Marinković, 2015; Matišić and Pejnović, 2015). However, twenty years have passed since the 1990s, and OBC should have already created mechanisms that would have overcome development drawbacks and weaknesses, as well as accelerated its development. Their outcome is analyzed below. Since GDP is an indicator of the value of final production achieved in the country, it can be used to measure and compare the level of economic activity and its economic power, while GDP per capita can be used to measure the level of development and standard of living. According to the latest available data from the CBS (2022), which go back to 2019, OBC produced in the value of €2,793,013.907.06, and the GDP per inhabitant was €10,232. Although this was an increase of 7.36% compared to the previous year, 2019 GDP did not reach the pre-recession level of €2,841,038.494.5 in 2008 (CBS, 2022). Figure 1, which shows the movements of total GDP and GDP per capita in the period 2000-2019, clearly illustrates this graphically. For comparison purpose, the average value of EU27 GDP per inhabitant amounted to €35,753 (Megatrends, 2023).

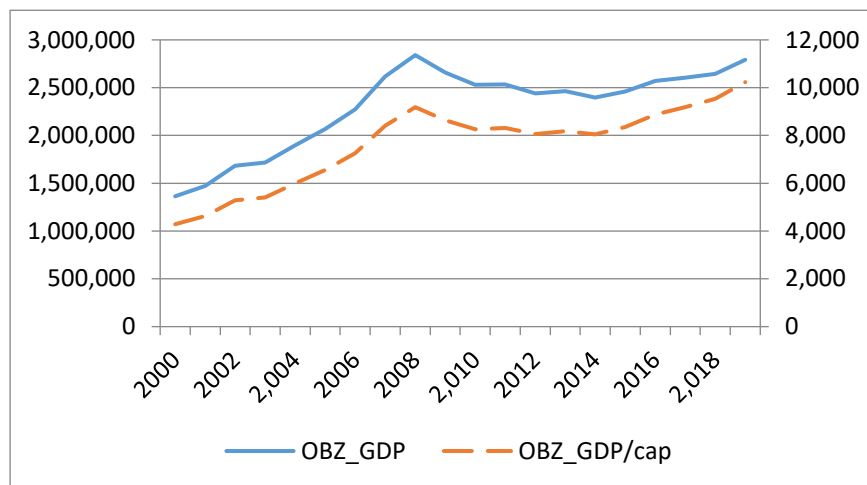


Figure 1: Development of total GDP and GDP per capita in the Osijek-Baranja County
Note: data on total GDP and GDP per inhabitant are expressed in thousands of euros (left ordinate), and in euros (right ordinate), respectively.
(Source: CBS (2022))

Nevertheless, the county achieves an annual increase in GDP and GDP per capita. For the period 2000-2019, the growth rate was 4.06% and 4.95% per year, respectively. The faster increase in GDP per capita compared to total GDP is a result of unfavorable demographic processes in the county. According to the CBS estimates, the population of the county decreased from about 318 thousand in 2000 to 273 thousand in 2019, which is an annual decrease of 0.85% in the period 2000-2019. This is a continuation of the unfavorable demographic trends Živić (2017) analyzed in his paper, which he pointed out, will continue into the future. In relation to Croatia, depopulation was particularly pronounced in Eastern Croatia, including OBC (Matišić and Pejnović, 2015; Lončar and Markinković, 2015). A particular problem is the fact that young and well-educated people make up a large part of emigrants, which will endanger the future development of Croatia and OBC in particular (Draženović et al., 2018). Borozan (2017) revealed that net migration is a determinant contributing to the deepening of regional disparities in Croatia, and Mikulić and Nagyszombaty (2015) that the quality of human capital, along with investment in fixed capital and specific structural characteristics of Croatian

counties, is the primary reason for regional disparities in Croatia. A more comprehensive picture of the county's economic power, i.e., the level of development and the standard of living, emerges when assessed in the Croatian and European contexts. Figures 2 and 3 serve that purpose. Although OBC was positioned in the top seven counties in terms of total final production and population over the period 2000-2019, data on GDP per capita for the same period typically ranked it above the 10th place. For example, OBC was ranked 5th and 6th by total final production in 2000 and 2019, while it was ranked 11th and 12th by GDP per capita among Croatian countries in the same years (see CBS, 2022).

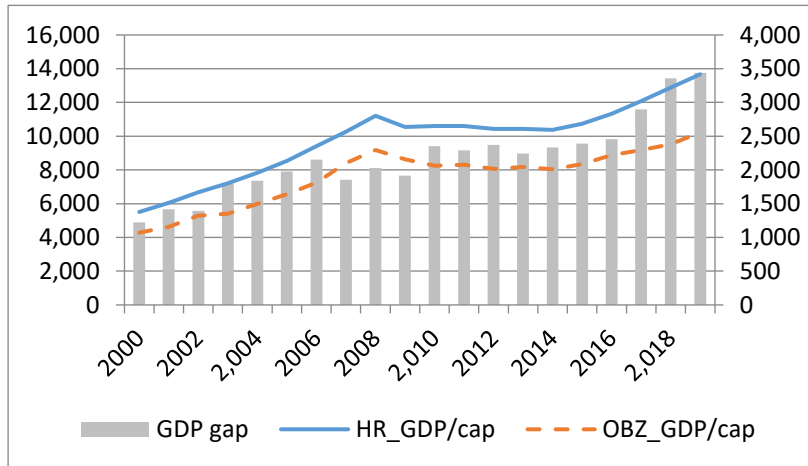


Figure 2: GDP and GDP per capita in Croatia (HR) and the Osijek-Baranja County
 Note: GDP is given in 000 EUR.
 (Source: CBS (2022))

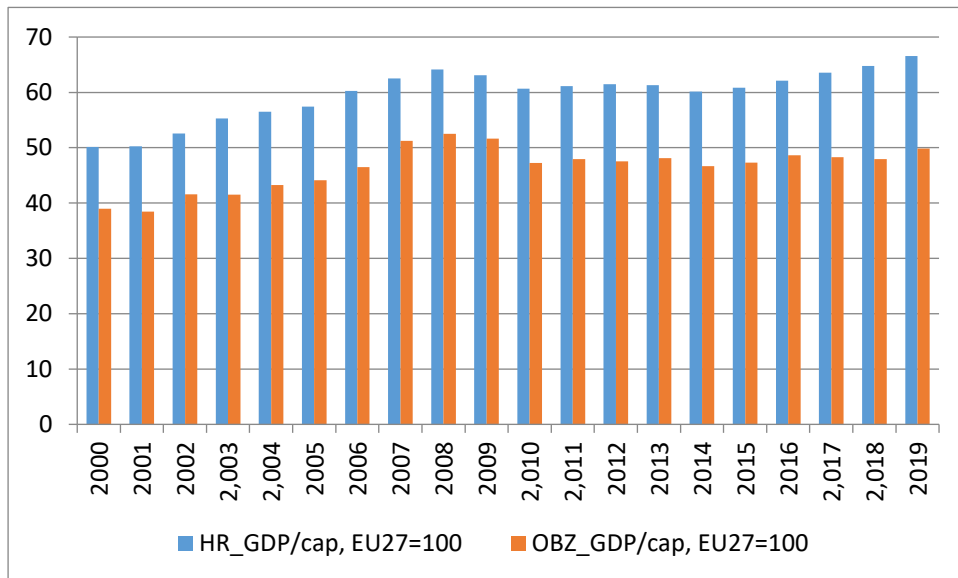


Figure 3: GDP per capita in Croatia and the Osijek-Baranja County (EU27=100)
 (Source: CBS (2022))

Apparently, an increase in OBC’s GDP per capita moved consistently with Croatia’s GDP per capita; however, the gap between them did not decrease. On the contrary, the share of OBC’s final production decreased from 5.76% in 2000 to 5.02% in 2019, which is a sign that some other counties were developing faster and increasing their share.

Empirical evidence (Đokić et al., 2014) shows that this is primarily the capital, which is the biggest attractor for economic activities and job opportunities in Croatia. Its share in Croatia's GDP rose from 29.50% in 2000 to 34.49% in 2019 (see CBS, 2022). About a third of all economic activities are carried out in the capital, Zagreb, whose GDP in 2019 was 19.17 billion euros (CBS, 2022). It is plausible to assume that such a trend will continue. However, an increasing gap between GDP per capita of the OBC and Croatia is not only a consequence of the strengthening of centralist and agglomeration processes in Croatia, but also of OBC's own developmental weakness. Unlike the city of Zagreb, whose GDP per capita in 2019 was above the EU27 by 16%, the county's GDP per capita reached 50% of its average in the same year (CBS, 2022). The county was hit hard by the recession in Croatia (2008-2014), which at the same time points to its low crisis resilience, but even more to the fact that it takes a long time to recover. This observation is in line with Đokić et al. (2014), who classified OBC in the group of counties with the worst economic performance and the least resistant to crises. Nevertheless, the above statistical data indicates that the OBC's economy is developing, and that its standard of living and level of development are increasing. However, there is no doubt that economic growth needs to be intensified. For this purpose, it is helpful to know which activities have contributed the most and have potential for development. The three OBC activities that contributed the most to the creation of Croatia's gross value added in 2019 were agriculture, forestry, and fishing (15.5%), construction (5.41%) and manufacturing industry (5.44%), excluding public administration and defense, education, health care and social welfare activities (6.5%) (see CBS data, 2022). In the next section, these activities are briefly analyzed using the data from the CCOS and the FINA. The latter collects data from the so-called "living companies", the companies that have submitted their financial reports to it.

2.2. Economic activity in the Osijek-Baranja County

The OBC economy is mainly based on its comparative advantages - natural, historical and cultural features. Its structure is dominated by agriculture and the food industry, construction, transport and trade. What follows is a brief analysis of those activities that have greater importance in its past and future development.

2.2.1. Agriculture and the food industry

Agriculture and the food industry are developing based on the OBC's comparative advantages, such as its geographical location, moderate continental climate, abundant water resources, as well as arable and relatively unpolluted agricultural land. The total agricultural area in OBC is 212,095 ha, of which 200,226 ha are used as arable land (CCOS, 2022). In terms of agricultural production capacity, OBC occupies one of the most important places in Croatia. The importance of agricultural production is exceptional; not only because life without food is impossible, but also because it is necessary for the preservation of "rural space, ecological balance and maintenance of traditional values, material and spiritual culture of the Croatian countryside" (CCOS, 2022). However, its capacities are far from being fulfilled, and productivity is lower than necessary (see Hadelan et al., 2022). Consequently, agriculture is not competitive and does not fully fulfill its role in modern societies. Its share in OBC's gross value added was 10.74% in 2019, according to the CBS's data (2022). The tradition of agricultural production in OBC's rural areas is certainly its strength; but, at the same time it is its weakness. Namely, the traditional agricultural crops grown in OBC (cereals sown at 53.9%, oilseeds at 26.15% and sugar beet at 3.6%) (CCOS, 2022) are low-income crops. The transition to new crops, more ecologically acceptable and more profitable on the market requires a technological and mental step forward, which represents an insurmountable obstacle for many companies and family farms. The main reasons therefor are the unfavorable educational and demographic structure of agricultural holdings (i.e., farms). This is reflected not only in a lack of adequate mechanization

and accompanying infrastructure (e.g., irrigation and drainage systems, refrigerators or dryers), but also in a lack of labor force, knowledge and skills, innovative ideas, unwillingness to learn and lack of strategic thinking (see Sesar, 2008). An illustrative example is the fact that, despite the availability of water resources, no comprehensive irrigation and drainage systems have been developed in the county. These systems are indispensable today, in times of climate change, unstable weather conditions and constant demands for more productive and higher quality production. Some estimates show that by building the necessary infrastructure, up to 80% of the county's arable land could be irrigated (CCOS, 2020). Even within this activity, smaller farms, which dominate the farming structure with a share of about 95%, understand the importance of adapting to modern trends in agriculture. These trends refer to ecological production and the development of the "green economy". On the other hand, they refer to "new" forms of organization (like clusters) and business differentiation through complementary activities that reduce business risk (e.g., through rural tourism, where they offer products from their own farms as a part of the gastronomic offer). Business associations, especially those of primary producers, are of great importance because, in addition to providing education, counseling and information for the producers, they secure a better position in the market. Business diversification can be good because it ensures much-needed business flexibility, which is especially evident in agricultural production. Agricultural production is dependent on natural and climatic conditions and natural and weather disasters of greater intensity are occurring more frequently. Agricultural products are the raw materials for the food industry, which is diverse in OBC. For example, the milling and baking industry, the confectionery industry, sugar, oil, animal feed industry, milk processing, wine and beer production, fruit and vegetable processing are developed here. However, these industries were mainly either economically unprofitable or yielded low profits in the considered period. This is supported by statistical data from the CCOS (2022), which indicates that, for example, in 2019, producers of food and beverages achieved a loss before taxation in the amounts of €1,692,306 and €623,031, respectively. Radical reforms are needed in both activities; comparative advantages exist, but there is a lack of knowledge, skills and ideas to bring the whole management system and governance to a level where the comparative advantages of these activities can be made competitive.

2.2.2. Manufacturing industry

The manufacturing industry has a special place in OBC; it is not only a major generator of county income but also of employment. Data from CCOS (2022) indicates that it generates about a third of the county's total revenue, and employs about a quarter of all the county's employees. In 2017, however, the manufacturing industry achieved a negative consolidated financial result, which was a sign of the difficulties it was facing and the need for a serious review of previous business models. However, in 2019, the situation changed and this industry performed positively, which continued in the following years. The manufacturing industry is diverse in terms of the activities that are carried out within it. In addition to the already mentioned food industry, other important industrial branches are the chemical industry, the wood and paper industry, the production of metals and metal products, mechanical engineering, the textile industry, and the building materials industry. These are mainly branches that were more developed before the Homeland War (1991-1995), produced significantly more, generated more income and employed more workers. The chemical industry is one of the few industries that managed to overcome the consequences of the war, the loss of markets and the changes in economic conditions in the 1990s. It is a branch in which 13 business entities subject to income tax operated in 2021, accounting for about 4% of the county's total revenues on average. The chemical industry generates a positive financial result and achieves a positive trade balance with foreign countries.

The textile industry is unfortunately an example of the economic collapse of many other branches in the county after the Homeland War, although it has a long tradition. It used to be an extremely strong industrial branch producing quality products, employing thousands of workers, and basing its development largely on its own primary textile and leather industries (for example, leather processing, textile fiber spinning, thread production, etc.). In 2021, the textile industry was only a shadow of the former tactile industry, with 20 taxpayers engaged in textile production and 38 in clothing production. It survives mainly thanks to the so-called *lohn jobs* for well-known Italian or German fashion companies. Despite achieving a positive balance in foreign trade, it is a low-income and labor-intensive activity that largely survives due to low labor prices. The wood processing industry, like the textile industry, is a labor-intensive industry with a low degree of finalization of the raw material wood. Within this branch, there were 71 business entities operating in the wood processing and wood production branch and 58 business entities in furniture production in 2021 (CCOS, 2022). The data of CCOS confirm the low degree of finalization in this branch, i.e., that "as much as 57% of wood is only primarily processed and remains in processing stages 0-3, 43% of wood ends up in processing between the 4th and 8th stages, and in furniture only 7% of the produced wood raw material is finished..." (CCOS, 2022). The data also indicates the importance of establishing a production base on a high degree of finalization, which will be competitive on an international scale. Competitive advantages are largely created by companies in paper manufacturing, paper products and printing. Namely, it is a branch whose 22 companies submitted their financial reports to FINA in 2021. This branch is one of the largest exporters in the county, and companies involved in the manufacturing of paper and paper products have contributed the most. The metal processing industry and mechanical engineering are two industries that are becoming increasingly less important in OBC. In the past, with its products, agricultural machinery, solid fuel stoves, enameled bathtubs and complex machinery and metal structures, it has not only met domestic demand, but also exported significant quantities to Asian and African markets, thereby achieving economies of scale. However, like many other industries, it has had a hard time recovering from the war and subsequent privatization fraud. Nevertheless, this activity achieves a positive foreign trade balance, which is good, since it is an industry that is existentially dependent on exports, considering the absorption capacity of the domestic market and the demand of domestic complementary industries (e.g. mechanical engineering, shipbuilding, the automotive industry, or energy).

2.2.3. Construction and the building materials industry

Dependence on the economic situation, i.e., the position in the business and investment cycle of the public sector, is particularly observable in the operation of the building materials industry (e.g., production of cement, lime, gypsum, stone, mineral wool, and products made of glass, ceramics, porcelain, etc.) and the construction industry itself. The six-year crisis (2009-2014) had an extremely unfavorable effect on companies from these activities in terms of company numbers and employment, so that these activities, especially construction today, are struggling with a lack of capital investment, but also a labor shortage. However, the recovery is in place and construction continues to matter for OBC, especially given the multiplier effects it has along with the building materials industry on the overall OBC economy. In a nutshell, OBC is dominated by low- and mid-level technological activities, where prices is the main competitive tool, and consequently by industries that are not highly profitable. In addition, labor productivity is lower in many of them, which is a direct consequence of technological backwardness, insufficient investment in research and development, non-innovative or generally uncompetitive production programs. Consequently, these are industries that are not as developed as they could be, given the potentially high quality domestic raw material base on which most of them are based.

Nevertheless, they are its most important development drivers; they just need to be developed. This can be done by improving the factors that economic theory recognizes as key - human capital, research and development, technological modernization and the development of an innovative and creative culture. Sound institutions and good governance should create a favorable economic and business environment for this.

3. NEW BUSINESS WINDS – BUILDING COMPETITIVE ADVANTAGES

Positive developments and changes can be felt not only in the structure of the OBC economy, but also in business models and practices, which have led to strong growth in the last two years. The main contributors to this are ecological producers in agriculture, i.e., family farms, dealing with eco-production and continental/rural tourism, the food industry, and in general, companies from the manufacturing industry. It is about the companies that constantly invest in human capital, technological modernization of their business processes, machines and infrastructure, develop new, more innovative production programs, and appear on the international market. However, in contrast to these stand-alone business entities, the information and communication (ICT) sector is characterized by networking business entities. The ICT sector of OBC is developing into the most dynamic and advanced branch of the economy. Its pattern of behavior, characterized by a high level of knowledge and skills, innovation and creativity, concern for employees, as well as internationalization and globalization of business, becomes a role model for other industries. The progressive increase in the number of companies (from 83 in 2013 to 233 in 2019) goes hand in hand with an increase in the number of employees (from 311 in 2013 to 1,221 in 2021) (CCOS, 2022), but above all also in the financial figures, income and profit. For example, total revenue increased more than six-fold when compared between 2013 and 2021. This is not only the result of the above mentioned reasons, together with a global view of the business these companies are cultivating and business enthusiasm, but also the persistent work of the Osijek Software City association, founded in 2013 on the initiative of the most important companies from this sector of the county, as well as a collaboration with the Josip Juraj Strossmayer University of Osijek.

4. CONCLUSION

Osijek-Baranja County is one of the 21 counties of the Republic of Croatia. Although it is a county with great development potential based on its population, area and natural resources, the negative demographic and economic trends that intensified in the last decade of the 20th century have continued. Consequently, it is a low-income county, lagging behind in development. Its average GDP per capita was 46% of the EU27 over the period 2000-2019. The brief analysis of the GDP trajectory provides a basis for implicit conclusions, which further research should be supported by econometric analyses. The main limiting factors of its development have so far been directly or indirectly related to human factors, such as unfavorable demographic processes, underdeveloped human capital, innovative and creative culture, insufficient investment in research and development, modernization, etc. The creation of regional competitive advantages and strong economic growth presupposes the improvement of productivity of all factors of production and of the economic and business environment. OBC has a valuable natural basis for the development of a green economy and a sustainable society in general. Productivity growth, based on human knowledge, research and development, and technological advancement, which have been recognized within the endogenous growth models as the critical ones, together with a favorable economic and business environment, the role of which should be studied in further research, is strongly needed for this county. The development breakthroughs are possible and the ICT sector together with progressive individual business entities from other industries and economic activities clearly support this.

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LITERATURE:

1. Borozan, Đ. (2003). Poduzetnička osnovica Osječko-baranjske županije, *Ekonomski vjesnik*, 16(1-2), 99-121.
2. Borozan, Đ., Barković I. (2003). Vrednovanje atraktivnosti Osječko-baranjske županije u privlačenju izravnih inozemnih ulaganja, *Ekonomski pregled*, 54(3-4), 324-358.
3. Borozan, Đ. (2017). Internal migration, Regional economic convergence, and growth in Croatia, *International Regional Science Review*, 40(2), 141-163.
4. Botrić, V., Božić, Lj., Broz, T. (2018). Regionalne razlike u ulaganju u istraživanje i razvoj i produktivnosti u hrvatskim poduzećima, *Podravina*, 17 (34), 122-134.
5. CBS (Croatian Bureau of Statistics) (2022). Gross domestic product – Review by counties, database. Retrieved 20 December 26, 2022 from www.dzs.hr
6. CBS (Croatian Bureau of Statistics) (2022). 2021 Population Census
7. CBS (Croatian Bureau of Statistics) (2022). First release, No. 7.1.4., different years
8. CCOS (Croatian Chamber of Economy – County Chamber Osijek) (2022). Poljoprivreda i prehrambena industrija. Retrieved 14.11.2022 from <https://www.hgk.hr/zupanijska-komora-osijek/poljoprivreda-i-prehrambena-industrija>
9. Draženović, I., Kunovac, M., Pripuzić, D. (2018). Dynamics and determinants of emigration: the case of Croatia and the experience of new EU member states, *Public Sector Economics*, 42(4), 415-447.
10. Đokić, I., Fröhlich, Z., Rašić Bakarić, I. (2016). The impact of the economic crisis on regional disparities in Croatia, *Cambridge Journal of Regions, Economy and Society*, 9(1), 179–195.
11. Đulabić, V. (2012). Regionalism and regional policy in Croatia: connection or disconnection, in: *New Regional Policies and European Experiences*, Damjanović, M. (Ed.), Beograd: Megatrend University Belgrade, 471-487.
12. European Commission (2017). Competitiveness in low-income and low-growth regions: The lagging regions report, Brussels. Retrieved 19.11.2022 from https://ec.europa.eu/regional_policy/sources/studies/lagging_regions%20report_en.pdf
13. Hadelan, H., Zrilić, M., Jež Rogelj, M., Zrakić Sušac, M. (2022). Enhancing the productivity of small farmers in Croatia through the agricultural fund for rural development, *Ekonomika poljoprivrede*, 69(4), 1043-1059.
14. Iammarino, S., Rodríguez-Pose, A., Storper, M. (2018). Regional inequality in Europe: Evidence, theory and policy implications, *Journal of Economic Geography*, 19(2), 273–298.
15. Jakišić, S. (2017). Explaining regional unemployment in Croatia: GVAR approach, *Revija za socijalnu psihologiju*, 24(2):189-217.
16. Kilroy, A., Ganau, R. (2020). Economic Growth in European Union NUTS-3 Regions, Policy Research Working Paper 9494, The World Bank.
17. Koprić, I. (2007). Regionalism and Regional Development Policy in Croatia, in: *Political Studies of Pecs: Regional Decentralization in Central and Eastern Europe*, Kovács Pálné, I. (Ed.), University of Pécs, Department of Political Studies, Pécs, 87-110.
18. Lončar, J., Marinković, V. (2015). Analysis of socio-economic indicators in the context of the regional development of Eastern Croatia, *Hungarian Geographical Bulletin*, 64(4), 327-344.
19. López-Villuendas, A. M., del Campo, C. (2022). Regional Economic Disparities in Europe: Time-Series Clustering of NUTS 3 Regions. *International Regional Science Review*, online first, <https://doi.org/10.1177/01600176221125703>

20. Macrotrends (2022). European Union GDP per capita 1970-2023. Retrieved 2.01.2023 from <https://www.macrotrends.net/countries/EUU/european-union/gdp-per-capita>
21. Marošević, K. (2020). Lagging regions: The case of Eastern Croatia. *Ekonomski vjesnik*, 33 (1), 255-270.
22. Matišić, M., Pejnović, D. (2015). Uzroci i posljedice zaostajanja Istočne Hrvatske u regionalnom razvoju Hrvatske, *Hrvatski geografski glasnik*, 77(2), 101-140.
23. Ministry of Regional Development and EU Funds (2018). Development index. Retrieved 10.10.2022 from <http://regionalni-en.weebly.com/development-index.html>
24. Mikulić, D., Galić Nagyszombaty, A. (2015). Jesu li razlike u regionalnom razvitku u Hrvatskoj određene međunarodnom razmjenom?. *Zbornik radova Ekonomskog fakulteta u Rijeci*, 33 (1), 81-102.
25. Osijek-Baranja County. Zaštita okoliša. Osnovna obilježja. Retrieved 14.11.2022 from <http://www.obz.hr/hr/pdf/zastitaokolisa/Osnova%20obiljezja.pdf>
26. Postiglione, P.; Cartone, A.; Panzera, D. (2020). Economic Convergence in EU NUTS 3 Regions: A Spatial Econometric Perspective. *Sustainability*, 12, 6717.
27. Puljiz, J., Rukavina, I. (2022). Analiza konvergencijskog procesa na lokalnoj i regionalnoj razini u Hrvatskoj. *Ekonomski pregled*, 73 (5), 693-716.
28. Rabar, D., Grbin, A. (2019). Analiza regionalne efikasnosti u Hrvatskoj korištenjem fiskalnih pokazatelja – neparametarski pristup. *Ekonomski pregled*, 70(4), 627-649. <https://doi.org/10.32910/ep.70.4.3>
29. Sesar, M. (2008). Analysis of Farmers' Opinions in Osijek-Baranja County Regarding Agricultural Engineering, in 36. International Symposium on Agricultural Proceedings of the Engineering & Actual Tasks on Agricultural Engineering, Košutić, S. (Ed.), Zagreb: University of Zagreb - Faculty of Agriculture, Agricultural Engineering Department, 605-616.
30. Živić, D. (2017), “Demografsko pražnjenje Istočne Hrvatske”, *Političke analize*, 8(31), 24-32.

GREEN INNOVATION: BRIDGING THE GAP BETWEEN CORPORATE SUSTAINABILITY DEVELOPMENT AND ENTERPRISE RISK MANAGEMENT - EVIDENCE FROM JORDAN

Munther B. Al-Nimer

*Associate Professor at Accounting Department, The Hashemite University, Jordan
muntheralnimer@hu.edu.jo*

ABSTRACT

*The study examines the impact of green innovation on the relationship between corporate sustainability development and enterprise risk management and sustainable performance in Jordanian companies. Data was collected through a structured questionnaire from Jordanian service, merchandise, and manufacturing companies listed on the Amman Stock Exchange. A total of 97 responses were received from 233 companies (41.63% response rate), with the largest number of responses from the service sector, followed by manufacturing and merchandise sectors. The participating firms had between 50-450 employees and were less than 10 to more than 25 years old. The study results show that green innovation significantly and positively mediates the relationship between corporate sustainability development and enterprise risk management ($\beta=1.374^{***}$, $p=0.000$) and significantly and negatively mediates the relationship between corporate sustainability development and enterprise sustainable performance ($\beta=1.374^{***}$, $p=0.000$). The research findings suggest that the green innovation approach, which incorporates the green concept throughout the product innovation stages, can improve resource utilization, promote the development of green products, enhance product quality and firm reputation, increase market share, and achieve sustainable growth.*

Keywords: *Green, Growth, Innovation, Market, Product, Resource*

1. INTRODUCTION

In recent years, corporate sustainability has become an increasingly important issue as society and investors are placing greater emphasis on the role of companies in addressing social and environmental challenges. Studies have shown that companies that prioritize sustainability tend to have better financial performance and are more attractive to investors. For example, a 2020 study by the Boston Consulting Group found that companies that have integrated sustainability into their business models had higher revenue growth and a higher return on assets compared to those that had not. Additionally, a 2020 survey by Deloitte of global investors found that environmental, social, and governance (ESG) factors are becoming increasingly important in investment decisions. Respondents cited concerns about climate change, human rights, and social inequality as key drivers of their ESG investment strategies. Corporate Sustainability Development (CSD) and Enterprise Risk Management (ERM) are two interrelated concepts that have gained increasing attention in recent years. CSD refers to the practice of businesses taking into account the economic, social, and environmental impact of their operations on society and the planet. ERM, on the other hand, is a process that helps organizations identify, assess, and prioritize potential risks to their operations and stakeholders. Studies have shown that integrating CSD into ERM can lead to improved risk management and overall business performance. A study by the Cambridge Institute for Sustainability Leadership (CISL) found that companies that integrated sustainability into their ERM processes had a better understanding of the potential risks and opportunities associated with sustainability issues and were better able to manage them (Preuss, 2015). Another study by the Chartered Institute of Management Accountants (CIMA) found that companies that integrated CSD into ERM had a

better ability to identify, assess, and respond to risks related to sustainability issues such as climate change and human rights (CIMA, 2014).

Furthermore, research has shown that companies that prioritize CSD tend to have better financial performance and are more attractive to investors. A study by the Harvard Business Review found that companies in the top quartile for environmental, social, and governance (ESG) scores had a return on equity that was 2.5 times higher than companies in the bottom quartile (HBR, 2018). However, it should be noted that the implementation of CSD in ERM can be challenging for some companies, as it requires a change in mindset and can be resource intensive. A study by the Journal of Business Ethics found that companies that had a more proactive approach to sustainability had a better ability to integrate CSD into ERM (JBE, 2016). In conclusion, the literature suggests that integrating CSD into ERM can lead to improved risk management and overall business performance. However, the implementation of CSD in ERM can be challenging and requires a change in mindset and resources. Over the last decade, a company's role in achieving sustainable development is important, especially in today's fast-changing environment. Firms are facing fierce competition and need to continuously improve their ability to develop and maintain a competitive advantage. Most high-tech firms rely heavily on pursuing sustainable and innovation capabilities (Wen-Hsiang Lai, 2015). Sustainability is an evolving area of research and is grabbing the attention of corporations, research communities, and regulatory bodies worldwide which had enhanced its implementation. For corporations focusing on sustainability need to ensure that the business is able to manage the business risk while meeting the stakeholder expectations. The adoption of sustainable practices increases resource-use competence and greater adoption of clean and environmentally friendly technologies and industrial processes (Muhammad Kashif Shad, 2019). Firms with sustainability in their orientation and innovation processes show evidence of value creation, such as the development value of products new to the market (radical innovations) and cooperation value with stakeholders (Wen-Hsiang Lai, 2015). ERM is crucial for everyday business activities and organizational practices in the current era as it facilitates business firms to control their internal system. Risk management is deemed a core factor for business competitiveness. It facilitates a firm to develop a unique strategy to minimize the potential losses and open a door for the exploitation of new opportunities, ERM practices reduce costs associated with a business operation and facilitate competitive advantage and superior performance (Songling Yang, 2018). There are several types of risk groups, namely the investment risk, the business risk, the financial risks and the nonfinancial risks. In financial institutions, risk includes credit risk, market risk and operational risk, several studies have found that the ERM has a significant effect on the financial performance of companies (Al-Nimer, 2021). Green innovation is related to products, processes and services that protect the environment. It is a process in which enterprises continuously carry out and implement green activities such as reducing waste, preventing pollution and improving environmental quality, and finally improve environmental and economic performance. Green innovation strategy is one of the most important environmental strategies and an important internal organizational factor that affects the enterprises' production and operation. (Sun, 2021). In this research we will show the association between Corporate Sustainability Development and Enterprise Risk Management is mediated by Green Innovation in Jordanian manufacturing sector.

2. THE RESEARCH HYPOTHESIS

2.1. Corporate Sustainability Development and Enterprise Risk Management

As businesses grow so do the risks. Thus, organizations need to adapt an integrated approach of risk management to mitigate risk (Agrawal, 2016). Enterprise Risk Management (ERM) has become the most important part of management for all organizational types. As a consequence

of globalization, public expectations have risen those businesses should behave responsibly and accountably in terms of minimizing their environmental and social impacts (Saardchom, 2013). The awareness by most of the companies in the world towards the environmental perils leads to the sustainability development. By emphasizing the sustainability risk management (SRM) and the sustainability agendas as part of corporate strategy, it's not only effecting on the company's financial performance but also maintaining the longer term of survival in the industry (Othman, 2016). ERM play a significant role in sustainable development of the organization through identification, measurement and management of risk including sustainability-related risks (Muhammad Kashif Shad, 2019). Implementing an integrated framework of ERM provides an essential foundation ensuring corporate commitments to ethical sustainability. Risk management and sustainability are interrelated, unethical and unsustainable behaviors may generate potential business risks and harm an organization's sustainability, as a management control system, the purpose of ERM is to help an organization achieve sustainable outcomes (Liu, 2019).

H0: *Corporate Sustainability Development is significantly influencing Enterprise Risk Performance in Jordanian manufacturing sector.*

2.2. Corporate Sustainability Development and Green Innovation

Sustainability performance refers to the ability of an organization or company to meet the needs of existing stakeholders without infringing on the needs of future stakeholders (Dyllick & Hockerts, 2002). Reid and Miedzinski (2008) stated that green innovation is any solution offered at any stage of a product or service life cycle to include a significant improvement in resources while reducing environmental impact. Green innovation can also refer to all kinds of innovations that contribute to the creation of new processes, products or services to minimize damage to the environment and prevent degradation and at the same time, maximizing utilization of natural resources (Leal-Millán et al., 2017). Based on relevant literature, previous research on the influencing factors of green innovation focuses on external factors, such as stakeholder pressure, environmental regulation, green supplier, external knowledge resources and market demand. Few studies emphasize the internal factors that promote green innovation, such as environmental ethics and environmental orientation. In the process of green management, an enterprise's internal stakeholders will increase the input of effective resources for green products, processes and services, coordinate the required heterogeneous resources and strengthen their environmental willingness, which is conducive to the integration of organizational resources and reduces the risk of process and output on environmental impact (Sun, 2021).

H1: *Corporate Sustainability Development is significantly influencing Green Innovation in Jordanian manufacturing sector.*

2.3. Green Innovation and Enterprise Risk Management

At present, innovation has attracted the attentiveness of many researchers and business owners. Green innovation has become one of the most important strategic tools to sustain resources and make environment-friendly. (Yehia Elzek, 2021). The emergence and popularity of ERM have ensued from a response to the rapid changes due to globalization and regulatory pressure on organizations to manage risk holistically. Its importance dramatically increased in recent years due to a series of corporate fraud, financial scandals, increasing the complexity of risks and pressure from regulatory bodies. (Muhammad Kashif Shad, 2019). ERM is supposed to minimize direct and indirect costs of financial distress, earnings volatility, and negative shocks in financial markets, as well as improve the decision-making process to select the best

investment opportunities, ERM practices enable a firm to reduce different types of costs associated with firms' operational and non-operational activities, ERM helps top management to manage different types of risk effectively (Songling Yang, 2018). Unsustainable behaviors can generate potential business risks to an organization's reputation and ultimately result in the collapse of an organization (Liu, 2019).

H2: *Green Innovation significantly influencing Enterprise Risk Performance in Jordanian manufacturing sector.*

2.4. Corporate Sustainability Development, Enterprise Risk Performance and Green Innovation

Risk management is an essential element of the strategic management of any organization and should be embedded in the ongoing activities of the business. ERM is defined in many ways but the accepted definition is: "a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risks to be within its risk appetite, to provide reasonable assurance regarding the achievement of the entity's objectives". (Committee of Sponsoring Organizations of the Treadway Commission COSO), the failure to prevent unethical and unsustainable behavior in risk management systems was a key factor in the financial collapse of the company. To mitigate threats derived from unethical behavior and direct sustainable decision-making, it is necessary to employ a wide range of control mechanisms, such as risk management (Songling Yang, 2018). Sustainability is often broken into three core concepts or "pillars": economic, environmental, and social. Many businesses and governments have committed themselves to sustainable goals, such as reducing their environmental footprints and conserving resources. Some investors are actively embracing green investments. Resource limitations and environmental concerns have made sustainable operations of assets and environmental pollution one of the major global issues. The economy's overall development may not go "hand in hand" with the reduction of pollution and sustainable management of resources, numerous investigations examined factors altering green innovations practices, such as environmental regulations, ethics, legal systems, and supply chain. (Haijun Wang, 2021). sustainable development has increasingly become a global consensus, promoting green growth and implementing green policies is the common choice of all major economies in the world, although green innovation can create economic, social, and ecological value, it is also a high-risk activity that needs to protect the value of green innovation through risk management. The process of green innovation is full of high uncertainty (Yingying Sun, 2019).

H3: *The association between Corporate Sustainability Development and Enterprise Risk Management is mediated by Green Innovation in Jordanian manufacturing sector.*

3. RESEARCH MODEL

The following figure shows the research model that displays each of the dependent variable (Corporate Sustainability Development) and independent variable (Enterprise Risk Performance) and mediator variable (Green Innovation) (based on the above discussion).

Figure following on the next page

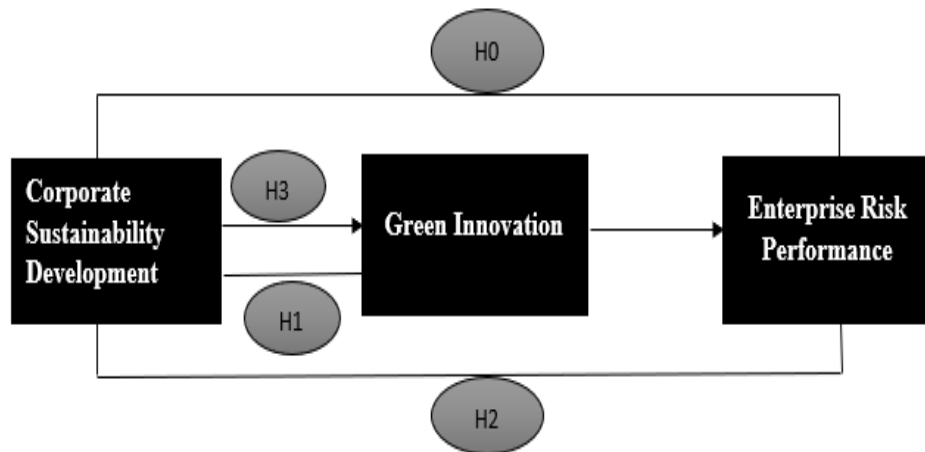


Figure 1: Research model that displays each of the dependent variable (Corporate Sustainability Development) and independent variable (Enterprise Risk Performance) and mediator variable (Green Innovation)

4. METHODOLOGY

4.1. Sample and Population

The study used a structured questionnaire to collect data from Jordanian service, merchandise, and manufacturing companies listed on Amman Stock Exchange. Where the number of companies listed in the services sector reached 139 companies, the manufacturing sector 55 companies, and the merchandise sector 39 companies. The firms participating in the study have shown in the following table. In this research, we surveyed those firms having between 50-450 employees and their age less than 10 to more than 25 years. We receive 97 responded of 233 companies which indicate 41.63% of total number of listed companies: 29.4% of service companies, 60.18% of manufacturing companies, 56.4% of merchandise companies responded. The greatest number of firms is from service, followed by manufacturing and merchandise respectively.

	Frequency	Percentage
Industry:		
• Service	41	42.26%
• Manufacturing	34	35.05%
• Merchandise	22	22.68%
Age:		
• Less than 10 years	42	43.29%
• 10- 15 years	25	25.77%
• 16-20 years	18	18.55%
• 21-25 years	9	9.27%
• More than 25 years	3	3.09%
Products/ Services:		
• 4 products/ services	44	45.36%
• 5 – 10	34	35.05%
• 11 – 20	15	15.46%
• 21 – 40	4	4.12%
• 41 or more	0	0%
Number of employees:		
• Less than 50	47	48.45%
• 50- 150	19	19.58%
• 151-300	21	21.64%
• 301-450	10	10.3%
• More than 450	0	0%

Table 1: Questionnaire data from Jordanian service, merchandise, and manufacturing companies listed on Amman Stock Exchange

4.2. Measuring Research Variables

Measuring sustainability can be by using a five-item scale (Q29–Q33) from the Sustainability Practices Indicator. The five items measure the overall focus of the organization on sustainability practices and principles. These items were measured using a 7-point Likert-type scale (1 = strongly disagree to 7 = strongly agree) (Muhammad Imran, 2019). Sustainable competitive advantage indicators are adopted including having advantage of caring environment compared to the competitors, having advantage to continue focusing on green, and having advantage to have social responsibility compared to the competitors (Eila Ardyan, 2017). Enterprise Risk Management: Impact of ERM on firm's value, examine ERM processes and operational performance and influence of ERM on firm value mediated through its financial performance can measuring by questionnaire survey, regression analysis, multivariate OLS regressions and annual report (Muhammad Kashif Shad, 2019). Because of the absence of a general theoretical framework or model that can predict the key factors influencing the relationship between a firm's CSR behavior and its risk management, we use the ERMI, to measure the effectiveness of a firm's risk management. This index is based on COSO's (2004) four business objectives: strategy, operations, reporting, and compliance. ERMI is to combine the achievements of the four objectives into one metric (Ya-Fen Kuo, 2018).

$$ERMI = \Sigma Strategy + \Sigma Operation + \Sigma Reporting + \Sigma Compliance$$

Green Innovation: A five-item Likert scale is used to measure green innovation (1=strongly disagree to 5=strongly agree) (Sascha Krausa, 2020). The focal mediator variable in the context of the current study was green innovation measuring by a questionnaire survey (Chatterjee2, 2019). "To measure the variable relating to innovation, we followed the approach of Stilgoe et al. (2013) by focusing on the four dimensions advocated by their research which are: Inclusion, anticipation, responsiveness and reflexivity" (Hadj, 2020).

Variable	Measuring Method	Reference
Corporate Sustainability Development	1. 7-point Likert-type scale. 2. Some indicators.	1. (Muhammad Imran, 2019) 2.(Eila Ardyan, 2017)
Enterprise Risk Performance	1. Questionnaire survey, regression analysis, multivariate OLS regressions and annual report. 2. Four business objectives.	1. (Muhammad Kashif Shad, 2019) 2.(Ya-Fen Kuo, 2018)
Green Innovation	1. Questionnaire Survey. 2. The approach of (Stilgoe et al). 3. A five-item Likert scale.	1.(Chatterjee2, 2019) 2.(Hadj, 2020) 3.(Sascha Krausa, 2020)

Table 2: Summary of Measuring the Research Variables

LITERATURE:

1. Preuss, L. (2015). Sustainability and enterprise risk management. Cambridge Institute for Sustainability Leadership.
2. CIMA. (2014). Corporate sustainability and enterprise risk management. Chartered Institute of Management Accountants.
3. Harvard Business Review. (2018). Companies with Strong Environmental and Social Performance Outperform Peers. Retrieved from <https://hbr.org/2018/01/companies-with-strong-environmental-and-social-performance-outperform-peers>

4. Journal of Business Ethics. (2016). Proactivity and corporate sustainability: A review and research agenda. *Journal of Business Ethics*, 136(3), 437-463.
5. Boston Consulting Group. (2020). Sustainability Pays: How Sustainable Business Models Lead to Higher Revenue Growth and Returns. Retrieved from <https://www.bcg.com/publications/2020/sustainability-pays-how-sustainable-business-models-lead-higher-revenue-growth-returns>.
6. Deloitte. (2020). 2020 Global ESG Survey. Retrieved from <https://www2.deloitte.com/global/en/pages/about-deloitte/articles/2020-global-esg-survey.html>

GLOBAL INNOVATION INDEX: AN OVERVIEW OF LATIN AMERICA AND THE TOP 20 INNOVATIVE COUNTRIES

Regina Negri Pagani

*PPGEP, Federal University of Technology, Paraná (UTFPR), Brazil
reginapagani@utfpr.edu.br*

Angelica Duarte Lima

*PPGEP, Federal University of Technology, Paraná (UTFPR), Brazil
GOVCOPP, ESTGA, University of Aveiro
gueia.lima@gmail.com*

Andrea Antunes da Luz

*University Center of Maringá (UniCesumar), Brazil
andrea.luz@unicesumar.edu.br*

David Nunes Resende

*GOVCOPP, ESTGA, University of Aveiro, Portugal
david@ua.pt*

Joao Luiz Kovaleski

*PPGEP, Federal University of Technology, Paraná (UTFPR), Brazil
kovaleski@utfpr.edu.br*

ABSTRACT

This paper explores the concept of innovation and its importance in driving progress and growth in various fields. The content highlights some of the most influential authors on innovation and discusses the Global Innovation Index (GII), an annual report that assesses the innovation capabilities and performance of the countries around the world. The content also discusses the economic development context in Latin America, making a comparison with the 20 top most innovative countries in the world, according to the GII. The results leads us to understand that, in order to promote a sustained and inclusive economic development, countries in Latin America will need to address some challenges highlight here, and others, and work towards building more diversified, innovative, and competitive economies.

Keywords: *Innovation, Latin America, Innovative Countries, Technology Transfer*

1. INTRODUCTION

Innovation is the process of creating something new or significantly improving an existing product, service, process, or idea, that creates value and meets a need in a unique and better way than what was previously available. These characteristics are able to provide competitive advantage for those organizations or countries who are able to innovate. However, the innovation process requires investments and structure, which is not always available in organizations or countries. Due to high investments required, sometimes a feasible way to seek innovation is transferring technology. Due to its relevance to organizations and countries, assessing innovation has become strategic. Born with this purpose, the Global Innovation Index (GII) is an annual report published by the World Intellectual Property Organization (WIPO) that assesses the innovation capabilities and performance of countries worldwide. Considering various factors contributing to innovation, the report also includes case studies and analysis of innovation trends, best practices, and rankings of top-performing countries and regions in terms of innovation.

Thus, it is a significant benchmark for innovation performance and is used by governments, international organizations, and businesses worldwide to guide policy and investment decisions. It provides valuable insights into the innovation landscape and helps policymakers, business leaders, and other stakeholders to enhance their innovation capabilities and competitiveness. Taking into consideration that the innovation process requires other capabilities and investments, the purpose of this paper is to provide a comparison of the innovation index from the top 20 most innovative countries and the ones from Latin America. Additionally, we will also infer the influences of the innovation index by other factors generally considered as driving forces or barriers to innovation, namely: income, government spending on R&D, human development, Government expenditure on education, total (% of GDP), Human Freedom Index, and corruption. In order to accomplish this objective, an exploratory review on the theme was done, and the basis for the analysis was a documental analysis performed in different types of indexes, described along the text.

2. INNOVATION

Innovation is a term pursued by many companies, knowledge-based organizations, or countries, under the premise that it will somehow bring competitive advantage for their existence. The Oslo Manual (OECD, 2018) defines it as a new or improved product or process, or even a combination of both, that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process). Innovation can be defined as the process of creating something new or significantly improving an existing product, service, process, or idea that creates value and meets a need in a unique and better way than what was previously available (Kogabayev, & Maziliauskas, 2017; Granstrand, & Holgersson, 2020; Baregheh, Rowley, & Sambrook, 2009). The term involves introducing new methods, approaches, or technologies that lead to better outcomes, increased efficiency, reduced costs, and improved customer experiences. It can be a disruptive force that transforms industries and creates new markets, or it can be an incremental improvement that makes existing products or services more useful or user-friendly (OECD, 2018). It is often driven by a desire to solve problems, improve quality of life, or generate new opportunities for growth and development. The term began to be used more frequently in literature in the late 19th and early 20th centuries. One of the earliest known uses of the term "innovation" in the modern sense can be traced back to the work of Schumpeter in his book *The Theory of Economic Development* (1911), where he introduced the concept of "creative destruction" to describe how innovation drives economic growth and development by destroying old ways of doing things and creating new opportunities for entrepreneurs and businesses (Schumpeter, 2017). Since then, the study of innovation has become a prominent topic in various fields, including business, economics, engineering, and technology. Currently, innovation is widely recognized as a key driver of progress and a critical factor in shaping the future of society and the economy. There are many authors who have contributed significantly to the study of innovation, and the list of important authors could vary depending on the specific field or perspective one is interested in. However, here are some of the most influential and widely recognized authors on innovation:

- Joseph Schumpeter: Austrian economist who introduced the concept of "creative destruction" to explain how innovation drives economic growth and development (Silvino, Joaquim, Souza, Santos, & Balbino, 2020).
- Clayton Christensen: Harvard Business School professor who coined the term "disruptive innovation" to describe the process by which new technologies and business models disrupt existing markets and industries (Christensen, Baumann, Ruggles, & Sadtler, 2006). *Disruptive innovation for social change*. Harvard business review, 84(12), 94..

- Nathan Rosenberg: an American economist, professor at the Stanford University, he was known for his research on the economic history of technology and innovation, as well as the role of institutions in promoting innovation, focusing on the importance of technological change as a driver of economic growth (Kline, & Rosenberg, 2010).
- Everett Rogers: Communication scholar who developed the diffusion of innovations theory, which explains how new ideas, products, and technologies spread through society (Rogers, Singhal, & Quinlan, 2014).
- Henry Chesbrough: Business professor who popularized the concept of "open innovation" to describe how companies can collaborate with external partners to generate and commercialize new ideas and technologies (Chesbrough, 2004).
- Eric von Hippel: MIT professor who pioneered the study of user innovation, which emphasizes the role of end-users in developing and improving products and services. (von Hippel, & Euchner, 2013).

These authors, among others, have made significant contributions to our understanding of innovation and its role in driving progress and growth in various fields. And, in the last decades, many tools to manage innovation have been proposed, as approached in Zammar, Kovaleski, Pagani, 2023). The innovation process is not simple, and requires investments and structure from the entity dedicated to it. These conditions are not always present in most of the smaller organizations or developing countries. Due to high investments required, sometimes a good way to seek innovation is transferring technology (Pagani, Zammar, Kovaleski, & Resende, 2016). Due to its relevance, measuring innovation has become strategic. The next section will present an index dedicated to this task.

2.1. GII

The Global Innovation Index (GII), in collaboration with other partners, is an annual report published by the World Intellectual Property Organization (WIPO) (Dutta, Lanvin, Wunsch-Vincent, & León, 2022). The report aims to provide a comprehensive assessment of the innovation capabilities and performance of countries around the world, based on a range of indicators and data sources. The GII considers a variety of factors that contribute to innovation, including investment in research and development (R&D), human capital and education, business environment and infrastructure, and the creation and use of intellectual property. The index uses a variety of metrics to evaluate these factors, such as patent applications, scientific publications, innovation output, and innovation efficiency. The report also includes case studies and analysis of innovation trends and best practices, as well as rankings of the top-performing countries and regions in terms of innovation (WIPO, 2022). Widely recognized as a leading benchmark for innovation performance, GII is used by governments, international organizations, and businesses around the world to guide policy and investment decisions. Therefore, GII aims to provide policymakers, business leaders, and other stakeholders with valuable insights into the innovation landscape and how countries can improve their innovation capabilities and competitiveness (Dutta, Lanvin, Wunsch-Vincent, & León, 2022).

2.2. The context of economic development in Latin America

Latin America is a region with a diverse range of countries and economies, each with its own unique history, culture, and economic development trajectory (Pagani, Kovaleski, & Resende, 2016). While some countries in the region, such as Chile, Uruguay, and Costa Rica, have experienced significant economic growth and development in recent years, others continue to struggle with high levels of poverty, inequality, and economic instability.

Overall, Latin America is characterized by a number of economic challenges, including high levels of inequality, political instability, corruption, and dependence on commodity exports. Many countries in the region also face significant infrastructure gaps, particularly in areas such as transportation, energy, and telecommunications, which can limit their ability to attract investment and promote economic growth (Pagani, Kovaleski, & Resende, 2016). In recent years, some countries in Latin America have taken steps to address these challenges and promote economic development (Jardon, & Pagani, 2016). For example, some countries have implemented economic reforms to attract foreign investment, reduce trade barriers, and promote competition. Others have invested in education and human capital development to improve the skills and productivity of their workforce. However, progress has been uneven, and many countries continue to face significant economic and social challenges. In order to achieve sustained and inclusive economic development, countries in Latin America will need to address the root causes of inequality, corruption, and political instability, and work to build more diversified, innovative, and competitive economies (Azam, 2022).

3. METHODOLOGY

The concepts and definitions of innovations makes a clear connection with economic growth and competitive advantage, either for organizations or countries. Therefore, when referring to the most innovative countries, it is of a general assumption that the most innovative countries are also the wealthier ones. In this sense, we can further infer that the most innovative countries are those with the best index in terms of human development, freedom, high levels of transparency, and other related aspects. Therefore, in an attempt to find connections between developed and developing countries and innovation level, we selected the top 20 most innovative countries from the GII to compare with Latin America, which is a group composed by developing countries. Thus, this work is majorly an exploratory research combined with a documental analysis. We used as the the main base the GII to select the top 20 most innovative countries, which can be identified in the figures shown in the results section. The countries from Latin American, which data were available at the GII, are also shown the same way. Among the factor we assum that are able to affect the innovation level of a country, we selected the following: Income Group Rank, Gross domestic spending on R&D, Human Development Index, Government expenditure on education, total (% of GDP), Human Freedom Index, and Transparency Level Perception Index. All of the sources for the data are properly referred in the next section. The results of crossing and comparing these indexes are shown in the sequence.

4. RESULTS

In terms of the GII, the top 20 innovative countries have a much higher score than Latin American countries. The average GII score of the top 20 innovative countries is 56.9, while the average score for Latin American countries is only 26.2. The innovation index scores for these countries range from 34 for Chile to 17.3 for Honduras. The highest scoring country in Latin America, Chile, has a GII score of 34, which is still significantly lower than the lowest scoring country in the top 20, Iceland, with a score of 49.5. This indicates a significant gap in innovation performance between these two regions. Subsequently, other indexes will be compared with the GII.

4.1. Innovation Index Score X Income Group Rank

The top 20 innovative countries in the world have an average score of 56.1, whereas Latin American countries have an average score of 27.2. When analyzing the GII ranking (Fig.1) for Latin American countries, we can see that they score lower than the top-ranked countries in the world, with Chile being the highest-ranked Latin American country at 50th place.

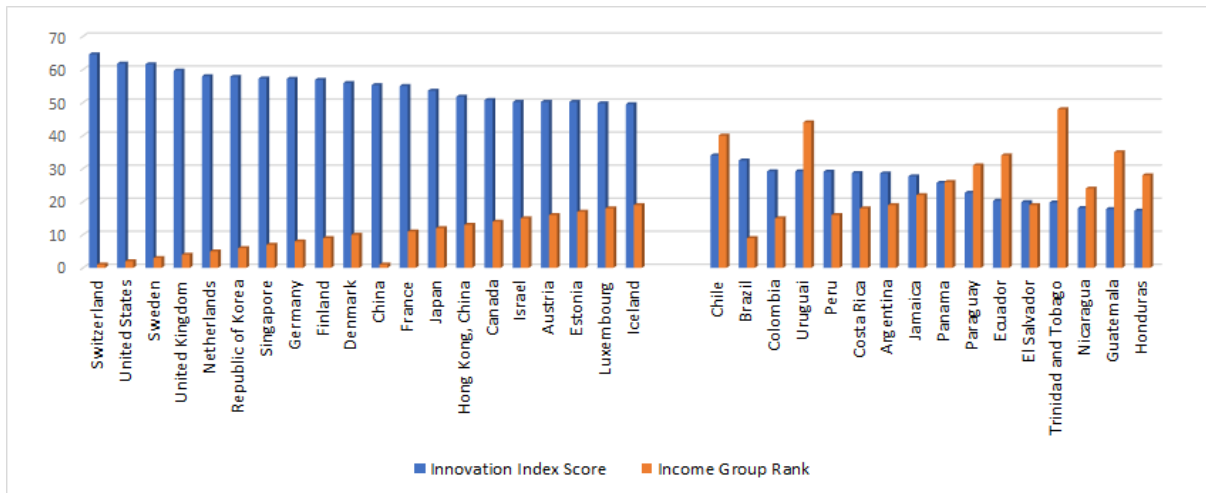


Figure 1: Innovation Index Score X Income Group Rank
(Source: Elaborated by the authors with data from WIPO (2022))

In terms of income group rank, we can see that Brazil is the only upper-middle-income country among the countries listed, with the rest being classified as either high-income or lower-middle-income countries. This suggests that income level is not necessarily a determining factor for innovation, as some lower-middle-income countries such as Uruguay and Costa Rica perform better than some high-income countries such as Argentina and Jamaica.

4.2. Innovation Index Score X Gross domestic spending on R&D

There seems to be a positive correlation between a country's Innovation Index Score and its Gross Domestic Spending on R&D (Fig.2). The top 20 most innovative countries show higher R&D spending as a percentage of their GDP, with most of them above 2%, and some even above 3%.

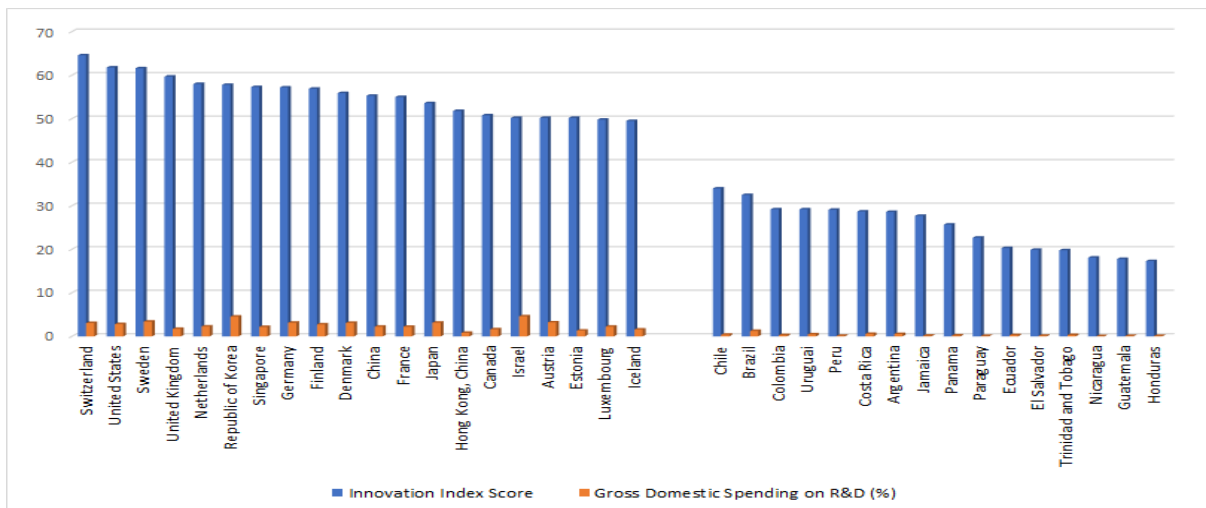


Figure 2: Innovation Index Score X Gross domestic spending on R&D
(Source: Elaborated by the authors with data from WIPO (2022) and OECD (2022))

On the other hand, the Latin American countries listed show much lower R&D spending, with most of them below 1%. This scenario indicates that investing in R&D is an important factor for fostering innovation and economic development. It also suggests that Latin American countries may need to increase their investment in R&D in order to improve their innovation capabilities and compete on a global level.

4.3. Innovation Index Score X Human Development Index

When comparing the top 20 innovative countries with Latin American ones, there are significant differences in terms of innovation and human development, as observed in Figure 3.

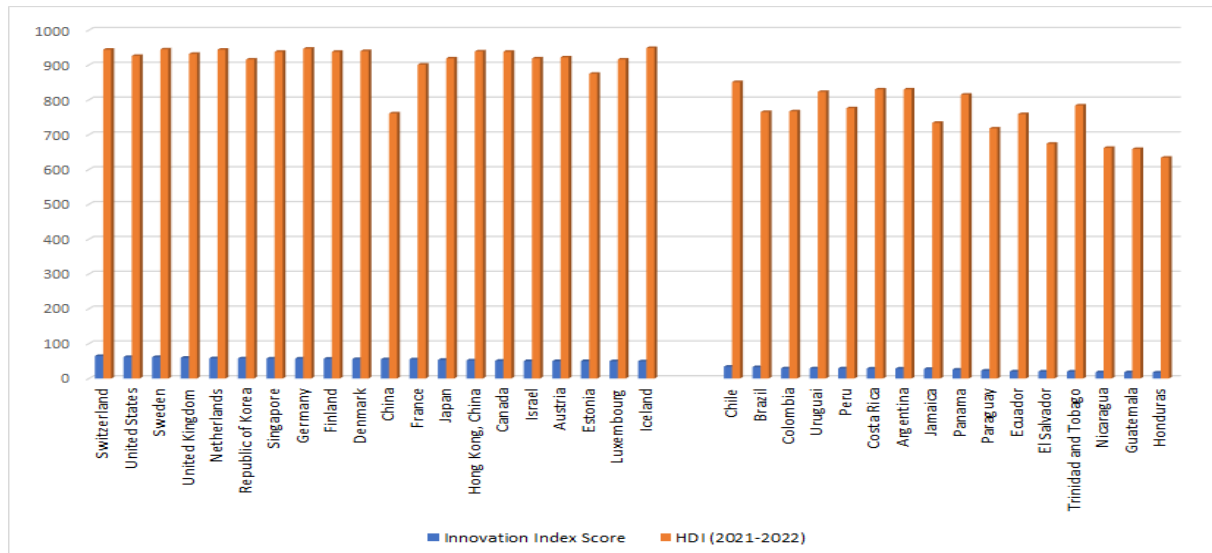


Figure 3: Innovation Index Score X Human Development Index
(Source: Elaborated by the authors with data from WIPO (2022) and HDR (2022))

The top 20 innovative countries, including Switzerland, the United States, and Sweden, have high scores on the GII and HDI, indicating strong innovative capabilities and high levels of human development. These countries also have high levels of investment in research and development, strong intellectual property protection, and a supportive environment for innovation. In contrast, Latin American countries such as Chile, Brazil, and Colombia have lower scores on both the GII and HDI, indicating weaker innovation capabilities and lower levels of human development. These countries face significant challenges in terms of investment in research and development, protection of intellectual property, and building a supportive environment for innovation. Overall, the differences between the top 20 innovative countries and Latin American countries highlight the importance of investing in innovation and creating an environment that supports the development of new ideas and technologies. This requires a concerted effort from governments, private sector organizations, and academic institutions to invest in research and development, promote entrepreneurship, and foster innovation ecosystems that can support the growth of new industries and technologies.

4.4. Innovation Index Score X Government expenditure on education

In terms of government expenditure on education, the top 20 innovative countries have an average of 5.1% of GDP spent on education, while Latin American countries have an average of 4.3% (Fig. 4). This suggests that while there is a difference in investment in education between the two regions, it is not as significant as the gap in innovation performance. However, it is important to note that there are individual countries within Latin America that are investing heavily in education and performing well in terms of innovation. For example, Costa Rica has a high government expenditure on education of 7.2% of GDP, and is ranked 68th in the GII. Meanwhile, countries such as El Salvador and Trinidad and Tobago have low scores on both measures, indicating that they could benefit from increased investment in education and innovation.

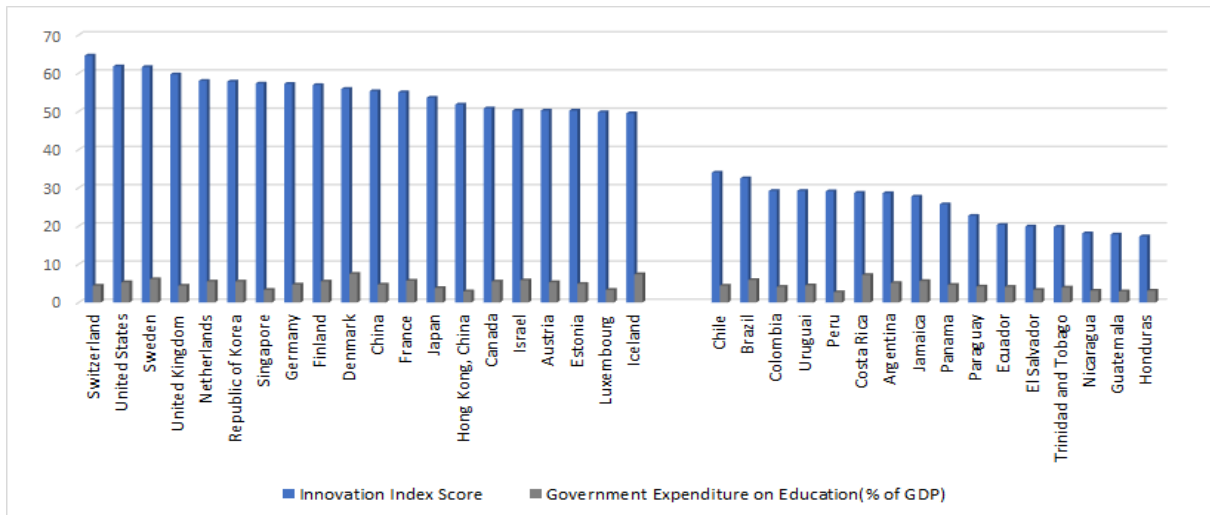


Figure 4: Innovation Index Score X Government expenditure on education
(Source: Elaborated by the authors with data from WIPO (2022) and The World Bank (2022))

Overall, the data suggests that while investment in education is important, it is not the sole factor determining innovation performance. Other factors, such as access to financing, a supportive regulatory environment, and a strong culture of entrepreneurship, may also play a significant role.

4.5. Innovation Index Score X Human Freedom Index

When comparing the top 20 innovative countries with Latin America in terms of the Global Innovation Index (GII) and the Human Freedom Index, we can observe that, in terms of the Human Freedom Index, the top 20 innovative countries have a higher score than Latin American countries on average, but the difference is not as significant (Fig. 5).

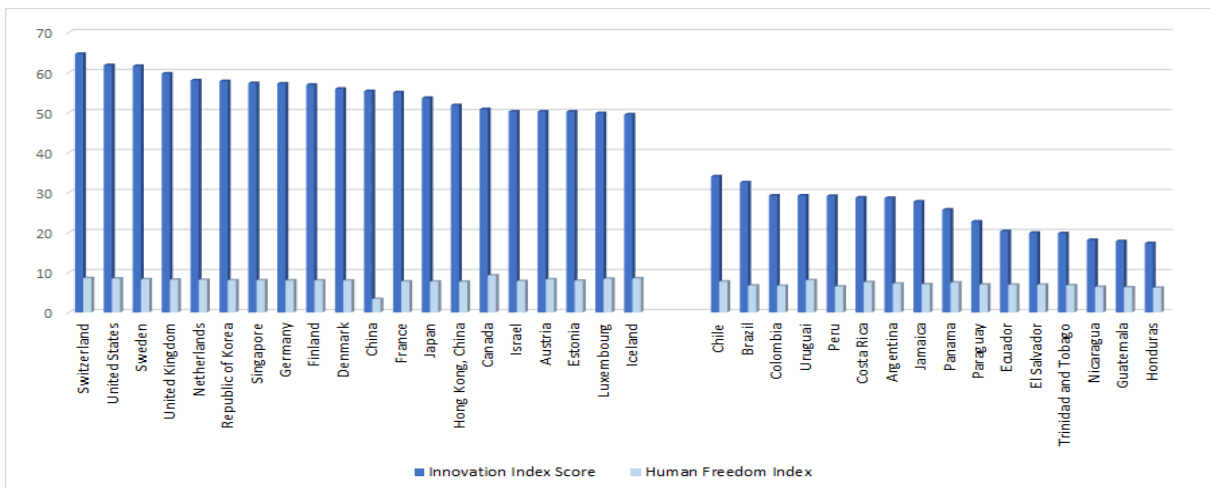


Figure 5: Innovation Index Score X Human Freedom Index
(Source: Elaborated by the authors with data from WIPO (2022) and World Population Review (2023))

The average Human Freedom Index score for the top 20 innovative countries is 8.04, while the average score for Latin American countries is 6.9. However, there are some Latin American countries such as Uruguay and Chile that have a relatively high score on the Human Freedom Index.

Overall, the top 20 innovative countries outperform Latin American countries in terms of innovation, despite they also tend to have higher scores on the Human Freedom Index. However, it is important to note that there are exceptions in both cases, and some Latin American countries have relatively high scores on both indices.

4.6 Innovation Index Score X Corruption Perception Index

The Global Innovation Index (GII) and the Corruption Perception Index (Transparency, 2022) are two different indicators that can provide insights into the overall development and progress of a country. As for the latter, it means that, the more transparent, the lower is the level of corruption. Thus, the lower is % in figure 5, the less corruption is perceived in the country.

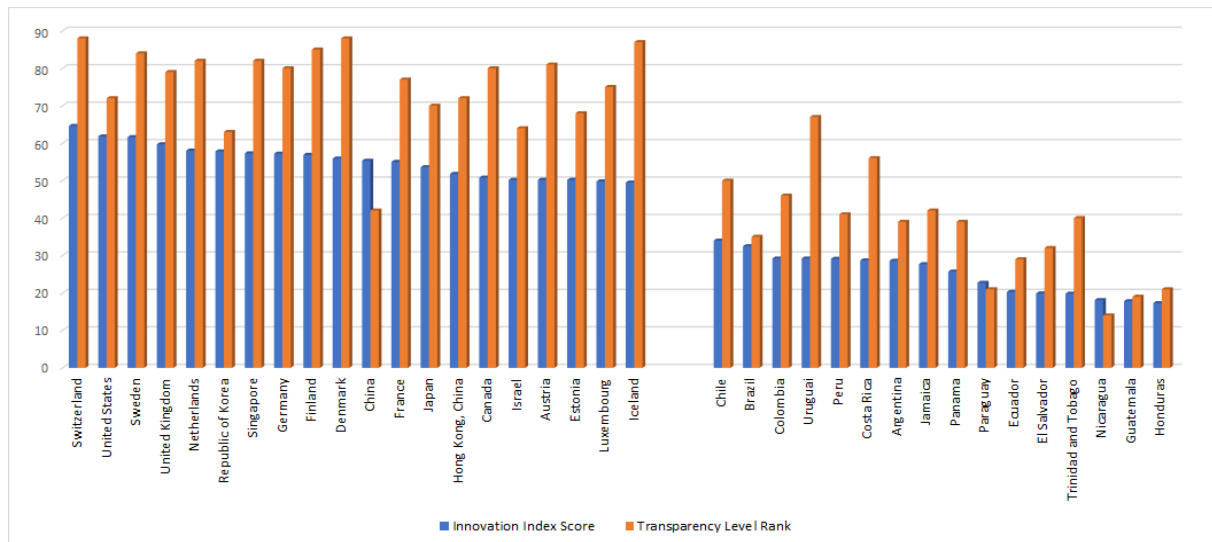


Figure 5: Innovation Index Score X Corruption Perception Index

(Source: Elaborated by the authors with data from WIPO (2022) and Transparency (2022))

As for the Comparing the top 20 innovative countries with Latin America in terms of GII and the level of transparency, we can observe that the top 20 innovative countries have significantly higher scores than Latin American countries. Switzerland, the top-ranked country, has a score of 64.6, while Chile, the highest-ranked Latin American country, has a score of only 34. In terms of the level of transparency, the top 20 innovative countries also generally rank higher than Latin American countries. However, there are some exceptions, such as China, which ranks 42nd in transparency but still ranks 11th in innovation. It is important to note that innovation and transparency are not necessarily causally linked, but there may be some correlations between the two. For instance, countries with high levels of transparency may be more conducive to innovation, as transparency can help foster a more open and accountable environment for research and development. Overall, the top 20 innovative countries tend to be wealthier, more developed, and more stable than Latin American countries. This suggests that innovation is closely linked to broader economic and social factors that can influence a country's overall development. Nevertheless, it is worth noting that innovation is a complex and multi-dimensional concept that is influenced by a wide range of factors, including education and human capital development, research and development investment, regulatory environment, and entrepreneurial culture, among others. Therefore, the performance of these countries on the GII is not necessarily indicative of their overall economic development or potential for growth, but rather provides insights into their innovation capabilities and potential for future innovation-driven growth.

5. CONCLUSION

The concept of innovation has been studied by numerous scholars and authors, once it is a critical factor in shaping the future of society and the economy, and it can transform industries and create new markets. The Global Innovation Index (GII) is a widely recognized benchmark for innovation performance, providing policymakers and business leaders with valuable insights into the innovation landscape and how countries can improve their innovation capabilities and competitiveness. This paper approached the innovation index, built by the GII, and compared it to other index and factors that may influence innovation in a country. More specifically, we compared the top 20 innovative countries with the countries in Latin America. The top 20 innovative countries are, most of them, developed countries, whereas Latin America figure among the developing ones. Latin America is a region with diverse economic challenges, and to achieve sustained and inclusive economic development, countries in the region need to address the root causes of inequality, corruption, and political instability while building more diversified, innovative, and competitive economies. The investigation of the context of innovation in Latin America over the last three years has shown that income level is not necessarily a determining factor for innovation. The analysis of income, gross domestic spending on R&D, government expenditure on education, human freedom index, and corruption perception index has revealed that investing in R&D and creating a supportive environment for innovation is crucial for fostering innovation and economic development. The comparison of Latin American countries with the top 20 most innovative countries in the world has highlighted significant differences in terms of innovation capabilities and human development. While investment in education is important, it is not the only factor determining innovation performance, as access to financing, a supportive regulatory environment, and a strong culture of entrepreneurship also play a significant role. Overall, the findings suggest that concerted efforts from governments, private sector organizations, and academic institutions are needed to invest in research and development, promote entrepreneurship, and foster innovation ecosystems to support the growth of new industries and technologies in Latin America. This major limitation of this work was the difficulty to condense such huge analysis in only a few pages, what makes it quite superficial. Therefore, for futures works, it is suggested to deepen the analysis and include a temporal approach, that could more accurately infer the results.

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LITERATURE:

1. Azam, M. (2022). *Governance and economic growth: evidence from 14 Latin America and Caribbean countries*. Journal of the Knowledge Economy, 13(2), 1470-1495.
2. Baregheh, A., Rowley, J., & Sambrook, S. (2009). *Towards a multidisciplinary definition of innovation*. Management decision, 47(8), 1323-1339.
- Chesbrough, H. (2004). *Managing open innovation*. Research-technology management, 47(1), 23-26.
3. Christensen, C. M., Baumann, H., Ruggles, R., & Sadtler, T. M. (2006). *Disruptive innovation for social change*. Harvard business review, 84(12), 94.
4. Dutta, S., Lanvin, B., Wunsch-Vincent, S., & León, L. R. (Eds.). (2022). *Global Innovation Index 2022:: What is the Future of Innovation-driven Growth?* (Vol. 2000). WIPO.
5. Granstrand, O., & Holgersson, M. (2020). *Innovation ecosystems: A conceptual review and a new definition*. Technovation, 90, 102098.

6. HDR. (2022). *Human Development Index* Retrieved 28.02.2023 from <https://hdr.undp.org/>
7. Jardon, C. M., & Pagani, R. N. (2016). *Is collective efficiency in subsistence clusters a growth strategy? The case of the wood industry in Oberá, Argentina*. *International Journal of Emerging Markets*, 11(2), 232-255.
8. Kline, S. J., & Rosenberg, N. (2010). *An overview of innovation*. *Studies on science and the innovation process: Selected works of Nathan Rosenberg*, 173-203.
9. Kogabayev, T., & Maziliauskas, A. (2017). *The definition and classification of innovation*. *HOLISTICA–Journal of Business and Public Administration*, 8(1), 59-72.
10. Pagani, R. N.; Kovaleski, J. L. ; Resende, L. M. (2016). *El contexto de la innovación social en Latinoamérica*. In: Carlos María Fdez-Jardón Fernández; Klaus Gierhake; María Susana Martos. (Org.). *Innovación Social y Conocimiento Local en Latinoamérica*. 1^a. ed.Vigo: Universidade de Vigo, v. I, p. 23-48.
11. Pagani, R. N., Zammar, G., Kovaleski, J. L., & Resende, L. M. (2016). *Technology transfer models: typology and a generic model*. *International Journal of Technology Transfer and Commercialisation*, 14(1), 20-41.
12. OECD/Eurostat. (2018). *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation*. 4th Edition, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris/Eurostat, Luxembourg, Retrieved 28.02.2023 from <https://doi.org/10.1787/9789264304604-en>.
13. OECD. (2023). *Gross domestic spending on R&D (indicator)*. Retrieved 28.02.2023 from doi: 10.1787/d8b068b4-en
14. Rogers, E. M., Singhal, A., & Quinlan, M. M. (2014). *Diffusion of innovations*. In *An integrated approach to communication theory and research* (pp. 432-448). Routledge.
15. Schumpeter, J. A. (2017). *The theory of economic development: An inquiry into profits, capita I, credit, interest, and the business cycle*. Routledge.
16. Silvino, Z. R., Joaquim, F. L., Souza, C. J. D., Santos, L. M. D., & Balbino, C. M. (2020). *Inovação tecnológica: perspectiva dialógica sob a ótica do Joseph Schumpeter*.
17. The World Bank. *Government expenditure on education, total (% of GDP)*. UNESCO Institute for Statistics (UIS). UIS.Stat Bulk Data Download Service. Retrieved 28.02.2023 from apiportal.uis.unesco.org/bdds.
18. Transparency. (2022). *Transparency Internacional, the global coalition against corruption*. The Corruption Perception Index. Retrieved 28.02.2023 from <https://www.transparency.org/en/cpi/2022>
19. von Hippel, E., & Euchner, J. (2013). *User innovation*. *Research-Technology Management*, 56(3), 15-20.
20. WIPO. *Global Innovation Index*. (2022). Retrieved 28.02.2023 from https://www.wipo.int/global_innovation_index/en/2022/
21. World Population Review. *Freedom Index by Country 2023*. Retrieved 28.02.2023 from <https://worldpopulationreview.com/country-rankings/freedom-index-by-country>
22. Zammar, A., Luiz Kovaleski, J., & Negri Pagani, R. (2023). *Innovation management tools: A comprehensive literature approach of the last three decades*. *Management Review Quarterly*, 1-25.

ASSESSMENT OF THE PERFORMANCE OF THE MANUFACTURING INDUSTRY IN LATVIA

Inta Kotane

*Faculty of Economics and Management, Rezekne Academy of Technologies, Latvia
Inta.Kotane@rta.lv*

Iveta Mietule

*Faculty of Economics and Management, Rezekne Academy of Technologies, Latvia
Iveta.Mietule@rta.lv*

ABSTRACT

Nowadays, the overall economic situation and the performance of enterprises in Latvia are significantly affected by the global and European economic environments, economic globalization and permanent changes in the external environment. Small and medium enterprises (SMEs) are one of the most active drivers of change in the economy of Latvia, and it is SMEs that are the most vulnerable to the permanent changes in the external environment. Under intensifying market competition, it is vitally important to be able to respond to market changes in time; therefore, SMEs seek opportunities to minimize potential losses and pay increasing attention to their performance assessments. Previous research studies have confirmed that the manufacturing industry indicates the overall state of the economy with sufficient precision; therefore, the success or failure of the manufacturing industry indicates the processes that are going to occur in the entire economy in the future. In Latvia, manufacturing SMEs make up the largest proportion of market sector economically active statistical units, and the value added of manufacturing SMEs accounts for the largest proportion in the total value added of the manufacturing industry. The present research aims to examine the main legal and policy documents governing the manufacturing industry in Latvia and assess factors in the performance and development of the manufacturing industry and manufacturing SMEs in Latvia. To examine the performance of the manufacturing industry, the authors used the laws and regulations of the European Union (EU) and Latvia, research studies by foreign scientists and data from the Official Statistics Portal of Latvia.

Keywords: *assessment, manufacturing industry, productivity, small and medium enterprises*

1. INTRODUCTION

Manufacturing is the broadest industry of the national economy, producing finished products from raw materials and other inputs. Industrial production usually involves a globally wide network that uses domestic and global (material and energy) resources to manufacture products that are applicable and utilizable in various geographic locations (Duflou et al., 2012; Chandran et al., 2015). Economic analysts usually focus on the manufacturing industry because previous research studies have confirmed that the manufacturing industry indicates the overall state of the economy with sufficient precision; therefore, the success or failure of the manufacturing industry indicates the processes that are going to occur in the entire economy in the future (Kasjanovs, 2015; Dametew, Ebinger, 2017). Economic growth in any country is a process of cyclic fluctuations caused by various dynamic conditions in the country and the world (Jasti, Kodali, 2016). Today manufacturing enterprises operate in an increasingly complex environment influenced by the scarcity of natural resources, legal regulation and an increasing consumer demand for sustainable products (Haapala et al., 2013), complex global challenges, e.g. increasing competition, changing commodity prices, increasing customer expectations and unstable economic conditions (Alomar, Pasek, 2015). M. Khalfallah and L. Lakhali (2021) have emphasized that increasing globalization, an uncertain business environment, rapid

technological progress and competitive pressures force manufacturers to adopt various practices and measures to enhance production processes, operations and supply chains. M. Alomar and Z. J. Pasek (2015) have found that competitive pressures encourage manufacturing enterprises to constantly revise and adapt their competitive strategies, supply chains and technologies to increase performance and compete and survive in the long term. Manufacturing SMEs have been the key driver of industrial economic growth worldwide in several aspects, including innovation, output and employment (Memili et al., 2015; Bigliardi, 2013). In 2020, according to the Official Statistics Portal (2022a), there were 10944 SMEs in Latvia, which accounted for 99.48% of the total number of market sector economically active enterprises in the manufacturing industry. In 2020, the value added generated by manufacturing SMEs in Latvia made up 60.81% of the total value added of the manufacturing industry (Official Statistics Portal, 2022c). The authors concluded that in Latvia, manufacturing SMEs made up the largest share of economically active enterprises in the market sector, and the value added of manufacturing SMEs accounted for the largest share in the total value added of the manufacturing industry.

2. LEGAL REGULATION OF THE MANUFACTURING INDUSTRY IN LATVIA

The Conception of the National Strategy for Manufacturing developed by the Ministry of Economics of the Republic of Latvia in 1995 (Latvijas Vēstnesis, 1995) set evaluation criteria for priority industries: 1) intellectual potential; 2) energy intensity; 3) material intensity; 4) use of domestic material resources; 5) possibility to sell the product in the market; 6) ecology; 7) possibility to quickly create or retain jobs without making large capital investments; 8) infrastructure development. The Memorandum on the Development of Manufacturing in Latvia, aiming to transform manufacturing to higher value added within three years (Ministry of Economics of the Republic of Latvia, 2018), included a national commitment to implement a set of measures to support manufacturing and increase the competitiveness of domestic manufacturing enterprises, including promoting labour availability, developing innovations and providing competitive energy prices. Manufacturing enterprises undertook to make significant investments in increasing productivity, as well as in research and development (innovations) over the next three years, thereby increasing export volumes and qualifications of their employees. Since 1999, an annual Action Plan for Business Environment Improvement has been developed and approved by the Cabinet, which provides for improvement in business legislation and services provided by national administrative institutions, thereby creating a competitive national business environment also on a global scale. On 22 May 2019, the Cabinet approved the Plan of Measures for Business Environment Improvement for 2019-2022 developed by the Ministry of Economics of the Republic of Latvia (On the Plan..., 2019), which aimed to create an attractive business environment: accessible and easy-to-understand services, a lower administrative burden. The goal of EU industrial policies is to increase the competitiveness of European manufacturing so that it could maintain its essential role in fostering sustainable growth and employment in Europe. Digital transformation and the transition to a carbon-neutral economy have contributed to the development of various strategies to create a better framework for EU manufacturing. The impacts of the Covid-19 pandemic have caused new reflections on economic recovery, renewal and resilience (European Parliament, 2021). The main goals and priorities of manufacturing, innovation and research and development (R&D) in Latvia until 2027 are specified in several policy documents: the National Development Plan of Latvia for 2021-2027 (Cross-Sectoral Coordination Centre, 2020), the Guidelines for the National Industrial Policy for 2021-2027 (Ministry of Economics of the Republic of Latvia, 2020a) and the Guidelines for the Development of Science, Technology and Innovation for 2021-2027 (Ministry of Education and Science of the Republic of Latvia, 2020).

The goals of sustainable development are balanced through three dimensions: economic, social and environmental. Two goals of the economic dimension of the UN Sustainable Development Goals and the individual sub-goals aim at the sustainable development of the manufacturing industry based on the policy documents for the manufacturing industry and the performance targets set therein (Table 1).

Sustainable development goals	Sustainable development sub-goals to be achieved	Policy document	Targets
Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Achieving higher levels of economic productivity through diversification, technological upgrading and innovation, including a focus on high value-added and labour-intensive industries	Guidelines for the National Industrial Policy for 2021-2027	1) Number of innovative enterprises (% of the total number of enterprises) 2) Place in the Digital Economy and Society (DESI) index: the subcategory integration of digital technologies. 3) Productivity, in current prices, % of the EU average.
	Promoting development-oriented policies that support production activities, the creation of decent jobs, entrepreneurship, creativity and innovation, and would facilitate the creation and growth of micro-enterprises and SMEs, inter alia by providing access to financial services		
Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Promoting inclusive and sustainable industrialization and increasing the share of employed population and gross domestic product in the manufacturing industry	Guidelines for the National Industrial Policy for 2021-2027	1) Share of exports in GDP (in current prices). 2) Share of enterprises engaged in export activities
	Increasing the access of small manufacturing and other enterprises to financial services and the integration of such enterprises into value-added chains and markets		The extent of market imperfections in the field of lending and guarantees has been eliminated
	Modernizing manufacturing industries to become more sustainable by increasing the efficiency of resource use and wider use of clean and environment-friendly technologies and industrial processes	National Development Plan of Latvia for 2021-2027	-
	Improving scientific research, enhancing the technological capabilities of manufacturing industries, promoting innovation and significantly increasing the number of people employed in the field of research and development per million people and public and private spending on research and development	Guidelines for the Development of Science, Technology and Innovation for 2021-2027	1) Share of funding for research and development, % of GDP; 2) Latvia's place in the European Innovation Index (EIS).

Table 1: Connection of the United Nations Sustainable Development Goals and their sub-goals with policy documents for the sustainable development of the manufacturing industry in Latvia, 2021-2022

(Source: authors' own compilation based on Cross-Sectoral Coordination Centre, 2022)

The authors have concluded that the goals of the economic dimension of the UN Sustainable Development Goals and the individual sub-goals contribute to the sustainable development of the manufacturing industry based on the policy documents for the manufacturing industry and the performance targets set therein, and the information summarized in Table 3.1 indicates the growing role of innovation and research in the development of the manufacturing industry in Latvia. On 10 March 2020, the European Commission presented an EU industrial strategy (European Commission, 2020). One of the objectives of the action line “Productivity, innovation and exports” set in the National Development Plan of Latvia for 2021-2027 envisages promoting digital transformation (digitalization, automation, robotization, artificial intelligence etc.) in business, incl. in manufacturing. Performance indicators: nominal labour productivity per working hour, as well as knowledge and technology outputs (Cross-Sectoral Coordination Centre, 2020). The aim of the research Prospects for the Manufacturing Sector by Industry, the Expected Restructuring until 2020 (Jeļisejevs et al., 2007) was to project the development of the manufacturing industry, as well as problems and potential improvements in the manufacturing industry in Latvia until 2020. The research made conclusions and developed recommendations for shaping the national industrial policy. The conclusions and main recommendations are presented in Table 2.

No	Conclusion	Recommendation
1.	In Latvia, industrial enterprises and associations lack resources for long-term development planning	The Ministry of Economics of the Republic of Latvia should take the role of initiator in the creation of a vision for the long-term development of manufacturing industries in Latvia
2.	Most of the industry of Latvia consists of traditional industries (food production, woodworking), not industries with a high level of technological development (chemistry, electronics)	It is important to respect the principles of equality and not to prioritize specific industries but to support the development of each manufacturing industry towards higher value added
3.	In Latvia, manufacturing enterprises are fragmented in terms of market and technology	Public support should be directed to horizontal priorities (such as market research, training, exhibitions, technology research and consultancy) that is used by enterprises to merge, establish joint ventures or cooperatives
4.	Until 2020, capital retained its role as the most important factor of industrial development	Industrial policies should be aimed at improving the investment environment by reducing investor risks and improving infrastructure (roads, industrial connections) and investment promotion measures (tax relief, subsidies for the purchase of new technologies).
5.	A significant long-term problem is the economic policy separated from the education/science policy	For the structural funding programming period, the Ministry of Economics and the Ministry of Education and Science of the Republic of Latvia need to set common priorities in the field of research commercialization, as well as establish cooperation at operational level

Table 2: Assessment of the implementation of recommendations for making industrial policies in Latvia, 2022

(Source: authors' own compilation based on Jeļisejevs et al., 2007)

The authors believe that the 1st recommendation for the national industrial policy is being implemented, which was confirmed by an annual Plan of Measures for Business Environment Improvement and the development of the Guidelines for the National Industrial Policy designed by the Ministry of Economics of the Republic of Latvia. In Latvia, no priority industries have been set at the national policy level. The authors have concluded that the 2nd recommendation for the national industrial policy is being implemented as well. However, Baltic International Bank (BIB, 2018) research data indicated that 27% surveyed residents in Latvia believed that the country should set priority industries. The government should concentrate its limited resources for development in the areas of knowledge in which entrepreneurs have the highest potential to develop knowledge- and technology-intensive and exportable products and services, including developing the manufacturing industry and promoting the spread of high-technologies in traditional industries because the manufacturing industry in Latvia is characterized by mostly low-tech enterprises (Cross-Sectoral Coordination Centre, 2020). In the opinion of the authors, the implementation of the following recommendations (3, 4 and 5) pertains to the operational programme Growth and Employment implemented in the 2014-2020 EU programming period. The authors have concluded that in Latvia manufacturing enterprises need to comply with the UN Sustainable Development Goals and the requirements of EU legal documents, incl. EU industrial policy principles, national policy documents and EU support programmes.

3. FACTORS IN THE performance OF THE MANUFACTURING INDUSTRY

The manufacturing industry plays an important role in fostering economic growth in Latvia. According to the Official Statistics Portal (2022b), the manufacturing industry accounted for 12.2% of the total value added in 2019 and for 14.3% in 2022. A target set in the National Development Plan of Latvia for 2014-2020 (Cross-Sectoral Coordination Centre, 2012) envisaged that investment in the manufacturing industry as a percentage of gross domestic product (GDP) should be 20% in 2020. The authors believe that the target of 20% was not achieved because the production of high value-added products by manufacturing enterprises that would be competitive in export markets was not sufficiently developed. Labour productivity in the manufacturing industry is the most important criterion that determines the international competitiveness of the industry. By increasing the amount of investment in equipment and training in the manufacturing industry, it is possible to significantly increase the productivity of the employees, as well as increase the competitiveness of the products without affecting the other factors of production (Cross-Sectoral Coordination Centre, 2012). In 2020 compared with 2010 in Latvia, labour productivity growth in the manufacturing industry was reported at 73.90%, and 52.78% for manufacturing SMEs (Official Statistics Portal, 2022c). The achievement of the target set in the National Development Plan of Latvia for 2014-2020 (Cross-Sectoral Coordination Centre, 2012) for 2012, which envisaged that productivity in the manufacturing industry (value added in 2000 constant prices in LVL per employee) would be LVL 11110 in 2020, is impossible to verify because both the national currency, in which productivity was calculated, as well as the base year of constant prices have changed. The Operational Strategy designed by the Ministry of Economics of the Republic of Latvia 2020-2022 (Ministry of Economics of the Republic of Latvia, 2020b), based on 2018 data, set a productivity target of EUR 26284 (value added in constant prices, EUR per employee, in 2015 prices) to be achieved in the manufacturing industry in 2020. The target set for 2020 has been achieved to an extent of 94.52% by manufacturing enterprises and only to an extent of 75.33% by manufacturing SMEs (Official Statistics Portal, 2022c). The level of productivity in the manufacturing industry was lower than the average in the national economy, and it accounted for 82.73% of GDP per employee in 2020 (Official Statistics Portal, 2022f).

The experience of several countries indicates that the manufacturing industry plays an important role in increasing overall labour productivity. This is mainly explained by the potentially higher innovation capacity of the industry. Manufacturing is an industry oriented towards foreign markets and has a higher degree of integration in global value chains. The low level of productivity in the national economy is largely determined by the extremely low productivity in the manufacturing industry (Productivity Research Institute..., 2020). The authors have concluded that the development of the manufacturing industry is determined by its innovation capacity, incl. the share of high-tech segments in the manufacturing industry. In 2020 compared with 2010, the share of high-tech (technology-intensive) segments in the manufacturing industry, increased by 3.27 percentage points, while the share of medium-tech segments increased by 0.77 percentage points (Official Statistics Portal, 2022i). The authors believe that the low shares of high- (on average 8.00% in 2010-2020) and medium-tech (on average 12.88% in 2010-2020) segments in the manufacturing industry and the relatively small increase in the shares in the period analysed explains the relatively low productivity level not only in the manufacturing industry but also in the entire national economy of Latvia. An analysis of data on the productivity of manufacturing enterprises by technological intensity (Official Statistics Portal, 2022i) revealed that the productivity level in the high-tech segments was significantly higher than that in the low-tech segments of the manufacturing industry. The authors' calculations showed that, for example, in 2020, labour productivity in medium-tech segments made up 48.6% of the productivity level in high-tech segments, while in medium-low-tech and low-tech segments it was 43.88 and 40.49%, respectively. The Cobb-Douglas model, which is one of the most frequently used models for identifying the influence of factors on economic growth, is used for assessing the situation in the manufacturing industry. Accordingly, the standard Cobb-Douglas production function is determined by the following mathematical relationship (Jelisejevs et al., 2007) (equation 1):

$$Y_t = A_t F(K_t, L_t) \quad (1)$$

where

- Y_t – output or value added in time period t, EUR;
- $A_t F$ – multifactor productivity index in time period t;
- K_t – investment in equity or fixed assets in time period t, EUR;
- L_t – labour input in time period t, hours.

The Cobb-Douglas model is based on an assumption that output is affected by the main factors of production, which are labour and fixed assets or capital, as well as multifactor productivity, or the efficiency of the factors of production. Multifactor productivity considers changes in the quality of technology and the efficiency of the use, the efficiency of factor management, as well as other factors. An additional model uses indexes or changes in shares. In similar research studies in EU Member States and Latvia, it has been established that the average share of income generated by fixed assets was 35%, while the share of income generated by labour was 65% (Roeger, 2006). Based on the changes in indicators of the Cobb-Douglas model in percentage terms, the authors constructed Figure 1 to show the number of hours worked by manufacturing enterprise employees in Latvia, the share of fixed assets in value added and the effect of multifactor productivity on the value added of manufacturing enterprises in Latvia in 2011-2020. The results obtained showed that the performance of manufacturing enterprises has been most significantly affected by multifactor productivity, which on average accounted for 49.10% of the total performance of the manufacturing industry in the period from 2011 to 2020.

Changes in the number of hours worked by employees accounted for on average 11.50% of the total performance of manufacturing enterprises, and the effect of changes in the share of fixed assets in value added on the performance of manufacturing enterprises was negative and on average accounted for 25.27% of the total change in value added generated by manufacturing enterprises.

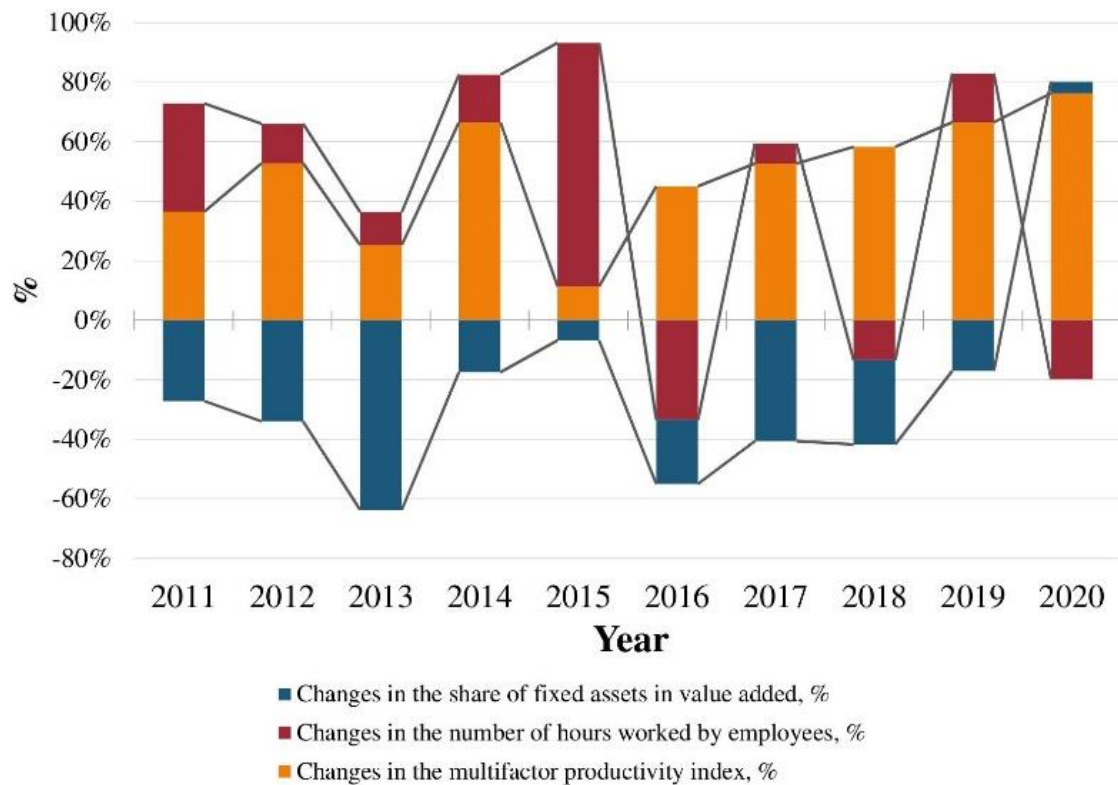


Figure 1: Effects of the factors "Share of fixed assets in value added", "Number of hours worked by employees", "Multifactor productivity index" on the performance of manufacturing enterprises in Latvia in 2011.–2020, %.

(Source: authors' calculations based on Official Statistics Portal, 2022e; 2022h)

An analysis of the number of hours worked by employees, the share of fixed assets in value added and the effect of multifactor productivity on the performance of SMEs in the manufacturing industry in 2011-2020 (Figure 2) revealed that the performance of SMEs in the manufacturing industry was most significantly affected by multifactor productivity, which, on average, accounted for 36.70% of the total performance of SMEs in the manufacturing industry in the period from 2011 to 2020.

Figure following on the next page

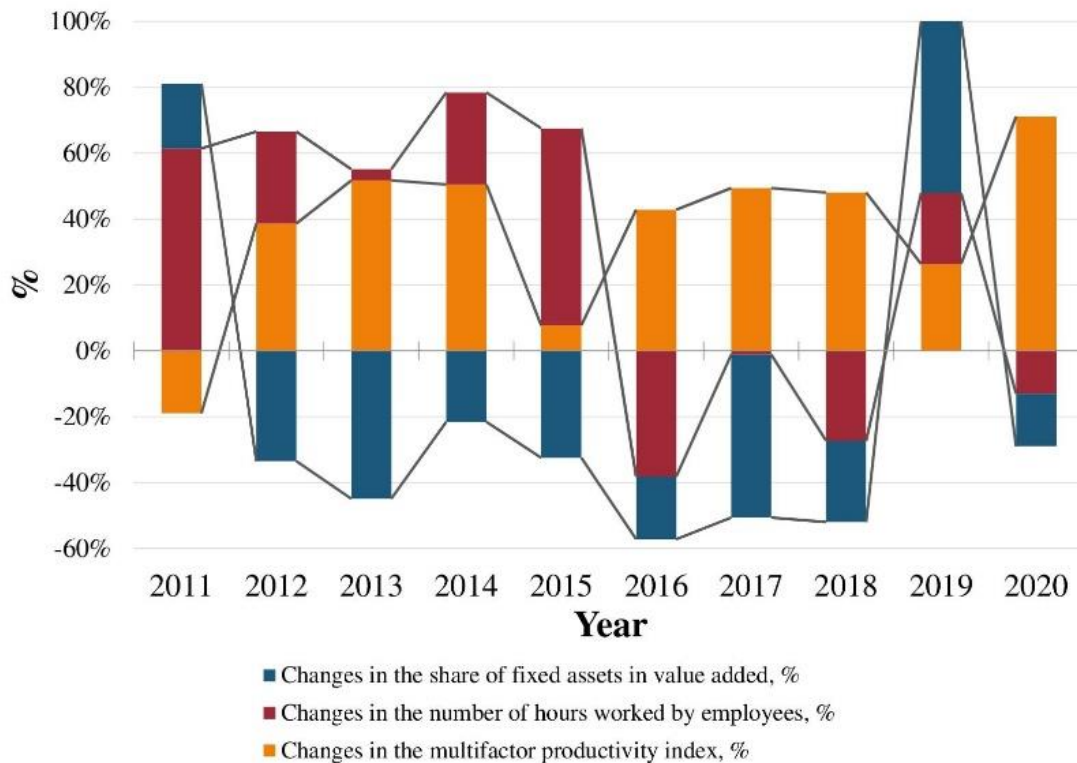


Figure 2: Effects of the factors "Share of fixed assets in value added", "Number of hours worked by employees", "Multifactor productivity index" on the performance of manufacturing SMEs in Latvia, 2011–2020, %.

(Source: authors' calculations based on Official Statistics Portal, 2022c; 2022g)

Changes in the number of hours worked by employees accounted for on average 12.24% of the total performance of SMEs in the manufacturing industry, and changes in the share of fixed assets in value added had a negative effect on the performance of SMEs in the manufacturing industry and accounted for on average 6.98% of the total change in the value added of the manufacturing industry. The Productivity Report for Latvia (Productivity Research Institute..., 2020) examined the possibility of granting public support to increase labour productivity in enterprises. Criteria were set for granting public support to an enterprise, and one of them limited the granting of support to micro-enterprises. In 2020, according to the Official Statistics Portal (Official Statistics Portal, 2022a), there were 10944 SMEs, which accounted for 99.48% of the total number of economically active manufacturing enterprises in the market sector, and micro-enterprises accounted for 83.56% of the total. The authors believe that when deciding to grant public support to manufacturing enterprises, it is also necessary to consider a possibility for manufacturing micro-enterprises to receive public support for increasing their labour productivity. For this reason, it is necessary to incorporate additional criteria for the evaluation of a manufacturing micro-enterprise into the eligibility criteria for granting public support, for example, growth in the respective segment of the manufacturing industry, as well as investments by the manufacturing micro-enterprise in modernization and innovation need to be considered as well.

4. CONCLUSION

Manufacturing SMEs could be viewed as key contributors to industrial economic growth worldwide in several aspects, including innovation, output and employment. In Latvia, manufacturing enterprises need to comply with the UN Sustainable Development Goals and the requirements of EU legal documents, incl.

EU industrial policy principles, national policy documents and EU support programmes. The manufacturing industry plays an important role in fostering economic growth in Latvia. The international competitiveness of the manufacturing industry is determined by labour productivity, which is affected by the degree of technological intensity or innovation capacity in the manufacturing industry, incl. the share of high-tech segments in the manufacturing industry. The assessment of the situation in the manufacturing industry based on the Cobb-Douglas model for identifying the effects of factors on economic growth revealed that in the period 2011-2020, the performance of manufacturing enterprises improved and was affected by multifactor productivity, which, on average, accounted for 49.10% of the total performance of the manufacturing industry and 36.70% of the total change in the performance of manufacturing SMEs. The effects of multifactor productivity (changes in the quality of technologies and the efficiency of the use, the efficiency of factor management etc. factors) on changes in value added generated by the manufacturing industry revealed that the production process has become more efficient.

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LITERATURE:

1. Alomar, M., Pasek, Z.J. (2015). A Performance Improvement and Management Model for Small and Medium Sized Enterprises. In: Pinson E., Valente F., Vitoriano B. (eds) *Operations Research and Enterprise Systems. ICORES 2014. Communications in Computer and Information Science*, 509, Springer, Cham. https://doi.org/10.1007/978-3-319-17509-6_6
2. BIB (2018). *Latvijas barometris. Tautsaimniecība. Nr.110*. Retrieved 25.03.2023 from <https://www.bib.eu/uploads/2017/02/Baltic-International-Bank-Latvijas-barometrs-tautsaimnieciba-01.2018.pdf>
3. Bigliardi, B. (2013). The effect of innovation on financial performance: A research study involving SMEs. *Innovation*, 15(2), 245.-255, <https://doi.org/10.5172/impp.2013.15.2.245>
4. Chandran, K.M., Mani, M., Chakrabarti, A. (2015). A Spatio-Temporal Network Representation for Manufacturing. In: Chakrabarti, A. (eds) *ICoRD'15 – Research into Design Across Boundaries*, 2(5), 459.-470. https://doi.org/10.1007/978-81-322-2229-3_39
5. Cross-Sectoral Coordination Centre (2012). *National Development Plan of Latvia for 2014–2020*. Retrieved 25.03.2023 from https://pkc.gov.lv/sites/default/files/inline-files/NDP_2020%20English%20Final_.pdf
6. Cross-sectoral Coordination Centre (2020). *National development plan of Latvia for 2021-2027*. Retrieved 25.03.2023 from https://pkc.gov.lv/sites/default/files/inline-files/nap2027__eng_2.pdf
7. Cross-Sectoral Coordination Centre (2022). *Ilgspējīgas attīstības mērķu kartējums*. Retrieved 25.03.2023 from <https://pkc.gov.lv/lv/attistibas-planosana-latvija/ano-ilgtspejigas-attistibas-merki/iam-kartejums>
8. Dametew, A.W., Ebinger, F. (2017). Performance Analysis of Manufacturing Industries for System Improvement. *Industrial Engineering and Management*, 6, 1.-9. doi:10.4172/2169-0316.1000228
9. Dufloy, J. R., Sutherland, J. W., Dornfeld, D., Herrmann, C., Jeswiet, J., Kara, S., et al. (2012). Towards energy and resource efficient manufacturing: a processes and systems approach. *CIRP Annals*, 61(2), 587.-609. <https://doi.org/10.1016/j.cirp.2012.05.002>

10. 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 A New Industrial Strategy for Europe*. Retrieved 25.03.2023 from <https://eur-lex.europa.eu/legal-content/LV/TXT/?qid=1593086905382&uri=CELEX%3A52020DC0102>
11. European Parliament (2021). *General principles of EU industrial policy*. Retrieved 25.03.2023 from <https://www.europarl.europa.eu/factsheets/en/sheet/61/es-rupniecibas-politikas-visparigie-principi>
12. Haapala, K. R., Zhao, F., Camelio, J., Sutherland, J. W., Skerlos, S. J., Dornfeld, D. A., Jawahir, I. S., Clarens, A. F., Rickli, J. L. (2013). A Review of Engineering Research in Sustainable Manufacturing." *ASME. Journal of Manufacturing Science & Engineering*, 135(4): 041013. <https://doi.org/10.1115/1.4024040>
13. Jasti, N.V.K., Kodali, R. (2016). An empirical study for implementation of lean principles in Indian manufacturing industry. *Benchmarking: An International Journal*, 23(1), 183.- 207. <https://doi.org/10.1108/BIJ-11-2013-0101>
14. Jeļisejevs, D., Mūriņš, S., Uzulēna, E., Knaidele, N. (2007). *Apstrādes rūpniecības perspektīvas nozaru griezumā, prognozējamā nozaru restrukturizācija līdz 2020. gadam*. Gala ziņojums. Retrieved 25.03.2023 from <http://petijumi.mk.gov.lv/node/1852>
15. Kasjanovs, I. (2015). *Apstrādes rūpniecības perspektīvas nozaru griezumā, prognozējamā nozaru restrukturizācija līdz 2020. gadam*. Gala ziņojums. Retrieved 25.03.2023 from <https://www.makroekonomika.lv/latvijas-apstrades-rupnieciba-skersgriezuma>
16. Khalfallah, M., Lakhal, L. (2021). The impact of lean manufacturing practices on operational and financial performance: the mediating role of agile manufacturing. *International Journal of Quality & Reliability Management*, 38(1), 147.-168. <https://doi.org/10.1108/IJQRM-07-2019-0244>
17. Latvijas Vēstnesis (1995). *Koncepcija valsts stratēģijai rūpniecībā (1995)*. 1995.gada 27.janvāra redakcija. Retrieved 25.03.2023 from <https://www.vestnesis.lv/ta/id/26828>
18. Memili, E., Fang, H., Chrisman, J.J., De Massis, A. (2015). The impact of small-and medium-sized family firms on economic growth. *Small Business Economics*, 45(4), 771.- 785. <https://doi.org/10.1007/s11187-015-9670-0>
19. Ministry of Economics of the Republic of Latvia (2018). *Rūpniecības pieaugums par 30% - Memoranda par Latvijas rūpniecības attīstību mērķis..* Retrieved 25.03.2023 from <https://www.em.gov.lv/lv/rupniecibas-pieaugums-par-30-memoranda-par-latvijas-rupniecibas-attistibu-merkis>
20. Ministry of Economics of the Republic of Latvia (2020a). *Nacionālās industriālās politikas pamatnostādnes 2021-2027*. Retrieved 25.03.2023 from <https://www.em.gov.lv/lv/industrial-politika>
21. Ministry of Economics of the Republic of Latvia (2020b). *Ekonomikas ministrijas darbības stratēģija 2020.-2022.gadam*. Retrieved 25.03.2023 from <https://www.em.gov.lv/lv/darbibas-strategija>
22. Ministry of Education and Science of the Republic of Latvia (2020). *Zinātnes, tehnoloģijas attīstības un inovācijas pamatnostādnes 2021. – 2027. gadam*. Retrieved 25.03.2023 from <https://www.izm.gov.lv/lv/media/11501/download>
23. Official Statistics Portal (2022a). *Economically active enterprises of market sector in regions, cities and municipalities by size group according to the number of employees and main economic activity*. (NACE Rev. 2). Retrieved 25.03.2023 from https://data.stat.gov.lv/pxweb/en/OSP_PUB/START__ENT__UZ__UZS/UZS030/
24. Official Statistics Portal (2022b). *Gross value added by kind of activity 1995 – 2021*. Retrieved 25.03.2023 from https://data.stat.gov.lv/pxweb/en/OSP_PUB/START__VEK__IK__IKP/IKP060/

25. Official Statistics Portal (2022c). *Key entrepreneurship indicators of enterprises by number of employees 2005 – 2020*. Retrieved 25.03.2023 from https://data.stat.gov.lv/pxweb/en/OSP_PUB/START__ENT__UF__UFR/UFR020/
26. Official Statistics Portal (2022e). *Entrepreneurship indicators of enterprises 2005 – 2020*. Retrieved 25.03.2023 from https://data.stat.gov.lv/pxweb/en/OSP_PUB/START__ENT__UF__UFR/UFR010
27. Official Statistics Portal (2022f). *Total gross domestic product, per capita and per person employed 1995 – 2021*. Retrieved 25.3.2023 from https://data.stat.gov.lv/pxweb/en/OSP_PUB/START__VEK__IK__IKP/IKP010/
28. Official Statistics Portal (2022g). *SME data*. Unpublished materials.
29. Official Statistics Portal (2022h). *Assets and liabilities of merchants by kind of activity at the end of year (NACE Rev.2), (million euro) 2006 – 2020*. Retrieved 25.03.2023 from https://data.stat.gov.lv/pxweb/en/OSP_PUB/START__ENT__UF__UFF/UFF040/
30. Official Statistics Portal (2022i). *Entrepreneurship indicators in manufacturing by technological intensity (NACE Rev. 2) 2005 – 2020*. Retrieved 25.03.2023 from https://data.stat.gov.lv/pxweb/en/OSP_PUB/START__ENT__UF__UFR/UFR040/
31. *On the Plan of Measures for Enhancing the Business Environment for 2019-2022 (22 May 2019)*. Cabinet Order No. 247. Retrieved 25.03.2023 from <https://likumi.lv/ta/id/307037-par-uznemejdarbibas-vides-pilnveidosanas-pasakumu-planu-2019-2022-gadam>
32. Productivity Research Institute, Faculty of Business, Management and Economics of the University of Latvia (2020). *Productivity Report for Latvia 2020*. “University of Latvia Think tank LV PEAK”. Retrieved 25.03.2023 from <https://www.em.gov.lv/lv/media/8753/download>
33. Roeger, W. (2006). *The Production Function Approach to Calculating Potential Growth and Output Gaps. Estimates for EU Member States and the US*. Retrieved 25.03.2023 from <https://www.banqueducanada.ca/wp-content/uploads/2010/08/roeger.pdf>

NON-FINANCIAL REPORTING OF TOP COMPANIES IN TURBULENT ENVIRONMENT

Oana Bogdan

*West University of Timisoara, Faculty of Economics and Business Administration, Romania
oana.bogdan@e-uvt.ro*

Valentin Burca

*West University of Timisoara, Faculty of Economics and Business Administration, Romania
valentin.burca@e-uvt.ro*

Aura Domil

*West University of Timisoara, Faculty of Economics and Business Administration, Romania
aura.domil@e-uvt.ro*

Codruta Pavel

*West University of Timisoara, Faculty of Economics and Business Administration, Romania
codruta.pavel@e-uvt.ro*

Alin Artene

*Faculty of Management in Production and Transportation,
Politehnica University of Timisoara, Romania
alin.artene@upt.ro*

ABSTRACT

Nowadays, the non-financial reporting of companies shows more and more interest both among companies and investors, who are no longer interested only in the reported figures. However, the pandemic period also left its mark among large companies. Our research concerns the global top 50 companies and the non-financial reports published by them before, during and after the pandemic generated by the novel coronavirus. The purpose of our paper is to illustrate how these entities present the story and the CSR actions taken during a time when most companies struggled to survive. To achieve these objectives, we used qualitative and quantitative research. Namely, we analyzed the entities' non-financial reports, to identify their social responsibility actions and we used the NVivo program in order to highlight which are the most representative words used in non-financial reporting in the three analyzed moments, namely before, during and after the COVID-19 pandemic. The results of the study reflect that in a turbulent environment, companies tend to present less complex reports and use more ambiguous tone. Also, our research highlights the fact that CSR activities undertaken were greatly reduced during the pandemic period.

Keywords: *non-financial reporting, global top companies, CSR*

1. INTRODUCTION

For companies, non-financial reporting, respectively the aspects regarding the impact that carried out activity exerts on the environment, the treatment applied to employees, but also a balance sheet of the efforts regarding the respect of human rights, the eradication of corruption, bribery and ensuring diversity in company boards (in terms of age, gender, educational and professional background) was, at first, an obligation imposed by EU Directive 2014/95 which led, as expected, to an increase in the use of investor-oriented NFR frameworks (Breijer & Orij, (2022)).

Without a standardized basis of NFR concepts and guidelines for reporting, each company told its story in its own way (Turzo et al., 2022). Thus, although EU Directive 2014/95 was imposed by the legislation transposed into the national regulations of each EU member state, over time, however, it seems that companies for which this reporting is mandatory, have identified the advantages that non-financial reporting can create, supplementing the information found in financial reporting, no longer being viewed just as an obligation. Non-financial reporting has thus also become a competitive advantage between companies, which is why even companies that are exempt from non-financial reporting have started to provide such information, taking as a model big corporations that give great importance to the impact they have in society. Thus, if the financial reporting looks at the results obtained, respectively the performance achieved in the past, the non-financial reporting tends to provide investors with indicators regarding the future potential of the company. Specifically, risk management, company values, policies and practices regarding social, economic and environmental aspects, information that allows both shareholders and stakeholders to better understand performance, business strategies and prospects for economic growth and development (Perrini, 2006). Recently, several new mandatory and voluntary regulatory requirements have been issued, respectively Regulation (EU) 2020/852 applicable for financial reports published starting from January 1, 2022 for the previous financial year, which focuses on six thematic objectives regarding climate change mitigation, adaptation to climate change, the sustainable use of waters, their protection and marine resources, the transition to a circular economy, the prevention and control of pollution and the protection and restoration of biodiversity and ecosystems, from the perspective of which the economic activities of companies must be analyzed in order to certify whether they are environmentally sustainable. Although the reporting requirements are becoming increasingly complex, it seems that the number of companies that disclose CSR-related information has increased substantially in time (KPMG, 2020) especially due to the fact that non-financial reporting allows the management of reputational risks and achieve an increased level of legitimacy (Schröder, P., 2022). Taking into account the fact that companies tend to emphasize the positive parts, our research question aims to highlight how companies present non-financial information in turbulent environment. How and what to disclose? Has the pandemic period affected CSR activity? Thus, our study concerns the global top 50 companies, considered role models and the non-financial reports published by them before, during and after the pandemic generated by the novel coronavirus. The purpose of our paper is to illustrate how these entities present the story and the CSR actions taken during a time when most companies struggled to survive. Our aim in this paper is to bring some new insights on the changes in the annual and sustainability reports in uncertain and turbulent times. In this context, the focus of our paper is the analysis of company's disclosures before, during and after a turbulent context generated by the novel coronavirus. This paper is structured as follows: Section 2 presents the literature review and the hypothesis development; Section 3 presents the research methodology, Section 4 discusses the results obtained, and Section 5 summarizes the main findings, conclusions, and avenues for future research directions.

2. LITERATURE REVIEW

In turbulent and uncertain times, annual and sustainability reports become even more important, as they represent the main driver for managers to communicate the results of the company to shareholders and stakeholders as well. Non-financial reporting, also known as sustainability reporting, is the way in which companies disclose information on the environmental, social and economic impacts of its current activities. Thus, responsibility has become an element through which companies highlight the fact that profit is not the only driver of activity and that interest in protecting ecosystems and the environment represent also a priority.

Social responsibility, i.e. the company's interest and efforts to get involved in the social problems of the community in which it operates are no longer seen as lost investments, the efforts returning tenfold after obtaining a prestige and a special image. Social programs to support disadvantaged categories or educational programs within the community can bring competitive advantages in the future, in a business environment that is constantly changing. Non-financial reporting has grown considerably over the last decade, being seen not only as a challenge but also an opportunity to raise the transparency and gain trust, interfering with several other interest fields, including business ethics, financial accounting and strategic management (Čičák et al., 2021). A special importance is allocated in sustainability reports to the way in which companies use natural resources, namely the way in which they manage to carry out their activity and at the same time rationally use natural resources, emphasizing the use of renewable energy resources. Using wind power with the help of wind installations and the sun, through solar and photovoltaic panels, companies demonstrate a responsible attitude towards the environment and towards the human communities in which they operate. Non-financial disclosures also highlight the values of the company as well as its business model while demonstrating the link between its strategy and its commitment to a sustainable economy (Saini et al., 2022). But in unprecedented and turbulent times, studies show that companies act different regarding the undertaken CSR activities, being forced to re-think sustainable growth in order to ensure financial stability, protect the employees and help the customers (Wilo, 2021). In this sense, companies adopted measures to protect their liquidity, to enhance financial flexibility and to support their operations (Amadeus, 2020). But these changes can easily be seen in the way non-financial information is disseminated, to those interested, through annual and sustainability reports. For social reporting, the GRI standards guide (2019) is largely used by companies because it highlights a set of information that should be disclosed in reports, respectively: existing conditions at the workplace, human rights, community, respectively the responsibility of the organization regarding the products supplied. In an uncertain context, the presentation of at least some minimalist information, which deals with sensitive aspects, could turn into a competitive advantage for companies that decide to use this powerful tool (Calu & Nichita, 2020). The literature highlights that over time, the length of annual reports has increased in parallel with deterioration of readability and increase of tone ambiguity (Dyer, Lang, and Stice-Laurence 2017; Lang and Stice-Laurence 2015). Bostan reached the same result in the study elaborated in 2022 which emphasize, through text mining, multivariate analysis, and topic modeling, that the reports included in their study, namely the companies listed on four stock exchanges from Europe, namely the Bucharest Stock Exchange, ATHEX Stock Exchange, IBEX-35, and WIG-20 between 2017–2020, are less extensive in uncertain and turbulent times and tend to become more generic. Our article comes with additional insights within the literature. It adds empirical evidence that in turbulent times non-financial reporting is subject to changes.

3. MATERIALS AND METHODS

The first objective of our study was to identify if the non-financial reporting topic presents interest into the field. Hence, we performed science mapping, a method by which the specialized literature can be quantitatively evaluated. The second objective of our research was to identify whether entities disclose different their non-financial information regarding environmental, social and economic issues following the application of the provisions of EU Directive 2014/95 in a turbulent environment context. Hence, our first research question (1): *Did entities tend to report less and more ambiguous non-financial information in turbulent environment context?* To answer to this research question and achieve our objective, we introduced the annual and sustainability reports of the world's 50 most powerful companies (PwC, 2021) in the Nvivo 14 program in three periods: before the pandemic, namely years

2018-2019, during the pandemic period, respectively 2020-2021, and after the pandemic, namely last year, 2022. In total, for the analyzed period of time, namely, between 2018 and 2022, we studied 250 Annual and Sustainability Reports. With the help of the word frequency criteria function, we extracted the 1.000 most-used words from each period. From these, we selected the terms regarding the environmental, social and economic aspects, hereafter key terms, and we analyzed their frequency in each report. The frequency of a word into a text it is important because it is demonstrated that as individuals are more frequently exposed to a weak negative, neutral, or positive stimulus, a progressively positive appreciation of the stimulus is reached (Gavreliuc, 2019). In this sense, by repeatedly use of key words, they became familiar for individuals, and they perceived them with a positive meaning, even if they do not represent something good. The study conducted by Artene et al., (2020) reflect the fact that companies that are active in the oil field, known as polluting, are more sensitive to environmental issues and tend to report more information compared to other business sectors. Also, the same research highlighted the fact that in the annual and sustainability reports, the investigated entities used terms such as pollution and emissions much more often in reports compared to other business sectors. This technique may have been used in order to transform words that do not necessarily have a positive connotation out of the desire for these to become common words in the eyes of those who are interested in the company's environmental impact. In this research, we also aimed to analyze with what CSR activities the most used words are related to in order to investigate if (2) *the pandemic context affected the CSR activity* of the entities included in our study.

4. RESULTS AND DISCUSSIONS

Over time, non-financial reporting began to present more and more interest both for the business environment and for the academic one, an increasing trend that can be seen from the number of studies conducted on this research topic, publications indexed in important databases such as the Web of Science Core collection. Thus, bibliometric analysis of scientific publications is a method by which the specialized literature can be quantitatively evaluated and the mapping of science can be carried out. In this study, scientific articles related to non-financial reporting published in the Web of Science Core Collection database were selected. We have filtered the results so that only those papers that contain "non-financial reporting" in the title to be highlighted. Thus, from 2003, the first year in which a scientific paper dealing with non-financial reporting issues was indexed and until now, a total of 415 published articles were identified, and the authors proposed keywords were extracted.

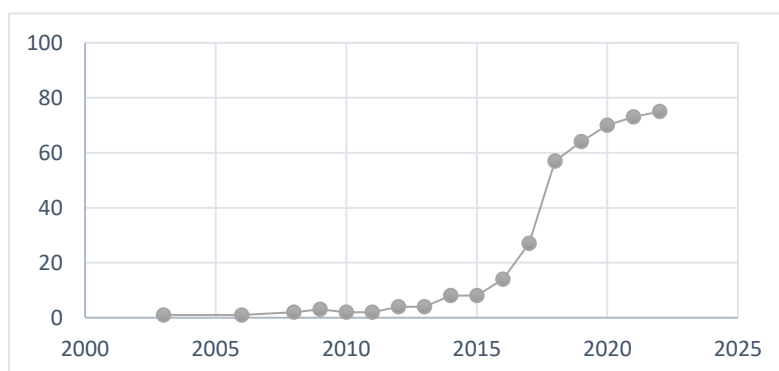


Figure 1: Number of scientific publications extracted from Web of Science Core Collection (Source: authors own elaboration after Web of Science Core Collection database)

A minimum threshold of 5 simultaneous occurrences and an additional requirement of at least one citation were used to observe the most common trends and topics in the field of non-financial reporting.

No.	Keyword	Occurrences	Link strength
1	Non-financial reporting	172	310
2	Integrated reporting	59	121
3	Corporate social responsibility	58	103
4	Sustainability	48	105
5	Sustainable development goals	36	70
6	Corporate governance	18	42
7	Directive 2014/95/UE	16	60
8	Stakeholders	12	33
9	Mandatory disclosures	6	18
10	Environmental reporting	5	11

Table 1: Top 10 keywords from co-occurrence highest output by occurrences
(Source: Authors own elaboration in VOSviewer)

As can be seen from this table and figure, the key words proposed by authors are counted among the most used words extracted from the EU Directive 2014/95, reflected in following figure.

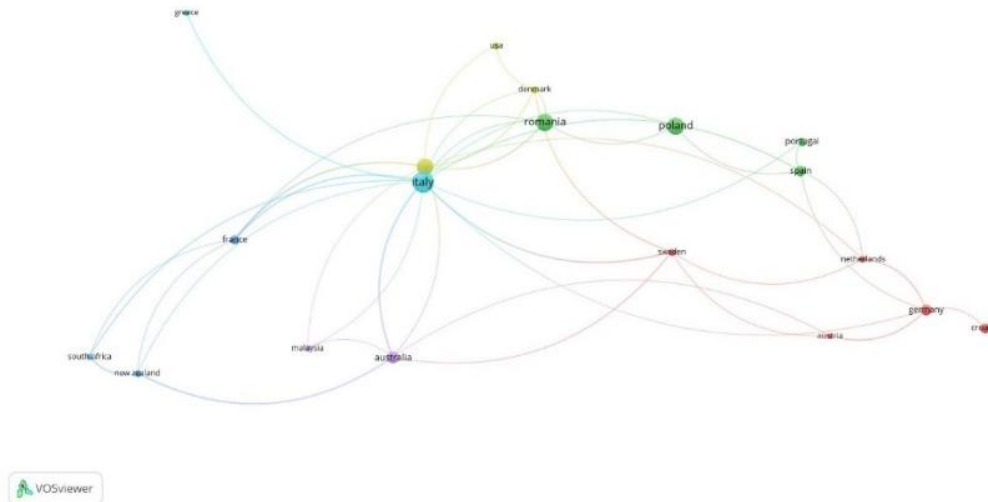


Figure 3: Directive 2014/95 WordCloud
(Source: Artene et al., 2020)

This highlights the fact that the authors of the studied scientific papers included in our research give importance to the way in which the EU Directive can be implemented within the entities, by analyzing the key elements.

4.1.2. Country co-authorship analysis

Analyzing the state network situation among the co-authorship of scientific works in the field of non-financial reporting with at least 5 publications and at least 1 citation at the country level, we identified 22 countries that meet the criteria and are represented graphically in Figure 3, out of a total of 58 countries with links in the specialized literature. All the 22 countries identified are grouped into 6 clusters, between which 42 links have been established. In order to be able to observe which are the most representative countries, ranked in descending order according to the intensity of the links between them, the first 5 were selected and can be found in Table 2.



*Figure 4: Country co-authorship analysis
(Source: Authors own elaboration in VOSviewer)*

The largest number of scientific articles identified in the Web of Science database, 74 documents out of a total of 415 materials were from Italy, followed by authors from Romania with 47 documents and, third, authors from Poland with 46 scientific papers. We can highlight that if we filter our results by the number of citations, the first position is occupied by Italy, second by Australian authors that have only 23 scientific articles, but the number of citations is high, namely 823 citations with a link intensity of 15. The third position is held by England with a number of 651 citations from 41 documents.

No.	Country	No. of Documents	Citations	Link strength
1	Italy	74	1.729	37
2	Romania	47	329	6
3	Poland	46	296	3
4	England	41	651	26
5	Russia	40	47	2

*Table 2: Top highest 5 cited countries by number of documents
(Source: Authors own elaboration in VOSviewer)*

4.2. Non-financial reporting in the business environment

The crisis caused by COVID-19 represented a major shock to the European and world economy. Member States have adopted budgetary, policy and liquidity measures to increase the capacity of their health systems and to provide relief to severely affected individuals and sectors. However, that crisis meant for many entities a sustained effort for survival. During that period, economic activity was slowed down primarily by the restrictive measures imposed to limit the spread of the novel coronavirus. Thus, have companies allowed themselves to allocate time and money to carry out CSR activities? How important was non-financial reporting in a turbulent environment for them? Analyzing the annual and sustainability reports published in 2018 and 2019, years prior to the crisis caused by COVID-19, by the world's 50 most important companies, we found that in the issued documents they have allocated important resources, both financial and time, in order to carry out CSR activities. In the published reports, the companies allocated whole pages to describe how they got involved in the community in which they operate, planted trees, recycled, reduced energy consumption, water and paper use.

The most used words referred to the environment, sustainable development and how the activity can be carried out so that the negative impact on the environment is as low as possible.



Figure 5: 2018/2019 WordCloud analysis
(Source: Authors own elaboration in NviVo 14)

The economic impact of the coronavirus crisis has varied from one industry sector to another and from one entity to another. It depended on a number of factors, such as the ability to adapt to disruptions in the supply chain, the existence of stocks or reliance on just-in-time production processes. In the period 2020-2021, the word frequency showed that companies gave importance to the concepts related to suppliers, chain, changes, employees and resources. The crises showed us that the world that we know can change in a second, and in order to overcome the crisis period, companies had to adapt to the new context. Thus, as much as possible, they transferred their activity to the online environment so that they could protect their employees and their families. Many companies have implemented telework and remote work, and digitization has been accelerated by the pandemic context. The reports published in the 2020/2021 period highlight the fact that the companies did not focus so much on CSR activities, and those that were undertaken mainly targeted investments in protecting people and implementing safety measures to limit the spread of the virus. Our research also highlighted the fact that non-financial reporting was less extensive and less comprehensive during the pandemic period, compared to the previous period.



Figure 6: 2020/2021 WordCloud analysis
(Source: Authors own elaboration in NviVo 14)

In 2022, with the applicability of the new Regulation (EU) 2020/852, we observe a change in terms of word frequency in the reports included in our study. We notice the fact that great importance is attached to aspects regarding sustainability and the transition to a safe, climate-neutral economy, resilient to both climatic changes as well as pandemic crises in order to become more efficient from the point of view of the use of resources.



Figure 7: 2022 WordCloud analysis
(Source: Authors own elaboration in NviVo 14)

We also note the fact that after the pandemic period, the size of the reports began to increase and the entities started to be once again much more actively again in the life of the community in which they operate.

5. CONCLUSIONS

The pandemic period affected the life we considered normal. In order to overcome the turbulent context, companies had to adapt and implement measures aimed at complying with the measures imposed by the authorities to limit the spread of the virus, and at the same time, to fulfill the interests of shareholders and stakeholders. Many fields of activity were seriously affected by the turbulent context, a fact that determined the reset of priorities. Thus, the entities focused on the ways in which they can overcome the crisis and not so much on CSR activities. This option also affected the way in which entities disclose their non-financial information. It seems that in turbulent times such as the one we recently went through due to the novel coronavirus, companies focus on recovery and put less emphasis on the CSR activities undertaken, focusing especially on investments in protecting people and implementing safety measures to limit the spread of the virus. The activities carried out by the top companies represent real role models, whose actions are under the scrutiny of various interested parties, inclusive non-financial disclosures. Our study highlighted that non-financial disclosures were less extensive and less comprehensive during the pandemic period, compared to the previous period. But nevertheless, we observe the fact that after the crisis period generated by the pandemic, entities start to invest both time and money in CSR activities.

LITERATURE:

1. Amadeus, Non-financial information 2020, available on line: <https://corporate.amadeus.com/documents/en/investors/2020/corporate-governance/non-financial-informations-2020.pdf>, accessed on February, 12, 2023;
2. Artene A, Bunget O-C, Dumitrescu A-C, Domil A-E, Bogdan O. Non-Financial Information Disclosures and Environmental Protection—Evidence from Romania and Greece. *Forests*. 2020; 11(8):814. <https://doi.org/10.3390/f11080814>;
3. Bostan, I., Bunget, O.C., Dumitrescu, A.D., Burca, V., Domil, A., Mates D., & Bogdan, O. (2022) Corporate Disclosures in Pandemic Times. *The Annual and Interim Reports Case, Emerging Markets Finance and Trade*, 58:10, 2910-2926, DOI: 10.1080/1540496X.2021.2014316 To link to this article: <https://doi.org/10.1080/1540496X.2021.2014316>
4. Breijer, R., & Orij, R. P. (2022). The Comparability of Non-Financial Information: An Exploration of the Impact of the Non-Financial Reporting Directive (NFRD, 2014/95/EU). *Accounting in Europe*, 19(2), 332-361.
5. Calu, D.A., Nichita, M. (2020), Raportarea nefinanciară și raportarea pentru management în contextul crizei generate de coronavirus, *CECCAR Business Review*, No 6/2020, pp. 13-20, DOI: <http://dx.doi.org/10.37945/cbr.2020.06.02>
6. Čičak, Josip; Vašiček, Davor; Ljubić, Matko, Non - financial reporting – challenge for Croatian public sector // *RED 2021 10th international scientific symposium region, entrepreneurship, development: conference proceedings* / Leko Šimić, Mirna ; Crnković, Boris (ed.).
7. Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 Amending Directive 2013/34/EU as Regards Disclosure of Non-financial and Diversity Information by Certain Large Undertakings and Groups. Available online: <http://eur-lex.europa.eu/legalcontent/EN/TXT/PDF/?uri=OJ:L:2014:330:FULL&from=EN> (accessed on 29 January 2023).
8. Dyer, T., M. Lang, and L. Stice-Laurence. (2017). The evolution of 10-K textual disclosure: Evidence from latent dirichlet allocation. *Journal of Accounting and Economics* 64 (2–3):2–3. doi:10.1016/j.jacceco.2017.07.002.
9. Gavreliuc, A. Wordpress. Available online: <https://alingavreliuc.wordpress.com/> (accessed on January, 21, 2023).
10. GRI Standards (2019). available on-line: <https://www.globalreporting.org/standards/>, (accessed on January, 21, 2023).
11. KPMG. (2020). The time has come: The KPMG Survey of Sustainability Reporting 2020. <https://assets.kpmg/content/dam/kpmg/xx/pdf/2020/11/the-time-has-come.pdf>
12. Lang, M. H., and L. Stice-Lawrence. 2015. Textual analysis and international financial reporting: Large sample evidence. *Journal of Accounting & Economics* 60 (2):110–35. doi:10.1016/j.jacceco.2015.09.002.
13. Perrini, F. (2006)., The practitioner's perspective on non-financial reporting, *California management review* 48.2: 73-103.
14. PwC, Global ranking of the top 100 public companies by market capitalization, <https://www.pwc.com/cl/es/publicaciones/assets/2019/global-top-100-companies-2019.pdf>, (accessed on January, 27, 2023).
15. Saini, N., Singhanian, M., Hasan, M., Yadav, M.P., Abedin, M.Z. (2022), Non-financial disclosures and sustainable development: A scientometric analysis, *Journal of Cleaner Production*, Volume 381, Part 1, 135173, ISSN 0959-6526, <https://doi.org/10.1016/j.jclepro.2022.135173>.
16. Schröder, P. (2022) Mandatory non-financial reporting in the banking industry: assessing reporting quality and determinants. *Cogent Business & Management*, 9(1), 2073628.

17. Turzo, T., Marzi, G., Favino, C., & Terzani, S. (2022). Non-financial reporting research and practice: Lessons from the last decade. *Journal of Cleaner Production*, 131154.
18. Wilo, Annual report, (2021), available on line: <https://corporate.amadeus.com/documents/en/investors/2020/corporate-governance/non-financial-informatsion-2020.pdf>, accessed on February, 12, 2023;

THE FUTURE OF WORK – EXPECTATIONS OF EMPLOYEES

Anna Skorska

*University of Economics in Katowice
1 Maja Street 47, 40-287, Katowice, Poland
anna.skorska@ue.katowice.pl*

ABSTRACT

The world of work is constantly changing: working conditions and standards, nature of work and tasks, its location, as well as forms of employment. These changes are influenced by many factors, among which automation, robotization and digitization of the economy have played a key role in recent decades. These trends offer new challenges but also new opportunities. The transition of labour from “old”, routine tasks to new, driven by new technologies, causes not only excitement, but in many cases uncertainty, resistance and insecurity. Tasks need to be performed or augmented by data-driven technologies, work is increasingly done remotely, which reduces contacts with coworkers, causes a sense of isolation and loneliness. People are afraid of losing jobs, replacing human work with AI. On the other hand, new technologies make work easier, safer, positively affect terms and quality of work, as well as work-life balance. Considering the above the purpose of the article is to present the essence of changes in the labour market as a result of robotization and automation, with particular emphasis on the concerns and expectations of employees. The implementation of the aim of the article required critical analysis of literature, research reports and forecasts of OECD, WEF, McKinsey, PwC and many others. The diagnostic survey method was used to prepare the second part of the article. The survey questionnaire was developed by the employees of the Department of Labour Market Forecasting and Analysis at the University of Economics in Katowice. It was conducted in December 2021 on a representative group of 1,067 Poles. The results presented in the article will enable to identify the key challenges of the labour market and compare them with the respondents’ opinions on the future of work.

Keywords: *automation, robotization, employment, future of work*

1. INTRODUCTION

The world of work shifts and changes all the time. Identification of trends that are shaping the future of work is one of the key issues considered by researchers, organizations and scientific institutes. It is important for business and other organizations to understand how work could shift because of automation, robotization, and digitization, as well as how workforces can prepare for these changes. The changes concern working conditions, workplaces, nature of work and tasks, forms of employment, forms of communication and management. Faster technology adoption has also implications for skill demand – workers acquire not only digital, but also cognitive, and interpersonal skills such as ability to learn, communicate and to adapt to a rapidly changing labour market. All these factors affect not only quantity, but also quality and experience of work. The changing world of work presents both challenges and opportunities. The transition of labour from “old”, routine tasks to new, driven by new technologies, causes not only excitement, but in many cases uncertainty, resistance and insecurity. Tasks need to be performed or augmented by data-driven technologies, work is increasingly done remotely, which reduces contacts with coworkers, causes a sense of isolation and loneliness. People are afraid of losing jobs, replacing human work with artificial intelligence. On the other hand, new technologies make work easier, safer, positively affect terms and quality of work, as well as work-life balance. It should be stressed that higher exposure to AI may be good for workers, as long as they have the skills to use these technologies effectively. Considering the above the purpose of the article is to present the essence of changes in the labour market as a result of

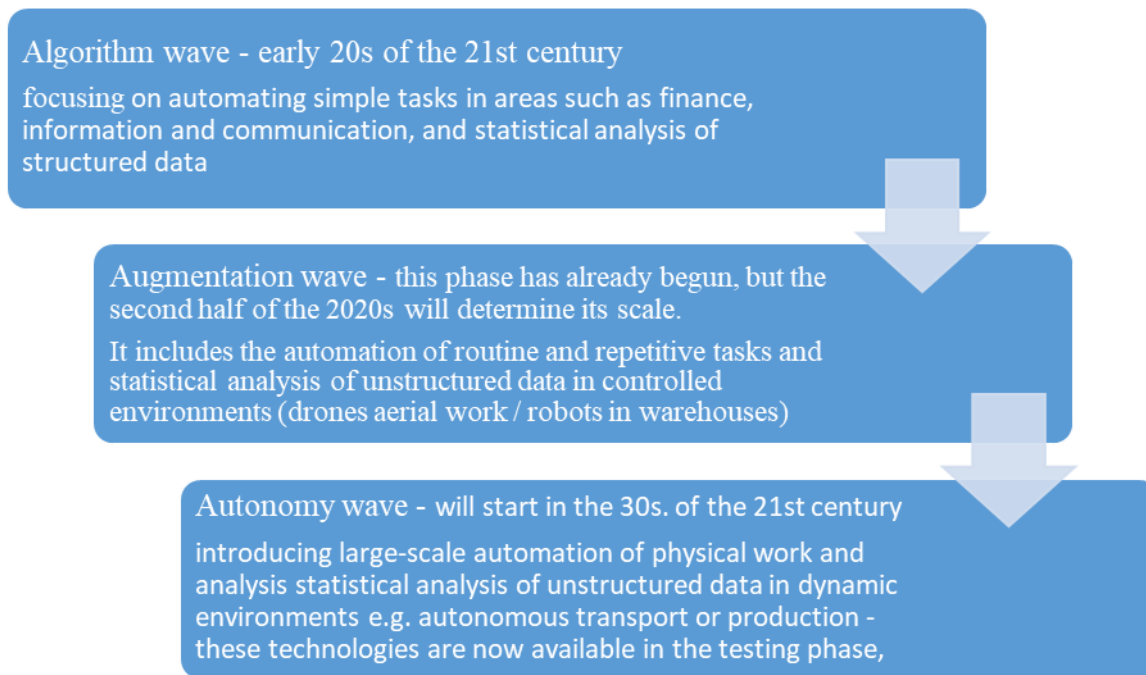
robotization and automation, with particular emphasis on the concerns and expectations of employees. The implementation of the goal formulated in this way required the following research questions:

- Will there be a significant reduction in jobs as a result of digitization, automation and robotization?
- Are the employees afraid of the consequences of those changes?
- What are the expectations of employees?

The implementation of the aim of the article required critical analysis of literature and results of research carried out by various international organizations, such as OECD, WEF, PwC, McKinsey and many others. The diagnostic survey method was used to prepare the main part of the article.

2. AUTOMATION, ROBOTIZATION AND LABOUR MARKET

Identification of trends that are shaping the future of work is one of the key issues considered by various researchers, organizations and scientific institutes (WEF, 2020, OECD 2019, Berger, Frey, 2016, Infuture Institute 2022, Deloitte, 2021, Śledziwska, Włoch, 2020). These trends may be grouped into two main categories: socio-demographic (such as aging societies and workforce, silver tsunami, Z-gen, digital nomads, womenomics) and technological (automation, robotization, AI, cybersecurity, big data). Infuture Institute (2022) presents them in the zone called the mirror world - the progressive digitization of life in all its dimensions associated with concepts such as: hacktivism, meta-economics, dematerialization or gigaconnectivity. There is no doubt that work is one of life dimension on which new technologies have a significant influence. The impact of automation and robotization on the labour market is the subject of endless public and academic debates and the research for answers to the following questions: Will the digital revolution reduce the demand for jobs? How many people will lose their jobs as the result of automation? Will robots take people's jobs? Or will they simply shift the occupational structure of employment with no net negative effect on employment level? Will humans cooperate with the artificial intelligence or rather compete with it? Will these changes lead to a decrease in the level of security and stability of employment? The best answer to questions formulated in this way seems to be: it depends... Conclusions that can be indicated on the basis of available research and analyzes concern the diverse impact of automation and robotization on employment (Acemoglu, Manera, Restrepo. 2020, Frey, Osborne. 2013, Woolters 2020, Arntz, Gregory, Zierahn 2016, Lane, Saint-Martin, 2021). Two approaches dominate these considerations: pessimistic – assuming a massive replacement of human work by digital technologies as part of work automation and robotization (e.g. Frey, Osborne, 2013, Brynjolfsson, McAfee, 2011), and positive – assuming a positive impact of technological changes on the labour market, including increase of productivity, creation of jobs and new occupations, but also a better quality of life (e.g. Manyika, Lund et al., 2017, Bessen 2018). On the one hand, Frey and Osborne (2017) claimed that up to 50% of jobs could be at risk over the next 50 years. The McKinsey Global Institute forecasts that by 2030, assuming rapid transition to the digital economy, it is possible that robots and AI will replace approximately 800 million jobs. However in other scenarios it is assumed that the reduction will not exceed 400 million jobs (Manyika, Chui et al., 2017) or 15% of jobs over the next 15 to 20 years (Nedelkoska and Quintini, 2018, McKinsey Global Institute 2017). It means that many workers will need a transition to new occupational groups and learn new skills. In every scenario time is one of the key factors – it is assumed that in the coming years the reduction of job will be relatively small, while next decades (next phases of the Fourth Industrial Revolution presented on Figure 1) will bring a significant change in the labour market (Autor, 2015, Bessen, 2018, Corrado, Hulten, 2010).



*Figure 1: Waves of the Fourth Industrial Revolution
(Source: own)*

The first wave of the Fourth Industrial Revolution that we are witnessing is not accompanied by significant changes, both in the global and domestic labour markets. The reduction of employment probably will not exceed 3% (PwC, 2019). In the past decades and nowadays, automation and robotization have mainly affected low- and middle-skilled workers whose tasks tended to be routine and repetitive. According to Nedelkoska and Quintini (2018) the automation mainly affects jobs in the manufacturing industry and agriculture, although a number of service sectors, such as postal and courier services, land transport and food services were also found to be highly automatable. The occupations with the highest estimated risk of automation typically only require basic to low levels of education (OECD 2018). For example low-educated men, due to their over-representation in manufacturing or construction are more at risk of losing their jobs. On the other hand, high-educated workers were more likely to work in occupation at low risk of automation. The second wave of industrial revolution introducing extensive digital and partially autonomous tools, so far have caused an increase in productivity without a huge reduction of employment (Aghion et al. 2020). However, in the following years, not only routine tasks and physical work, but also tasks related to computational processes, are characterized by high risk of automation. It should be emphasized that almost a quarter of tasks in this area can be automated, using technologies that already exist and are used in business. (Autor, Dorn, 2013). Professions requiring working with people, building relationships or creative tasks are the least exposed to automation. In such cases, new technologies will increase productivity rather than reduce employment. The biggest concerns are related to the third wave, which will introduce autonomous technologies operating in different, unstructured environments. Recent technological progress in artificial intelligence (AI), machine learning affects the range of tasks that the machines can perform and, consequently the risk of automation of further areas of human activity (Georgieff, Milanez, 2021, OECD, 2019, Aghion et al. 2020, Bessen, 2019). With the development of technology, the occupations requiring high level of formal education tend to have higher exposure to AI. These occupations include: Business Professionals; Managers; Science and Engineering Professionals; and Legal, Social and Cultural Professionals (OECD, 2021, pp. 2). According to the forecasts, by the mid-30s up to 30% of jobs may be automated, however in the same time an increase in demand for new professions and skills is

assumed. The scale and dynamics of changes will not be the same due to the differences in the level of socio-economic development of individual regions and countries, their structure of economy as well as the structure of employment. The consequences of these processes on the Polish labour market are presented in Fig. 2.

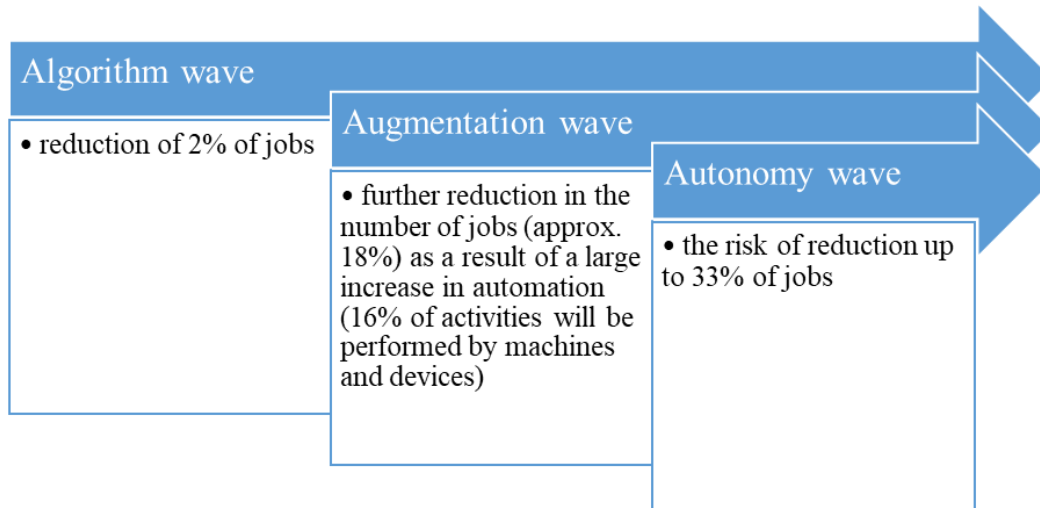


Figure 2: Consequences of the 4th Revolution on Polish labour market
(Source: own based on (PwC, 2019))

The risk of losing a job as a result of these processes varies depending on age, gender, education level, occupation of the employee, as well as the sector of the economy and size of firm that adopt technology. Some groups are at the higher risk of experiencing the negative consequences of automation while others appreciate the advantages of the implemented technologies. While new technologies affect the decrease in labour demand in certain areas, they equally create new industries, occupations and tasks. The increase in demand for IT-related professions, including artificial intelligence specialists, data analysts, GIS information scientists, social media specialists etc., is also accompanied by a growing demand for professions related to care services, culture and entertainment and the so-called green jobs. Jobs have become increasingly interactive, they require not only STEM (science, technology, engineering and mathematics) and digital competences, but also interpersonal skills. As a consequence demand for high cognitive competences, which include e.g. advanced ability to work on and analyze texts, quantitative and statistical skills, critical thinking and decision making, project management, information processing and interpretation will continue to grow. Social and interpersonal competences – understood as the ability to work in teams, cooperate, taking responsibility and leadership will be equally important, as well as high digital competences (Bughin et al 2018, Manyika Chui et al, 2017, Smit et al, 2020).

3. RESEARCH ANALYSIS

The diagnostic survey method was used to prepare the second part of the article. As far as data collection tools were concerned, the conduction of the research involved the use of anonymous survey questionnaire, developed by the employees of the Department of Labor Market Forecasting and Analysis at the University of Economics in Katowice (Skórska, 2022a). It was conducted in December 2021 on a representative group of 1,067 Poles. The sample size was determined based on the statistical equation. The main objective of the survey was to conduct a comprehensive assessment of quality of life during the COVID-19 pandemic with special emphasis to changes in the labour market. The results presented in the article are only part of a much more extensive research. Characteristics of the research group are presented in Table 1.

Socio-demographic characteristics of the respondents		number	%
Gender	Women	557	52,2
	Men	510	47,8
Age	18 – 25 (Z generation)	172	16,1
	26-41 (Y generation)	312	29,2
	42-55 (X generation)	247	23,2
	57 and more (Baby boomers)	336	31,5
Educational attainment level	Less than primary and primary education	27	2,5
	Lower secondary education	108	10,1
	Upper secondary and post-secondary non-tertiary education	498	46,7
	Tertiary education	434	40,7
Marital status	Single persons (never in legal union)	292	27,4
	Married persons	622	58,3
	Divorced persons	84	7,9
	Separated persons	10	0,9
	Widowed persons	59	5,5
Place of residence	City	826	77,4
	Country	241	22,6
Status on labour market	Employed persons	702	65,8
	Unemployed persons	25	2,3
	Retirement	255	23,9
	Inactive persons because of disability	41	3,8
	Student	20	1,9
	Pupil	9	0,8
	Inactive persons for other reasons	15	1,4

*Table 1: Socio-demographic characteristics of the research group
(Source: own calculation based on the research results)*

In the surveys of factors affecting the labour market, technological changes play a key role. For example, in WEF (2020) research around 61% of employees indicated that technological change and globalization will affect their current employment. A similar, though slightly lower percentage of indications (51.3% of responses) was obtained in our own research¹. One of the consequences of these changes is the possibility of remote work and its further development that was indicated by almost 59% of respondents. Such a high percentage of indications may have been partly influenced by the time of the survey, as it took place during the Covid-19 pandemic, when remote work was often the only option to perform professional duties (Krantz-Kentkrantz, 2019, Skórska, 2022b). Technological development also affects the demand for specific professions and competences. Hence the projected increase in demand for highly specialized employees, which was indicated by almost 32% of respondents. The distribution of respondents' answers is shown in Fig. 3. The results concerning working conditions, including employment stability (less than 16% of indications) and development of human capital (less than 10%) are disappointing. This can be confusing, because on the one hand, human capital is considered as a key element of the organizations, and its development is one of the priorities (WEF, 2019), on the other hand, employees do not see employers' willingness to invest in their development.

Figure following on the next page

¹ Respondents were asked (regardless of their status on the labour market) to indicate the phenomena which, in their opinion, will develop dynamically over the next 5 years. They could indicate three answers.

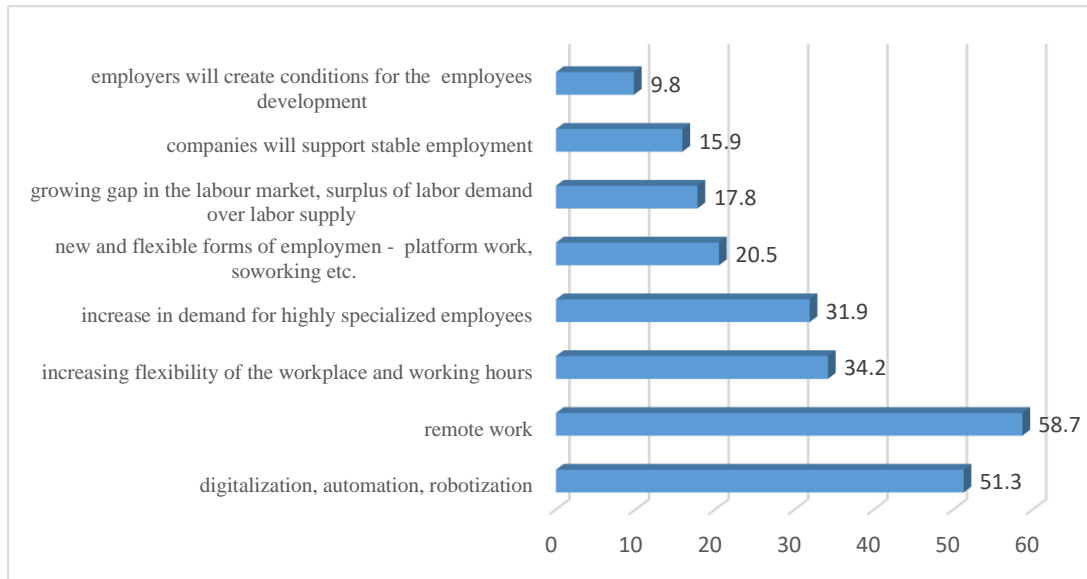


Figure 3: Phenomena which, in respondents' opinion will develop dynamically over the next five years (%)

(Source: own calculations based on the research results)

The assessment of the impact of automation on employment is ambiguous. On the one hand almost 37% of respondents, just like in PwC survey (2018), are afraid that human work will be replaced by artificial intelligence, and in Eurobarometer surveys 72% of Europeans declared that “robots and artificial intelligence are stealing people’s jobs” (European Commission, 2017). On the other hand, the respondents notice the facilitations resulting from the development of technology, e.g. reduction or elimination of boring and routine activities (24.5%) and they are not afraid of changes (32.1% of responses), as shown in Fig. 4.

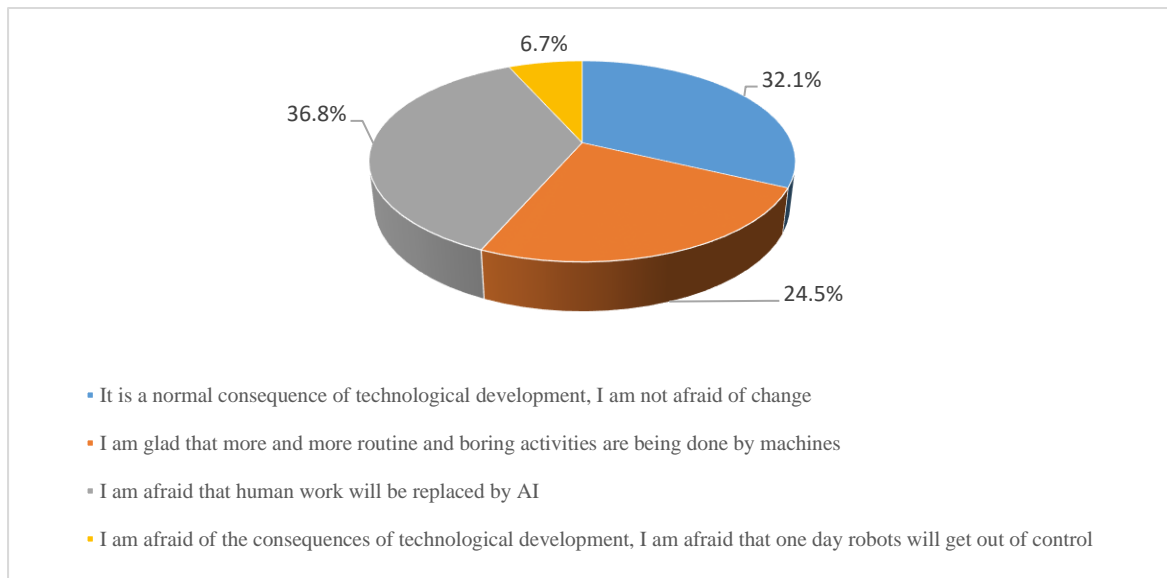


Figure 4: Opinions of respondents regarding work automation (%)

(Source: own calculations based on the research results)

While in the first general question, a relatively high percentage of respondents pointed to the negative consequences of work automation, the assessment of changes in the individual professional situation of the respondents was quite different.

Only 5.5% of respondents indicated that within 5 years most of their duties will be automated, and slightly more than 11% that it will be more than half of their tasks. On the other hand, almost 19% of respondents stated that these processes would not affect their work, and an additional 15.3% - that only single activities would be automated, as shown in Fig. 5.

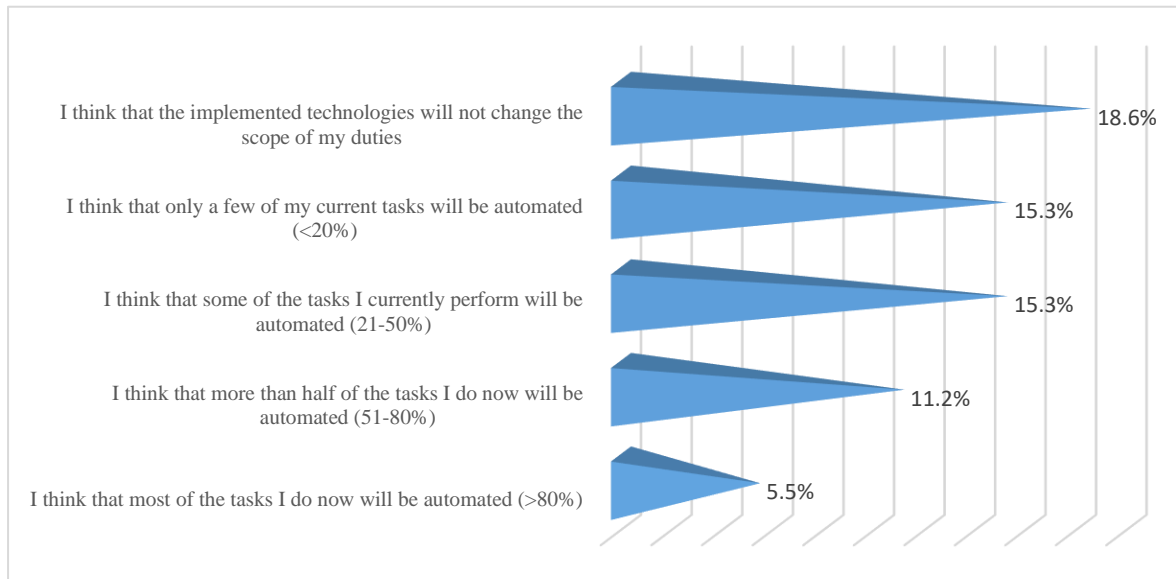


Figure 5: Professional activities that are likely to be automated in the next 5 years (%)
(Source: own calculations based on the research results)

Summing up, it can be presumed that employees are aware of the impact of technology on the labour market and the risk of decreasing demand for labour in specific industries and professions. However, at the same time, respondents do not seem to notice that these changes may affect their work. Taking into account the intensity of automation and robotization processes in the coming decades, it is difficult to agree with such an optimistic perception of the respondents' professional duties in the future.

4. CONCLUSIONS

Digitization and automation of the economy are increasingly affecting the labour market in various dimensions and areas. Global economic systems are becoming more interconnected than ever before, information spreads wide, new technologies expand very fast. The changes in work, the workforce and the workplace, are happening across the economy and across the world. Although there are differences between countries and sectors. Some of them benefit more, whereas others may not benefit at all. Technological advances enable the automation of repetitive, dangerous or dirty tasks and processes, and may allow workers to focus more on creativity and innovation. At the same time, technology is changing the way of executing some tasks, increasing productivity. On the other hand automation increases the risk of job reduction in specific areas, as indicated in many studies. Some respondents perceive the risks associated with these processes and the possibility of replacing human work by AI. That is why, it is important that companies, but also individuals understand the need to prepare for evolving future of work. As the nature of work changes, acquiring new skills that will be demanded and expected in the labour market will be critical. New business models and changing market realities require not only digital, but also specific soft skills, such as quickly adapting to a changing environment, cooperation, working in teams, cross-discipline thinking. As organizations become more automated, they will need employees whose skills will not be easily able to replicated by AI.

Automation and robotization bring both hope and challenge. Workers will need to rethink traditional notions of where they work, how they work, and what talents and capabilities they bring to that work. The transition of labour from „old“ tasks to new, driven by new technologies causes resistance, uncertainty, insecurity. Especially when employees do not feel the support, when the employers do not care about their development. On the other hand companies have to rethink their model of business and ask fundamental questions about tasks and processes in the organizations: which task need to be done by people? Can people and machines, AI work together in an augmented way? In most cases the cooperation of human and AI will be necessary. Thus it is important to find a new human-machine symbiosis, the optimal way of using human and technological capabilities.

LITERATURE:

1. Acemoglu, D., Manera A., Restrepo P. (2020), Taxes, Automation, and the Future of Labor. MIT Task Force on the Work of the Future Research Brief.
2. Aghion, P., Antonin C., Bunel S., Jaravel X., (2020), What are the Labor and Product Market Effects of Automation? New Evidence from France, CEPR Discussion Paper No. DP14443.
3. Arntz, M., Gregory T., Zierahn U. (2016) The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis, OECD Social, Employment and Migration Working Papers, No. 189, OECD, Publishing, Paris.
4. Autor, D. (2015), Why Are There Still So Many Jobs? The History and Future of Workplace Automation, Journal of Economic Perspectives, Vol. 29/3, pp. 3-30.
5. Autor D., Dorn D. (2013), The Growth of Low-Skill Service Jobs and the Polarization of the US Labor Market, American Economic Review, 103.5.
6. Berger, T., Frey C. (2016), *Structural Transformation in the OECD: Digitalisation, Deindustrialisation and the Future of Work*, OECD Social, Employment and Migration Working Papers, No. 193, OECD Publishing, Paris.
7. Bessen, J. (2019) Automation and jobs: when technology boosts employment, Economic Policy, Vol. 34/100, pp. 589-626.
8. Bessen J. (2018). Automation and Jobs: When Technology Boosts Employment. Boston University School of Law, Law and Economics Research Paper, No. 17-09.
9. Brynjolfsson E., McAfee A. (2011), Race against the Machine: How the Digital Revolution Is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy, Digital Frontier Press, Lexington, Massachusetts.
10. Bughin J., Hazan E., Lund S., Dahlstrom P., Wiesinger A., Subramaniam A. (2018). Skill shift: Automation and the future of the workforce. McKinsey Global Institute.
11. Corrado, C. A and C. R. Hulten (2010), How Do You Measure a Technological Revolution?, American Economic Review, Vol. 100, No. 2, pp. 99-104.
12. Deloitte, (2021), The social enterprise in a world disrupted. Leading the shift from survive to thrive. Global Human Capital Trends Report.
13. European Commission, (2017) *Attitudes towards the impact of digitisation and automation on daily life*, Eurobarometer Special Report 460, European Commission.
14. Frey C.B., Osborne M.A. (2013), The Future of Employment: How Susceptible are Jobs to Computerisation? Oxford Martin School Programme on the Impacts of Future Technology Working Paper.
15. Frey, C. and M. Osborne (2017), The future of employment: How susceptible are jobs to computerisation?, Technological Forecasting and Social Change, Vol. 114, pp. 254-280,
16. Georgieff, A., Milanez A. (2021), *What happened to jobs at high risk of automation*, OECD Social, Employment and Migration Working Papers, No. 255, OECD Publishing, Paris.

17. Infuture Institute, (2019), *Przyszłość w erze cyfrowej zmiany. Transformacja cyfrowa w Polsce*, <https://infuture.institute/>
18. Krantz-Kentkrantz, R. M. (2019), Where did workers perform their jobs in the early 21st century?, *Monthly Labor Review*, pp. 1-10.
19. Lane M., Saint-Martin S. (2021), *The impact of Artificial Intelligence on the labour market: What do we know so far?*, OECD Social, Employment and Migration Working Papers, No. 256, OECD Publishing, Paris.
20. Manyika J., Lund S. Chui M., Bughin J., Woetzel J., Batra P., Ko R., Sanghvi S. (2017), *Jobs Lost, Jobs Gained: What the Future of Work Will Mean for Jobs, Skills, and Wages*, McKinsey Global Institute, San Francisco
21. Manyika J., Chui M., Miremadi M., Bughin J., George K., Willmott P., Dewhurst M. (2017), *A Future That Works: Automation, Employment, and Productivity*, McKinsey Global Institute, San Francisco
22. Nedelkoska, L. and G. Quintini (2018), *Automation, skills use and training*, OECD Social, Employment and Migration Working Papers, No. 202, OECD Publishing, Paris.
23. OECD (2019), *OECD Employment Outlook 2019: The Future of Work*, OECD Publishing, Paris.
24. OECD (2018), *Putting faces to the jobs at risk of automation. Policy Brief on the Future of Work*. OECD Publishing: Paris.
25. OECD (2021), *Artificial Intelligence and employment. New evidence from occupations most exposed to AI*, Policy Brief on the Future of Work, OECD Publishing: Paris.
26. PwC (2019), *Will robots really steal our jobs? An international analysis of the potential long term impact of automation*. www.pwc.co.uk/economics
27. PwC (2018), *Workforce of the future. The competing forces shaping 2030*, www.pwc.co.uk/economics
28. Skórska A. (2022), *Praca a jakość życia Polaków – zmiany w okresie pandemii COVID-19*, Wydawnictwo Uniwersytetu Ekonomicznego w Katowicach, 2022.
29. Skórska A. (2021), *Remote work and work-family balance during the Covid-19 pandemic*, 15th International Scientific Conference "Analysis of International Relations 2021. Methods and Models of Regional Development". Conference Proceedings / ed. by Włodzimierz Szkutnik, Anna Sączewska-Piotrowska, Monika Hadaś-Dyduch, Jan Acedański, Publishing House of the University of Economics in Katowice, pp. 154-162
30. Śledziwska K., Włoch R. (2020), *Gospodarka cyfrowa. Jak nowe technologie zmieniają świat*, Wydawnictwa Uniwersytetu Warszawskiego, Warszawa.
31. Smit et al, (2020) *The Future of Work in Europe: Automation, Workforce Transitions, and the Shifting Geography of Employment*, McKinsey Global Institute.
32. World Economic Forum (2019) *The Future of Jobs Report 2018*
33. World Economic Forum (2021), *The Future of Jobs Report 2020*.
34. Wolters L. (2020), *Robots, Automation, and Employment: Where We Are*, MIT Work of the Future Working Paper 2020.
35. (Infuture Institute) <https://infuture.institute/mapa-trendow/> [dostęp: 24.03.2023]

“INTERNATIONAL CORPORATE SOCIAL RESPONSIBILITIES: HOW DO SUBSIDIARIES OPERATING IN DEVELOPING COUNTRIES DEVELOP THEIR CORPORATE SOCIAL RESPONSIBILITY PROGRAMMES”

Beatriz Moutinho

IESE Business School, Spain

bfmtmoutinho@gmail.com

ABSTRACT

In today's globalized world, Multinationals from Developed Countries are increasingly opening offices, branches or subsidiaries in Developing Countries. These subsidiaries face the perennial dilemma of having to mutually comply with the international reality of its headquarters, and the local reality of its offices or branches. This duality is highly emphasized in their Corporate Social Responsibility Programmes, where subsidiaries have to respond to the pressure of both international and local stakeholders. The development and study of International Corporate Social Responsibility is often focused on the perspective of the headquarters company, neglecting the view of the subsidiary in this process. Subsidiaries operating in Developing Countries present unique cultural, social, and economic contexts. Studying CSR practices in multinational corporations from the perspective of the subsidiary is a complex issue that often lacks the necessary literature to frame it. Drawing upon literature in International Business (“Bartlett and Ghosal” typology), and CSR (“The three domains of CSR” typology; “The Locus and Motivation” Framework; and the “Stakeholder Approach”), this study will focus on developing an adequate framework: “The Adapt, Adopt and Create” approach to study International CSR from the perspective of a subsidiary operating in a Developing Country. Accordingly, depending on the autonomy, share or alignment of motivation, values and goals, with headquarter, subsidiaries may adopt, adapt, or create new CSR programs.

Keywords: *CSR, Developing Countries, Internationalization, Multinationals, Subsidiaries*

1. INTRODUCTION

Corporate Social Responsibility (CSR) refers to a company's commitment to operating economically, socially, and environmentally responsibly. It involves considering the impact of business decisions on stakeholders such as employees, customers, suppliers, communities, and the environment. By implementing CSR practices, companies aim to balance profit and growth with society's and the planet's well-being. Multinational firms that operate in numerous countries with different characteristics and degrees of development are becoming more prevalent in today's globalised world - we may increasingly discover Multinationals with headquarters in Developed nations and subsidiaries, branches, or offices in Developing countries. Discussing International CSR becomes more relevant, as operating economically, socially, and ecologically responsible may not imply the same thing internationally. From the perspective of a subsidiary in a developing country, the CSR initiatives must align with the goals and values of the multinational corporation and with the cultural and economic context of the local community, which places a challenging dilemma. CSR in multinational corporations is a complex issue that requires a nuanced understanding of the perspectives and needs of the various stakeholders involved. This study will focus on perceiving the International CSR practices of multinational subsidiaries operating in Developing Countries, the similarities of their CSR practices with the ones practised in the headquarters and the level of the responsiveness given to local and global stakeholders. To understand the importance of this research, it is crucial to reflect on (i) the current context of international trade, which

exacerbates the importance of multinationals from Developed countries on Developing countries, and (ii) the current context of CSR in Developed and Developing countries and how that affects the social practices of companies. Increased awareness about societal problems has led the new generations to demand urgent action regarding CSR practices. Subsequently, the notion of responsibility, traditionally attached to individuals and governments, started to be widely applied to companies (Epstein 1989; Soares 2003); as studies point out that 91% of the consumers [US reality] state companies should have an active social role (Cone, 2015). Simultaneously, companies started to adopt a more inclusive perspective, as the shareholder value approach of business, centred on maximising short-term financial goals (Friedman, 1970), was widely substituted by the stakeholder approach (Freeman & Vela, 2001). According to the stakeholder approach, the corporate environment is seen as an ecosystem of related groups that must be considered and satisfied to ensure a company's health and long-term success. Stakeholders include customers, shareholders/ investors, government, and employees, among others (Freeman, 2010). In Developed countries, stakeholders are a dominant force intensively demanding Corporate Social Responsibility: 84% of consumers consider the impact in the world of their individual consuming actions (Futerra, 2018); 80% of the mainstream investors consider the environmental, social, and governing behaviours of a company before investing on it (Forbes, 2019); 70% of employees would not work on a company without a social mission, 80% is willing to receive a smaller wage to work in a socially responsible company, and 90% of the feels more motivated, inspired and loyal to a company that conducts CSR practices (Harvard Business School, 2021). On the other hand, in Developing countries, the awareness regarding CSR and the demand for these types of programmes are not as strong as in Developed countries. The less accentuated external pressure, the lack of solid institutions, and the general inexistence of complying legislation (Ghimire & Mukherjee, 2016) might ease corporations to conduct abusive behaviours without being held accountable by either the law or society. It is, therefore, essential to study how, in this context, subsidiary companies operating in Developed Countries develop their Corporate Social Responsibility Programmes.

2. LITERATURE REVIEW

Studying International CSR from the subsidiary's perspective from a developing country is quite complex, as there is a lack of specific literature. This study is a starting tentative in this analysis, aiming to build on existing literature on complementing areas to create a specialised framework. Literature regarding Corporate Social Responsibility, Corporate Social Responsibility in Developing Countries, and International Business will be considered to fill this gap.

2.1. Regarding Corporate Social Responsibility

“The term CSR is a brilliant one; it means something, but not always the same thing to everybody” (Votaw, 1973, p. 11). The “Corporate Social Responsibility” concept has been widely debated in the literature. The concept was first introduced in the United States after World War II and during the Cold War debate regarding communism versus capitalism (Carroll & Shabana, 2010). Corporate Social Responsibility presents the idea that individual entrepreneurship, as the central role of an economy, might also produce social welfare. Over the years, CSR has become an argument to defend new forms of socially responsible capitalism and save the capitalism system under siege (Porter & Kramer, 2011). Introduced by Bowen (1953|2013), the initial approach of CSR debated the morality of managers' individual decisions and their impact on the public. It was centred on questions such as “What constitutes good citizenship for a business enterprise?” or “How does a moral enterprise behave?” (Bowen, 1953|2013, p5). It was first discussed as a theoretical concept and started to spread during the 60's and the 70's, as Human Rights' movements gained importance (Carroll, 1999).

The first critics pointed out that CSR was an obstacle to profit maximisation, an intrusion on governmental activities, and an illusionary idea that was hard to implement (Levitt, 1958; Jones, 1980). However, the expanding integration of CSR as a common management practice in Developing countries companies in the last 50 years (The Economist, 2015; Pinkston and Carroll 1994), the growing interest from governments in incentivising CSR (McWilliams & Siegel 200; Steurer, 2010), and even the positive financial outcomes that seem to follow it (Buallay & Hawaj, 2021; Morningstar, 2021; The Economist, 2005 Ting, 2021), show that those concerns were not real. In 1984, Freeman (1984) introduced the stakeholder value approach that would revolutionise the business process. As the stakeholder value approach became more popular, so did CSR practices. The concept of the “Triple Bottom Line” (Elkington, 1994) got widely accepted, establishing that companies should focus as much on social and environmental issues as they do on profit, under the “profits, planet, people” motto. Literature regarding Corporate Social Responsibility evolved further and further away from the theoretical sphere (Lindgreen & Swaen, 2010), and the number of theoretical and empirical fruitful studies on the topic has increased exponentially. The current literature reviews on CSR contain not only the analysis of the concept according to academics (Dahlsrud, 2008; Carroll, 1999; Carroll, 2008) but also according to managers (O’Dwyer, 2002; Moir, 2001; Fatima & Elbanna, 2023). In some countries, like India, conducting CSR practices is even mandatory by law, but the advantages of this enforcement are still being studied (Bansal & Kumar, 2021; Jarboui et al., 2022; Aparna et al., 2023). Additionally, the concept of CSR has expanded into multiple related concepts, such as Strategic Corporate Social Responsibility (Porter & Kramer, 2006); Environmental, Social and Governance Responsibility (Global Reporting, 2022), Creating Shared Value (Kramer & Porter, 2011), among others, reinforcing the bond established between business and social action. Even though literature in the area has expanded exponentially (Annex 1), it is still very centred on the Developed nations (Sharma, 2019). The Locus and Motivation Framework, proposed by Hemingway and Maclagan (2004), is based on two main aspects: motivation and locus. The model considers that the locus of CSR could be linked to individual options when the manager is the central player behind CSR [the programmes would reflect the manager’s values and vision]; or to the corporate itself when the programmes reflect the values and the vision of the company. When it comes to the motivation behind CSR practices, the framework divides motivation into ideal/altruistic and strategic, admitting the hypothesis that a company might have both those motivations present, in a perspective of mutual benefit for the community and themselves, aligned with the concept of “Creating Shared Value”, presented by Porter & Kramer (2011). This point is quite crucial because the community plays a central role. When designing their strategies, firms must consider not only their goals but simultaneously their impact on all stakeholders, promoting integrated development. The strategic management stakeholder approach (Freeman & McNivea, 2001) defends that individuals depend on the firm while simultaneously, the firm depends on them. CSR aims to draw attention to those not often regarded stakeholders, with a particular emphasis on the community. Thus, enterprises must not only comprehend the market but also understand their stakeholders' characteristics and social needs and adapt to them (Freeman & McNivea, 2001).

2.2. Regarding CSR in Developing Countries

Corporate Social Responsibility practices in developing countries are still in their early stages. The existing literature on the topic is based mainly on the experiences of countries in the North (Jamali et al, 2009; Barkemeyer, 2009; Fox, 2004; Utting, 2001). Analysing CSR in Developing countries is crucial since companies are shifting their focus to Developing regions (McKinsey, 2013; OECD, 2007), and most of the world population lives in these countries, representing “the lion’s share of global social and environmental problems” (Jamali & Neville, 2011, p.599)

Political and cultural aspects cannot be forgotten when shaping CSR in Developing Countries (Visser, 2008). In fact, CSR is culturally embedded (Ameshi et al, 2006), “through the incorporation of root traditions of the countries” (Sharma, 2019, 714). For this reason, multiple authors question if firms could import CSR practices from Developed to Developing countries (Egri & Ralston, 2008; Jamali & Mirshak, 2007), considering differences in practices, problems, needs, and priorities (Stanislavská et al, 2020). There is a consensus that different contexts require different business roles in society (Hart, 1997; Barkemeyer, 2011). Compared to the practices in Developed countries, CSR in Developing countries seems more politically independent and less based on firms’ strategy (Visser, 2008), more idealistic and less formalised (Amaeshi et al., 2006). In Developing countries, CSR is sometimes not considered a business tool but a development tool (Gruber & Schlegelmilch, 2015), filling the gap left by the absence of strong institutions in these countries (Blowfield & Frynas, 2005). Some authors even consider CSR a potential long-term solution to development challenges (Cochran, 2007; Porter & Kramer, 2011; Visser, 2006), whereas others are more sceptical (Frynas, 2008; Jenkins, 2005). Whilst the debate regarding the role of CSR in International Development continues (Frynas, 2005; Prieto-Carrón et al., 2006), examples on both sides of the spectrum can be observed. While some “companies enter the arena of citizenship where government has not yet administered citizenship rights, for example, improving working conditions in sweatshops, ensuring for employees a living wage, and financing the schooling of child laborers in the absence of legislation requiring this” (Visser, 2008, 11); others use the less strict legal requirement as a shield to hide behaviours that would be illegal or unethical in other parts of the world. Applying the strategic / altruist motivation scale presented by Hemingway and Maclagan (2004) to the case of subsidiaries from multinationals conducting CSR programmes in Developing Countries, it is possible to consider that firms can have an idealistic motivation behind their CSR programmes, believing they can have a positive impact in a humanitarian/philanthropic way, “involving genuine optional caring, irrespective of whether the firm will reap concrete benefits or not” (Jamali et al., 2009, 360; Visser, 2008). On the other side, CSR programmes could be used strategically, in a business diplomacy logic, supporting international integration and helping the firm to be accepted in these countries (Gruber & Schlegelmilch, 2015). Gaining acceptance through social impact in the communities seems especially relevant in Developing countries (Monteiro & Meneses, 2015). Some authors seem to have a more sceptical view, arguing that “corporations adopt CSR to cover up the impact of their corporate misdemeanour” (Hemingway & Maclagan, 2004, 35), using greenwashing or social washing practices to manage the environment, establish relationships, acquire a good reputation and be seen as “good players”. Finally, firms can also have a perspective of mutual benefit for the community and themselves – a situation portrayed in the middle position of the vertical axis of the model and in the Created Share Value Approach (Porter & Kramer, 2011). CSR programmes create added value for the communities but might also benefit the company. Regarding the strategic management stakeholder approach, according to Visser et al. (2009), in Developing countries, firms must pay attention to the same stakeholders as in Developed Countries and four additional groups: trade unions, development agencies, international NGOs, and business associations. So, subsidiaries of MNCs operating in Developing countries are in a very complex dilemma; they must conform to local norms, values and practices and, at the same time, to global norms, values and practices (Chaudhri, 2006; Husted & Allen, 2006, 2008; Post, 2000, Logsdon & Wood, 2002, 2005; De George, 2005; Arthaud-Day, 2005; Muller, 2006; Husted & Allen, 2006; Filatotchev & Stahl, 2015; Gruber & Schlegelmilch, 2015); these subsidiaries have the pressure from a wide range of global and local stakeholders (Kolk & Margineantu, 2009; Muller, 2006; Muller & Kolk, 2010), which “dramatically increasing the complexity of the governance challenges and ethical dilemmas confronting them” (Filatotchev & Stahl, 2015, p. 2).

2.3. International CSR (headquarters perspective)

Multinationals face the perennial dilemma of balancing the need to keep “global consistency in CSR approaches with the need to be sensitive to the demands and expectations of local stakeholders” (Filatotchev & Stahl, 2015), as there are advantages and disadvantages in keeping a global, centrally coordinated approach; or keeping a local, decentralised approach (Muller, 2006; Husted and Allen, 2006). To understand the strategies companies might use, it is crucial to establish that the literature regarding International Corporate Social Responsibility borrows multiple concepts from the literature regarding International Business and International Business Political Behaviour (Barkemeyer & Figge, 2014; Jamali, 2010). When applying the International Strategy framework (Bartlett & Ghoshal, 1989), represented in Figure 1, to CSR strategies, it is possible to consider that firms might choose strategies that privilege local responsiveness or global responsiveness.

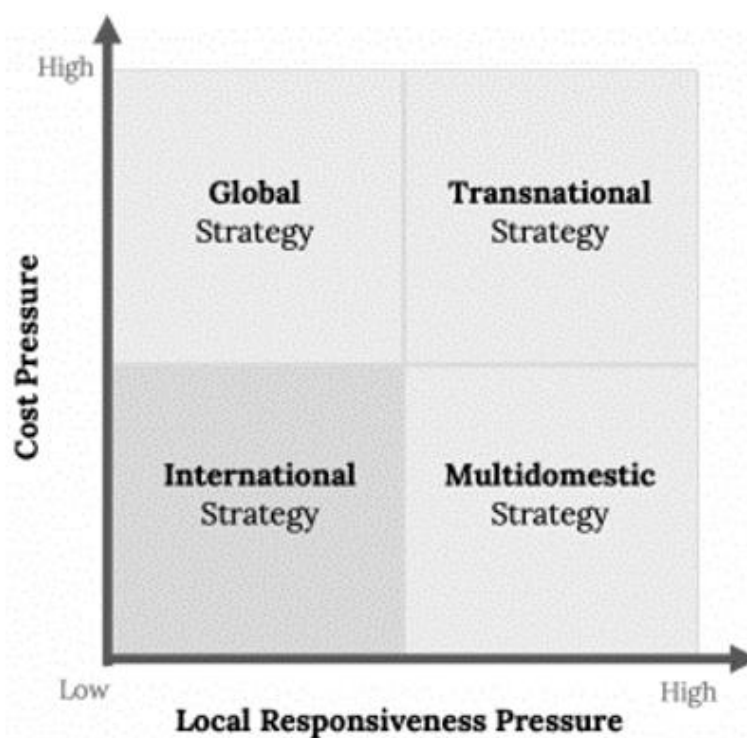


Figure 1: International Strategy Framework (Bartlett & Ghoshal, 1989)

Filatotchev and Stahl (2015) consider that International CSR might follow the Local [Multidomestic], Global, or Transnational. Some authors also consider the International strategy (McWilliams et al., 2006; Arthaud-Day, 2015; Bu & Chen, 2023). Both, the international and global strategies, have low local responsiveness – so from the perspective of the local subsidiary, it might be hard to distinguish these two strategies. It is hard to choose which dimension should be prioritised, significantly when values are disrupted between the local and the global context (Hilliard, 2019). A global CSR approach makes it more likely for managers to legitimise actions that are detrimental to the interests, values and practices of local stakeholders and ignore the specific problems and needs of the local community (Gruber & Schlegelmilch, 2015; Husted & Allen, 2006; Muller, 2006; Jamali, 2010). On the other hand, the local CSR approach may promote unethical practices and lead to disastrous decisions at the local level, mainly if weak institutions characterise the local context, inadequate regulations, ineffective law enforcement and human rights abuse (Filatotchev & Stahl, 2015).

The advantages of the transnational approach to CSR are recognised by multiple authors (Husted and Allen, 2006; Arthaud-Day, 2005; Gruber & Schlegelmilch, 2015; Filatotchev & Stahl, 2015; Bartlett & Ghoshal, 1989). As explained by Filatotchev and Stahl (2015, p.7) “a transnational approach adopts a hybrid strategy, based on the assumption that global and local approaches to CSR are not mutually exclusive. This approach defends that companies should “centralise when possible and also adapt to local conditions whenever necessary” (Arthaud-Day, 2005, p. 7), “becoming responsive to local needs while retaining global efficiency” (Bartlett and Ghoshal, 2000, p. 13). “A transnational CSR approach demands that companies develop a global template for their CSR activities (...) but allow subsidiaries to adapt that template, according to their specific needs and circumstances” (Filatotchev & Stahl, 2015, p. 7). This approach creates a comparative advantage for Multinationals, as they can benefit from both local and global specialisation (Harzing, 2000; Barkemeyer & Figge, 2014; Filatotchev & Stahl, 2015). It is still important to mention that some authors questioned if the transnational approach of CSR is “a realistic ambition or rather a utopian ideal” (Barkemeyer & Figge, 2014, p. 125), arguing that the headquartering effect necessarily leads to a prioritisation of the northern interests (Barkemeyer et. al, 2015) and their stakeholders’ agenda, failing to empower the stakeholders from Developing Countries (Barkemeyer & Figge, 2014). Nevertheless, an empirical study conducted by Gruber and Schlegelmilch, (2015) showed proof of decision-making autonomy at the local level, as every multinational company interviewed agreed that Africa was a special market, and most companies devoted special attention to it. The study concluded that “it seems as if Africa truly poses unique challenges to companies, which necessitate responsive CSR strategies to encounter them” (Gruber & Schlegelmilch, 2015, p. 594). This is an essential aspect to consider throughout the analysis. The dichotomy of the African and European reality should guide the research regarding the adaption of the programmes. Africa is a particular case given its history of environmental degradation, conflicts and severe poverty (Kolk & Lenfant, 2010; Kolk & Lefant, 2013) and therefore “CSR, as a locally rooted notion, should reflect “African” realities and take specific historical and cultural factors into account” (Kolk & Lenfant, 2013, p. 46). CSR actions should focus on social issues, such as education, training, and health care (Filatotchev & Stahl, 2015), whilst in Europe “a bias towards environmental issues” might be found in CSR actions (Barkemeyer, 2009).

2.4. International CSR from the perspective of the subsidiaries

Studying International CSR, from the perspective of the subsidiary from a developing country is crucial because it allows companies to understand the unique cultural, social, and economic contexts in which their subsidiaries operate. This knowledge can help companies to develop CSR policies and practices that are relevant and effective in local communities, which can contribute to positive social and environmental outcomes and strengthen their reputation. Furthermore, adopting a subsidiary perspective in CSR may assist businesses in identifying and addressing any disparities between their global CSR policy and the actual practices of their subsidiaries. However, studying CSR practices from the subsidiary perspective is quite complex. Some primordial studies have been taking place in recent years (Anlesinya & Abugre, 2021; Gulema & Roba, 2021; Cho et al., 2021; Amoako et al., 2021), but there is still a lack of specialised literature. To create a specialised framework that can efficiently characterise the CSR programmes of a subsidiary operation in a Developing country, the Adopt, Adapt and Create Approach (Table 1) was developed based on the literature review considered. This framework divides the CSR programmes implemented in a subsidiary considering the way their origination process, the level of independence and the stakeholders considered, concerning the headquarters company, dividing the programmes into three categories. Each category of CSR programmes is connected to the international business framework and characterised following the key factors: values, motivation, desired goals and implementation.

Values and motivation are vital factors to characterise the intentions and the beliefs behind the creation of CSR programmes, in accordance with the “Locus and Motivation” framework proposed by Hemingway and MacLagan, (2004) and the “Three-Domains of CSR” framework proposed by Carroll (1999). The desired goals and implementation are vital factors to characterise the objectives behind the creation of the CSR programmes and what problems and target groups they aim to tackle, in accordance with the “Stakeholder Approach” proposed by Freeman and McNivea (2001) and the “International Business Framework” proposed by Bartlett and Ghoshal (1989).

Characteristics of the Subsidiary’s CSR towards the Headquarters’ CSR	ADOPT	ADAPT	CREATE	NO CSR
Values	Shared (a)	Aligned (b)	Autonomous (c)	Different
Motivation	Shared	Aligned	Autonomous	Different
Desired Goals	Similar	Different	Autonomous	Different
Implementation	Similar	Different	Autonomous	Different
International Approach	Global	Transnational	Local	No CSR

Table 1: The Adopt, Adapt and Create Approach

Exploring the differences between shared, aligned, and autonomous characteristics is essential to comprehend the model. The definition of shared value is stricter than the definition of aligned value. The definition of shared value is so strict at its core that when a programme from a subsidiary follows a value that is shared with the headquarters company, there is no space for a different understanding regarding how that value can be implemented in different programmes; the programmes will necessarily be similar, following similar desired goals and having a similar implementation process. Whilst an aligned value leaves room for the subsidiary to understand the same belief in a different way, aiming to achieve different goals through a different form of implementation. We can use some examples to better understanding.

- The case for aligned values:
Headquarters A believes that carbon offsetting is very important. Therefore, headquarters A invests in an offsetting programme that only uses renewable energy. In the case of its subsidiary B, an offsetting programme focused on reforestation is more suitable for the company’s context; therefore, subsidiary B invests in an offsetting programme through reforestation. Both the companies created offsetting programmes, aligned with the value that offsetting is important, but the programmes created are not exactly similar.
- The case for shared values:
Headquarters A believes that a carbon offsetting focused on using renewable energy only is very important. Therefore, headquarter A and subsidiary B invest in offsetting programmes that only use renewable energy. The programmes are the same, as they share the same value.
- The case for autonomous values:
When two companies have autonomous values, no matter if the values are the same or different, they are not shared or aligned, as no interaction between the companies happens. Two companies that share all their values necessarily have the same identity. Nevertheless, two companies that only align their values can have different identities, following a similar underlying structure.

The Adopt, Adapt and Create approach results in the following categories of programmes:

1) Programmes that follow the Adopt Approach

This type of programmes are developed in the subsidiary by adopting similar existent programmes from the headquarters company. Because they are adopted entirely as they were conceived in the headquarters, the programmes implemented in the subsidiaries and in the headquarters have shared values and shared motivation, similar desired goals and similar implementation. These programmes are created based on developed countries' standards, and local responsiveness is not central. Therefore, we can consider that these programmes are aligned with the global and international strategy. It is possible to consider that when a firm follows an international or global strategy most of the programmes of its subsidiaries will be adopted from similar programmes implemented in the headquarters.

2) Programmes that follow the Adapt Approach

This type of programme is developed in the subsidiary by adapting similar programmes from the headquarters company. These programmes are adapted to the local context, stakeholders and needs but preserve the same basic structure as the analogous programmes from the headquarters company. We can consider that these programmes have values and motivation aligned with the similar programmes implemented in the headquarters company, but their desired goals and implementation are adapted to the local needs. These programmes consider both international and local stakeholders, balancing a level of responsiveness to both parties. Therefore, these programmes are aligned with the transnational strategy. It is possible to consider that when a firm follows a transnational strategy, most of the programmes of its subsidiaries will be adapted from programmes implemented in the headquarters.

3) Programmes that follow the Create Approach

These programmes are created, developed, and implemented by the subsidiary autonomously. Existing programmes of the headquarters company do not influence these programmes, having autonomous values, motivation, desired goals and implementation focused on the local context of the subsidiary. These programmes consider the local stakeholders exclusively, prioritising the level of responsiveness to these parties. Therefore, these programmes are aligned with the local, also known as multidomestic, approach. It is possible to consider that when a firm follows a local approach, most of the programmes of its subsidiaries will be created autonomously.

There is also the possibility that the subsidiary company does not follow any CSR programmes (“NO CSR”). In this possibility, the subsidiary does not follow the same core values, motivation, desired goals or implementation as the headquarters company CSR programmes, as social dumping is present in the subsidiary’s operations.

3. CONCLUSIONS

Literature on Corporate Social Responsibility often lacks studies focused on developing nations' perspectives. Driven primarily by a northern agenda, literature on International CSR tends to focus on the perspective of the headquarters companies, sacrificing studies focused on the perspective of its subsidiaries. Studying International CSR practices from a Multinational, considering the perspective of the subsidiaries operating in developing countries, is essential to fully understand the impact of CSR globally, especially where it is needed the most. To classify the CSR programmes developed in subsidiaries, we can use the “Adapt”, “Adopt”, and “Create” approach that classifies CSR programmes in accordance with the Values, Motivation, Desired Goals and Implementation process they follow, linking these programmes with the International Business Framework of “Global”, “Transnational” or “Local” programmes.

LITERATURE:

1. Amaeshi, K., B. Adi, C. Ogbechie and O. Amao (2006), CSR in Nigeria: Western Mimicry or Indigenous Influences?, *The Journal of Corporate Citizenship*, 24, 83–99
2. Amoako, K. O., Amoako, I. O., Tuffour, J., & Marfo, E. O. (2022). Formal and informal sustainability reporting: an insight from a mining company's subsidiary in Ghana. *Journal of Financial Reporting and Accounting*, 20(5), 897-925.
3. Anlesinya, A., & Abugre, J. B. (2022). Strategic CSR practices, strategic orientation and business value creation among multinational subsidiaries in Ghana. *Society and Business Review*, 17(2), 257-279.
4. Aparna K., A. S., & Raj L., V. (2023), "Customers' response to mandatory corporate social responsibility in India: an empirical evidence", *Social Responsibility Journal*, 19 (3), 429-445.
5. Arthaud-day, M.L. (2005), Transnational corporate social responsibility: a tri-dimensional approach to international CSR research, *Business Ethics Quarterly*, 15 (1), 1-22
6. Bansal, M., & Kumar, V. (2021). Forcing responsibility? Examining earnings management induced by mandatory corporate social responsibility: evidence from India. *Review of Accounting and Finance*, 20(2), 194-216.
7. Barkemeyer, R. (2009), Beyond compliance – below expectations? CSR in the context of international development, *Business Ethics: A European Review*, 18 (3), 273-289
8. Barkemeyer, R. (2011), Corporate perceptions of sustainability challenges in Developed and Developing countries: constituting a CSR divide?, *Social Responsibility Journal*, 7 (2), 257-281
9. Barkemeyer, R., & Figge, F. (2014). CSR in multiple environments: the impact of headquartering. *Critical perspectives on international business*, 10(3), 124-151.
10. Barkemeyer, R., Preuss, L., & Lee, L. (2015). On the effectiveness of private transnational governance regimes—Evaluating corporate sustainability reporting according to the Global Reporting Initiative. *Journal of World Business*, 50(2), 312-325.
11. Bartlett, C.A. & Ghoshal, S. (1999), *Managing Across Borders: The transnational solution*, Vol. 2, Harvard Business School Press, Boston, MA
12. Blowfield, M. & Frynas, J.G. (2005), Setting new agendas: critical perspectives on corporate social responsibility in the Developing world, *International Affairs*, 81 (3), 499-513.
13. Bowen, H. R. (2013). *Social responsibilities of the businessman*. University of Iowa Press
14. Bu, X., & Chen, L. (2023). From efficiency to legitimacy: the changing logic of internal CSR in emerging multinationals during internationalization. *Asian Business & Management*, 1-36.
15. Carroll, A. B. (1999). Corporate social responsibility: Evolution of a definitional construct. *Business & society*, 38(3), 268-295
16. Carroll, A. B., & Shabana, K. M. (2010). The business case for corporate social responsibility: A review of concepts, research and practice. *International journal of management reviews*, 12(1), 85-105
17. Carroll, Archie B. (2008), *A history of corporate social responsibility: Concepts and practices*. The Oxford handbook of corporate social responsibility 1.
18. Chaudhri, V.A. (2006), Organising global CSR. A case study of Hewlett-Packard's e-inclusion initiative, *Journal of Corporate Citizenship*, 23, 39-51.
19. Cho, C. H., Krasodomska, J., Ratliff-Miller, P., & Godawska, J. (2021). Internationalization and CSR reporting: evidence from US companies and their Polish subsidiaries. *Meditari Accountancy Research*, 29(7), 135-162.
20. Cochran, P.L. (2007), The evolution of corporate social responsibility, *Business Horizons*, 50 (6), 449-454

21. Cone (2015) “Ebiquity Global Corporate Social Responsibility Study” report <https://www.conecomm.com/research-blog/2015-cone-communications-ebiquity-global-csrstudy#download-research>
22. Dahlsrud, A. (2008). How corporate social responsibility is defined: an analysis of 37 definitions. *Corporate social responsibility and environmental management*, 15(1), 1-13
23. De George, R.T. (2005), Business Ethics, Pearson/Prentice Hall, Upper Saddle River, NJ
24. Egri, C.P. & Ralston, D.A. (2008), Corporate responsibility: a review of international management research from 1998 to 2007, *Journal of International Management*, 14 (4), 319-339.
25. Elkington, J. (2013). Enter the triple bottom line. In *The triple bottom line: Does it all add up?* (pp. 1-16). Routledge.
26. Epstein, E. M. (1989). Business ethics, corporate good citizenship and the corporate social policy process: A view from the United States. *Journal of Business Ethics*, 8(8), 583–595.
27. Fatima, T., & Elbanna, S. (2023). Corporate social responsibility (CSR) implementation: A review and a research agenda towards an integrative framework. *Journal of Business Ethics*, 183(1), 105-121.
28. Filatotchev, I., & Stahl, G. K. (2015). Towards transnational CSR. Corporate social responsibility approaches and governance solutions for multinational corporations. *Organizational Dynamics*, 44(2), 121-129.
29. Forbes (2019) “Corporate Responsibility: What To Expect In 2019” Retrieved on the 27th March 2022 <https://www.forbes.com/sites/dereksaul/2022/02/20/bernie-madoffs-sister-dies-in-apparent-murdersuicide/?sh=2ddd29344558>
30. Fox, T. (2004), Corporate social responsibility and development: in quest of an agenda, *Development*, 47 (3), 29-36.
31. Freeman, R. E. (1984). Strategic management: a stakeholder approach, Pitman. Boston, MA.
32. Freeman, R. E. (2010). Strategic management: A stakeholder approach. Cambridge University press
33. Freeman, R. E., & McVea, J. (2005). A stakeholder approach to strategic management. *The Blackwell handbook of strategic management*, 183-201.
34. Friedman, M. (1970). A theoretical framework for monetary analysis. *Journal of Political Economy*, 78(2), 193-238.
35. Frynas, J.G. (2008), Corporate social responsibility and international development: critical assessment, *Corporate Governance: An International Review*, 16 (4), 274-281.
36. Ghimire, S., Mukherjee, D., & Alvi, E. (2016). Aid for Trade and export performance of Developing countries. *Applied Econometrics and International Development*, 16(1), 23-34
37. Global Reporting (2022) “ESG standards, frameworks and everything in between “ retrieved on the 10th of September of 2022 from <https://www.globalreporting.org/media/jxkgrggd/gri-perspective-esgstandards-frameworks.pdf>
38. Gruber, V., & Schlegelmilch, B. B. (2015). MNEs’ regional headquarters and their CSR agenda in the African context. *International Marketing Review*, 32 (5), 576-602.
39. Gulema, T. F., & Roba, Y. T. (2021). Internal and external determinants of corporate social responsibility practices in multinational enterprise subsidiaries in developing countries: Evidence from Ethiopia. *Future Business Journal*, 7(1), 7
40. Hart, S.L. (1997), Beyond greening: strategies for a sustainable world, *Harvard Business Review*, 75 (1), 67-76
41. Harvard Business School (2021) “15 eye-opening corporate social responsibility statistics” Retrieved on the 27th March 2022 <https://online.hbs.edu/blog/post/corporate-social-responsibility-statistics>

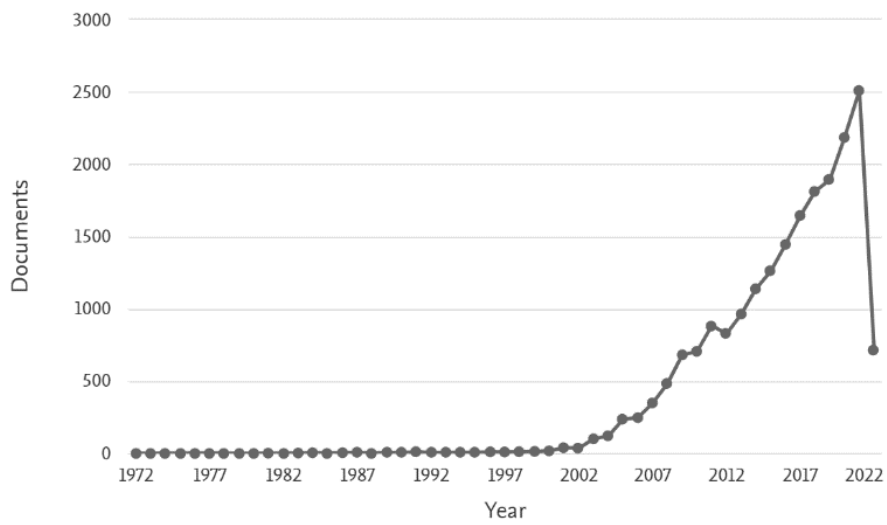
42. Harzing, A. W. (2000). An empirical analysis and extension of the Bartlett and Ghoshal typology of multinational companies. *Journal of international business studies*, 31, 101-120.
43. Hemingway, C. A., & Maclagan, P. W. (2004). Managers' personal values as drivers of corporate social responsibility. *Journal of Business Ethics*, 50(1), 33-44
44. Hilliard, I. (2019). *Coherency Management*. Springer International Publishing.
45. Husted, B.W. & Allen, D.B. (2008), Toward a model of cross-cultural business ethics: the impact of individualism and collectivism on the ethical decision-making process, *Journal of Business Ethics*, 82 (2), 293-305.
46. Jamali, D. & Mirshak, R. (2007), Corporate social responsibility (CSR): theory and practice in a Developing country context, *Journal of Business Ethics*, 72 (3), 243-262.
47. Jamali, D. (2010). The CSR of MNC subsidiaries in developing countries: global, local, substantive or diluted?. *Journal of business ethics*, 93, 181-200.
48. Jamali, D., & Neville, B. (2011). Convergence versus divergence of CSR in developing countries: An embedded multi-layered institutional lens. *Journal of Business Ethics*, 102, 599-621.
49. Jamali, D., Zanhour, M., & Keshishian, T. (2009). Peculiar strengths and relational attributes of SMEs in the context of CSR. *Journal of business Ethics*, 87(3), 355-377
50. Jamali, D., Zanhour, M., & Keshishian, T. (2009). Peculiar strengths and relational attributes of SMEs in the context of CSR. *Journal of business Ethics*, 87, 355-377.
51. Jarboui, A., Dammak Ben Hlima, N., & Bouaziz, D. (2023). Do sustainability committee characteristics affect CSR performance? Evidence from India. *Benchmarking: An International Journal*, 30(2), 628-652.
52. Jenkins, R. (2005), Globalization, corporate social responsibility and poverty, *International Affairs*, 81 (3), 525-540
53. Jones, T. M. (1980). Corporate social responsibility revisited, redefined. *California Management Review*, 22(3), 59-67
54. Kolk, A. & Lenfant, F. (2010), MNC reporting on CSR and conflict in central Africa, *Journal of Business Ethics*, 93 (2), 241-255.
55. Kolk, A. & Lenfant, F. (2013), Multinationals, CSR and partnerships in central African conflict countries, *Corporate Social Responsibility & Environmental Management*, 20 (1), 43-54.
56. Kolk, A., & Margineantu, A. (2009). Globalisation/regionalisation of accounting firms and their sustainability services. *International Marketing Review*, 26 (4/5), 396-410.
57. Kramer, M. R., & Porter, M. (2011). *Creating shared value* (Vol. 17). Boston, MA, USA: FSG.
58. Levitt, T. (1958). The dangers of social-responsibility. *Harvard Business Review*, 36(5), 41-50
59. Lindgreen, A., & Swaen, V. (2010). Corporate social responsibility. *International Journal of Management Reviews*, 12(1), 1-7
60. Lindgreen, A., & Swaen, V. (2010). Corporate social responsibility. *International Journal of Management Reviews*, 12(1), 1-7.
61. Logsdon, J.M. & Wood, D.J. (2002), Business citizenship: from domestic to global level of analysis, *Business Ethics Quarterly*, 12 (2), 155-187.
62. Logsdon, J.M. & Wood, D.J. (2005), Global business citizenship and voluntary codes of ethical conduct, *Journal of Business Ethics*, 59 (1/2), 55-67.
63. McKinsey (2013) "Urban world: The shifting global business landscape" retrieved on the 20th of September of 2022 from https://www.mckinsey.com/~media/McKinsey/Featured%20Insights/Urbanization/Urban%20world%20The%20shifting%20global%20business%20landscape/MGI_Urban_world3_ES_Oct2013.pdf

64. McWilliams, A., & Siegel, D. (2001). Corporate social responsibility: A theory of the firm perspective. *Academy of Management Review*, 26(1), 117-127.
65. Moir, L. (2001). What do we mean by corporate social responsibility?. *Corporate Governance: The international Journal of Business in Society*, 1(2), 16-22.
66. Monteiro, R., & Meneses, R. (2015). The relevance of business diplomacy in internationalisation processes: an empirical study. *International Journal of Business and Globalisation*, 15(1), 20-44.
67. Morningstar (2021) "Morningstar's ESG Indexes Have Outperformed and Protected on the Downside" retrieved on the 16th of September of 2022 from <https://www.morningstar.com/insights/2021/02/08/morningstars-esg-indexes-have-outperformed-and-protected-on-the-downside>
68. Muller, A. (2006), Global versus local CSR strategies, *European Management Journal*, 24 (2), 189-198.
69. Muller, A., & Kolk, A. (2010). Extrinsic and intrinsic drivers of corporate social performance: Evidence from foreign and domestic firms in Mexico. *Journal of Management studies*, 47(1), 1-26.
70. O'dwyer, B. (2002). Managerial perceptions of corporate social disclosure: An Irish story. *Accounting, Auditing & Accountability Journal*, 15(3), 406-436.
71. O'Dwyer, B. (2003). Conceptions of corporate social responsibility: the nature of managerial capture. *Accounting, Auditing & Accountability Journal*, 16 (4), 523-557.
72. OECD (2007) "Moving Up the Value Chain: Staying Competitive in the Global Economy - MAIN FINDINGS" retrieved on the 20th of September of 2022 from <https://www.oecd.org/sti/ind/38558080.pdf>
73. Pinkston, T. S., & Carroll, A. B. (1994). Corporate citizenship perspectives and foreign direct investment in the US. *Journal of Business Ethics*, 13(3), 157-169
74. Porter, M. E., & Kramer, M. R. (2006). The link between competitive advantage and corporate social responsibility. *Harvard Business Review*, 84(12), 78-92
75. Post, J.E. (2000), Meeting the Challenge of Global Corporate Citizenship, Boston College Center for Corporate Community Relations, Boston.
76. Prieto-Carrón, M., Lund-Thomsen, P., Chan, A., Muro, A. & Bhushan, C. (2006), Critical perspectives on CSR and development: what we know, what we don't know, and what we need to know, *International Affairs*, 82 (5), 977-987.
77. Sharma, E. (2019). A review of corporate social responsibility in Developed and Developing nations. *Corporate Social Responsibility and Environmental Management*, 26(4), 712-720
78. Soares, C. (2003). Corporate versus individual moral responsibility. *Journal of Business Ethics*, 46(2), 43–150
79. Stanislavská, S., Pilař, L., Margarisová, K., & Kvasnička, R. (2020). Corporate social responsibility and social media: Comparison between Developing and Developed countries. *Sustainability*, 12(13), 5255
80. Steurer, R. (2010). The role of governments in corporate social responsibility: Characterising public policies on CSR in Europe. *Policy Sciences*, 43(1), 49-72
81. The Economist (2015), "The world according to CSR" Retrieved on the 5th April 2022 from <https://www.economist.com/special-report/2005/01/22/the-world-according-to-csr>
82. Ting, P. H. (2021). Do large firms just talk corporate social responsibility?-the evidence from CSR report disclosure. *Finance Research Letters*, 38, 101476
83. Utting, P. (2001), "Promoting socially responsible business in Developing countries. The potential and limits of voluntary initiatives", Report of the UNRISD Workshop 23-24 October, 2000, United Nations Research Institute for Social Development, Geneva

84. Visser, W. (2006), “Research on corporate citizenship in Africa: a ten-year review (1995-2005)”, in Visser, W., McIntosh, M. and Middleton, C. (Eds), *Corporate Citizenship in Africa: Lessons from the Past: Paths to the Future*, Greenleaf Publishing, Sheffield, pp. 18-28.
85. Visser, W.: 2008, ‘Corporate Social Responsibility in Developing countries’, in A. Crane, A. McWilliams, D. Matten, J. Moon and D. Siegel (eds.), *The Oxford Handbook of Corporate Social Responsibility* (Oxford University Press, Oxford), pp. 473–503.
86. Visser, W., Matten, D., Pohl, M., & Tolhurst, N. (2009). *The A to Z of corporate social responsibility: A complete reference guide to concepts, codes and organisations*. John Wiley & Sons.
87. Votaw, D. (1973). *Genius becomes rare. The corporate dilemma*. Englewood Cliffs, NJ: Prentice Hall

APPENDIX

Documents by year



*Annex 1: Evolution of papers about CSR, Indexed in Scopus
Scopus, Graph CSR, Retrieved on the 4th of April 2022
TITLE-ABS-KEY ("corporate social responsibility") AND (LIMIT-TO (SUBJAREA,
"BUSI") OR LIMIT-TO (SUBJAREA, "SOCI" OR LIMIT-TO (SUBJAREA "ECON"))*

ASSESSING THE EFFECTS OF GAS AND CO₂ EMISSIONS ALLOWANCE PRICING ON CHP SYSTEM ECONOMIC PERFORMANCE

Dubravka Pekanov

*Faculty of Economics in Osijek, Trg Ljudevita Gaja 7, 31000 Osijek, Croatia
dubravka.pekanov@efos.hr*

ABSTRACT

Combined heat and power (CHP) systems offer a promising solution for reducing energy consumption and greenhouse gas (GHG) emissions, by minimizing losses associated with separate heat and electricity production. Given the energy crisis that Europe faced in 2021, this paper examined the economic performance of CHP system in the context of significant changes in the energy market. Specifically, the study aimed to investigate the impact of rising gas and CO₂ allowance prices, which directly affect the price of electricity generated by CHP system. Two scenarios were evaluated using sensitivity analysis, each assessing the effect of varying gas and CO₂ allowance prices. Additionally, changes in electricity prices were also analyzed to assess their potential impact on the economic performance of gas CHP system. The findings indicate that the economic performance of CHP system is highly vulnerable to fluctuations in gas and CO₂ allowance prices, as well as electricity prices. Therefore, it is critical to account for these factors when designing and operating gas CHP systems, to optimize performance and financial returns. This study provides a valuable tool for decision-making and designing efficient and effective CHP systems, by analyzing the effects of changing energy market conditions on their economic performance.

Keywords: *CHP plant, Energy generation, Sensitivity analysis, Net present value, Internal rate of return*

1. INTRODUCTION

According to the European Green Deal (EC, 2019), energy generation and consumption account for three-quarters of all greenhouse gas emissions in the EU. Therefore, the EU strongly encourages investments in renewable energy sources to reduce these emissions. It is also in Croatia's strategic interest that changes in the overall energy consumption structure move towards increasing energy supply security and quality, with a focus on greater use of renewable energy sources, and low-emission greenhouse gas technologies. The Energy Development Strategy of the Republic of Croatia (Official Gazette, 25/2020) highlights the importance of natural gas in the shift towards a low-carbon economy, as the fossil fuel with the lowest CO₂ emissions. This aligns with the EU taxonomy, which provides a categorization system for economically viable investment activities that are environmentally sustainable. The EU taxonomy for sustainable activities (EC, 2022) includes gas and nuclear energy as transitional fuels that can aid in the achievement of climate neutrality by 2050. Their utilization can expedite the transition from more harmful energy sources such as coal. However, in 2021, Europe faced an energy crisis characterized by exceptionally high prices of natural gas and electricity. This crisis was compounded by the ongoing Russian invasion of Ukraine, which further intensified concerns about energy security and the need to transition towards alternative energy sources. To address this situation, the European Commission introduced the REPowerEU Plan in March 2022 (EC, 2022a), with the goal of ending the EU's dependence on Russian fossil fuels, particularly imports of natural gas, by the year 2030. Despite this plan, conventional energy sources still occupy a significant portion of Europe's energy portfolio, highlighting the need for continued efforts to transition to more sustainable energy sources. While addressing Europe's energy crisis, ensuring a secure supply of electricity remains a critical priority for European

Member States (VVA consulting, Copenhagen Economics, Neon & Deloitte, 2018). Moreover, preparing the EU electricity market for the transition to clean energy is an essential component of the Clean Energy for all Europeans package introduced by the European Commission in 2019 (EC, 2019a). Combined heat and power (CHP) systems are a type of power generation system that produce both electricity and heat, with some of the generated heat delivered as a product, resulting in higher cogeneration efficiencies. One of the main advantages of CHP, also known as cogeneration, is its potential to minimize energy consumption and lower greenhouse gas emissions by avoiding the losses associated with separate production of heat and electricity. Consequently, CHP systems can make a notable contribution to mitigating climate change. However, recent research has shown that investments in conventional, flexible power plants such as natural gas have become unprofitable, despite the need for investments in flexible energy production facilities (see Borožan et al., 2020). These facilities may be the sole viable choice in an electricity system with significant penetration of intermittent renewables. In addition, earlier studies, such as those of Gołębiewski and Galant-Gołębiewska (2021), Colantoni et al. (2021) and Pääkkönen and Joronen (2019), have demonstrated that CHP facilities, and their financial flows, are highly sensitive to changes in input parameters, particularly gas and CO₂ allowance prices, while economic performance is significantly dependent on projected electricity prices. Therefore, the purpose of this paper is to examine the potential effects of changes in the energy market on the viability of investing in a 450 MW CHP unit designed for the simultaneous production of electricity and thermal energy based on gas turbine technology. This single-shaft concept has four main components: a steam turbine, generator, gas turbine, and an exhaust gas boiler. The paper will evaluate financial indicators, such as NPV and IRR, for three distinct scenarios, to determine the sensitivity of the results to changes in gas and CO₂ allowance prices, as well as changes in electricity prices. The remainder of this paper is organized as follows. Following the introduction, the second chapter presents a conceptual framework that comprises a literature review on the effects of price changes in input parameters on the economic performance of CHP plants. The third chapter provides a description of the data sources and methods used for the analysis. In the fourth chapter, the impact of changes in gas and CO₂ allowance, as well as electricity prices on the financial indicators is discussed. The paper concludes with the final chapter, where the findings are summarized and conclusions are drawn.

2. CONTEXTUAL BACKGROUND WITH LITERATURE REVIEW

Risk is inherent in any investment decision, and the presence of uncertainty can have a significant impact on the outcome of future events. Sensitivity analysis is a useful method for anticipating the effect of input data on the output results of a model. This method is particularly important in the assessment of investment projects where uncertainty is a factor, such as in the case of combined heat and power (CHP) systems. CHP systems face potential risks stemming from multiple factors, such as fluctuations in fuel costs, electricity and thermal prices, and potential escalation in CO₂ allowance prices. Therefore, previous research has highlighted the importance of considering multiple uncertainties and economic parameters when evaluating the economic performance of CHP systems. Gołębiewski and Galant-Gołębiewska (2021) highlighted the importance of investment risk considerations and sensitivity analysis in evaluating the profitability and viability of CHP plants. Their technical and economic analysis of distributed electricity and heat production using natural gas evaluated the impact of changes in gas and electricity prices and environmental fees on investment profitability. The results demonstrated that variable power solutions have the lowest investment risk and potential as a viable option for distributed energy production. Similarly, Król and Ocloń (2019) conducted an energy and economic analysis of a hybrid cogeneration power plant in Poland and performed a sensitivity analysis to assess the impact of significant changes in the energy market since early

2018. The authors highlighted the vulnerability of hard coal technologies to the increasing CO₂ allowance prices. Król and Ocloń (2018) have been additionally dealing with the cost of CO₂ emissions and found that the CO₂ emission cost has a considerable influence on the installations' profit. Additionally, their cost analysis of a medium-sized CHP operation in Poland found that future CO₂ emission price increases have a significant impact on thermal and electrical energy production activity. In a study by Colantoni et al. (2021), the Net Present Value (NPV) of investment in cogeneration plants was assessed through Monte Carlo simulation, evaluating the likelihood of a favorable NPV for cogeneration plants of three different sizes. The sensitivity analysis revealed that the cost of biomass, electricity selling price, and amount of gasification product gas were the most significant factors affecting the NPV. The authors proposed that the utilization of internally generated biomass waste and green energy certificates could contribute to the success of the initiative. Pääkkönen and Joronen (2019) analyzed the feasibility of operational flexibility in a bio-fueled CHP plant using a spreadsheet model. Their study demonstrated that CHP plants could balance power gaps and be profitable in future energy systems. The sensitivity analysis conducted identified fuel costs and selling price for heat as the two most significant factors influencing the CHP plant's profitability. Other researchers have examined the potential of using new technologies and energy sources in CHP plants. Zhang et al. (2018) introduced a novel combined cooling, heating and power (CCHP) system that uses biomass, natural gas, and geothermal energy. Through thermodynamic and economic analyses, the authors investigated the impact of operating parameters and economic factors on the system's performance. Their study included a sensitivity analysis of economic factors, which revealed that an increase in biomass and natural gas prices, as well as interest rates, led to a rise in the levelized cost of energy. Older studies such as Tolis and Rentizelas (2011) provided insights on the impact of different scenarios of electricity and CO₂ allowance prices on power sector portfolios. Their study highlighted the potential benefits of increasing electricity prices and raising CO₂ allowance prices, which could generate favorable conditions for renewable energy investments. Additionally, Keppo and Savola (2007) investigated the financial feasibility of small biofuel-fired CHP plants by utilizing an optimization model that was founded on simulation data for three operational plants. Their outcomes imply that elevated electricity prices or reduced investment expenses are necessary to make CHP plants desirable for use in minor district heating networks. However, the sensitivity of their findings to the original economic parameters points to the potential uncertainty over future cash flows, which could reduce investments in small CHP plants. Finally, Wang et al. (2011) developed a techno-economic model to analyze hybrid heating systems that incorporate combined heat and power plants and gas-fired boilers, with a specific focus on conducting sensitivity analysis and examining the effects of fuel prices. The results indicate that the heating cost of a CHP system is more sensitive to fluctuations in coal price, whereas the optimal heat load ratio is more affected by variations in gas prices. These findings highlight the importance of considering fuel prices and sensitivity analysis when designing hybrid heating systems. Overall, these studies demonstrate the importance of considering economic viability when making decisions regarding the power sector. Renewable energy investments, operational flexibility, and sensitivity analysis of economic parameters are all important factors to consider in ensuring profitable and sustainable energy systems.

3. METHODOLOGY

3.1. Analysis assumptions and data sources

The analysis was conducted from the perspective of the investor and is based on constant prices. The financial analysis period is forecasted for 20 years. The investment amount in the project is based on the technical and technological characteristics of the plant (see more in Borozan et al., 2015).

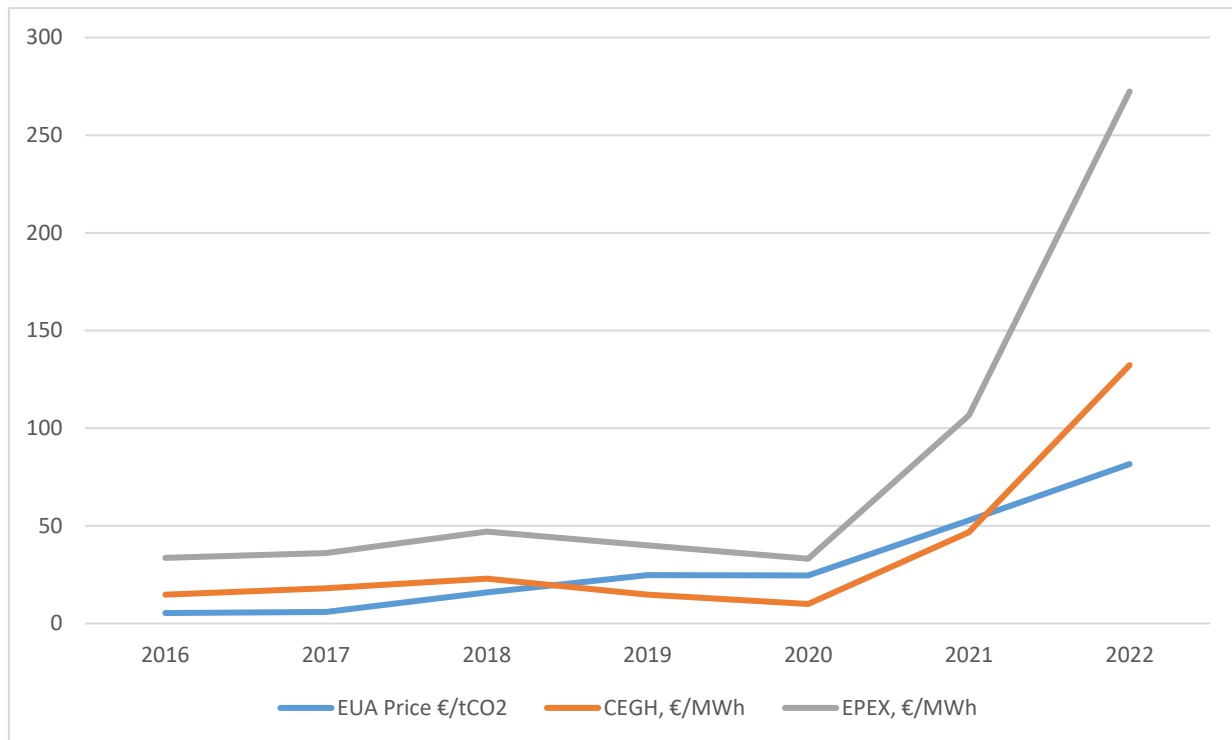
In the base scenario, the price of natural gas is estimated at €25/MWh, the price of electricity at €65/MWh, and the cost of emitting one ton of CO₂ at €10/ton. Two assumptions about electricity prices were used to optimize electricity production: a period of high electricity prices and a period of low electricity prices. In addition, the week is divided into three different types: five working days, Saturday, and Sunday. For natural gas, hot water, and steam prices, it was assumed that they do not depend on the time of day. As for thermal energy production, a capacity of 125 MWt is predicted. The number of working hours per year varies depending on the maintenance mode of the gas turbine. The following table illustrates the share of individual operational costs in the total operational costs of the CHP plant.

Cost	Share, in %
Fuel costs	66.64%
Maintenance costs	5.24%
Salaries	0.20%
Water charges	0.15%
Costs for CO ₂ and NO _x emissions	5.79%
Cooling water costs	1.44%
Depreciation	11.32%
Financial costs	7.39%
Administrative, service and immaterial costs	1.84
Total	100.00

*Table 1: Share of individual operational cost categories in the total operational costs of the CHP plant
(Source: IGH, 2014)*

Considering that natural gas accounts for 2/3 of the total operational costs of CHP 450 power plant and represents a significant portion of the expenses involved in generating heat and electricity, its role in maintaining competitive energy production is crucial. In addition, emission fees comprise nearly 6 % of the operational costs of CHP plant and will be included in the sensitivity analysis alongside natural gas. Ultimately, the analysis will test the sensitivity of project financial indicators to fluctuations in electricity prices. The Central European Gas Hub (CEGH) in Baumgarten is an essential data source for monitoring gas spot prices in this paper. The leading power exchange for trading in Central Western Europe, the United Kingdom, and the Nordic countries is the European Power Exchange (EPEX), which is the basis for electricity spot prices. Statista (2023) is a key source of data for the spot prices of European Union Emission Allowances (EUA). Figure 1 shows the annual average trends of natural gas prices (in euros per MWh), electricity prices, and EUA prices from January 2016 to September 2022.

Figure following on the next page



*Figure 1: Gas, electricity and EUA prices in the period 2016-2022
(Source: for gas prices, CEGH; for electricity prices, EPEX; for EUA prices, Statista)*

Given the significant changes that have occurred in the energy market since 2018, the sensitivity analysis in this study will utilize assumptions about gas prices, electricity prices, and CO₂ allowance prices, based on average spot prices from 2018, 2020, and 2022. These assumptions will be used to calculate financial indicators, namely NPV and IRR and to consequently reevaluate the investment project. The changes in gas prices, electricity prices, and CO₂ allowance prices compared to the base scenario prices are presented in Table 2.

Year	Average spot prices			Price change (Base scenario =100)		
	Gas (€/MWh)	Electricity (€/MWh)	CO ₂ (€/t)	Gas	Electricity	CO ₂
2018	23.02	46.97	15.94	92.07	72.27	159.36
2020	9.99	33.15	24.62	39.98	50.99	246.17
2022	132.27	272.37	81.62	529.07	419.04	816.22

Table 2: Changes in gas prices, electricity prices, and emission allowance prices compared to the base scenario

As can be observed from the preceding table, the energy market is undergoing notable changes that have a consequential impact on the profitability of undertaken investments. With the increase in input parameter prices for the project, in this case, gas, electricity, and CO₂ allowances by 429.07%, 319.04%, and 716.22%, respectively, in 2022, no project can be financially justified.

3.2. Methods

Financial net present value (FNPV) represents the difference between the present value of a project's net cash flows and the present value of the investment amount. The equation shows the formula for calculating the financial net present value.

Equation 1. Financial net present value calculation

$$FNPV = \sum_{n=1}^t NP * \frac{1}{(1+r)^n}$$

where:

FNPV – Financial net present value

NP – net cash flows

r – discount rate

n – years

Net present value of cash flow includes all revenues and costs of the investment and takes into account the time value of money. When assessing FNPV, three values may arise:

$$FNPV < 0, \quad FNPV = 0 \quad \text{and} \quad FNPV > 0.$$

When the cash flows of a project or investment are discounted using a particular discount rate, a positive FNPV indicates that the project or investment is profitable, while a negative NPV implies that the project or investment is not profitable.

Internal rate of return (Internal rate of profitability, IRR) is another important indicator of project efficiency and represents the discount rate at which the financial net present value of the project is equal to 0. Equation 2 shows the formula for calculating the internal rate of return.

Equation 2. Internal rate of return calculation

$$0 = \sum_{n=1}^t NP * \frac{1}{(1+r)^n}$$

If the internal rate of return is lower than the discount rate, the project's revenues will not cover the costs.

Sensitivity analysis. By conducting sensitivity analysis, the sensitivity of the project to changes in critical parameters is determined. The ultimate goal is to determine the values of the financial net present value and internal rate of return after changing critical parameters. These calculations lead to new project acceptability values calculated within the financial analysis of the project, enabling the analyst to assess and draw conclusions about the impact of changing critical variables on project results.

4. RESULTS AND DISCUSSION

Sensitivity analysis determines the project's sensitivity to changes in key parameters. The sensitivity analysis for the 450 MW CHP power plant construction project will be performed for the following key parameters: natural gas price, CO2 allowance price, and electricity price. In the sensitivity analysis, changes in the project's financial indicators (FNPV and IRR) will be tested against changes in the energy market. Specifically, average spot prices on the energy market for gas, electricity, and CO2 allowances will be used to determine how significant changes in the energy market would affect the project's profitability compared to the base scenario where gas price of €25/MWh, electricity price of €65/MWh, and CO2 allowance price of €10/t were used. The following table shows the effects of these changes on the economic performance of investing in a 450 MW CHP.

	Base scenario = 100	Change in the NPV and IRR as a result of the change in the price of:								
		2018			2020			2022		
		gas	electricity	CO2	gas	electricity	CO2	gas	electricity	CO2
NPV	100	189.11	-421.37	46.20	775.55	-865.70	-33.27	-5,876.54	5,433.82	-653.04
IRR	100	122.09	-148.55	85.73	242.36	NA	62.91	NA	815.64	-682.64

Table 3: Sensitivity analysis of NPV and IRR compared to the base scenario (Source: Author's calculations)

Table 3 demonstrates that the project is highly sensitive to changes in electricity and natural gas prices, as well as CO2 allowance prices. The changes that occurred in the energy market have led to a deterioration of investment financial indicators. The increase in electricity prices in 2018 resulted in a negative FNPV, which was also the case in 2020. During 2022, a significant increase in electricity prices impacted an increase in financial indicators. On the other hand, in 2022, the price of natural gas also increased significantly, resulting in a negative FNPV. In order to determine the inputs that have the greatest impact on the financial indicators of investment feasibility, an additional sensitivity analysis was conducted where the critical project parameters were varied by +/- 5% and +/- 10% (individually, without changing other parameters) (Table 4).

	Base scenario = 100	5%	10%	5%	10%	-5%	-10%
		gas		CO2		electricity	
NPV	100	43.74	-12.74	95.47	90.94	16.41	-69.00
IRR	100	85.00	69.00	98.82	97.64	77.36	51.91

Table 4: Sensitivity analysis of NPV and IRR (Source: Author's calculations)

It was found that an increase of 10% in the natural gas price, as well as a decrease in the electricity price by the same percentage, results in a negative financial net present value. Earlier research confirmed that the fuel price is the dominant factor influencing the economic performance of CHP plants (Colantoni et al., 2021; Pääkkönen and Joronen, 2019; Wang et al., 2011). On the other hand, the emission allowance prices do not have a similar impact on this project's financial indicators. Namely, an increase in CO2 allowance prices by 10% results in slightly less than a 10% reduction in project NPV. However, when market changes are so significant that emission allowance prices increase by more than 400% over a four-year period, then their impact on the assessment of project financial feasibility becomes significant. In this context, the aforementioned observation aligns with previous studies that have investigated the influence of emission prices on the economic performance of CHP plants, as demonstrated by Król and Ocloń (2018, 2019). The findings indicate that it is crucial to take into account the aforementioned factors when designing and operating combined heat and power (CHP) systems, in order to attain the best possible performance and financial returns. Therefore, it is recommended to conduct a thorough analysis of the energy market trends and input parameter changes, such as natural gas and electricity prices, as well as CO2 allowance prices, and their impact on project feasibility indicators.

5. CONCLUSION

Recent political developments have highlighted the EU's mixed response to the transition towards climate neutrality. While there has been a drive towards increasing renewable energy, efficiency, and alternative energy sources, which are seen as essential for reducing reliance on fossil fuels and mitigating against energy price hikes, arguments have also been made for the need to invest in new fossil gas infrastructure to diversify supply routes and secure long-term supply contracts with non-Russian producers.

This debate over the role of natural gas as a transitional fuel has raised concerns about its environmental impact, emphasizing the need for careful consideration of alternative energy sources and the development of sustainable, low-carbon energy systems. In this paper, the objective was to assess the impact of changes in the energy market on the viability of investing in a 450 MW CHP unit that generates both electricity and thermal energy simultaneously. Three distinct scenarios were examined, and financial indicators NPV and IRR were evaluated to ascertain the impact of gas and CO₂ allowance prices, as well as electricity prices. The results showed that the project is highly vulnerable to variations in electricity and natural gas prices, as well as CO₂ allowance prices. Changes in the energy market would negatively affect the project's financial indicators. Specifically, the increase in electricity prices in 2018 and 2020 would result in a negative FNPV. However, during 2022, a substantial increase in electricity prices would have a positive impact on financial indicators. Conversely, the significant increase in gas price in 2022 would lead to a negative FNPV. Additionally, it was observed that a 10% increase in natural gas prices or a 10% decrease in electricity prices would result in a negative FNPV. To make informed decisions about energy investments, it is crucial to understand how changes in the energy market can impact the feasibility of different types and sizes of CHP systems. Further research is needed to explore this issue, which would allow for a more informed selection of viable energy projects under varying market conditions. Additionally, it is essential to investigate the role of natural gas in the transition to a low-carbon energy system. By examining the potential risks and benefits of investing in new fossil gas infrastructure, it could be better determined if such investments align with climate goals and energy security objectives.

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LITERATURE:

1. Borozan, D., Starcevic, D. P., & Adzic, S. (2015, August). The Internalization of External Costs of CHP Plants in Croatia. *Energy Procedia*, 75, 2596–2603. <https://doi.org/10.1016/j.egypro.2015.07.321>
2. Borozan, Pekanov Starčević, & Radman Funarić. (2020). Toward a European Energy Union: Financial Ratio Analysis of the EU Energy Sector. In *Proceedings of the 23rd Eurasia Business and Economics Society Conference*. Springer, Cham.
3. CEGH (2023). *Market Data*. Retrieved 4.3.2023. from <https://www.cegh.at/en/exchange-market/market-data/>.
4. Colantoni, A., Villarini, M., Monarca, D., Carlini, M., Mosconi, E. M., Bocci, E., & Rajabi Hamedani, S. (2021, November). Economic analysis and risk assessment of biomass gasification CHP systems of different sizes through Monte Carlo simulation. *Energy Reports*, 7, 1954–1961. <https://doi.org/10.1016/j.egypr.2021.03.028>
5. EEX (2023). *Market Data*. Retrieved 4.3.2023. from <https://www.eex.com/en/market-data>.
6. Energy Development Strategy of the Republic of Croatia until 2030 with an outlook to 2050. *Official Gazette*: 25/2020.
7. European Commission. (EC, 2019a). *Clean energy for all Europeans package*. Retrieved 1.3.2023. from https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package_en.
8. European Commission. (EC, 2019). *Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, COM (2019) 640 final. The European Green Deal*. Retrieved 25.2.2023. from https://ec.europa.eu/info/sites/default/files/european-green-dealcommunication_en.pdf.

9. European Commission. (EC, 2022). *EU taxonomy for sustainable activities*. Retrieved 20.2.2023. from https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en.
10. European Commission. (EC, 2022a). *REPowerEU: A plan to rapidly reduce dependence on Russian fossil fuels and fast forward the green transition*. Retrieved 10.2.2023. from https://ec.europa.eu/commission/presscorner/detail/en/ip_22_3131.
11. Gołębiewski, M., & Galant-Gołębiewska, M. (2021, November 11). Economic Model and Risk Analysis of Energy Investments Based on Cogeneration Systems and Renewable Energy Sources. *Energies*, 14(22), 7538. <https://doi.org/10.3390/en14227538>
12. Institut IGH d.d. (2014). *Investment program for combined cycle heat and power plant*, Zagreb.
13. Keppo, I., & Savola, T. (2007, April). Economic appraisal of small biofuel fired CHP plants. *Energy Conversion and Management*, 48(4), 1212–1221. <https://doi.org/10.1016/j.enconman.2006.10.010>
14. Król, J., & Ocloń, P. (2018, September). Economic analysis of heat production in existing medium size combined heat and power plant, with respect to the CO2 allowances purchasing cost. *Energy Conversion and Management*, 171, 110–125. <https://doi.org/10.1016/j.enconman.2018.05.054>
15. Król, J., & Ocloń, P. (2019, September). Sensitivity analysis of hybrid combined heat and power plant on fuel and CO2 emission allowances price change. *Energy Conversion and Management*, 196, 127–148. <https://doi.org/10.1016/j.enconman.2019.05.090>
16. Pääkkönen, A., & Joronen, T. (2019, May). Revisiting the feasibility of biomass-fueled CHP in future energy systems – Case study of the Åland Islands. *Energy Conversion and Management*, 188, 66–75. <https://doi.org/10.1016/j.enconman.2019.03.057>
17. Statista (2023). Average spot prices of European Emission Allowances (EUA) 2010-2021. Retrieved 5.3.2023. from <https://www.statista.com/statistics/1329581/spot-prices-europe-an-union-emission-trading-system-allowances/>.
18. Tolis, A. I., & Rentizelas, A. A. (2011, November). An impact assessment of electricity and emission allowances pricing in optimised expansion planning of power sector portfolios. *Applied Energy*, 88(11), 3791–3806. <https://doi.org/10.1016/j.apenergy.2011.04.054>
19. VVA consulting, Copenhagen Economics, Neon & Deloitte. (2018). *Study on the quality of electricity market data of transmission system operators, electricity supply disruptions, and their impact on the European electricity markets. Report for the European Commission (DG ENER)*. Retrieved 1.3.2023. from https://energy.ec.europa.eu/document/download/3fc39813-cd94-4f65-8697-974f168b470a_en.
20. Wang, H. C., Jiao, W. L., Lahdelma, R., & Zou, P. H. (2011, December). Techno-economic analysis of a coal-fired CHP based combined heating system with gas-fired boilers for peak load compensation. *Energy Policy*, 39(12), 7950–7962. <https://doi.org/10.1016/j.enpol.2011.09.050>
21. Zhang, X., Liu, X., Sun, X., Jiang, C., Li, H., Song, Q., Zeng, J., & Zhang, G. (2018, September). Thermodynamic and economic assessment of a novel CCHP integrated system taking biomass, natural gas and geothermal energy as co-feeds. *Energy Conversion and Management*, 172, 105–118. <https://doi.org/10.1016/j.enconman.2018.07.002>.

EUROPEAN LOGISTICS FIRMS' DIGITAL TRANSFORMATION THROUGH SOCIAL MEDIA ANALYTICS AND CUSTOMER REVIEWS

Damianos P. Sakas

*BICTEVAC LABORATORY Business Information and Communication Technologies in Value Chains laboratory, Department of Agribusiness and Supply Chain Management, School of Applied Economics and Social Sciences, Agricultural University of Athens, 118 55 Athina, Greece
d.sakas@aua.gr*

Dimitrios P. Reklitis

*BICTEVAC LABORATORY Business Information and Communication Technologies in Value Chains laboratory, Department of Agribusiness and Supply Chain Management, School of Applied Economics and Social Sciences, Agricultural University of Athens, 118 55 Athina, Greece
drekleitis@aua.gr*

Panagiotis Trivellas

*Organizational Innovation and Management Systems, Department of Agribusiness and Supply Chain Management, School of Applied Economics and Social Sciences, Agricultural University of Athens, 11855 Athens, Greece
ptrivel@aua.gr*

ABSTRACT

To acquire a competitive advantage nowadays, logistics businesses must adopt novel strategies. European logistics 3pl companies have to consider whether redesigning their social media marketing might increase the effectiveness of their digital marketing strategy. Insights from this study will be used to help European logistics firms improve the effectiveness of their digital marketing in social media. The collection of behavioral big data from the logistics industry businesses is the first step. Next come regression and correlation analyses, as well as the creation of fuzzy cognitive map simulation. The results revealed that in order to optimize social media interactivity logistics companies need to upload more posts per day. Additionally, in order to increase followers on social media, they need to increase their app ratings in Google Play.

Keywords: *competitive advantage, digital transformation, digital marketing, logistics, social media*

1. INTRODUCTION

The application of new digital technologies (social media, big data, web analytics) to allow big changes in companies such as improving customer experience and optimizing processes, is known as digital transformation (Matt et al., 2015). Digital transformation has an impact on how businesses manage knowledge and challenges their business strategies. It provides businesses the option of either growing or gradually disappearing (Verhoef et al., 2021). The digital transformation is an ongoing process that changes according to the digital maturity of the company (Morakanyane et al., 2017). According to Kane et al. (2017), digital maturity can be described as “the degree to which organizations have adapted themselves to a digital business environment”.

2. LITERATURE REVIEW

2.1. Digital transformation in marketing

Businesses that identify their aims and act appropriately are more likely to succeed. Digital transformation in marketing is about exploiting the digital entity of the physical company (Miklosik & Evans, 2020). It entails continually evolving all parts of the company model, such as what it sells, how it communicates with clients, and how it performs, through the use of technology (Melović et al., 2020). Digital marketing entails performing a series of careful and reinforcing activities that lead to the formation of powerful digital strategies (Miklosik & Evans, 2020; Sakas et al., 2022b; Sakas et al., 2022c). Presently, marketing is interconnected through social media-based, where client involvement is critical for long-term revenues. The logistics companies' audiences are demographically varied and personalization and user experience optimization are crucial, in order to create an effective digital marketing strategy (Sakas et al., 2022a). Due to digitalization and the use of big data, the logic of marketing has been transformed. For instance, the budget to advertise a product on social media is 1000% less than the same tv advertisement in order to reach the same amount of audience (Bhargava, 2015).

2.2. Digital transformation in 3pl logistics

According to previous research, just around half of logistics clients are pleased with their digital experience, and businesses today have not invested sufficiently to improve this percentage (Kern, 2021). Additionally, this percentage might be lower due to the lack of implementation of a corporate social responsibility strategy (Reklitis et al., 2017). The logistics networks of businesses can become more environmentally sustainable using big data. Logistics companies may also save funds and help to a more productive and ecologically responsible strategy by utilizing technology (Kaur & Singh, 2018). The 4th Industrial Revolution is expected to significantly change 3pl management by embedding innovative technologies in everything, to dramatically increase efficiency as well as client satisfaction. Technological innovations have emerged because of digitalization, forcing 3PLs to adapt to changing contexts with varying consumer needs (Alicke et al. 2016).

2.3. Social media analytics and research hypothesis

Social media analytics are crucial for the development of an effective digital marketing strategy (Sakas et al., 2022c). The procedure of gathering and evaluating consumer data provided on social media in order to enhance a company's business decisions is known as social media analytics (Fan & Gordon, 2014). Social media can assist companies by allowing decision-makers to identify customers' behavior patterns that are important to formulate a digital marketing strategy (Saura et al., 2021). Marketers may also examine the effectiveness of other social media platforms, such as Instagram and Twitter, as well as particular social media postings, to identify which messages and themes connect most with the targeted consumers (Saura et al., 2021). Social media analytics can be extracted from corporate social media and can illustrate the users' behavior (Sakas et al., 2022c). In this paper, the authors extracted the social media analytics from the webpage Fanpagekarma.com. and the app ratings have been extracted with the assistance of a web scraping tool. The following table illustrates the extracted data.

Table following on the next page

	Explanation
Post interaction	This social media analytic displays the average number of the totality of interactions (FanpageKarma.com, 2023).
Total Reactions, Comments, Shares	This social media analytics refers to the "Number of interactions on page-posts, that were published in selected time period." (FanpageKarma.com, 2023).
Fans	This social media analytics refers to the total number of fans per social media page (FanpageKarma.com, 2023).
Page Performance Index	The Page Performance Index (PPI) measures user engagement and growth. It combines these data to measure a social media page's performance. (FanpageKarma.com, 2023).
Number of Comments	This social media analytics refers to the total number of comments. (FanpageKarma.com, 2023).
Number of Likes	This social media analytics refers to the total number of likes. (FanpageKarma.com, 2023).
Follower Growth Percentage	This social media analytics refers to a social media profile's average weekly growth rate. (FanpageKarma.com, 2023).

Table 1: Social media analytics

The following hypotheses have been created in order to examine the interactivity of European logistics customers with the corporate social media.

- **H1:** The “Post Interaction” analytic positively affected by the “Total Reactions, Comments, Shares” and the total number of “Fans”
- **H2:** The “Page Performance Index” analytic positively affected by the “Number of Comments” and the total “Number of Likes”
- **H3:** The App Ratings in google play analytic are positively affected by the “Page Performance Index” and “Follower Growth Percentage”

3. METHODOLOGY

In the first part of the study social media analytics has been collected from the website named 'FanpageKarma.com' for the top ten European logistics companies. Additionally, with the assistance of a web scrapping tool, their app reviews have been extracted. In both cases, the collected data refers to the last 280 days. In the second part of the paper, those data have been statistically analyzed. Finally, with the assistance of the correlation and regression models, two optimization scenarios have been created.

4. RESULTS

4.1. Statistical Analysis

The following tables 2&3 illustrate the results of the first hypothesis. Positive significant correlation can be observed between the post interaction and the total reactions, comments, and shares which is expected. Interestingly, a negative interaction can be observed between the post interaction and the total fans. This is aligned with previous research on logistics websites and shows the necessity of creating social media with less but clear information on how to track a parcel (Sakas & Terzi, 2010). The regression model revealed that for every 1% increase in post interaction, a 44,5% increase in total reactions, comments, and shares can be observed, and a decrease of 32,4% in total fans.

	Post interaction	Total Reactions, Comments, Shares	Fans
Post interaction	1		
Total Reactions, Comments, Shares	,445**	1	
Fans	-,314*	,197	1

***. Correlation is significant at the 0.01 level (2-tailed).* **. Correlation is significant at the 0.05 level (2-tailed).*

Table 2: First hypothesis correlations

	Standardized Coefficient	R ²	F	pValue
<i>Constant (Post interaction)</i>	-	,366	13,257	,000
Total Reactions, Comments, Shares	,527			,001
Fans	-,417			,000

Table 3: First hypothesis Regression

The following tables 4&5 illustrate the results of the Second hypothesis. Positive significant correlation σ can be observed between the Page Performance Index, the Number of Comments and the Number of Likes with $p=,352^*$ and $p=,710^{**}$ respectively. This is expected since the overall engagement is affected by the comments and the likes. This is also aligned with previous research in the hospitality sector (Sakas et al., 2022c). The regression model revealed that for every 1% increase in Page Performance Index, a 35,2% increase in total reactions, comments, and shares can be observed, and an increase of 71,% in the Number of Likes.

	Page Performance Index	Number of Comments	Number of Likes
Page Performance Index	1		
Number of Comments	,352*	1	
Number of Likes	,710**	,575**	1

***. Correlation is significant at the 0.01 level (2-tailed).* **. Correlation is significant at the 0.05 level (2-tailed).*

Table 4: Second hypothesis correlations

	Standardized Coefficient	R ²	F	pValue
<i>Constant (Page Performance Index)</i>	-	,510	23,897	,000
Number of Comments	,759			,507
Number of Likes	-,084			,000

Table 5: Second hypothesis Regression

The following tables 6&7 illustrate the results of the third hypothesis. Negative significant correlations can be observed between the Apps Ratings, the Page Performance Index, and the Follower Growth Percentage with $p=-,365^*$ and $p=-,330^*$ respectively. This is a very interesting finding which highlights that the logistics apps are not easy to use and user friendly which has a negative effect on social media activity and vice versa. The big data analytics can be beneficial for the analysis and optimization of those logistics apps (Byun et al., 2020), as implemented in high-tech sector (Terzi et al., 2011). The regression model revealed that for every 1% increase in post interaction, a 44,5% increase in total reactions, comments, and shares can be observed, and a decrease of 32,4% in total fans.

	Apps Ratings	Page Performance Index	Follower Growth Percentage
Apps Ratings	1		
Page Performance Index	-,365*	1	
Follower Growth Percentage	-,330*	,514**	1

***. Correlation is significant at the 0.01 level (2-tailed).* **. Correlation is significant at the 0.05 level (2-tailed).*

Table 6: Third hypothesis correlations

	Standardized Coefficient	R ²	F	pValue
<i>Constant (Apps Ratings)</i>	-	,159	3,303	,001
Page Performance Index	-,264			,160
Follower Growth Percentage	-,190			,308

Table 7: Third hypothesis Regression

4.2. Fuzzy Cognitive Map

The Fuzzy Cognitive Map (FCM) has been developed using the statistical models described above. FCM is critical for decision-makers in order to identify the issue and produce optimization scenarios. As big data is unstructured information, illustrating the cause-and-effect links of a system on a map is quite valuable for decision-makers (Son et al., 2019). Figure 1 depicts the FCM as well as the strength of the relationship between social media analytics. The stronger the relationship, the broader the line.

Figure following on the next page

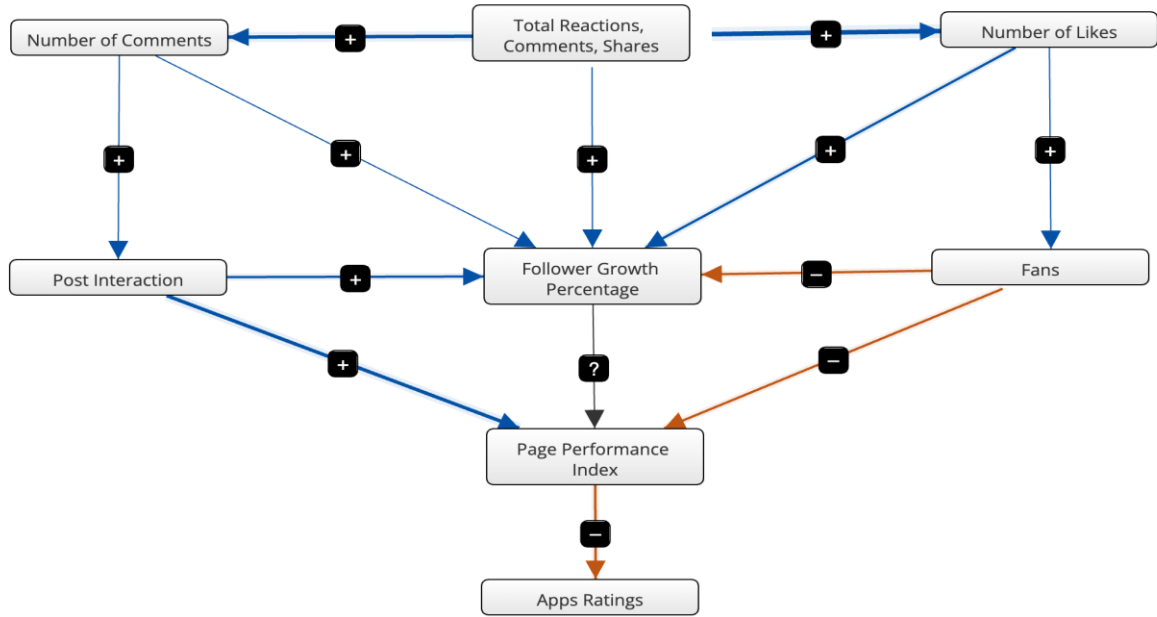


Figure 1: Fuzzy Cognitive Map of Social Media Analytics

The following Figures 2&3 present the optimization scenarios that marketers need to implement in order to improve the interactivity and the follower growth of their social media. In order to increase the number of followers by 10% companies need to increase the total use engagement (Page Performance Index) by 2%. Additionally, they need to make their mobile application easy to use for customers.

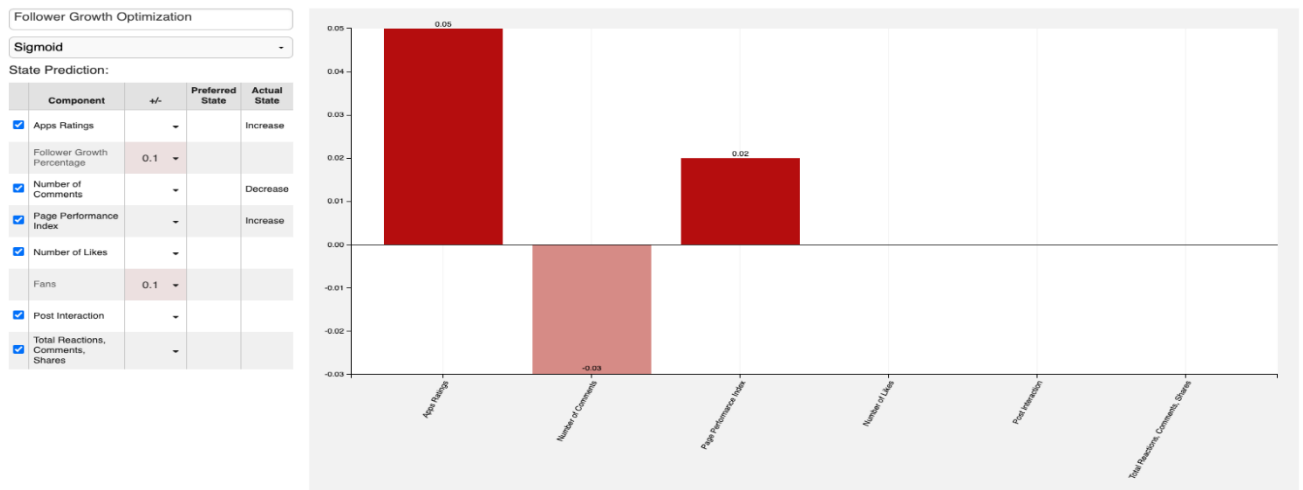


Figure 2: Follower Growth Optimization Scenario

In order to improve the interactivity of their social media by 10%, marketers need to place more advertisements in order to increase follower growth by 11%. Additionally, they need to create more engaging content to improve the number of comments, likes, and fans. The interesting outcome relies on the fact when interactivity increases the app rating decreases. This is fully aligned with previous research. In contradiction to other industry apps, such as clothing, logistics customers want to enter fast, search for a parcel as fast as possible, and then exit the app (Sakas et al, 2022a). For this kind of user, the apps need to be created as simple as possible with clear instructions.

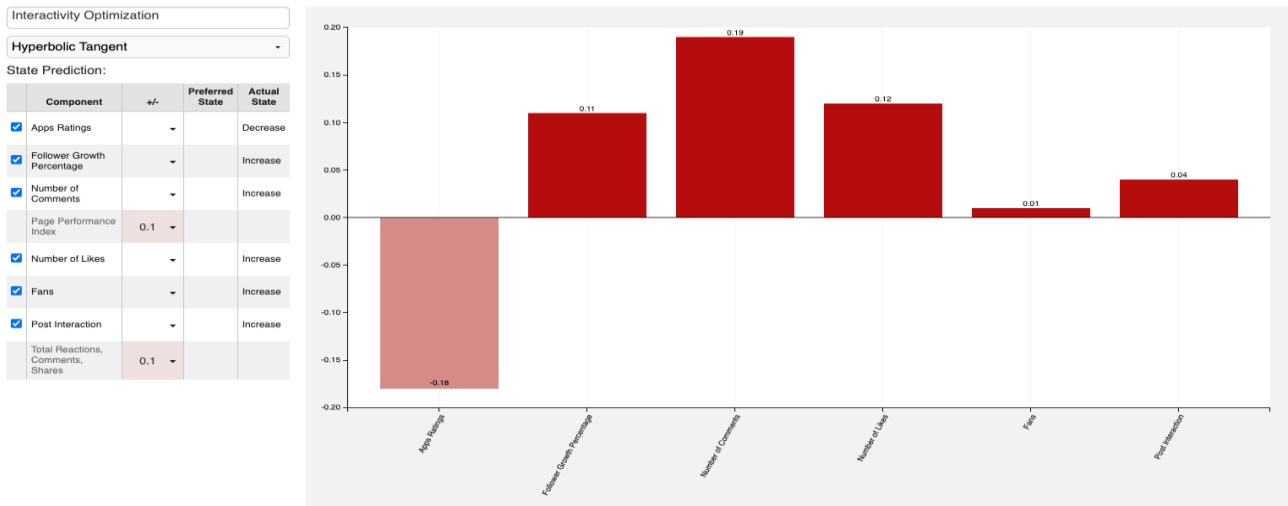


Figure 3: Interactivity Optimization Scenario

5. CONCLUSION

This study made a contribution by creating a two-stage data-driven approach for assessing social media analytics on the top ten European logistics organizations. Furthermore, the study expands the arsenal of researchers while seeking to expand critical digital marketing prior outcomes and future strategies. This study demonstrated the use of Fuzzy Cognitive Maps in the assessment of macro-level issues and the development of optimal social media optimization scenarios. This research has three practical consequences. To begin, marketers must generate more interesting content in order to increase the number of comments, likes, and fans. Second, because of the nature of the users, developers must ensure that logistics applications are simple to use and user-friendly. Thirdly, in order to increase followers on social media, they need to increase their app ratings in Google Play.

LITERATURE:

1. Alicke, K., Rachor, J., and Seyfert, A. (2016). Supply Chain 4.0 – The Next-Generation Digital Supply Chain. McKinsey Supply Chain Management Practice <https://www.mckinsey.com/~media/McKinsey/Business%20Functions/Operations/Our%20Insights/Supply%20Chain%2040%20the%20next%20generation%20digital%20supply%20chain/08b1ba29ff4595e03e9987344dcbc.pdf>.
2. Bhargava, M., 2015. Up keeping with the new era of the digital world: Digital marketing & prospects. *Indian Streams Res. J*, 4(7).
3. Byun, D.-H., Yang, H.-N. and Chung, D.-S. (2020) “Evaluation of mobile applications usability of Logistics in life startups,” *Sustainability*, 12(21), p. 9023. Available at: <https://doi.org/10.3390/su12219023>.
4. Fan, W. and Gordon, M.D. (2014) “The power of Social Media Analytics,” *Communications of the ACM*, 57(6), pp. 74–81. Available at: <https://doi.org/10.1145/2602574>.
5. FanpageKarma.com (2023) *Fanpage Karma Overview*, *Fanpage Karma Academy*. Available at: <https://academy.fanpagekarma.com/> (Accessed: April 1, 2023).
6. Kaur, H. and Singh, S.P. (2018) “Heuristic modeling for Sustainable Procurement and logistics in a supply chain using Big Data,” *Computers & Operations Research*, 98, pp. 301–321. Available at: <https://doi.org/10.1016/j.cor.2017.05.008>.
7. Kane, G.C., Palmer, D., Phillips, A.N., Kiron, D. and Buckley, N. (2017), “Achieving digital maturity”, MIT Sloan Management Review and Deloitte University Press, Vol. 59 No. 1, pp. 1-30.

8. Kern, J. (2021) “The digital transformation of Logistics,” *The Digital Transformation of Logistics*, pp. 361–403. Available at: <https://doi.org/10.1002/9781119646495.ch25>.
9. Matt, C., Hess, T. and Benlian, A. (2015) “Digital Transformation Strategies,” *Business & Information Systems Engineering*, 57(5), pp. 339–343. Available at: <https://doi.org/10.1007/s12599-015-0401-5>.
10. Melović, B. *et al.* (2020) “The impact of digital transformation and digital marketing on the brand promotion, positioning and electronic business in Montenegro,” *Technology in Society*, 63, p. 101425. Available at: <https://doi.org/10.1016/j.techsoc.2020.101425>.
11. Miklosik, A. and Evans, N. (2020) “Impact of big data and machine learning on Digital Transformation in Marketing: A Literature Review,” *IEEE Access*, 8, pp. 101284–101292. Available at: <https://doi.org/10.1109/access.2020.2998754>.
12. Morakanyane, R., Grace, A.A. and O’Reilly, P. (2017), “Conceptualizing digital transformation in business organizations: a systematic review of literature”, Bled eConference, pp. 427-443.
13. Reklitis, P. *et al.* (2017) “Employee perceptions of corporate social responsibility activities and work-related attitudes: The case of a Greek management services organization,” *Accounting, Finance, Sustainability, Governance & Fraud: Theory and Application*, pp. 225–240. Available at: https://doi.org/10.1007/978-981-10-4502-8_10.
14. Sakas, D.P. *et al.* (2022) “The effects of logistics websites’ technical factors on the optimization of Digital Marketing Strategies and corporate brand name,” *Processes*, 10(5), p. 892. Available at: <https://doi.org/10.3390/pr10050892>.
15. Sakas, D.P., Kamperos, I.D. and Terzi, M.C. (2022) “The long-term risk familiarity effect on courier services’ digital branding during the COVID-19 crisis,” *Journal of Theoretical and Applied Electronic Commerce Research*, 17(4), pp. 1655–1684. Available at: <https://doi.org/10.3390/jtaer17040084>.
16. Sakas, D.P. *et al.* (2022) “Multichannel digital marketing optimizations through Big Data Analytics in the tourism and Hospitality Industry,” *Journal of Theoretical and Applied Electronic Commerce Research*, 17(4), pp. 1383–1408. Available at: <https://doi.org/10.3390/jtaer17040070>.
17. Sakas, D.P. and Terzi, M., (2010) “Measuring service quality in the Greek's shipping transportation sector: The emerging gap in customers' expectations and perceptions,” *Marketing and Management Sciences* [Preprint]. Available at: https://doi.org/10.1142/9781848165106_0049.
18. Saura, J.R., Palacios-Marqués, D. and Iturricha-Fernández, A. (2021) “Ethical design in social media: Assessing the main performance measurements of User Online Behavior Modification,” *Journal of Business Research*, 129, pp. 271–281. Available at: <https://doi.org/10.1016/j.jbusres.2021.03.001>.
19. Son, C., Kim, J. and Kim, Y. (2019) “Developing scenario-based technology roadmap in the Big Data Era: An utilisation of fuzzy cognitive map and text mining techniques,” *Technology Analysis & Strategic Management*, 32(3), pp. 272–291. Available at: <https://doi.org/10.1080/09537325.2019.1654091>.
20. Terzi, M.C., Sakas, D.P. and Vlachos, D. (2011) “Marketing dynamic simulation modelling in high tech laboratories,” *Key Engineering Materials*, 495, pp. 23–27. Available at: <https://doi.org/10.4028/www.scientific.net/kem.495.23>.
21. Verhoef, P.C. *et al.* (2021) “Digital Transformation: A multidisciplinary reflection and research agenda,” *Journal of Business Research*, 122, pp. 889–901. Available at: <https://doi.org/10.1016/j.jbusres.2019.09.022>.

LEVERAGING DIGITAL MARKETING STRATEGIES IN FAVOR OF BUSINESS PERFORMANCE: EVIDENCE FROM THE MARITIME LOGISTICS SECTOR

Marina C. Terzi

*Agricultural University of Athens (AUA), Athens, Iera Odos 75, 11855, Greece
mariterz@gmail.com*

Damianos P. Sakas

*Agricultural University of Athens (AUA), Athens, Iera Odos 75, 11855, Greece
d.sakas@aua.gr*

Nikos Kanellos

*Agricultural University of Athens (AUA), Athens, Iera Odos 75, 11855, Greece
nikos.kanellos2@gmail.com*

Nikolaos Giannakopoulos

*Agricultural University of Athens (AUA), Athens, Iera Odos 75, 11855, Greece
n.giannakopoulos@aua.gr*

Panagiotis Trivellas

*Agricultural University of Athens (AUA), Athens, Iera Odos 75, 11855, Greece
ptrivel@yahoo.com*

Panagiotis Reklitis

*Agricultural University of Athens (AUA), Athens, Iera Odos 75, 11855, Greece
preklitis@yahoo.com*

ABSTRACT

In competitive markets, such as the logistics sector, the optimization of digital marketing strategies is the key to ensure high levels of customer satisfaction that will ultimately lead to increased business sales and higher market share. The evolution of new technologies forces logistics companies to constantly look for new ways to increase their websites' traffic in order to maintain existing customers and acquire new ones. To effectively perform in such a demanding era, marketing managers need to employ well-defined digital marketing strategies in order to build a competitive advantage. The present research investigates the role of website metrics, as website performance indicators, on business performance within the supply chain. With the intention to shed light into the relationship between business performance and digital marketing, the current paper employs an innovative methodology based on web analytics and big data. Five top maritime transport companies with global activities have been selected on a 6-month period. Following the data collection, the authors performed statistical analysis based on websites KPIS. The results demonstrate that there is a significant correlation between logistics websites' KPIs as a marketing lever for the growth of business performance. The outcomes of the studies could be used by logistics companies to unlock business potentials, scarcely explored before in the maritime transport sector. The paper further demonstrates a dynamic simulation model for the proper allocation of resources in order to drive business performance.

Keywords: *Digital marketing, business performance, logistics, maritime transport, big data, simulation modelling*

1. TOWARDS THE DIGITALIZATION OF THE MARITIME INDUSTRY: THE MARKETING PERSPECTIVE

Digitalization generates both opportunities and challenges to logistic companies, unleashing new waves of innovation in order to ensure business continuity and improve the reliability of critical supply lines. The Covid-19 pandemic has further highlighted the importance of maritime transport as the backbone of the global economy, since over 80% of merchandise trade is transported by ocean shipping (Statista, 2022). Indeed, during the pandemic, the maritime sector served as a critical link in the supply chain, delivering essential supplies and keeping in this way the industry afloat, while being in uncharted waters. However, the maritime sector is not considered as a pioneer in the digitalization of shipping operations and associated activities (Raza et al. 2023). As the sector slowly embraces the 4th Industrial Revolution (Ichimura et al., 2022), the marketing of shipping companies should also follow this digital pathway (Sekularac, 2021). In today's fast paced business world, meeting shifting customer and market demands is of the essence in order to eliminate the supply chain fragility, which emerged from current crises and previous sector's digital immobility. With the growing shift towards digital marketing, the supply chain companies need to navigate new challenges. That is to say, logistic companies should not only to rely on providing a service, but also to build strong customer relationships and establish authority so as to be researched online and selected. To do so, special attention must be placed on prioritizing key marketing indicators, as solid business strategy pillars, to measure marketing investments that will lead to outstanding business performance (Ghahremani-Nahr and Nozari, 2021). In the contemporary changing marketing landscape, mapping various marketing metrics from website traffic enable logistic companies to improve their bottom line and make accurate business decisions. In order to fill the gap between digital technologies and business performance opportunities, multiple review papers have been devoted in highlighting the use of big data within the context of maritime services (Sanchez-Gonzalez et al., 2019; Munim et al., 2020; Parola et al., 2021). However, the majority of studies explore the role of web analytics in favor of vessel performance, route planning, speed optimization, environmental sustainability, cost savings and navigation safety, among others. A huge amount of data regarding the digital marketing aspect of maritime logistic sector still remains unexplored, in terms of users' engagement between the corporate website performance and customers' online purchasing behavior. The purpose of this paper is to highlight the importance of website metrics as an incentive to redesign marketing activities of maritime services, which will provide rich avenues and vast opportunities to improve business performance.

2. DIGITAL MARKETING IN LOGISTICS COMPANIES: THE BIG DATA

In this highly competitive industry, digital marketing for the supply chain is able to transform shipping services, as it reinforces customer engagement and interaction (Mehralian & Khazaei, 2022). As the digital revolution has drastically changed consumers' online behavior and their ability to purchase (Khan et al. 2022), it becomes a unique challenge for logistics companies to stand out and gain a competitive advantage among so many competitors. Therefore, it becomes a necessity for companies to move beyond traditional, old-fashioned marketing approaches (Ozoglu and Topal, 2020) and invest in digital marketing operations that will fundamentally transform the dynamics of the maritime industry in favor of business performance (Omar et al., 2020). According to Statista (2023), 32.5% of CMOs acknowledge the positive impact of digital marketing on business performance. Harnessing digital marketing offers the opportunity to businesses to increase the website traffic (Juswadi et al., 2020) and provides a better interactive experience across multiple channels. By connecting with potential customers on a larger scale, new practical perspectives on the evolving digital customer journey arise, which will ultimately lead to the optimization of the customer experience.

As customers are spending loads of time online, digital marketing is a boon for companies to increase sales and revenue in a scalable yet cost-effective way, maintain brand reputation and achieve higher levels of user engagement, by targeting the right audience (Olson et al. 2021). As the transportation of goods continues to grow exponentially and e-commerce orders reach record highs, there is a non-stop stream of data that reveals rich insights into customers' behavior. The real-time monitor of data facilitates the recording of customers' choices, disclosing emerging trends and new behavioral patterns, which could be used by maritime companies in order to conclude to more efficient decisions, with regards to their marketing goals (Sestino et al., 2020). As the challenge for shipping companies to stay relevant with the changing demands of the digital marketplace augments, capitalizing the revolutionizing concept of big data analytics lead to greater supply chain visibility, in terms of improving customers' relationship management, customer experience and personalization (Anshari et al., 2019). The evolution of both digital marketing and digital logistics boosts users' interaction and engagement (Erokhina et al., 2018). As consumers become increasingly familiar in the way they perform and execute purchasing decisions on the digital landscape, the use of data will enable companies to clarify users' online behavior at the earliest stage of their customer journey and deliver superior customer experience. As such, web analytics and big data provide useful insights on mapping customers' DNA, which will lead to the advancement of the supply chain's functions and operational efficiency (Arunachalam et al. 2018).

3. WEB ANALYTICS KPIS ON BUSINESS PERFORMANCE

As digital marketing in maritime services is a relative new field of research, the evaluation of its performance is critical aspect that requires special attention. Ghahremani-Nahr and Nozari (2021) conclude that Key Performance Indicators (KPIs) are important metrics to be used by companies in order to gauge the effectiveness of marketing activities to the overall business performance. In this line, van de Ven et al. (2022) state that KPIs are reflection of business decisions, since they are able to provide directional insight on the company's progress. Due to their measurable nature, KPIs are seen as conversion metrics that can improve business outcomes by highlighting areas that need changes or improvements. Previous studies have shown that the optimization of digital marketing could be improved by the use of web analytics (WA), as measurable metrics to track customers' interaction with a company's website (Sakas et al., 2022; Sakas et al., 2022c). Tracking and analyzing WA reveals the variables that influence the audience's motives, priorities and decision-making process during their online journey, making customers' experience the core business differentiator. As online users' behavior constantly changing, uncovering hidden behavioral patterns that produce undesirable online behavior, is the key to accelerate business performance by shifting them in a new direction. For the purpose of the current study, the authors extracted the necessary website performance KPIs from the SEMrush platform. The description of the KPIs is presented in Table 1.

Table following on the next page

Web Analytics KPIs	Description
Top 3 Keywords	Keywords (organic and paid) are words and phrases that users type into web engines to find information on a specific topic (Saura et al., 2017).
Global Rank	Global rank refers to the overall performance of a website, by popularity rating order, where the lower the global rank, the higher the visibility of the website (Järvinen and Karjaluoto, 2015; Sakas et al, 2022a; Sakas et al., 2022 b)
Bounce Rate	When a visitor lands on a website and immediately leaves, without taking further action (Drivas et al., 2021)
Search traffic	Search traffic (organic and paid) is referred to users who visit a website through paid or non-paid ways (Sakas et al., 2022a) ; Drivas et al., 2021).

Table 1: Description of WA KPIs

In order to build a competitive advantage, the maritime companies should invest in digital activities based on specific website KPIs, that will allow the management team to track, monitor and evaluate their performance. Shipping companies struggle to stay on top of the search results, as the lower the global rank, the better the visibility and traffic of the brand's website (Sharma et al., 2019). Therefore, the bounce rate acts as an inhibitor to the improvement of the websites traffic and the overall website's global rank, leading to poor customer experience and low performance levels (Järvinen and Karjaluoto, 2015). As customers' digital behavior is expressed in keywords (Sakas et al., 2022a), it is of the essence to evaluate the link between the metric "Top 3 keywords" and how they affect the "bounce rate". Therefore, the following hypothesis has been developed

- H1: The metric "Top 3 keywords" affects the maritime logistics' websites "global rank" through the "bounce rate" variable.

It is of the essence for maritime companies to attract the right audience, since it constitutes the core of the business strategy. Appealing to a broad audience, without proper segmentation, may lead to marketing failure and a waste of resources. Leveraging data for the optimal audience, based on consumer online behavior, enhances the potentials of converting online visitors into actual clients of a company, and thus make them loyal to the specific brand (Vollrath, M.D., Villegas, 2022). In order to achieve higher conversion rates, special attention should be placed on the search traffic as a way to understand how online users come to the websites by typing specific keywords and clicking on search results (Saura et al., 2017). Having said that, it is important to evaluate the link between keywords and bounce in order to enhance a website's search traffic. Therefore, the following hypothesis has been developed:

- H2: The metric "Top 3 keywords" affects the maritime logistics' websites "search traffic" through the "bounce rate" variable.

In sum, web analytics KPIs show to have a positive impact on the development of efficient marketing strategies, offering great potentials to the websites' traffic. (Sakas et al., 2022b; Drivas et al., 2021).

Considering their powerful impact on business performance and branding, the current study proposes the analysis of KPIs to be used in the digital marketing of maritime services as an accelerator lever to advance their digital presence.

4. RESEARCH METHODOLOGY AND RESULTS

In order to fulfil the purpose of the current study, an alternative methodology was adopted so as to evaluate the effects of maritime logistics websites' WA KPIs on the overall business performance. At the first stage of the study, web metrics were gathered for five world-leading maritime companies based on their profitability: MAERSK, MSC, CMA-CGM, COSCO, EVERGREEN on a 6-month period, between 6/2021 and 12/2021. Data originated from the above websites refer to daily website analytics insights, during 180 days from the internet platform SEMrush. Following data gathering, a statistical analysis was performed, both descriptive statistics and correlations analysis. In the final stage of the methodological context, the authors developed a dynamic simulation model to be used as a valuable tool for the proper allocation of a company's resources on concrete digital marketing activities, in favor of business performance.

	N	Minimum	Maximum	Mean	Std. Deviation
Global_Rank	7	346736,00	356378,00	350962,7143	3301,42801
Bounce_Rate	7	,21	,37	,3043	,05767
Search_Traffic	6	9815906,00	11863010,00	10968325,8333	753828,89119
Top3_Keywords	6	96465,00	119860,00	106152,5000	9199,26512

Table 2: Descriptive statistics

		Global_Rank	Search_Traffic	Bounce_Rate	Top3_Keywords
Global_Rank	Pearson Correlation	1	-0,61	,822*	,894*
	Sig. (2-tailed)		0,198	0,023	0,016
	N	7	6	7	6
Search_Traffic	Pearson Correlation	-0,61	1	0,811	-,875*
	Sig. (2-tailed)	0,198		0,05	0,022
	N	6	6	6	6
Bounce_Rate	Pearson Correlation	,822*	0,811	1	-,935**
	Sig. (2-tailed)	0,023	0,05		0,006
	N	7	6	7	6
Top3_Keywords	Pearson Correlation	,894*	-,875*	-,935**	1
	Sig. (2-tailed)	0,016	0,022	0,006	
	N	6	6	6	6

Table 3: Variables' Correlations

Based on the outcomes of the present research, there is a positive correlation with $\rho = 0,822$ between the global rank and the bounce rate, implying that as the bounce rate decreases, the global rank decreases too. In other words, as visitors spend more time on the website and browse more webpages, the global rank is decreased and thus, the maritime's website becomes more visible since it appears higher on the search results page.

Furthermore, there is a significant correlation between global rank and top 3 keywords with $\rho = 0,894$, which indicates the effectiveness of the keywords in terms of best targeting the audience. In addition, the correlation between the bounce rate and top 3 keywords is extremely significant with $\rho = -0,935$, which indicates that as keywords become more targeted, more online users decide to leave the website, with the remaining users to be the ones that are more interested in the services that the website offers. Table 3 illustrates a significant correlation between search traffic and bounce rate with $\rho = 0,811$ which means that as the search traffic, whether paid or not, increases, the bounce rate also increases. That is to say that many visitors are landing on the specific website via search traffic and decide to abandon the website without further action. Moreover, there is a significant correlation between search traffic and Top 3 Keywords with $\rho = -0,875$, implying that as visitors type specific keywords, the website's traffic decreases. This is further confirmed by the correlation between the bounce rate and the top 3 keywords, which is $\rho = -0,935$. This is a clear indication that when keyword targeting comes to matter, and especially the top 3 keywords, the bounce rate increases. In other words, targeted Top 3 keywords generate less website traffic. However, this is a useful outcome for maritime companies, since users are segmented and thus, are more likely to become actual customers.

5. DYNAMIC SIMULATION MODEL

The complex environment of digital marketing poses a range of challenges that constrain the effective business performance of maritime logistics companies. Commonly viewed as a scenario-development tool, dynamic simulation modelling (DSM) provides valuable solutions in real-time conditions, by giving clear insights in multifaceted environments. By running “what-if” scenarios, simulation modeling places emphasis on verifying, communicating, finding alternatives and understanding complexities across industries for the development of competitive advantage (Sakas et al., 2014). Various modelling efforts have been recorded in the supply chain (Dolgui et al., 2020), analyzing the underlying dynamics among various variables and risk interactions (Liu et al., 2021). The current research focused on the development of a dynamic simulation (DS) model that integrates the WA KPIs from five top maritime companies. This DS model aims to present an advanced decision support tool for the proper allocation of marketing resources in the supply chain. The model is flexible to run in multiple scenarios, based on users' online purchasing behavior, as exported by the results, in order to advance business performance. Once the dynamic simulation model was developed (Figure 1), based on the outcome of the current research, a “run” was performed so as to verify its efficiency. The company allocates marketing resources to the stocks “paid traffic” and “paid keywords” respectively, in order to advance the maritime websites' branding. These two stocks transfer their resources to the stock “global rank”. The stock “global rank” further receives resources from both “organic traffic” and “organic keywords” stocks. The outcomes produced by the DSM are presented in Figure 2 and 3.

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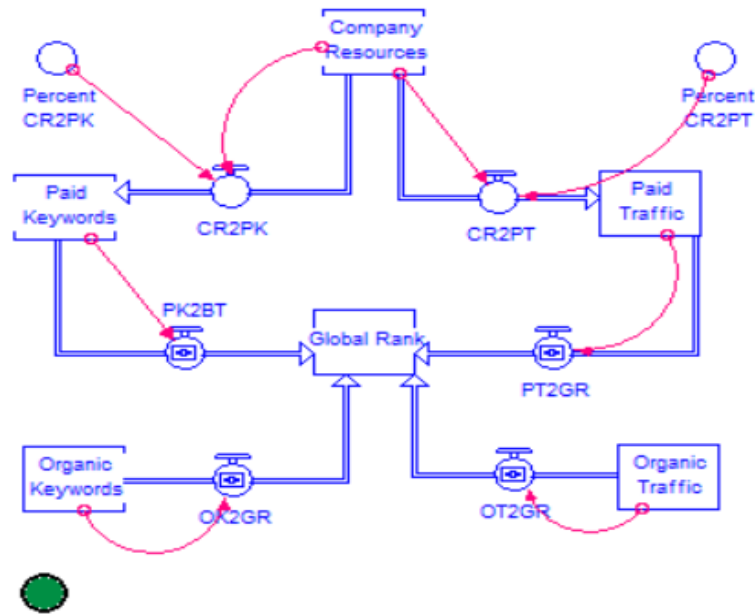


Figure 1: Dynamic Simulation Model

Months	Global Rank	Paid Traffic	Paid Keyw	Organic Ke	Organic Tr
1	308.00	127.25	168.25	371.00	378.00
2	462.00	152.53	234.53	342.00	356.00
3	616.00	175.89	298.89	313.00	334.00
4	770.00	197.34	361.34	284.00	312.00
5	924.00	216.95	421.95	255.00	290.00
6	1.078.00	234.73	480.73	226.00	268.00
7	1.232.00	250.74	537.74	197.00	246.00
8	1.386.00	264.99	592.99	168.00	224.00
9	1.540.00	277.53	646.53	139.00	202.00
10	1.694.00	288.40	698.40	110.00	180.00
11	1.848.00	297.62	748.62	81.00	158.00
12	2.002.00	305.23	797.23	52.00	136.00

Figure 2: Outcomes of DSM

As it is obvious on Figure 3, paid traffic (orange line) and organic traffic (green line) tend to constantly drop due to keyword targeting. The decrease in traffic means the website attracts the targeted audience, those who intentionally visit the website and are more likely to make a purchase. This is exactly the point where the marketing department of maritime companies should invest more resources on the website’s content so as to produce more paid and organic keywords and thus increase their overall traffic. The digital marketing strategy should be based on finding the most desired keywords that better depict users’ perceptions of the brand. Matching the intend of each keyword to the development of a website’s high-quality content will attract users’ interest and compel them to share it and link back to it. Investing resources in decision support systems based on WA KPIs, such as the development of DSM, facilitates the optimization of digital marketing activities, and thus enables maritime companies to enhance their online visibility and achieve higher performance levels.

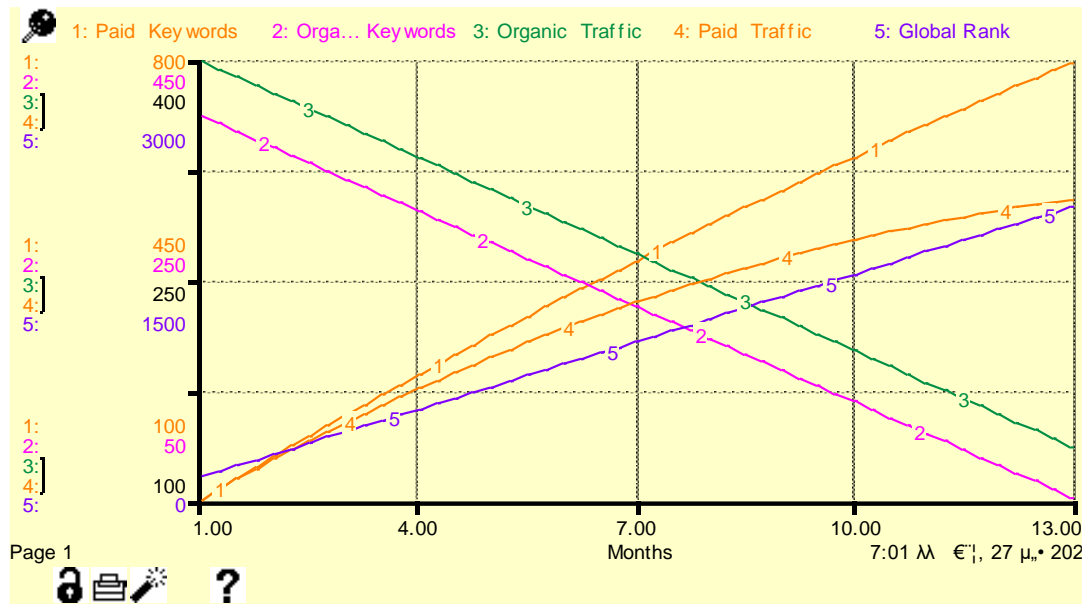


Figure 3: Outcomes of DSM graphical representation

6. CONCLUSIONS

The Industrial Revolution 4.0 contributes to the development of new business models within the logistics industry, with the integration of people, machines and processes, which makes the industry smarter in terms of efficiency, productivity and cost reduction (Holubcık et al., 2021). One of its main pillars is big data, which brings intelligence to the edge across logistics and optimizes the end-to-end chain, since it constitutes an effective tool to analyze and predict future demand (El Hamdi and Abouabdellah, 2022). The ability to leverage big data in the logistics sector enables companies to identify current digitalization gaps in marketing activities, by gathering insights into customers behavior (Boone et al., 2019). The ability to demonstrate business performance depends on the maritime company's ability to integrated the WA KPIs into its digital marketing strategy (Jarvinen and Karjaluo, 2015). Since the maritime sector is characterized by multiple complexities, the systematic process of monitoring and measuring the website's performance is of the essence in order to properly allocate resources and contributes to the development of concrete digital marketing activities. The results of the current research confirm previous studies on the impact of search traffic and keywords on global rank (Drivas et al., 2020; Sakas et al., 2022b). However, addressing to a large proportion of audience is not helpful for organization with limited resources and will not lead to higher conversion rates. Supporting Olson et al. research (2021), the current study suggests market segmentation as an effective way to save resources while simultaneously achieve higher levels of user engagement. Specifically, by targeting into specific niche markets through keyword targeting, the websites of maritime companies will achieve a top listing in the search engines, enhance their visibility and discover where the richest vein of gold lies. To this end, the study further proposes DSM as an important decision-making tool for the proper allocation of resources in favor of business performance.

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LITERATURE:

1. Statista (2022). *Ocean shipping worldwide - statistics & facts*. Retrieved 21.03.2023 from https://www.statista.com/topics/1728/ocean-shipping/#topicHeader__wrapper
2. Zeeshan Raza, Johan Woxenius, Ceren Altuntas Vural, Mikael Lind (2023) *Digital transformation of maritime logistics: Exploring trends in the liner shipping segment*, Computers in Industry, Volume 145, doi: <https://doi.org/10.1016/j.compind.2022.103811>.
3. Ichimura, Yuki, Dalaklis, Dimitrios, Kitada, Momoko and Anastasia Christodoulou, (2022). *Shipping in the era of digitalization: Mapping the future strategic plans of major maritime commercial actors*, Digital Business, Volume 2, Issue 1, 2022, <https://doi.org/10.1016/j.digbus.2022.100022>.
4. Sekularac Ivošević, S. (2021). *Envisioning Marketing in a Digital Technology-Driven Maritime Business*. Mednarodno Inovativno Poslovanje = Journal of Innovative Business and Management, 13(1), 22-28. <https://doi.org/10.32015/JIBM/2021.13.1.22-28>
5. Ghahremani-Nahr, J., & Nozari, H. (2021). *A Survey for Investigating Key Performance Indicators in Digital Marketing*. International Journal of Innovation in Marketing Elements, 1(1), 1–6. <https://doi.org/10.52547/ijime.1.1.1>
6. Sanchez-Gonzalez, P.-L., Díaz-Gutiérrez, D., Leo, T., & Núñez-Rivas, L. (2019). *Toward Digitalization of Maritime Transport?* Sensors, 19(4), 926. MDPI AG. Retrieved from <http://dx.doi.org/10.3390/s19040926>
7. Munim, Ziaul Haque, Dushenko, Mariia Jaramillo Jimenez, Veronica Hassan Shakil Mohammad & Imset Marius (2020) *Big data and artificial intelligence in the maritime industry: a bibliometric review and future research directions*, Maritime Policy & Management, 47:5, 577-597, DOI: 10.1080/03088839.2020.1788731
8. Parola, Francesco, Satta, Giovanni, Buratti, Nicoletta & Vitellaro, Francesco (2021) *Digital technologies and business opportunities for logistics centres in maritime supply chains*, Maritime Policy & Management, 48:4, 461-477, DOI: 10.1080/03088839.2020.1802784
9. Mehralian, M. M., & Khazaei, P. (2022). *Effect of Digital Marketing on the Business Performance of MSMEs during the COVID-19 Pandemic: The Mediating Role of Customer Relationship Management*. In 37th Digital Marketing and Customer Behavior Science Conference (2022).
10. Khan, S., Tomar, S., Fatima, M., & Khan, M. Z. (2022). *Impact of artificial intelligent and industry 4.0 based products on consumer behaviour characteristics: A meta-analysis-based review*. Sustainable Operations and Computers, 3, 218-225.
11. Ozoglu, B., Topal, A. (2020). *Digital Marketing Strategies and Business Trends in Emerging Industries*. In: Hacioglu, U. (eds) Digital Business Strategies in Blockchain Ecosystems. Contributions to Management Science. Springer, Cham. https://doi.org/10.1007/978-3-030-29739-8_18
12. Omar, Faradillah Iqmar & Mohamad Zan, Umami Munirah Syuhada & Hassan, Nor Azlili & Ibrahim, Izzurazlia. (2020). *Digital Marketing: An Influence towards Business Performance among Entrepreneurs of Small and Medium Enterprises*. International Journal of Academic Research in Business and Social Sciences. 10. 126-141. 10.6007/IJARBS/v10-i9/7709.
13. Statista (2023) *Digital marketing contribution to companies' performance according to CMOs in the United States as of January 2021*. Retrieved 21.03.2023 from <https://www.statista.com/statistics/1223580/marketing-contribution-business-performance-usa/>

14. Juswadi, J., Sumarna, P., & Mulyati, N. S. (2020, April). *Digital marketing strategy of Indonesian agricultural products*. In International Conference on Agriculture, Social Sciences, Education, Technology and Health (ICASSETH 2019) (pp. 105-110). Atlantis Press.
15. Olson, E. M., Olson, K. M., Czaplewski, A. J., & Key, T. M. (2021). *Business strategy and the management of digital marketing*. *Business horizons*, 64(2), 285-293.
16. Sestino, Andrea Prete, Maria Irene, Piper, Luigi and Guido, Gianluigi (2020) *Internet of Things and Big Data as enablers for business digitalization strategies*, *Technovation*, Volume 98, <https://doi.org/10.1016/j.technovation.2020.102173>.
17. Anshari, Muhammad, Almunawar, Mohammad Nabil, Lim, Syamimi Ariff and Al-Mudimigh, Abdullah (2019) *Customer relationship management and big data enabled: Personalization & customization of services*, *Applied Computing and Informatics*, Volume 15, Issue 2, Pages 94-101, ISSN 2210-8327, <https://doi.org/10.1016/j.aci.2018.05.004>.
18. Erokhina, T. B., Mitko, O. A., & Troilin, V. V. (2018). *Digital marketing and digital logistics in consumer communication*. *European Research Studies*, 21, 861-867.
19. Arunachalam, Deepak Kumar, Niraj and Kawalek, John Paul (2018) *Understanding big data analytics capabilities in supply chain management: Unravelling the issues, challenges and implications for practice*, *Transportation Research Part E: Logistics and Transportation Review*, Volume 114, Pages 416-436, <https://doi.org/10.1016/j.tre.2017.04.001>.
20. Sakas, D. P., Kamperos, I. D. G., Reklitis, D. P., Giannakopoulos, N. T., Nasiopoulos, D. K., Terzi, M. C., & Kanellos, N. (2022c). *The Effectiveness of Centralized Payment Network Advertisements on Digital Branding during the COVID-19 Crisis*. *Sustainability*, 14(6), 3616.
21. van de Ven, Montijn Renard; Lara Machado, Paola; Athanasopoulou, Alexia; Aysolmaz, Banu; and Turetken, Oktay, "Key Performance Indicators for Business Models: A Review of Literature" (2022). ECIS 2022 Research Papers. 126. https://aisel.aisnet.org/ecis2022_rp/126
22. Sakas, D. P., Reklitis, D. P., Trivellas, P., Vassilakis, C., & Terzi, M. C. (2022a). *The Effects of Logistics Websites' Technical Factors on the Optimization of Digital Marketing Strategies and Corporate Brand Name*. *Processes*, 10(5), 892. MDPI AG. Retrieved from <http://dx.doi.org/10.3390/pr10050892>
23. Saura, J. R., Palos-Sánchez, P., & Cerdá Suárez, L. M. (2017). Understanding the Digital Marketing Environment with KPIs and Web Analytics. *Future Internet*, 9(4), 76. MDPI AG. Retrieved from <http://dx.doi.org/10.3390/fi9040076>
24. Järvinen, Joel and Karjaluoto, Heikki (2015) The use of Web analytics for digital marketing performance measurement, *Industrial Marketing Management*, Volume 50, Pages 117-127, <https://doi.org/10.1016/j.indmarman.2015.04.009>.
25. D. P. Sakas, N. T. Giannakopoulos, N. Kanellos and S. P. Migkos, "Innovative Cryptocurrency Trade Websites' Marketing Strategy Refinement, via Digital Behavior," (2022b) in *IEEE Access*, vol. 10, pp. 63163-63176, 2022, doi: 10.1109/ACCESS.2022.3182396.
26. Drivas, I.C., Sakas, D.P., Giannakopoulos, G.A., Kyriaki-Manessi, D. (2021). *Optimization of Paid Search Traffic Effectiveness and Users' Engagement Within Websites*. In: Sakas, D.P., Nasiopoulos, D.K., Taratuhina, Y. (eds) *Business Intelligence and Modelling*. IC-BIM 2019. Springer Proceedings in Business and Economics. Springer, Cham. https://doi.org/10.1007/978-3-030-57065-1_2
27. D. Sharma, R. Shukla, A. K. Giri and S. Kumar, "A Brief Review on Search Engine Optimization," 2019 9th International Conference on Cloud Computing, Data Science & Engineering (Confluence), Noida, India, 2019, pp. 687-692, doi: 10.1109/CONFLUENCE.2019.8776976.

28. Vollrath, M.D., Villegas, S.G. *Avoiding digital marketing analytics myopia: revisiting the customer decision journey as a strategic marketing framework*. *J Market Anal* 10, 106–113 (2022). <https://doi.org/10.1057/s41270-020-00098-0>
29. Sakas, D., Vlachos, D. and Nasiopoulos, D. (2014), "*Modelling strategic management for the development of competitive advantage, based on technology*", *Journal of Systems and Information Technology*, Vol. 16 No. 3, pp. 187-209. <https://doi.org/10.1108/JSIT-01-2014-0005>
30. Dolgui Alexandre, Ivanov Dmitry, Potryasaev Semyon, Sokolov Boris, Ivanova Marina & Werner Frank (2020) *Blockchain-oriented dynamic modelling of smart contract design and execution in the supply chain*, *International Journal of Production Research*, 58:7, 2184-2199, DOI: 10.1080/00207543.2019.1627439
31. Liu, X., Arthanari, T. and Shi, Y. (2021), "*Leverage risks for supply chain robustness against corruption*", *Industrial Management & Data Systems*, Vol. 121 No. 7, pp. 1496-1521. <https://doi.org/10.1108/IMDS-10-2020-0587>
32. Holubcík, Martin, Koman, Gabriel and Soviar Jakub (2021) *Industry 4.0 in Logistics Operations*, *Transportation Research Procedia*, Volume 53, Pages 282-288, <https://doi.org/10.1016/j.trpro.2021.02.040>.
33. El Hamdi, S., & Abouabdellah, A. (2022). *Logistics: Impact of Industry 4.0*. *Applied Sciences*, 12(9), 4209. MDPI AG
34. Boone Tonya, Ganeshan Ram, Jain Aditya, Sanders Nada R., *Forecasting sales in the supply chain: Consumer analytics in the big data era*, *International Journal of Forecasting*, Volume 35, Issue 1, 2019, Pages 170-180, ISSN 0169-2070, <https://doi.org/10.1016/j.ijforecast.2018.09.003>.

HOUSEHOLD BANKRUPTCY - SELECTED ASPECTS

Urszula Grzega

University of Economics in Katowice, Faculty of Management, Poland

ugrzega@ue.katowice.pl

ABSTRACT

In the conditions of progressing socio-economic changes, new challenges and crises, regular monitoring of changes in the sphere of household debt, including excessive debt leading to bankruptcy, becomes important. It provides important information on the living conditions of the population and ways of managing the cash budget, and also constitutes a premise for conducting socio-economic policy in the country. The theoretical purpose of the considerations is to identify the economic and social aspects of household bankruptcy. The empirical goal is to recognize and assess the scale of consumer bankruptcy in Poland. The time range of the research covers the years 2015-2022. The survey showed, that in the years 2015-2022, a growing scale of household bankruptcy was observed in Poland. The number of bankruptcies declared in 2022 in Poland exceeded 15.5 thousand. It represents the number of temporarily financially excluded consumers, but it is still low enough to be considered a significant factor of social exclusion of Polish households. Certainly, the registered number of declared bankruptcies cannot solely be the measure of consumer exclusion. Nevertheless, considering the current socio-economic situation of the country, a further increase in the number of declared bankruptcies should be expected.

Keywords: *households, bankruptcy, consequences of consumer bankruptcy*

1. INTRODUCTION

Understanding and trying to explain the problem of household bankruptcy and the events which, as a result, household members encounter in everyday life, is multidimensional. Difficulties in assessing this phenomenon result among others, from the fact that not only the balance of household incomes and expenses, the absolute level and structure of debt, or its relation to disposable income and household assets are measured, but also a number of unimportant, difficult to measure, often qualitative, non-economic issues that contribute to the phenomenon of consumer exclusion. Unlike the entities on the supply side of the market, in the case of which bankruptcy usually means the "death" of the enterprise or mergers and acquisitions, in the case of a household, it should be remembered that this entity is "alive" and consists of people. Therefore, it is hard to imagine a situation in which we declare bankruptcy and, after settling all dues, dissolve the household and order its members to disperse to different parts of the world. The theoretical purpose of the considerations is to identify the economic and social aspects of household bankruptcy. The empirical goal is to recognize and assess the scale of consumer bankruptcy in Poland. The time range of the research covers the years 2015-2022. To achieve the assumed goals, information from secondary sources was applied (including reports of The Polish Financial Supervision Authority (UKNF) and the Central Economic Information Centre).

2. CONSUMER BANKRUPTCY AND RELATED CONCEPTS IN THEORETICAL APPROACH

The concept of bankruptcy can be applied to various market entities, including those on the demand side of the market. A household is an entity managing personal finances. It focuses on acquiring, collecting and spending cash resources (Świecka, 2008, p. 64). The area of household finances includes such behaviors as: saving, going into debt, purchasing insurance, paying taxes and conduct on financial markets.

The primary concept in relation to household bankruptcy is the concept of debt, which can be perceived narrowly or broadly. In the narrow sense, this concept is mainly associated with borrowing from financial institutions, whereas in a broader sense, not only getting into debts in banks and quasi-banking institutions, but also debts in non-banking institutions, including mass institutions classified as municipal services provided to the local community are considered. (Świecka, M. Koziński, 2014). The market of debt products for households also includes the informal market (Bywalec, 2009, p. 174). Considering the level of household debt, we can distinguish the following households (Lea, Webley, Walker, 1995):

- no debt households, i.e., those that are not in arrears in repayment of liabilities,
- households with average debts, i.e., those that repay their liabilities, but with delays, which may result from various situational factors, including unexpected circumstances,
- households with serious debt, i.e., households where the debt is the basis for starting a debt collection process or a lawsuit to recover money by creditors.

The last situation, related to difficulties in settling debt obligations, is associated with the problem of excessive debt, insolvency and bankruptcy of households. The notion of excessive indebtedness should be understood as the inability to repay all liabilities on time, which is manifested by deteriorating financial liquidity. It is a gradual phenomenon characterized by the current and future financial burdens of households exceeding their disposable income as well as the shortage of consumer assets that could be cashed for the purpose of repaying the debts (Gębski, 2013). Insolvency, on the other hand, means a permanent loss of the ability of the debtor to service its liabilities, characterized by a complete loss of liquidity. In the economic approach, insolvency is called bankruptcy (Świecka, 2008, p. 196). Consumer bankruptcy means in turn, court proceedings aimed at partial or full discharge of the consumer's debts while satisfying creditors' claims (Machowska, 2020, p. 23). It can be an effective way to get out of the debt spiral, restore financial liquidity and debt-free household functioning. Consumer bankruptcy is a broader and more complex concept than company bankruptcy. It does not end with its liquidation. A household cannot be dissolved or subjected to a liquidation procedure, but only to an arrangement procedure at most. In the economic sense, a household is bankrupt if it is unable to pay its liabilities and the value of its assets is not sufficient to cover all debts (Świecka, 2008, pp. 191-192). Bankruptcy does not occur suddenly; it usually takes years and a series of events that threaten the existence of a household. It is a kind of pathology of a household development, which threatens its economic existence, as well as leads to financial and social exclusion. When studying the basic concepts related to household bankruptcy, it should be emphasized that household debt can be, and often is, a normal state, related to the necessity to finance expensive, strategic consumer goods and services, such as e.g., buying a house. However, due to various reasons, the debt may turn into a problem of insolvency of the household, and although it is a kind of payment backlog in this case, it is still a temporary loss of financial liquidity which does not necessarily mean bankruptcy of the household. Bankruptcy of a household occurs only when the problems accumulate to such an extent that the difficulties change their character from temporary (e.g., counted in months) to permanent (counted in years). The permanent loss of the ability to settle the payments leads to a situation in which the household is unable to obtain new sources of financing, such as a consolidation loan or a loan from friends, due to poor financial parameters, including creditworthiness. This condition usually prevents further household management and means the need to apply for bankruptcy in court. Identifying the causes of bankruptcy requires a holistic approach and their exploration at various levels. The insolvency of households is determined by a complex set of factors operating with various intensity in different periods of time. It is important that the list of these determinants remains open, as shown by the events of the last three years, including the crisis related to the Covid pandemic or Russia's war in Ukraine.

The situation of some households directly affected by the crises of the last several months has changed dramatically and caused some of them to face the problem of losing their source of income and the possibility of financing the consumption process. As you can see, turbulent changes in the environment bring constant emergence of new crisis-generating factors and change the significance of those previously existing. It can even be assumed that changes in the set of causes of household bankruptcy should be expected along with the change in conditions in the environment. In the simplest approach, the causes of household bankruptcy can be perceived in two dimensions, dividing them into micro and macro economic and non-economic determinants. As for the first group, it should be emphasized that insolvency and bankruptcy of households may be the result of irrational, ill-considered, senseless financial decisions, including loan decisions, and they may result from insufficient economic knowledge, as well as reckless spending of funds or pathological phenomena, such as gambling, alcoholism or drug addiction. In the group of micro determinants, human errors or too late reaction to these errors are of great importance. It is also worth remembering that distortions resulting from the inclusion of false information in the decision-making process are one of the greatest challenges of the digital economy of the 21st century. The asymmetry of information in the market is yet another problem. Households, compared to entities in the supply sphere of the market, occupy a worse position in terms of access to information, the possibility of its processing or effective use (Pawłowicz, 2019, pp. 7-15). The so-called macro determinants include for example: structural and macroeconomic factors, e.g. dynamics of economic growth (some bankruptcies of market entities are explained by the volatility of business cycles) (Mączyńska, 2009), condition of the credit and money markets, activity on the securities market, deterioration of situation on the labor market, changes in the tax system, rising inflation, increasing interest rates, an economic downturn on the real estate market or on the domestic financial market (Bywalec, 2009, p. 188). It should be added that national economies are becoming more and more dependent on the global situation, which additionally poses a macroeconomic threat to the efficient functioning of households (Boratyńska, 2009). Non-economic determinants beyond the control of households include unfavorable events and unexpected circumstances, such as the death of one of the household members, theft, fire or flood. The impact of these factors is unpredictable and their influence on household bankruptcy is relatively small. It is obvious that there is a relatively wide spectrum of causes of household bankruptcy, and the combined impact of many overlapping factors often creates an unfavorable and synergistic force pushing the household towards the implementation of black scenarios. It is important that in the case of households, regardless of the reason for bankruptcy, such a situation, unlike the bankruptcy of enterprises, cannot be considered as cleaning the economy of ineffective entities and is a kind of natural selection (Pociecha, 2014, p. 7). Certainly, it cannot be assumed that bankruptcies are a natural element of the functioning of a household. The problem of household bankruptcy has various economic and non-economic consequences. Consumer exclusion is one of its more severe effects. This exclusion is related to the inability of households to participate in given events, activities or situations, lack of access to certain goods and services as well as the inability to exercise certain rights or privileges (Sołtysik, 2017). This phenomenon is not new, it has occurred in various historical periods, political systems, societies and cultures (Richardson, Le Grand, 2002). Financial exclusion which covers a number of disadvantages that a household encounters on the financial market is one of the dimensions of consumer exclusion (Solorz, 2008, p. 132). Depending on the context of the considerations, consumer bankruptcy can be perceived as a cause of temporary financial exclusion of households as well as a form of protection against exclusion, including protection against further falling into debt that prevents the household from normal functioning. Focusing on financial exclusion as a consequence of declaring bankruptcy of a household, it should be indicated that first of all, an indebted household loses rights to its property - to its real estate and all valuable items.

They are sold to repay debts. The insolvency trustee may also seize part of the bankrupt's remuneration and allocate it to pay creditors. The bankrupt household also may not, without the consent of the court, incur any new liabilities, i.e., take out loans and credits, have a credit card, buy in installments or conclude subscription agreements. Considering only the economic aspect of declaring consumer bankruptcy, it is therefore worth analyzing whether, if the indebted consumer is not in a difficult life situation, it could be reasonable to postpone the decision to declare bankruptcy and try to reach an agreement with creditors by negotiating, for example, the terms of debt repayment. Thanks to this, the consumer can gain the opportunity to pay debts on their own, agreed terms. The financial exclusion of consumers and the accompanying relocation of households to a non-banking and sometimes non-legal area of meeting financial needs (e.g., by working in the shadow economy), impoverishment and long-term non-satisfaction of needs cause consequences in social, moral and psychological dimensions. Financial problems often exclude the household from cultural life, limit the possibilities of health care, affect the quality of social life, withdrawal in social relations, cause conflicts in the family and even pathological phenomena, such as theft and drunkenness. Moreover, debts stigmatize the indebted household and lead to the exclusion of all its members, including those who had no share in the deterioration of the situation of the entire entity (e.g., children who, due to their parents' debts, have to live in a worse district, attend a worse school and resign from paid extracurricular activities) (Gębski, 2013). As a consequence of difficulties in functioning in various areas of life in society, social exclusion of a household may occur (Bywalec, 2009, p. 190). The term social exclusion relatively quickly, as already in 1974, found its application in the social sciences. M. Weber, who recognized that exclusion is a form of social closure was one of the first researchers of this issue. In Poland, this problem began to be explored at the beginning of the 21st century. There were certainly studies devoted to this issue earlier, but no attempt was made to define it. For example, the recognized and respected Polish sociologist Z. Bauman used such terms as redundant, unwanted, rejected, and marginalized in relation to excluded people (Bauman, 1998). Social exclusion as a problem has a multidimensional nature and refers to the lack of participation or inability to participate in important spheres of social life, including for example social, economic, cultural life, in everyday activities and behaviors characteristic of a given society (Frączkiewicz, 2005, p. 13). In a narrow approach, social exclusion is related to the category of poverty and can be associated with exclusion from the sphere of work, education, culture and access to information, as well as spatial exclusion, including homelessness (Tarkowska, 2005, p. 21). In a broader sense, social exclusion covers the lack of resources and rights, treating them as a process causing deprivation, violating family and social ties (Golinowska, Broda-Wysocki, 2005, pp. 33-37). In general, the social consequences of consumer exclusion as a result of their bankruptcy are manifold and often spread from individual consumption entities to the whole society, generating losses at the micro and macroeconomic level.

3. CONSUMER BANKRUPTCY IN THE LIGHT OF PROVISIONS OF APPLICABLE LAW

The initiation of bankruptcy proceedings which may result in the declaration of consumer bankruptcy is a possible effect of excessive household debt. By definition, its purpose is the legal protection of households and their creditors. Consumer bankruptcy is a debt relief procedure combined with the debtor's commitment to cover at least part of his debts. It is a legal proceeding that involves specific court and extra-judicial procedures aimed to clarify the financial situation of the household, determine the reasons for bankruptcy, and provide external assistance in the form of a settlement with the creditor (Świecka, 2008, p. 193). Bankruptcy proceedings and proceedings for an arrangement with creditors concerning consumers were regulated for the first time in Polish law in the Act of 28 February 2003.

Bankruptcy Law (*Journal of Laws 2003 No. 60 item 53*). This legal regulation replaced the regulations on bankruptcy and reorganization proceedings functioning in Polish law from before the Second World War. The act was introduced into the national system on December 5, 2008. Unfortunately, at that time the written law proved to be only a dead regulation. For example, until the introduction of the first amendment to the Act of August 29, 2014 (*Journal of Laws of 2014, item 1306*), only several bankruptcies were declared annually. Although the adoption of the amendment made it possible to file an application for bankruptcy and simplified the debt relief procedure, the issue of determining the reasons for the debtor's insolvency still remained. If the consumer's intentional or grossly negligent behavior was found, the court did not allow further bankruptcy proceedings. Nevertheless, these changes resulted in the number of declared bankruptcies increasing annually. The amendment to the Act of August 30, 2019, which entered into force on March 24, 2020, was another change in the regulations (*Journal of Laws of 2019, item 1802*). This change meant that the number of declared bankruptcies increased from several to several thousand a year. In addition to further simplification of the bankruptcy procedure, the basic changes that were related to the introduction of the amendment to the act concerned abolishing the obligation to provide reasons for insolvency, introducing the possibility of a settlement between the debtor and the creditor, the possibility of declaring bankruptcy in relation to a consumer who deliberately, with premeditation led to it. Pursuant to the Act, complete debt relief is possible only if the court proves that the debtor does not have any assets, and it is equally important that an application for consumer bankruptcy can also be filed by sole proprietors (Spurgiasz, 2022).

According to the regulations in force from 2020:

- A consumer or a household can declare bankruptcy more than once in a lifetime, but not more often than once every 10 years.
- Bankruptcy proceedings are initiated by the debtor or creditor.
- The locally competent district court decides on the declaration of bankruptcy.
- The court may appoint a trustee to manage the bankrupt's assets in such a way as to sell them (with some exceptions).
- The court decides on the debt repayment plan and time.
- The debt relief process should not last longer than 3 years (with some exceptions).
- During the debt repayment period, the bankrupt debtor cannot take out new loans.
- The declaration of bankruptcy suspends court and enforcement proceedings against the debtor.

In the event that the consumer suddenly and without a clear reason quits their job, they may be exposed to the discontinuance of court proceedings for declaring bankruptcy. As a result of release, any future debt cancellation is impossible. The consumer is also deleted from the register of insolvent debtors in the National Court Register. The consequences of declaring bankruptcy are also related to the debtor's assets. The debtor loses the right to administer their property. This right is transferred to the trustee in bankruptcy. In addition, in many cases the bankrupt must transfer their assets and submit relevant information related to their property (Upadłość..., 2022). The latest amendment to the bankruptcy regulations is included in the announcement of the Marshal of the Sejm of the Republic of Poland of June 9, 2022 on the publication of the consolidated text of the Bankruptcy Law (*Journal of Laws 2022, item 1520*). In the light of the amended act, consumer bankruptcy is still the fastest method to discharge the debts of natural persons who have become insolvent - and thus have lost the ability to settle their due cash liabilities.

The main advantages of declaring consumer bankruptcy include (Upadłość..., 2022):

- debt relief – upon issuing the decision on debt cancellation, the consumer is relieved of debt, which means, among others, that the bankrupt's liabilities that are covered by bankruptcy proceedings can no longer be enforced,
- suspension of enforcement and court proceedings and suppression of growing interest, release from creditors, bailiffs,
- no need to have assets, which means that the consumer may be declared bankrupt without having any assets,
- spreading part of the liabilities into installments after determining the household income and ensuring the housing needs of the bankrupt,
- in exceptional situations, it is possible to completely discharge the debt without establishing a repayment plan,
- psychological comfort, peace of mind, other non-economic benefits.

In addition to obvious advantages of declaring consumer bankruptcy, this solution also has disadvantages. The loss of assets to pay off liabilities is the biggest of them. The whole procedure also takes a long time, sometimes several years. It should also be added that not all liabilities are subject to redemption. Receivables resulting from a fine, criminal proceedings, damages and alimony are for example an exception here. It is also often uncomfortable to publish financial information about a given consumer in Court and Economic Monitor and to enter data in the Central Bankruptcy and Restructuring Register (Zalety..., 2022). A bankrupt consumer must also expect the inability to incur new liabilities, take out loans and credits. In any such case, they must apply for the consent of the court. To sum up, considering all the pros and cons of declaring consumer bankruptcy, it should be perceived as a last resort after exhausting other options. This is because the disadvantages may outweigh the advantages that may result from such a procedure. From the point of view of the conditions of functioning of households, declaring bankruptcy makes sense only in the event of a complete loss of control over the economic situation, incurring liabilities significantly exceeding the possibilities of meeting them on agreed terms, or a difficult life situation, e.g. death of one of the household members or unexpected events.

4. THE SCALE OF THE PHENOMENON AND THE EVALUATION OF CONSUMER BANKRUPTCY IN POLAND

Regardless of changes in the law, which were related to specific possibilities of protection of consumer as a market participant, in the years 2015-2022 Polish courts issued a total of 73,506 decisions on declaring consumer bankruptcy. 2021 proved to be a record year in this regard, as over 18.2 thousand private bankruptcies were declared by Poles, i.e., 39% more than the year before. The growing number of consumer bankruptcies is not a positive phenomenon; however it should be remembered that in the Polish legal system it is still a relatively new institution. 2022 was only the eighth year after a major amendment to the bankruptcy law of 2014, thanks to which Poles could benefit from this procedure on a larger scale than in previous years (only 98 bankruptcies were declared in Poland in 2011-2014). The data published by the MGBI credit information agency shows that the launch of the National Debt Register in December 2021 and the related problems are among the most important factors inhibiting the increase in the large number of announced bankruptcies is the most important.

Table following on the next page

Bankruptcy Year	Number of declared bankruptcies	Absolute increase year/year	Change % year/year	Change % 2015=100
2015	2112	-	-	-
2016	4434	2322	109.9	109.9
2017	5535	1101	24.8	162.1
2018	6570	1035	18.7	211.1
2019	7944	1374	20.9	276.1
2020	13084	5140	64.7	519.5
2021	18205	5121	39.1	762.0
2022	15622	-2583	-14.2	639.7

Table 1: Declared consumer bankruptcies in 2015-2022

(Source: COIG, 2022)

As for the demographic characteristics of Polish debtors who are insolvent, in 2022 26% of them were aged 40-49 and 23% aged 30-39. The youngest person declared bankrupt was 19 and the oldest 99 years old. The average age was 49. Seniors aged 60 and over in 2022 accounted for 26.6% of all consumer bankruptcies. Bankruptcy was declared more often in the case of men - 52.2%. As for the spatial distribution of this phenomenon in Poland, the largest number of bankruptcies in 2022 was announced in the province of Śląskie 18.2% and Mazowieckie 11.6%, the lowest in Opolskie 2.5% and Świętokrzyskie 2.6% (COIG, 2022). Household bankruptcy is not a one-point phenomenon – it does not happen overnight, or even from week to week – it is a gradual process. This process is the result of wrong decisions made by household members, but also by other market participants. The latter remark does not mean that the household is released from responsibility for its own entity, however, the issue of insufficient economic knowledge and factors on the part of consumption entities cannot be the only justification for the circumstances leading to the problem of over-indebtedness, insolvency and subsequent consumer bankruptcy. Generally speaking, the country's relatively good socio-economic situation and the high availability of debt products are conducive to the consumption model of life and the phenomenon of indebtedness. The very crediting of consumption in various phases of the household's life cycle is something normal. The problem arises when the household's decisions regarding consumption and crediting are burdened with excessive and unnecessary risk, which affects its future. A household with appropriate economic knowledge, aware and reasonably managing its own financial budget should consider various types of consumer risks, including those related to random events, such as loss of job, place of residence or health. It is also important to be aware that during the repayment of loans, especially long-term ones, market conditions, e.g., interest rates or exchange rates may change significantly. Extraordinary situations, such as a pandemic or war may also occur. If such a risk becomes real, it does not necessarily will, but it can cause big problems leading to a spiral of household debt. Some of such risky situations may be compensated with previously accumulated household assets. However, one should be aware that only some households have such security, be it in the form of savings, other forms of capital, or in the form of support from another household. Thus, while highly affluent households can potentially cope with the occurrence of a crisis situation, which previously remained only in the area of potential risk, low affluent households are definitely more sensitive to the occurrence of negative events determining their financial liquidity. It is this group of households that is most at risk of bankruptcy and consumer exclusion. As for the situation of moderately well-off households, the occurrence of a crisis situation - in the form of a random event or unfavorable market conditions - may have a gross impact on their living conditions and lead to a situation similar to that in the case of low-income households.

And while the first consequences will concern the level of meeting needs, especially those above basic, the next ones will limit their creditworthiness, and then partially or completely lead to financial exclusion.

5. CONCLUSION

Summarizing all the considerations, the following conclusions can be drawn:

- Consumer bankruptcy, which is a consequence of excessive indebtedness, although it means temporary financial exclusion of consumers from the market, is a tool to protect the household against the accumulation of debt, intensifying financial exclusion and falling into social exclusion.
- The current debt relief procedure, which should be the final solution in the event of financial problems of a household, is an imperfect solution, burdened with defects, and including no educational elements that could increase the competence of consumers in the field of cash budget management.
- In the years 2015-2022, a growing scale of household bankruptcy was observed in Poland. The number of bankruptcies declared in 2022 in Poland exceeded 15.5 thousand. It represents the number of temporarily financially excluded consumers, but it is still low enough to be considered a significant factor of social exclusion of Polish households. Certainly, the registered number of declared bankruptcies cannot solely be the measure of consumer exclusion. Nevertheless, considering the current socio-economic situation of the country, a further increase in the number of declared bankruptcies should be expected.

LITERATURE:

1. Bauman, Z. (1998). Zbędni, niechciani, odrznięci – czyli o biednych w zamożnym świecie. *Kultura i Społeczeństwo*. No 2, pp. 3-18.
2. Boratyńska, K. (2009). Przyczyny upadłości przedsiębiorstw w Polsce. *Ekonomiczne Problemy Usług*. No 39, pp. 450-458.
3. Bywalec, C. (2009). *Ekonomika i finanse gospodarstw domowych*. Warszawa: PWN.
4. COIG, (2023). *2022 Upadłość konsumencka*. Retrieved 15.03.2023 from https://www.coig.com.pl/2022-upadlosc-konsumencka_grudzien.php.
5. Frączkiewicz, L. (ed.). (2005). *Zapobieganie wykluczeniu społecznemu*. Katowice: Wydawnictwo AE w Katowicach.
6. Gębski, Ł. (2013). Nadmierne zadłużenie gospodarstw domowych – problem finansowo-prawny czy społeczny? *Gospodarka Narodowa*. No 4 (260), pp. 83-108.
7. Golinowska, S., Broda-Wysocki, P. (2005). *Kategorie ubóstwa i wykluczenia społecznego. Przegląd ujęć*. In: S. Golinowska, E. Tarkowska, I. Topińska (eds.) *Ubóstwo i wykluczenie społeczne. Badania. Metody. Wyniki*. Warszawa: IPiSS.
8. Lea, S., Webley, P., Walker, C.M. (1995). Psychological Factors in Consumer Debt: Money Management, Time Horizons and Consumer Behavior. *Journal of Economic Psychology*. Vol. 16, pp. 687-701.
9. Machowska, A. (2020). *Upadłość konsumencka*. Warszawa: Wolters Kluwer.
10. Mączyńska, E. (2009). Upadłości przedsiębiorstw – dysfunkcje, ich przyczyny. *Zeszyty Naukowe Małopolskiej Wyższej Szkoły Ekonomicznej*. No 2, pp. 185-196.
11. *Obwieszczenie Marszałka Sejmu Rzeczypospolitej Polskiej z dnia 9 czerwca 2022 r. w sprawie ogłoszenia jednolitego tekstu ustawy - Prawo upadłościowe*. Dz.U. 2022 poz. 1520.
12. Pawłowicz, L. (2019). *Hazard moralny i konflikty interesów*. In: J. Hausner (ed.), *Dewiacje finansjalizacji*. Warszawa: CeDeWu.
13. Pocięcha, J. (2014). *Statystyczne metody prognozowania bankructwa w zmieniającej się koniunkturze gospodarczej*. Kraków: Fundacja Uniwersytetu Ekonomicznego w Krakowie.

14. Richardson, L., Le Grand, J. (2002). *Outsider and Insider Expertise: The Response of Residents of Deprived Neighborhoods to an Academic Definition of Social Exclusion*. CASE Papers 57. London: London School of Economics, Centre for Analysis of Social Exclusion.
15. Solorz, M. (2008). *Nadmierne zadłużenie osób fizycznych jako przyczyna wykluczenia społecznego*. In: P. Karpuś, J. Węclawski (eds.), *Rynek finansowy. Inspiracje z integracji europejskiej*. Lublin: Wydawnictwo Uniwersytetu Marii Curie-Skłodowskiej.
16. Sołtysik, M. (2017). *Postrzeganie zjawiska wykluczenia finansowego przez młode pokolenie Polaków*. *Ekonomiczne Problemy Usług*. No 2 (127), pp. 285-297.
17. Spurgiasz, K. (2022). *Upadłość konsumencka 2022 – co to jest i kto może ją ogłosić?* Retrieved 11.08.2022 from <https://www.totalmoney.pl/artykuly/221365,kredyty-gotowkowe,upadlosc-konsumencka-2020----co-to-jest-i-kto-moze-ja-oglosic,1,1>.
18. Świecka, B. (2008). *Niewypłacalność gospodarstw domowych. Przyczyny – skutki – przeciwdziałanie*. Warszawa: Difin.
19. Świecka, B., Koziański, M. (2014). *Rola perspektywy czasowej w zadłużeniu gospodarstw domowych: ujęcie behawioralne*. *Problemy Zarządzania, Finansów i Marketingu*. No 34 (823), pp. 217-230.
20. Tarkowska, E. (2005), *Kategoria wykluczenia społecznego a polskie realia*. In: M. Orłowska (ed.), *Skazani na wykluczenie*. Warszawa: Akademia Pedagogiki Specjalnej im. Marii Grzegorzewskiej.
21. *Upadłość konsumencka – jak ją zgłosić i czy warto*, Retrieved 11.08.2022 from <https://prawo.gazetaprawna.pl/artykuly/8056022,upadlosc-konsumencka-jak-zglosic-czy-warto-korzysc-skutki.html>.
22. *Ustawa z 28 lutego 2003 r. Prawo upadłościowe*. Dz.U. 2003/60 poz. 535.
23. *Ustawa z dnia 29 sierpnia 2014 r. o zmianie ustawy – Prawo upadłościowe i naprawcze, ustawy o Krajowym Rejestrze Sądowym oraz ustawy o kosztach sądowych w sprawach cywilnych*. Dz.U. 2014 poz. 1306.
24. *Ustawa z dnia 30 sierpnia 2019 r. o zmianie ustawy - Prawo upadłościowe oraz niektórych innych ustaw*. Dz.U. 2019 poz. 1802.
25. *Zalety i wady upadłości konsumenckiej*, Retrieved 11.08.2022 from <https://restrukta.pl/zalety-i-wady-upadlosci-konsumenckiej/>.

SUPPLY CHAIN FIRMS' FINANCIAL PERFORMANCE CONNECTION WITH DIGITAL MARKETING WEBSITE DATA

Damianos P. Sakas

BICTEVAC LABORATORY: Business Information and Communication Technologies in Value Chains Laboratory, Department of Agribusiness and Supply Chain Management, School of Applied Financials and Social Sciences, Agricultural University of Athens, 118 55 Athens, Greece

Nikolaos T. Giannakopoulos

BICTEVAC LABORATORY: Business Information and Communication Technologies in Value Chains Laboratory, Department of Agribusiness and Supply Chain Management, School of Applied Financials and Social Sciences, Agricultural University of Athens, 118 55 Athens, Greece

Nikos Kanellos

BICTEVAC LABORATORY: Business Information and Communication Technologies in Value Chains Laboratory, Department of Agribusiness and Supply Chain Management, School of Applied Financials and Social Sciences, Agricultural University of Athens, 118 55 Athens, Greece

Marina C. Terzi

BICTEVAC LABORATORY: Business Information and Communication Technologies in Value Chains Laboratory, Department of Agribusiness and Supply Chain Management, School of Applied Financials and Social Sciences, Agricultural University of Athens, 118 55 Athens, Greece

Panagiotis Rekleitis

Department of Agribusiness and Supply Chain Management, School of Applied Financials and Social Sciences, Agricultural University of Athens, 118 55 Athens, Greece

Panagiotis Trivellas

Department of Agribusiness and Supply Chain Management, School of Applied Financials and Social Sciences, Agricultural University of Athens, 118 55 Athens, Greece

ABSTRACT

A common objective for firms and organizations is the accomplishment of financial efficiency throughout their operations. To achieve this task, firms need to acknowledge a vast majority of potential factors that affect their key financial performance metrics. A rising factor that is capable of determining such financial metrics for supply chain firms is their digital marketing performance. Supply chain firms' digital marketing performance is closely related to website analytical data, like users' engagement metrics. The present research is focused on determining whether various digital marketing metrics from air forwarders' websites can affect their financial performance. For this reason, the authors collected data from the websites of 5 air forwarder firms, as well as historical data regarding their financial performance. The referred data went through statistical analysis and a Hybrid Model (HM) was deployed to simulate their variation over a period of 90 days. From the study's outcomes, it is highlighted that specific digital marketing metrics of air forwarders, and generally, supply chain firms, such as the

engagement level of their visitors can positively affect key financial performance metrics like gross profit. Thus, it is implied that higher digital marketing efficiency (lower global rank and bounce rate, higher website visitors' engagement) can enhance the financial performance of supply chain firms (gross profit, holders' net earnings).

Keywords: *supply chain, air forwarding, digital marketing, Big Data, Decision Support Systems*

1. INTRODUCTION

Organizations with identical supply chains should collaborate to serve consumer demands more effectively than their rivals in a context marked by accelerated globalization, quickly expanding innovation, and constantly demanding consumers (Jansen, 2014). As a result, in today's economic climate, the harmonization of operational and strategic choices across the many phases of the supply chain is a must for establishing and preserving strategic benefits. Firms can decrease both social and ecological consequences while improving financial results by collaborating effectively with consumers and vendors (Jansen, 2014). From a supply chain standpoint, goods may be categorized as predefined (as well-known as 'operational') or unsettled (as well-known as 'revolutionary') according to factors such as the life of the product, profitability, availability of products, predicting fault, equities rate, discounts, or delivery ferocity (Qi et al., 2009). Wagner et al. (2012) demonstrated experimental relevance for current conceptual frameworks focusing on comprehending whether different supply chain management techniques affect economic measures such as investment and operational costs, service quality, and stock levels. As a result, many modern innovations are producing massive amounts of digital and new data on people and business procedures, which, when correctly evaluated, may assist uncover patterns and analyze financial, manufacturing, and cultural patterns or amplitude. As a result, these are frequently alluded to as "Big Data" (Cox & Ellsworth, 1997). Through portraying the four most prevalent stages inside Big Data analytics automating processes, Assunção et al. (2015) mirrored certain elements that ought to be evident in any Big Data infrastructure: sources of information, information management (along with activities like feature extraction process and filtration), modeling, and outcome from analysis and visualization. This approach was applied to cloud technology, whose possibilities and advantages for holding massive quantities of data and conducting sophisticated calculations have positioned it as a desired innovation to be implemented in the deployment of a Big Data infrastructure. Since digital company administrators devote well over 70% of their advertising expenditure to digital marketing, as reported by Statista (2019) the consequences for administration are deemed as important. Erdmann and Ponzoa (2021) deliver practical findings for data-driven marketing professionals on how to improve digital marketing expenses by combining internet promotion and placement with Search Engine Optimization (SEO) and Search Engine Marketing (SEM). The structure of the paper is presented below: the Introduction part focuses on providing a basic context of the analyzed terms, while the Related Background provides information about the related literature review and settles the research hypotheses. Then, the appropriate statistical analysis was performed to extract the required coefficients, as input to the developed Hybrid Model (HM). Finally, a summary of the findings and the practical implications that arose from the research are provided in the closing stages of the paper.

2. RELATED BACKGROUND

Roehrich et al. (2014) discovered that by forming cooperative partnerships with their supply chain associates, central enterprises that want to apply sustainable strategies may distribute expenses and uncertainties throughout other supply chain participants, reducing challenges caused by competing economic goals.

Because the distribution network examines the goods from primary resource extraction through distribution to the client, the comprehensive perspective can produce a positive influence on the sustainable subject, resulting in the higher pleasure of environmentally conscious consumers (Parry et al., 2007). Sustainable procurement procedures need the use of a particular vendor. One sustainable provider, though, may not be a more effective or resilient provider (Ivanov, 2018). Long-term confidence relationships between vendors and sustaining a stable workforce in sourcing locations would clash with supply chain adaptability to limit the spillover impact caused by multiple sourcing and contingency operations (Ivanov, 2018). The majority of the quantitative methods offered in the examined research primarily try to incorporate the incremental expenses related to the power stream into the entire supply chain expenditure, with just a couple of research considering system efficiency as an optimization problem or as a decision-making factor (Marchi & Zanoni, 2017). Notwithstanding the immense possibilities of such data, combining and evaluating the many supplies cannot be accomplished using standard financial and sociological scientific methodologies. To achieve this goal, the entire operation of data capture, processing, and evaluation must be properly planned and implemented. Here is where the Big Data and data lifespan concepts come into play as useful insights regarding ways to cope with this procedure (Blazquez & Domenech, 2018). The Big Data concept additionally provides several opportunities and gains to businesses, communities, and communities. According to Jin et al. (2015), it has the ability to contribute to economic and regional growth since it drives researchers to alter and update their methodologies, encourages and facilitates multidisciplinary study, and aids in forecasting the current and the tomorrow more accurately. To this extent, similar research has been done on the section of digital marketing website analytics and their impact on various organizations and firms' performance (Sakas & Terzi, 2010; Toudas & Kanellos, 2022). Digital marketing analytics of firms' websites have been found to affect key performance metrics of their sustainability and digital marketing efficiency. Such studies indicate the significance of various digital marketing analytical metrics for assessing their role in the variation of sustainability and digital marketing performance metrics in the sectors of airlines and air forwarders (Sakas & Giannakopoulos, 2021a; Sakas & Giannakopoulos, 2021b). Harvesting innovative digital marketing analytics (Sakas et al., 2022a; Sakas et al., 2022b), apart from the previously referred (Sakas & Giannakopoulos, 2021a; Sakas & Giannakopoulos, 2021b), would enhance supply chain firms' financial efficiency and performance. After the elaboration of the related literature review, there has been spotted a research gap in the connection between supply chain firms' financial performance and their digital marketing effectiveness. A precise analysis of key metrics of supply chain firms' financial performance (gross profit, holders' net earnings, etc.) should be conducted, where the influential factors of digital marketing efficiency will be included (global rank, bounce rate, time on site, etc.). Therefore, the authors settle the 3 research hypotheses seen below:

- **H1:** “*Air forwarder firms' gross profit can be affected by their websites' analytical data*”.
- **H2:** “*There is no connection between air forwarder firm holders' net earnings*”.
- **H3:** “*For air forwarding firms to rank higher in search engines, their website analytical data should be utilized*”.

3. METHODOLOGY

For the deployment of the methodological context of the present study, the authors utilized specific research tools. To achieve the topics of the study, the authors utilized the coefficients and correlations from the regression analysis, in favor of the hybrid modeling process. Hence, the assessment of supply chain firms' financial performance, in the air forwarding sector, will be performed, based on their digital marketing website analytics. From this point, the Hybrid Model (HM) takes over, and focuses on the estimation of air forwarders' economic performance through digital marketing analytics in 90 days of simulation, by utilizing both Agent-Based

(AB) and System Dynamics (SD) models (Anylogic, 2023). Such results could be interpreted and capitalized by air forwarders and supply chain firms' marketers to:

- further develop and optimize their digital marketing strategy, so as to enhance the visibility of their website.
- acknowledge the metrics of their website that potentially affect and increase their financial performance, thus aiming to enhance them.

The authors collected website analytical data from 5 air forwarding firms' websites, as well as financial performance metrics and historical data, based on their freight tonnage transferred in 2019 (2020). Such data include metrics like gross profit, global rank, website bounce rate, pages per visit, etc., and refer to the following firms: DHL (2023), Kuehne & Nagel (2023), DB Schenker (2023), DSV (2023), and UPS (2023). The website analytical data were collected from the Semrush (2023) online data retrieval platform.

4. RESULTS

After setting the papers' research hypotheses, the authors proceeded into performing the required multiple linear regressions to reject or confirm them. In Table 1, the required descriptive statistics were deployed for the main variables of the research, while in Table 2, the authors present the 3 produced multiple linear regression models with the key performance indicators of air forwarders' financial performance, as dependent variables. These variables include gross profit, holders' net earnings, as well as their global ranking metric, which determines their positioning through searches on the world wide web. The multiple linear regression of air forwarders' gross profit does not appear to be verified overall, due to a low p-value = 0.202 > $\alpha = 0.05$ level of significance, despite a decent $R^2 = 0.632$. Nevertheless, the bounce rate metric was found to have a significant impact on air forwarders' gross profit, with a p-value = 0.350 below the significance level of 0.05. Thus, our first research hypothesis (H1) is verified, meaning that air forwarder firms' gross profit can be affected by their websites' analytical data. The second multiple regression model, of air forwarder holders' net earnings, was also not verified overall, with non-significant p-value = 0.323 > $\alpha = 0.05$. This time, none of the digital marketing analytics were found to cause significant variation to it. The bounce rate metric had the closest p-value to the significance level (0.052), but still cannot be considered an important one. Hence, the paper's second research hypothesis (H2) is verified, and there was no connection found between air forwarder firm holders' net earnings. Finally, the third and last deployed regression model of the gross profit appears to be verified and significant, overall, with p-value = 0.460 < $\alpha = 0.5$ level of significance, and a high $R^2 = 0.710$. More specifically, the metric of unique visits tends to impact significantly the variation of air forwarders' global rank, when it decreases, with p-value = 0.027 below the significance level of 0.05. Thus, the research's third and last hypothesis (H3) is also verified, meaning that for air forwarding firms to rank higher in search engines, their website analytical data should be utilized.

Variables	Mean	Min	Max	Std. Deviation
Gross Profit	995134,3333	386003,00	1229734	225434.255
Revenues	8046314,4167	6462352,00	9488542	1053941.383
Net Earnings Holders	144391,2500	871,00	194597	50159.269
Global Rank	147230,1056	101576,92	196916,7	35770.9267
Unique Visits	0.31%	0.189%	0.48%	0.00095%
Time on site	637.87	498.13	839.61	105.7283
Page Views	9.45	7.77	10.99	1.1477
Bounce Rate	0.4522	0.44	0.46	0.00386

*Table 1: Descriptive Statistics
(N = 180 observation days for 5 Air forwarder Firms)*

Variables	Standardized Coefficient	R ²	F	p-Value
Dependent: Gross Profit				
Constant	-			0.202
Global Rank	-0.481			0.336
Unique Visits	-0.649	0.632	2.061	0.152
Time on Site	-0.680			0.217
Page Views	-0.066			0.892
Bounce Rate	0.779			0.035*
Dependent: Net Earnings Holders				
Constant	-			0.323
Global Rank	-0.476			0.385
Unique Visits	-0.438	0.551	1.472	0.355
Time on Site	-0.783			0.200
Page Views	0.245			0.651
Bounce Rate	0.768			0.052
Dependent: Global Rank				
Constant	-			0.460*
Unique Visits	-0.624			0.027*
Time on Site	-0.306	0.710	4.280	0.457
Page Views	-0.183			0.642
Bounce Rate	0.118			0.626

*Table 2: Multiple Linear Regressions
(* indicate statistical significance at the 95% level)*

5. HYBRID MODEL

The deployed Hybrid Model (HM) of the analysis consists of both agent-based (ABM) and system dynamics (SD) models (Terzi et al., 2011). The agents follow the statecharts and move based on commands (and, if, or, etc.) (Retzlaf et al., 2021). During their movement, various dynamic variables interact with each other. The aim of the produced model is to represent the variation of basic financial metrics of air forwarder firms, based on their website analytical data. The variables of the selected air forwarder firms' websites are following the Normal distribution, and the combination of these metrics (bounce rate, unique visitors, time on site, and pages per visitor) creates the general metric of website visitors' engagement, as seen in the output below. In Figure 1 the developed hybrid model for simulation of the variation of air forwarding's financial features and their website analytical data is presented.

Figure following on the next page

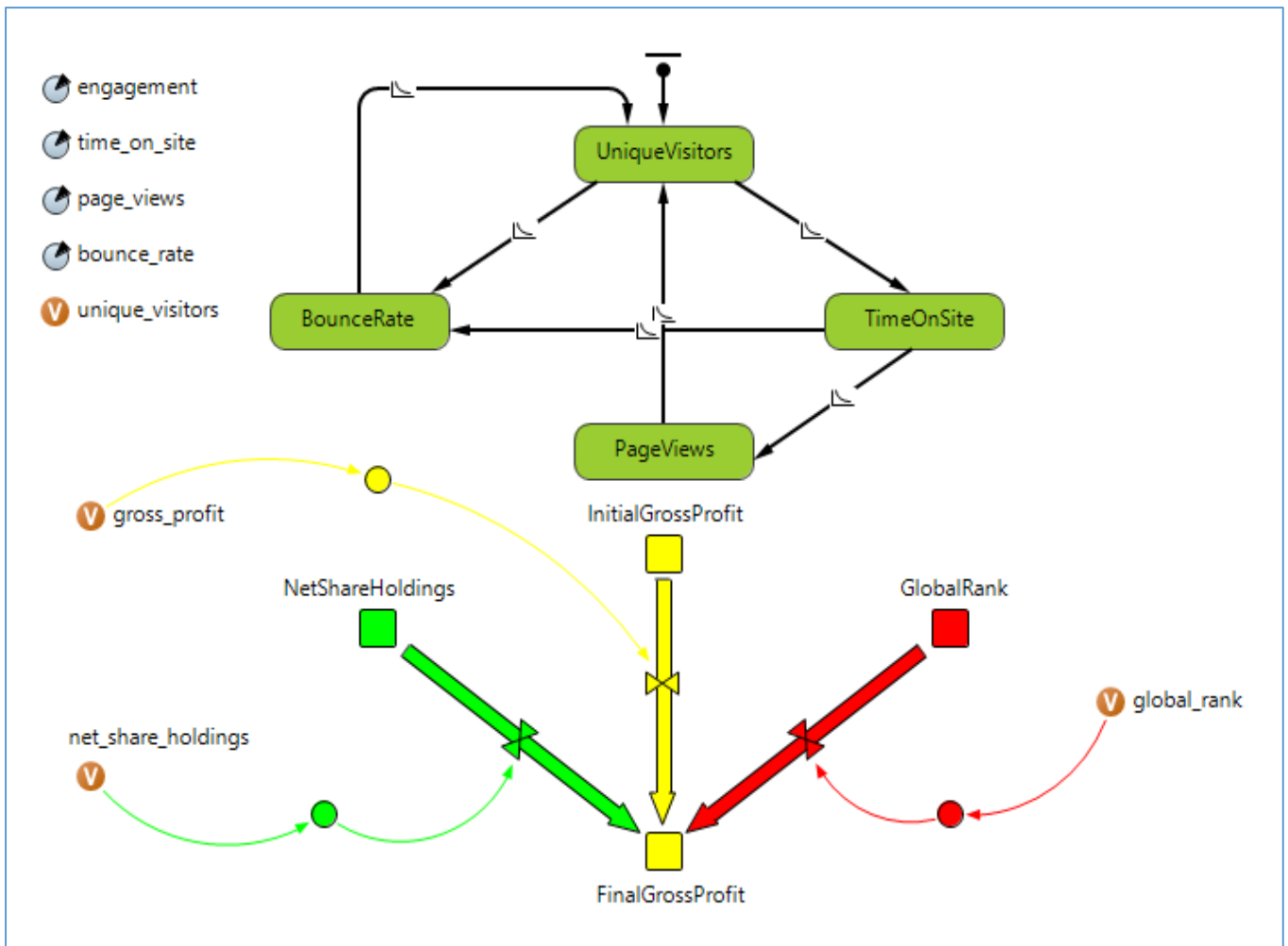


Figure 1: Dynamic Model Deployment

The model proceeds to simulate the selected metrics' variation in 90 days period, producing results shown in Figure 2. There, the variations of air forwarders' gross profit, global rank, and holders' net earnings are presented with the related engagement variation of their website visitors. We can discern that, throughout the simulation period of 90 days, when their website visitors' engagement increases, their global rank is decreased (which indicates an enhancement), while in most of the cases, gross profit and holders' net earnings are affected positively from website visitors' engagement levels. Moreover, the variation in air forwarders' gross profit follows the variation in their website visitors' engagement with a small-time delay, and their holders' net earnings also follow the gross profit metric with a small-time delay. Both gross profit and engagement variables, as well as gross profit and holders' net earnings, are connected positively.

Figure following on the next page

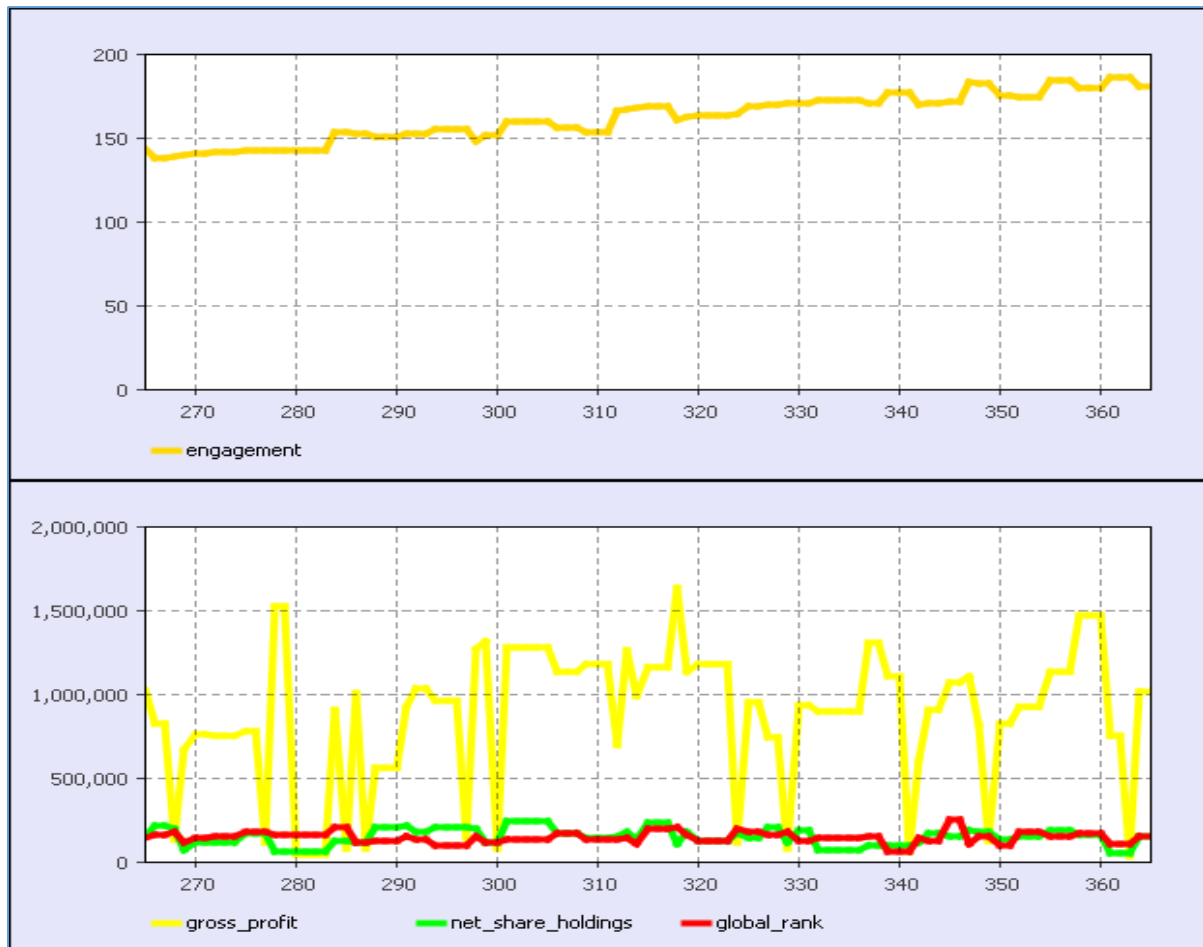


Figure 2: Hybrid Model Air Forwarding metrics' variation

6. CONCLUSION

During the course of this study, the main topic of interest was the investigation of the connection between air forwarders' financial performance metrics with their digital marketing and website analytics. The more air forwarding firms engage their website visitors, and potential customers, the more their search engine results enhance (lower global ranking metric), thus leading to increased gross profit results and finally, increased net earnings for their shareholders. Supply chain firms should take into consideration the fact that their financial performance can be enhanced through investment in digital marketing campaigns that aim to increase website visitors' engagement. From the performed analysis of air forwarders' financial performance metrics, plenty of practical implications arise. For the attraction of investors, supply chain firms should optimize their website visitors' engagement as a tool for increasing their search engine results (lower global rank). By enhancing their global rank metric, supply chain firms' gross profit, and shareholders' net earnings will gradually increase, meaning that investors will be attracted to their shares.

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LITERATURE:

1. Anylogic. (2023). Retrieved 20.02.2023 from <https://www.anylogic.com/>.
2. Assunção, M.D., Calheiros, R.N., Bianchi, S., Netto, M.A. & Buyya, R. (2015). Big Data computing and clouds: trends and future directions. *J. Parallel Distrib. Comput.* 79-80, 3–15. <http://dx.doi.org/10.1016/j.jpdc.2014.08.003>. Cox, M. & Ellsworth, D. (1997). Managing Big Data for scientific visualization. *ACM Siggraph, MRJ/NASA Ames Res. Cent.* 5, 1–17.
3. Blazquez, D. & Domenech, J. (2018). Big Data sources and methods for social and economic analyses. *Technological Forecasting & Social Change*, 130, 99–113. <http://dx.doi.org/10.1016/j.techfore.2017.07.027>.
4. Brett, D. (2020). *Top 25 Air Forwarding 2019: DHL Leads the Pack in a Tough Year*. Retrieved 16.02.2023 from <https://www.aircargonews.net/business/statistics/top-25-air-forwarding-dhl-leads-the-pack-in-a-tough-year/>.
5. DB Schenker. (2023). Retrieved 16.02.2023 from <https://www.dbschenker.com/>.
6. DHL. (2023). Retrieved 16.02.2023 from <https://www.dhl.com/>.
7. DSV. (2023). Retrieved 16.02.2023 from <https://www.dsv.com/>.
8. Erdmann, A. & Ponzoa, J.M. (2021). Digital inbound marketing: Measuring the economic performance of grocery e-commerce in Europe and the USA. *Technological Forecasting & Social Change*, 162, 120373. <https://doi.org/10.1016/j.techfore.2020.120373>.
9. Ivanov, D. (2018). Revealing interfaces of supply chain resilience and sustainability: a simulation study. *International Journal of Production Research*, 56 (10), 3507-3523. [10.1080/00207543.2017.1343507](https://doi.org/10.1080/00207543.2017.1343507).
10. Jansen, J.H. (2014). *Supply Chain Finance Management*. HAN Business Publications: Nijmegen, The Netherlands, 1–36.
11. Jin, X., Wah, B.W., Cheng, X. & Wang, Y. (2015). Significance and challenges of big data research. *Big Data Res.* 2 (2), 59–64. <http://dx.doi.org/10.1016/j.bdr.2015.01.006>.
12. Kuehne-Nagel. (2023). Retrieved 16.02.2023 from <https://kuehne-nagel.com/>.
13. Marchi, B. & Zanoni, S. (2017). Supply Chain Management for Improved Energy Efficiency: Review and Opportunities. *Energies*, 10, 1618. <https://doi.org/10.3390/en10101618>.
14. Parry, P., Martha, J. & Grenon, G. (2007). The Energy-Efficient Supply Chain. *Strategy Bus.*, 47, 1–8.
15. Qi, Y., Boyer, K.K. & Zhao, X., (2009). Supply chain strategy, product characteristics, and performance impact: evidence from Chinese manufacturers. *Decision Sciences*, 40 (4), 667-695.
16. Roehrich, J.K., Grosvold, J. & Hoejmoose, S.U. (2014). Reputational risks and sustainable supply chain management. *Int. J. Oper. Prod. Manag.*, 34, 695–719. <https://doi.org/10.1108/IJOPM-10-2012-0449>.
17. Retzlaff, C.O., Ziefle M. & Calero-Valdez, A. (2021). The history of agent-based modeling in the social sciences. In: Duffy VG (ed) *Digital human modeling and applications in health, safety, ergonomics and risk management. Human body, motion and behavior. HCII 2021. Lecture notes in computer science*, 12777. Springer, Cham. https://doi.org/10.1007/978-3-030-77817-0_22.
18. Sakas, D.P. & Terzi, M.C. (2010). Measuring service quality in the Greek's shipping transportation sector: the emerging gap in customers' expectations and perceptions. *Marketing and Management Sciences*, 280-284. https://doi.org/10.1142/9781848165106_0049.
19. Sakas, D.P. & Giannakopoulos, N.T. (2021a). Harvesting Crowdsourcing Platforms' Traffic in Favour of Air Forwarders' Brand Name and Sustainability. *Sustainability*, 13, 8222. <https://doi.org/10.3390/su13158222>.

20. Sakas, D.P. & Giannakopoulos, N.T. (2021b). Big Data Contribution in Desktop and Mobile Devices Comparison, Regarding Airlines' Digital Brand Name Effect. *Big Data Cogn. Comput.*, 5, 48. <https://doi.org/10.3390/bdcc5040048>.
21. Sakas, D.P., Giannakopoulos, N.T., Kanellos, N. & Tryfonopoulos, C. (2022a). Digital Marketing Enhancement of Cryptocurrency Websites through Customer Innovative Data Process. *Processes*, 10, 960. <https://doi.org/10.3390/pr10050960>.
22. Sakas, D.P., Giannakopoulos, N.T., Kanellos, N. & Migkos, S.P. (2022b). Innovative Cryptocurrency Trade Websites' Marketing Strategy Refinement, via Digital Behavior. *IEEE Access*, 10, 63163-63176. 10.1109/ACCESS.2022.3182396.
23. Semrush. (2023). Retrieved 16.02.2023 from <https://www.semrush.com/>.
24. Statista. (2019). Food & Personal Care e-commerce report 2019. Retrieved 10.03.2023 from <https://www.statista.com/study/39182/ecommerce-report-food-and-personal-care/>.
25. Terzi, M.C., Sakas, D.P. & Vlachos, D. (2011). Marketing Dynamic Simulation Modelling in High Tech Laboratories. *Key Engineering Materials*, 495, 23-27. <https://doi.org/10.4028/www.scientific.net/KEM.495.23>.
26. Toudas, K. & Kanellos, N. (2022). Economic and accounting performance of Greek innovative firms through knowledge-based entrepreneurship. *J. Account. Taxation*, 14(2), 150-160. <https://doi.org/10.5897/JAT2022.0530>.
27. UPS. (2023). Retrieved 16.02.2023 from <https://www.ups.com/>.
28. Wagner, S.M., Grosse-Ruyken, P.T. & Erhun, F. (2012). The link between supply chain fit and financial performance of the firm. *Journal of Operations Management*, 30 (4), 340-353. <https://doi.org/10.1016/j.jom.2012.01.001>.

DIGITAL BUSINESS OPERATIONS IN THE TRANSPORT, DISTRIBUTION AND HANDLING PROCESSES OF THE SUPPLY CHAINS IN THE SHIPPING INDUSTRY

Damianos P. Sakas

BICTEVAC LABORATORY: Business Information and Communication Technologies in Value Chains Laboratory, Department of Agribusiness and Supply Chain Management, School of Applied Financials and Social Sciences, Agricultural University of Athens, 118 55 Athens, Greece

Nikos Kanellos

BICTEVAC LABORATORY: Business Information and Communication Technologies in Value Chains Laboratory, Department of Agribusiness and Supply Chain Management, School of Applied Financials and Social Sciences, Agricultural University of Athens, 118 55 Athens, Greece

Nikolaos T. Giannakopoulos

BICTEVAC LABORATORY: Business Information and Communication Technologies in Value Chains Laboratory, Department of Agribusiness and Supply Chain Management, School of Applied Financials and Social Sciences, Agricultural University of Athens, 118 55 Athens, Greece

Marina C. Terzi

BICTEVAC LABORATORY: Business Information and Communication Technologies in Value Chains Laboratory, Department of Agribusiness and Supply Chain Management, School of Applied Financials and Social Sciences, Agricultural University of Athens, 118 55 Athens, Greece

Panagiotis Rekleitis

Department of Agribusiness and Supply Chain Management, School of Applied Financials and Social Sciences, Agricultural University of Athens, 118 55 Athens, Greece

Panagiotis Trivellas

Department of Agribusiness and Supply Chain Management, School of Applied Financials and Social Sciences, Agricultural University of Athens, 118 55 Athens, Greece

ABSTRACT

Research in the field of shipping entrepreneurship focuses on starting and running shipping-related firms. Researchers can utilize data analytics to get insights into different elements of the shipping business, including market trends, consumer behavior, and operational effectiveness, thanks to the growing availability of big data. The market study is one potential area of research in shipping entrepreneurship that might gain from big data analytics. Data from sources like shipping logs, market reports, and social media might be used by researchers to study market patterns and spot possible business possibilities in the shipping sector. For instance, they could examine consumer feedback to discover market gaps or use data on shipping volumes and routes to pinpoint regions where the need for shipping services is increasing. Customer behavior research is another promising topic of study. Researchers could find strategies for shipping business owners to better serve their consumers by examining data

on consumer preferences and purchasing trends. They may, for instance, examine consumer comments to pinpoint areas where shipping firms could enhance their customer service or use data on shipping preferences to create new shipping services that better-fit customers' expectations. The current study examines the role that big data metrics play in enhancing the competitiveness of the shipping industry's online presence.

Keywords: *supply chain, shipping companies, digital marketing operations, Big Data, Decision Support Systems*

1. INTRODUCTION

The determination of the companies' comparative objectives is a critical component of operations management. They could encompass the fundamental goals of expense, performance, service, and adaptability (Boyer & Lewis, 2002) alongside subsequent objectives like innovation (Kroes & Ghosh, 2010). By distributing its scarce assets, a corporation must exchange between these objectives, in particular in terms of the proportional levels of progress of the various objectives (Hayes & Pisano, 1996). Boyer & Lewis (2002) discovered an exchange involving expense and adaptability, timeliness and adaptability, and delivery and performance in their analysis of 110 production facilities. This exchange is evidenced in the contrasts among lean vs. flexible production (Inman et al., 2011) and supply chain practices (Qi et al., 2011), plus the effectiveness duality in supply chain objectives, in which efficacious supply chains strive for expense contentment of dependable demand and adaptable supply chains target for a fast reply to unanticipated demand (Parmigiani et al., 2011). Cost-cutting and waste-reduction initiatives mean fewer stock across the supply chain. Though such tactics could be ecologically and financially reasonable, they might have a detrimental impact on supply chain adaptability due to a lack of risk abatement stocks to deal with interruptions (Ivanov, 2018). Several firms nowadays embrace digitization to enhance consumer engagement and compete. Corporations are deemed to have digital development in order to establish consumer-based digital marketing strategies (Kane et al., 2015). The digital revolution has been a critical motivator of efficiency in several industries, including cargo transportation (De Martino et al., 2013). It has been noticed that digitization, which is a significant problem of supply chain activities, is being quickly implemented in the cargo shipping business. The context of the research is analyzed in the sections seen below: the introductory part aims to grant a glimpse of the referred literature of the paper, followed by the Related Background part, where an extensive analysis of the literature review of the paper's framework is presented. Later on, the following sections focus on settling the research hypotheses of the research and extracting the necessary statistical (correlation analysis) and modeling outcomes (Fuzzy Cognitive Mapping) to provide useful information. At last, the study is summed up in the Conclusions section, with the most important insights, which originated from the analysis, being presented.

2. RELATED BACKGROUND

Operations and energy consumption efficiency have grown in importance as a strategic critical asset for financial and environmental growth in recent times, owing to the numerous advantages it brings to various stakeholders (Marchi & Zanoni, 2017). Such efficacy may lead to significant expenditure benefits, enhanced performance, sustainability, reliability, a more productive environment, and other benefits for the industry's consumers (Marchi & Zanoni, 2017). Just a continuous study strategy could prove causation or the development of important factors through time, allowing deeper investigation into the complex character of supply networks in order to achieve a match along the products' lifetime (Wagner et al., 2012). Sustainability measurements are heavily integrated into businesses' supply chain management operations and vendor evaluation approaches (Ahi & Searcy, 2015).

It is abundantly shown that a robust supply chain strategy encounters sustainability concerns. Yet at the present time, establishing a broad association among efficacy, sustainability, and adaptability is challenging and needs more research (Ivanov, 2018). E-commerce optimizes Digital Marketing in accordance with an existing digital operations model, identifying variances between nations and by company form (Erdmann & Ponzoa, 2021). The concentration focuses on the economic evaluation of the usage and modification of the range of Digital Marketing approaches, which in particular is dependent on the business's preliminary step. Because the study is not consistent, it must be adjusted to every business's unique scenario in order to find the expenditures in Digital Marketing with the best payoff (separately as well as a combination of strategies) (Erdmann & Ponzoa, 2021). The Big Data concept certainly provides several opportunities and perks to businesses, authorities, and societies. According to Jin et al. (2015), it has the ability to contribute to economic and technological growth because it drives researchers to alter and update their methodologies, encourages and facilitates integrated analysis, and aids in forecasting the now and the future more effectively. Wang et al. (2016) created a comprehensive and focused Big Data analytics infrastructure in the clinical industry. This design was developed relying on the market's best techniques for creating Big Data applications. Moreover, in the sectors of airlines and air forwarders, it was found that specific digital marketing analytics are determining factors for key sustainability and financial performance metrics (Sakas & Giannakopoulos, 2021a; Sakas & Giannakopoulos, 2021b). From that point, capitalization of innovative frameworks for exploiting various digital marketing analytics could provide a handful of insights into shipping companies digital operations' efficacy (Sakas et al., 2022a; Sakas et al., 2022b; Sakas & Terzi, 2010). To this time, many studies have done research on transportation firms' common operations' outcomes and benefits. The authors spotted a gap in the literature regarding the connection between shipping companies' digital operations efficiency and their digital marketing analytics. Through exact analysis of key metrics of supply chain firms' digital operations and efficiency, as well as their digital marketing analytics (bounce rate, page views, time on site, etc.), beneficial insights concerning those metrics' relationships could emerge. Crucial insights from the referred literature review led the authors to deploy the following research hypotheses, based on the enhancement of shipping companies' digital operations.

- **H1:** *“Shipping companies can achieve greater engagement of their customers to their brand through effective digital marketing operations”.*
- **H2:** *“Digital marketing metrics of shipping companies cannot determine the number of customers originated from direct sources”.*
- **H3:** *“To attract more new customers to their services, shipping companies should increase the page views of their websites”.*

3. METHODOLOGY

As stated before, for the authors to estimate the effectiveness of shipping companies' digital operations, multiple research models were harvested. More specifically, statistical tools and applications were used, such as descriptive statistics and correlation analysis, to depict the key relationships of shipping companies' digital operation metrics. This analysis was followed by a fuzzy modeling process with specific scenarios, through the platform of MentalModeler (2023). Through this methodological context, the estimation of shipping companies' digital operation efficacy will be executed, via the elaboration of exact digital marketing metrics. As a consequence, marketers and decision-makers in shipping companies would be capable of:

- enhancing their digital operations' efficacy through adjusting specific digital marketing metrics, that are closely connected with the behavioral analytics of their website customers.
- deploy operation-wise digital marketing strategies, that originate from Big Data collection from the shipping companies' websites.

For the purposes of the study, the collection of the required data occurred from the websites of the 5 largest shipping companies for 2023, based on their shipping tonnage transferred in 2021 (MarineInsight, 2022). The referred metrics range from branded traffic and direct traffic to the companies' website bounce rate, pages per visit, etc. To proceed with the extraction of the data, the authors focused on the following shipping companies: MSC (2023), Maersk (2023), CMA-CGM (2023), Cosco (2023), and Hapag-Lloyd (2023). For the proper collection of the analytical data from the websites of the shipping companies, the capitalization of the website platform Semrush (2023) was necessary.

4. RESULTS

The following stage of the results aims to apply advanced statistical elaboration and to comprehend the deployed relationships among the digital marketing metrics of shipping companies. From this point, the authors will verify or reject the settled research hypotheses, based on the statistical outcomes. In Table 1, the basic descriptive statistics are shown, which can provide important information regarding the included variables of the sample's shipping companies. For both dependent variables (branded traffic, direct traffic, and new customers) and the selected independent ones (bounce rate, page views, time on site, etc) the descriptive statistics of mean, std. variation, min, and max were utilized. These statistics are useful for obtaining a clear image of the collected metrics' characteristics and descriptions. Apart from the descriptive statistics, the authors deployed correlation analysis, based on Pearson's coefficient (Pearson, 1895). The most significant correlations that were produced for the dependent variables of the paper's analysis, are: (a) for branded traffic is with direct traffic, new customers, and page views, (b) for direct traffic no significant correlation is produced, and (c) for new customers is with page views. Hence, from these outcomes the authors are able to verify all of the research hypotheses, meaning that:

- **H1:** Shipping companies can achieve greater engagement of their customers to their brand through effective digital marketing operations.
- **H2:** Digital marketing metrics of shipping companies cannot determine the number of customers originating from direct sources.
- **H3:** To attract more new customers to their services, shipping companies could increase the page views of their websites.

Variables	Mean	Min	Max	Std. Deviation
Branded Traffic %	89.86%	89%	90%	0.378
Direct Traffic	31505067	32268152	32268152	551885.34
New Customers %	1.56%	1%	2%	0.36%
Time on site	257.943	166.40	349.00	63.219
Page Views	2.5857	2	3.26	0.432
Bounce Rate	0.3043	0.21	0.37	0.0576
Total Keywords	1497642.33	1422235	1566694	45959.317

*Table 1: Descriptive Statistics
(N = 180 observation days for 5 Shipping Companies)*

Table following on the next page

Variables	Branded Traffic	Direct Traffic	New Customers	Time on site	Page Views	Bounce Rate	Total Keywords
Branded Customers	1	-0.677*	-0.633*	-0.030	-0.688*	-0.128	0.035
Direct Traffic	-0.677*	1	0.175	0.481	0.204	0.173	0.182
New Customers	-0.633*	0.175	1	0.211	0.850*	-0.335	0.423
Time on site	-0.030	0.481	0.211	1	0.183	-0.129	0.679*
Page Views	-0.688*	0.204	0.850*	0.183	1	0.197	0.429
Bounce Rate	-0.128	0.173	-0.335	-0.129	0.197	1	0.087
Total Keywords	0.035	0.182	0.423	0.679*	0.429	0.087	1

*Table 2: Variables' Correlations
(* indicate statistical significance at the 95% level)*

5. FUZZY COGNITIVE MODEL

At the current stage, the authors developed an innovative modeling framework (Terzi et al., 2011) to assess the relationships of all the referred metrics of shipping companies' digital operational effectiveness. The Fuzzy Cognitive Maps (FCM) modeling process was utilized, through 4 scenarios, in order to estimate the impact of shipping companies' digital marketing metrics on their digital operations efficacy. The FCM model that is presented in Figure 1, includes the connection between all the factors of the study, both digital operations' metrics (branded traffic, new customers, and direct traffic) and digital marketing's metrics (time on site, page views, bounce rate, etc.). The referred variables were connected with arrows, whose thickness and color are based on their correlations' significance and their sign (negative – red, positive – blue) accordingly (Case et al., 2018). Apart from that, other studies have highlighted FCM's implication and role in describing and analyzing static outcomes of financial figures, especially when these are discerned from high correlation coefficients (Migkos et al., 2022). So, the authors moved to develop 4 discrete FCM scenarios that will estimate the course of shipping companies' digital operations efficacy factors (branded traffic, new customers, and direct traffic) through the variation of their digital marketing metrics (bounce rate, page views, etc.).

Figure following on the next page

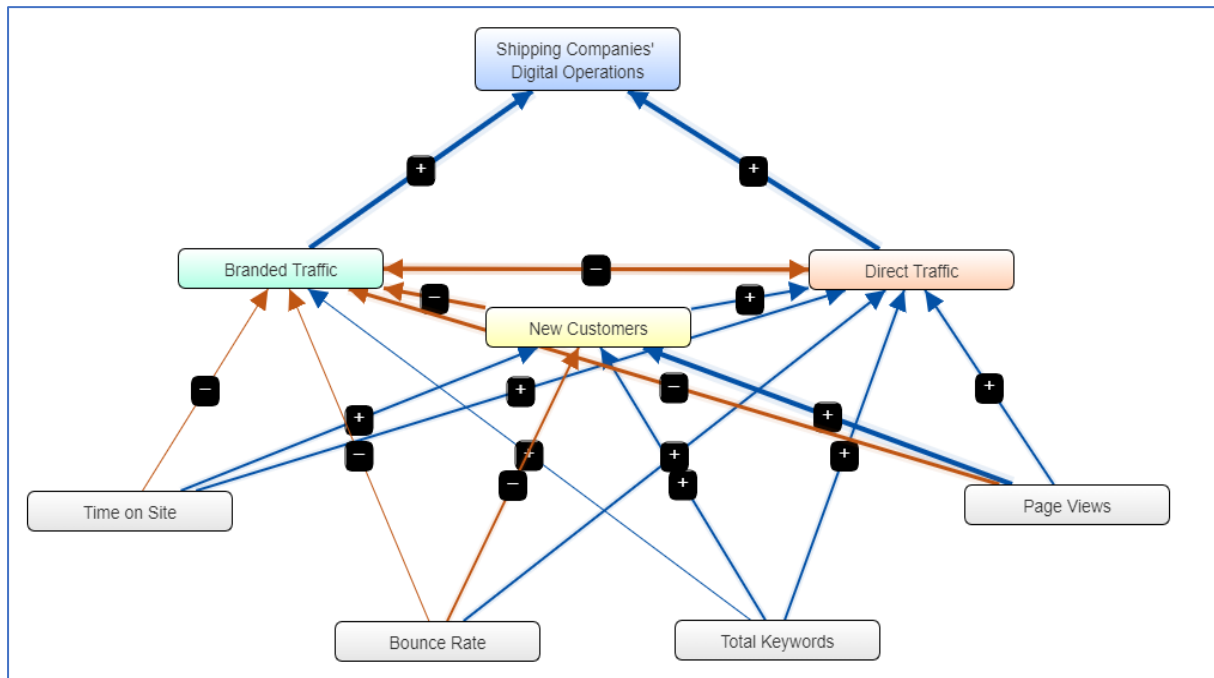
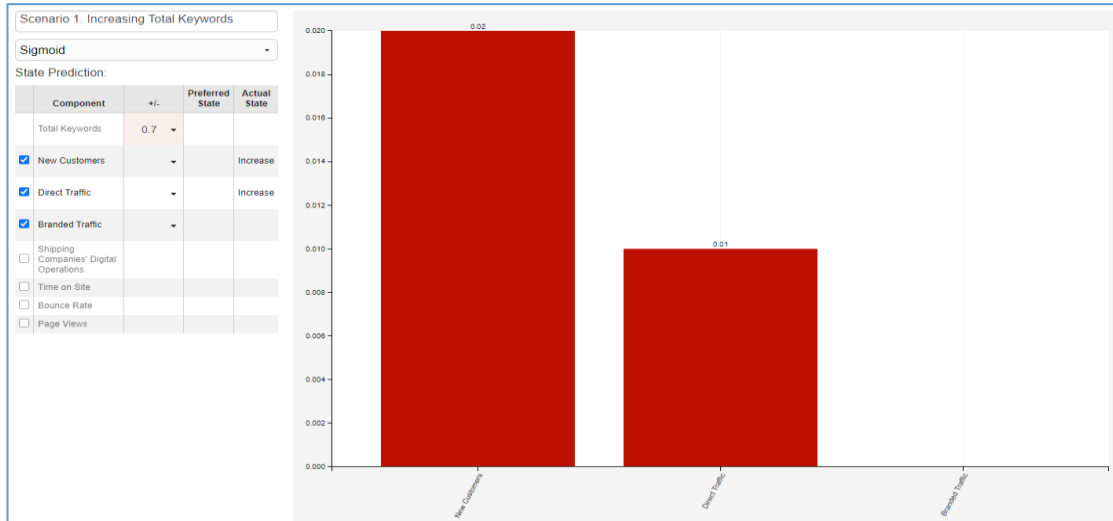


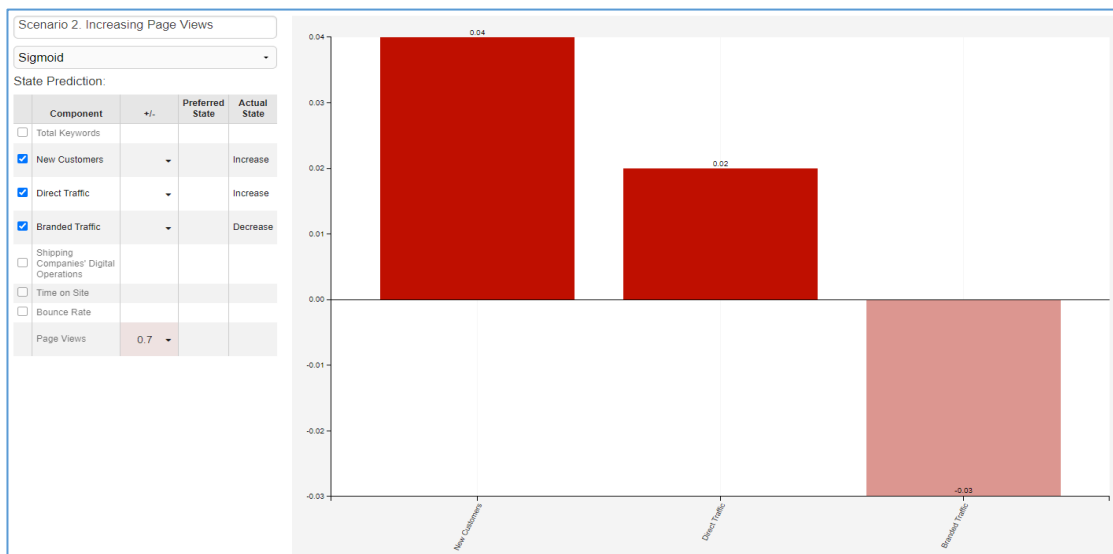
Figure 1: Fuzzy Cognitive Model Deployment

The deployment of the FCM scenarios, seen in Figure 2 (a) to (d), provides multiple handful insights. In scenario 2(a), the impact of increased total keywords on shipping companies' branded and direct traffic, as well as the new customers' metric. First of all, in scenario 1, by increasing the number of potential total keywords range of shipping firms' websites by 70%, their new customers will increase by 2% and their direct traffic by 1%, while their branded traffic variable will remain stable. In scenario 2, where the authors increased page views of shipping companies' websites by 70%, their branded traffic was decreased by 3%, while the variables of new customers and direct traffic rose by 4% and 2% respectively. Throughout scenario 3, it can be discerned that shipping companies' new customers and direct traffic can be increased up to 1% and 2% accordingly, with branded traffic remaining stable, by increasing, up to 70%, of the time their website customers spend on the site. Finally, in scenario 4, the decrease of shipping companies' website bounce rate by 50% was applied, thus, leading to increased new customers and branded traffic metric, by 7% and 2% respectively, but to lower direct traffic by 4%. The extracted outcomes could be further combined to produce enhanced results for shipping companies' digital operations efficacy.

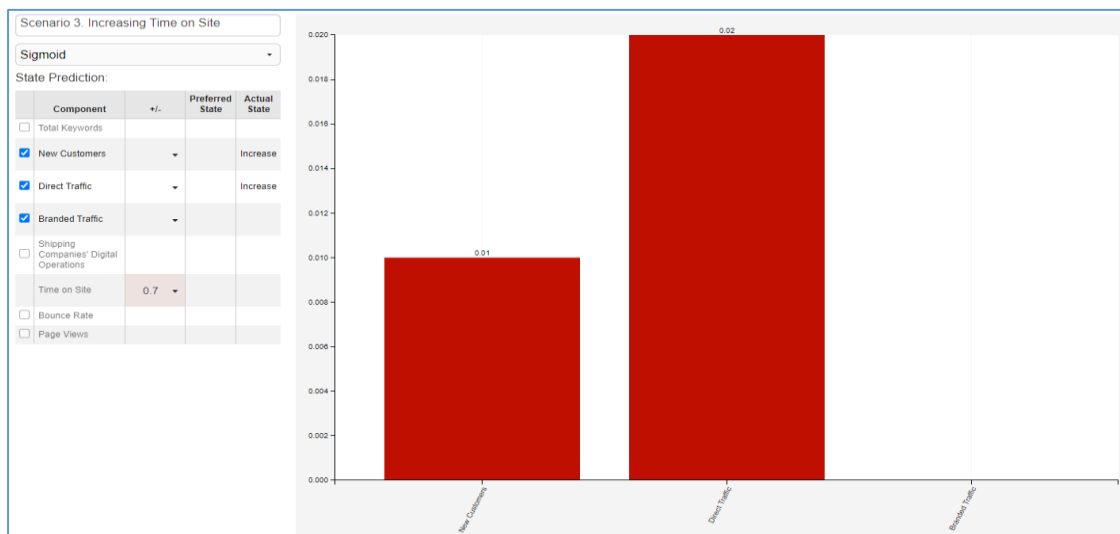
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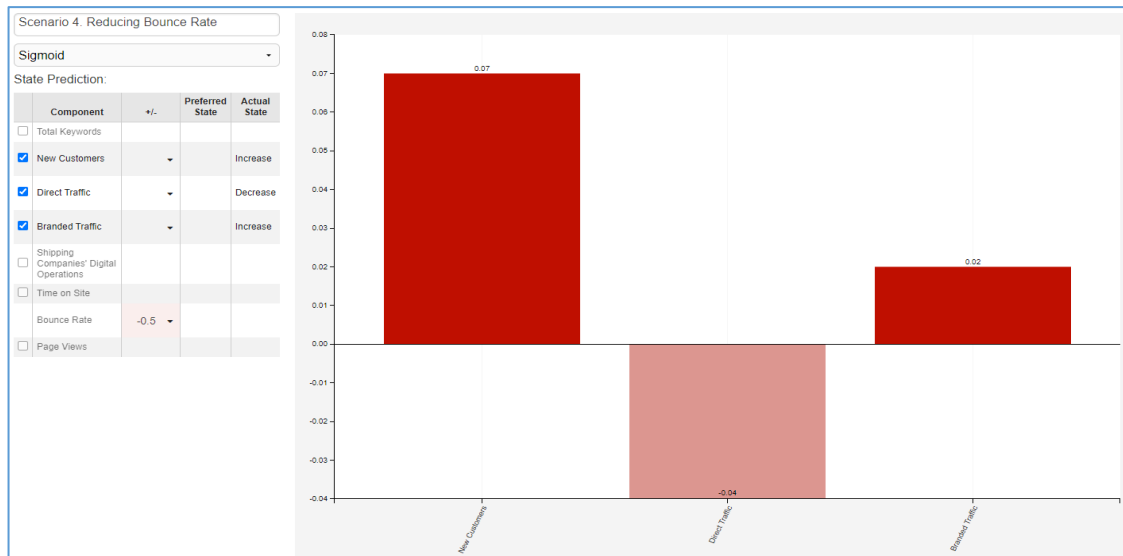
(a)



(b)



(c)



(d)

Figure 2: Fuzzy Cognitive Model Scenarios (a)-(d)

6. CONCLUSION

The authors, prior to the deployment of the research, sought to identify the factors of shipping firms' digital marketing process that affects their digital operations' efficacy. For this purpose, the capitalization of FCM models and scenarios was selected. In these scenarios, various metrics of shipping firms' digital marketing processes were varied to elaborate their effect on companies' digital operations efficacy. Such efficacy can be achieved through increased branded and direct traffic, as well as new customer outcomes. For shipping companies, enhanced digital operations' efficacy could be achieved by monitoring and aiming to increase the engagement of their customers with their websites. This goal is highly related to the level of investment in website platform development funds. Regarding the practical implications of the research findings, it should be stated that shipping companies are capable of acknowledging their competitiveness (Toudas & Kanellos, 2022). The referred digital marketing metrics provide valuable insights to shipping companies regarding their level of competitiveness and thus, through proper adjustment of specific website variables, they could be able to enhance the efficacy of their digital operations. Such enhancement would be depicted through more new website customers, increased customer engagement with the brand, and enhanced website direct traffic for shipping firms.

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LITERATURE:

1. Ahi, P. & Searcy, C. (2015). An Analysis of Metrics Used to Measure Performance in Green and Sustainable Supply Chains. *Journal of Cleaner Production*, 86, 360–377.
2. Boyer, K.K. and Lewis, M.W. (2002). Competitive priorities: investigating the need for trade-offs in operations strategy. *Production and Operations Management*, 11 (1), 9-20.

3. Case, D.M., Blackburn, T. and Stylios, C. (2018). Modelling Construction Management Problems with Fuzzy Cognitive Maps. In *Fayek, A.R. (Ed.) Fuzzy Hybrid Computing in Construction Engineering and Management*, Emerald Publishing Limited, Bingley, 413-449. <https://doi.org/10.1108/978-1-78743-868-220181012>.
4. CMA-CGM. (2023). Retrieved 05.02.2023 <https://www.cma-cgm.com/>.
5. Cosco. (2023). Retrieved 05.02.2023 <https://lines.coscoshipping.com/home/>.
6. De Martino, M., Errichiello, L., Marasco, A., & Morvillo, A. (2013). Logistics innovation in seaports: An inter-organizational perspective. *Research in Transportation Business & Management*, 8, 123–133. <https://doi.org/10.1016/j.rtbm.2013.05.001>.
7. Erdmann, A. & Ponzoa, J.M. (2021). Digital inbound marketing: Measuring the economic performance of grocery e-commerce in Europe and the USA. *Technological Forecasting & Social Change*, 162, 120373. <https://doi.org/10.1016/j.techfore.2020.120373>.
8. Hapag-Lloyd. (2023). Retrieved 05.02.2023 <https://www.hapag-lloyd.com/>.
9. Hayes, R.H. & Pisano, G.P. (1996). Manufacturing strategy: at the intersection of two paradigm shifts. *Production and Operations Management*, 5 (1), 25-41.
10. Inman, R.A., Sale, R.S., Green Jr., K.W. & Whitten, D. (2011). Agile manufacturing: relation to JIT, operational performance and firm performance. *Journal of Operations Management*, 29 (4), 343-355.
11. Ivanov, D. (2018). Revealing interfaces of supply chain resilience and sustainability: a simulation study. *International Journal of Production Research*, 56 (10), 3507-3523. [10.1080/00207543.2017.1343507](https://doi.org/10.1080/00207543.2017.1343507).
12. Jin, X., Wah, B.W., Cheng, X. & Wang, Y. (2015). Significance and challenges of big data research. *Big Data Res.* 2(2), 59–64. <http://dx.doi.org/10.1016/j.bdr.2015.01.006>.
13. Kane, G.C., Palmer, D., Phillips, A.N., Kiron, D. & Buckley, N. (2015). Strategy, Not Technology, Drives Digital Transformation. 14, *MIT Sloan Management Review and Deloitte University Press*, 1–25.
14. Kroes, J.R. & Ghosh, S. (2010). Outsourcing congruence with competitive priorities: impact on supply chain and firm performance. *Journal of Operations Management*, 28 (2), 124-143.
15. Maersk. (2023). Retrieved 05.02.2023 <https://www.maersk.com/>.
16. Marchi, B. & Zanoni, S. (2017). Supply Chain Management for Improved Energy Efficiency: Review and Opportunities. *Energies*, 10, 1618. <https://doi.org/10.3390/en10101618>.
17. MarineInsight. (2022). *10 Largest Container Shipping Companies in the World in 2023*. Retrieved 05.02.2023 <https://www.marineinsight.com/know-more/10-largest-container-shipping-companies-in-the-world/>.
18. MentalModeler. (2023). Retrieved 05.02.2023 <https://dev.mentalmodeler.com/>.
19. Migkos, S.P., Sakas, D.P., Giannakopoulos, N.T., Konteos, G. and Metsiou, A. (2022). Analyzing Greece 2010 Memorandum’s Impact on Macroeconomic and Financial Figures through FCM. *Economies*, 10, 178. <https://doi.org/10.3390/economies10080178>.
20. MSC. (2023). Retrieved 05.02.2023 <https://www.msc.com/>.
21. Parmigiani, A., Klassen, R.D. & Russo, M.V. (2011). Efficiency meets accountability: performance implications of supply chain configuration, control, and capabilities. *Journal of Operations Management*, 29 (3), 212-223.
22. Pearson, K. (1895). Notes on regression and inheritance in the case of two parents. *Proceedings of the Royal Society of London*, 58, 240–242.
23. Qi, Y., Zhao, X. & Sheu, C. (2011). The impact of competitive strategy and supply chain strategy on business performance: the role of environmental uncertainty. *Decision Sciences*, 42 (2), 371-389.

24. Sakas, D.P. & Terzi, M.C. (2010). Measuring service quality in the Greek's shipping transportation sector: the emerging gap in customers' expectations and perceptions. *Marketing and Management Sciences*, 280-284. https://doi.org/10.1142/9781848165106_0049.
25. Sakas, D.P. & Giannakopoulos, N.T. (2021a). Harvesting Crowdsourcing Platforms' Traffic in Favour of Air Forwarders' Brand Name and Sustainability. *Sustainability*, 13, 8222. <https://doi.org/10.3390/su13158222>.
26. Sakas, D.P. & Giannakopoulos, N.T. (2021b). Big Data Contribution in Desktop and Mobile Devices Comparison, Regarding Airlines' Digital Brand Name Effect. *Big Data Cogn. Comput.*, 5, 48. <https://doi.org/10.3390/bdcc5040048>.
27. Sakas, D.P., Giannakopoulos, N.T., Kanellos, N. & Tryfonopoulos, C. (2022a). Digital Marketing Enhancement of Cryptocurrency Websites through Customer Innovative Data Process. *Processes*, 10, 960. <https://doi.org/10.3390/pr10050960>.
28. Sakas, D.P., Giannakopoulos, N.T., Kanellos, N. & Migkos, S.P. (2022b). Innovative Cryptocurrency Trade Websites' Marketing Strategy Refinement, via Digital Behavior. *IEEE Access*, 10, 63163-63176. [10.1109/ACCESS.2022.3182396](https://doi.org/10.1109/ACCESS.2022.3182396).
29. Semrush. (2023). Retrieved 05.02.2023 from <https://www.semrush.com/>.
30. Terzi, M.C., Sakas, D.P. & Vlachos, D. (2011). Marketing Dynamic Simulation Modelling in High Tech Laboratories. *Key Engineering Materials*, 495, 23-27. <https://doi.org/10.4028/www.scientific.net/KEM.495.23>.
31. Toudas, K. & Kanellos, N. (2022). Economic and accounting performance of Greek innovative firms through knowledge-based entrepreneurship. *J. Account. Taxation*, 14(2), 150-160. <https://doi.org/10.5897/JAT2022.0530>.
32. Wagner, S.M., Grosse-Ruyken, P.T. & Erhun, F. (2012). The link between supply chain fit and financial performance of the firm. *Journal of Operations Management*, 30 (4), 340-353. <https://doi.org/10.1016/j.jom.2012.01.001>.
33. Wang, Y., Kung, L. & Byrd, T.A. (2016). Big data analytics: understanding its capabilities and potential benefits for healthcare organizations. *Technol. Forecast. Soc. Chang.*, 1–11. <http://dx.doi.org/10.1016/j.techfore.2015.12.019>.

SELF-PERCEIVED BUSINESS CYBERSECURITY: EMPIRICAL EVIDENCE FROM SERBIA

Kristina Jovanovic

*University of Belgrade, Faculty of Organizational Sciences
Jove Ilica 154, 11000 Belgrade, Serbia
jovanovickr@hotmail.com*

Milos Milosavljevic

*University of Belgrade, Faculty of Organizational Sciences
Jove Ilica 154, 11000 Belgrade, Serbia
milos.milosavljevic@fon.bg.ac.rs*

Nemanja Milanovic

*University of Belgrade, Faculty of Organizational Sciences
Jove Ilica 154, 11000 Belgrade, Serbia
nemanja.milanovic@fon.bg.ac.rs*

ABSTRACT

The aim of this study is to examine the human factors associated with cybersecurity in Serbia by measuring the self-reported cybersecurity practices of individuals responsible for data management. Empirical data was collected using the HAIS-Q (Human Aspects of Information Security Questionnaire), a well-established instrument consisting of 23 sections with knowledge, attitude, and behavior-based questions. A total of 100 responses were collected and analyzed. The findings suggest that those responsible for managing critical business data and digital assets in Serbia exhibit deficiencies in their knowledge, attitude, and behavior towards cyber attacks.

Keywords: *Cybersecurity, HAIS-Q, Insurability, Serbia*

1. INTRODUCTION

Cybersecurity risks arise from a myriad of different technical factors, including outdated software versions, poor security protocols, hardware failure, and many other reasons (Jeong et al. 2019). The human factor, however, represents one of the biggest risks for the realization of a cyberattack. Carelessness and inattention, unprofessional behavior, improper and inadequate handling of devices, as well as ignorance can easily endanger company resources. People tend to use business computers, especially nowadays, for private purposes, which could put their company at risk. Human factors of cybersecurity have thus become an important topic among scholars and practitioners (Pollini et al. 2022). This study sought to examine the self-perceived exposure to cyber-attacks in a business environment. To this end, we used HAIS-Q as a research instrument and interviewed 100 respondents responsible for securing digital assets in Serbian companies. To the best of the authors' knowledge, a study of this kind has never been conducted in Serbia before. In general, digital technologies are found to have an important impact on business performance in Serbia (Kahrovic and Avdovic 2021). Some studies recognize Serbia as a country with established legal mechanisms to fight cybercrime (Minovic et al. 2016). Other conceptual studies find that although cybersecurity has been established, Serbia still faces serious online data privacy problems (Burak 2021). However, none of these studies assessed self-perceptions of information security in businesses. For this purpose, our paper employs one well-known research instrument – HAIS-Q (Parsons et al. 2017) to explore the human factor of cybersecurity in Serbia. The remainder of this paper is organized as follows. Section 2 provides a brief background by explaining the main types of cyberattacks.

Section 3 explains the methodology, including the research instrument, sampling procedure and data processing. In Section 4, the results are delineated and the main findings are contextualized. Finally, Section 6 is reserved for the concluding remarks, which include the contributions, implications, limitations and further recommendations.

2. BACKGROUND

Currently, economic, commercial, cultural, social, and governmental activities and interactions among nations, including individuals, non-governmental organizations, and governmental institutions, take place predominantly in the cyberspace (Li and Liu 2021) CITE). With the increasing use of wireless communication technologies, private companies and government organizations worldwide are encountering the threat of cyber-attacks. Given the high dependence of the contemporary world on electronic technology, safeguarding the information from such attacks poses a significant challenge. Cyberattacks refer to malicious activities that are carried out by individuals or groups with the intention of gaining unauthorized access to computer systems, networks, or devices (Bullock et al. 2021). These attacks are becoming increasingly common, and their impact can be severe, ranging from financial losses to reputational damage and even physical harm. According to a report by Accenture, the average cost of cybercrime for companies has increased by 50% in the past five years. In 2020 alone, the total cost of cybercrime globally was estimated to be \$1 trillion (Accenture 2020). Cyberattacks can result in financial losses due to factors such as theft of sensitive information, disruption of business operations, and the cost of repairing systems and infrastructure (Healey et al. 2018). Additionally, the loss of customer trust and reputation damage can also result in long-term financial impacts (Kamiya et al. 2021). It is crucial for companies to invest in cybersecurity measures and continuously monitor and update their systems to protect against potential cyber threats and prevent financial losses. Considering the recent emergence of the topic of cyberattacks in the field of business research, it is imperative to establish a comprehensive and well-defined typology of cyberattacks. Due to the multi-disciplinary nature of the topic, experts from both legal and technical fields have proposed various definitions and typologies of cyberattacks. As they are a complex and multifaceted phenomenon, there is no universally agreed upon typology of cyberattacks. However, existing studies (for example: Ahmetoglu and Das 2022; Facchinetti et al. 2023) have identified several commonly occurring types of cyberattacks, which will be briefly explained in this section. *Phishing* is a social engineering attack that involves the use of fraudulent emails, messages, or websites to trick individuals into revealing sensitive information such as login credentials or credit card details (Gupta et al. 2017). Phishing attacks can be highly sophisticated, often utilizing realistic-looking messages and websites to fool individuals into providing sensitive information. A variation of phishing, known as spear-phishing, involves targeting specific individuals or organizations with tailored messages to increase the likelihood of success. *Malware* is a type of software that is designed to harm computer systems, networks, and devices (Aslan and Samet 2020). Malware can include various types of viruses, trojans, and ransomware. *Spyware* is a harmful software that is designed to secretly gather information from a computer system without the user's knowledge or permission. Several studies have been conducted to detect and prevent cyberattacks caused by this insidious intruder (Mallikarajunan et al. 2019). This type of virus can collect sensitive personal information, such as passwords and credit card numbers, as well as browsing history and other usage patterns. It can infiltrate a system through various channels, such as downloading infected software or email attachments, visiting compromised websites, or exploiting vulnerabilities in existing software. Once it has infected a computer, it can operate surreptitiously, collecting data and sending it back to the attacker for malicious purposes, such as identity theft, financial fraud, or targeted advertising.

Spyware is difficult to detect and remove because it tries to evade security measures and runs undetectably in the background. *Denial of Service (DoS) and Distributed Denial of Service (DDoS) attacks* involve overwhelming a target system with traffic to cause it to crash or become unavailable. In a DoS attack, a single system or network is targeted, while in a DDoS attack, multiple systems or networks are utilized to generate traffic, making it more difficult to mitigate (Eliyan and Pietro 2021). *Advanced Persistent Threats (APTs)* are long-term, targeted attacks that involve gaining access to a system and remaining undetected for an extended period to gather sensitive information (Chen et al. 2020). APTs are typically conducted by state-sponsored groups or advanced criminal organizations and often utilize a combination of techniques, including social engineering, malware, and zero-day exploits. *Man-in-the-Middle (MITM) attacks* involve intercepting communications between two parties to steal information or modify data. In a MITM attack, an attacker positions themselves between the two parties, intercepting and modifying data as it passes through (Conti et al. 2016). *SQL Injection attacks* exploit vulnerabilities in web applications to gain access to a database or steal sensitive information (Ma et al. 2019). SQL injection attacks involve inserting malicious code into input fields to gain access to sensitive data or modify database records. *Zero-day attacks* exploit unknown vulnerabilities in software or hardware, making them difficult to detect and prevent. Zero-day vulnerabilities are typically discovered by attackers and kept secret to exploit them before they are patched (Blaise et al 2020). *Social engineering attacks* involve the manipulation of individuals through psychological means to gain access to sensitive information or computer systems. Social engineering attacks can take various forms, including phishing, pretexting, baiting, and tailgating (Aldawood and Skinner 2019). The aforementioned list represents a condensed typology of cyberattacks. Naturally, this classification could be further elaborated and subjected to critical analysis. However, such an effort lies beyond the scope of this paper. It is important to conclude that, in order to protect against cyberattacks, it is crucial to implement robust cybersecurity measures, including the use of firewalls, anti-virus software, and regular system updates, as well as training employees to recognize and prevent social engineering attacks (Nespoli et al. 2021). Additionally, it is essential to maintain a proactive approach to cybersecurity, regularly conducting risk assessments and staying informed about emerging threats and vulnerabilities.

3. MATERIALS AND METHODS

3.1. Research instrument

This study is based on the HAIS-Q research instrument designed to measure information security awareness (Parsons et al. 2014). The questionnaire is structured into seven groups of questions, each with subcategories, as shown in Table 1.

Table following on the next page

Category	Subcategory
Password management	Locking workstations Password sharing Choosing a good password
Email use	Forwarding emails Opening attachments IT department level of responsibility
Internet use	Installing unauthorized software Accessing dubious websites Inappropriate use of internet
Social Networking Sites (SNS)	Amount of work time spent on SNS Consequences of SNS Posting about work on SNS
Incident Reporting	Reporting suspicious individuals Reporting bad behavior by colleagues Reporting all security incidents
Mobile computing	Physically securing personal electronic devices Sending sensitive information via mobile networks Checking work email via free network
Information handling	Disposing of sensitive information Inserting USB devices Leaving sensitive material unsecured

*Table 1: Categories and subcategories of HAIS-Q
(Source: Parsons et al. 2014)*

Each subcategory is examined from three perspective: knowledge, attitude and behavior. Knowledge questions examine whether employees are familiar with company policies and procedures, what is allowed and what is not. Attitude questions examine employee attitudes to provide information about what employees think and their perception of what the policies or procedures pre-suppose, whereas behavioral questions really examine the specific behavior of employees, whether they do any of the above mentioned things. A Likert scale from 1 to 5 is used to evaluate the answers, where the value 1 indicates complete disagreement and 5 complete agreement with the answer offered (Parsons et al. 2013).

3.2. Sampling procedure

For the purposes of this paper, we used a snowball sampling procedure. The snowball sampling technique relies on peer-to-peer recruitment and the formation of a referral chain (Radonic and Milosavljevic 2019).

4. RESULTS AND DISCUSSION

4.1. Sample features

In terms of the gender split, the sample was unbalanced. Out of 100 respondents, as many as 62% were females, while men are in the minority and make up the remaining 38%. For the gender structure, the largest share of respondents were aged 20 to 30 with a share of 70%, followed by those aged 30 to 40 with 23%, and only 7 people over 40 were included among the respondents: four were within age group of 40 to 50 years and three were over 50-years. When it came to education, most respondents completed basic academic studies, followed by master's academic studies, high school, basic vocational studies and one doctor of science.

The number of years of work experience is divided as follows: as many as 62% have been employed for less than 5 years, following by persons with experience of 5 to 10 years 24%. Furthermore, 8% of respondents had 10 to 15 years of work experience, and 3% had from 15 to 20 years or more than 25 years of experience.

4.2. Main analysis

The data collected through the questionnaire was analyzed by calculation of mean and standard deviation. The subcategories of HAIS-Q are numbered from 1 to 21 as followed: 1) locking workstation, 2) password sharing, 3) choosing a good password, 4) forwarding emails, 5) opening attachments, 6) IT department level of responsibility, 7) installing unauthorized software, 8) accessing dubious websites, 9) inappropriate use of the internet, 10) amount of work time spent on SNS, 11) consequences of SNS, 12) posting about work on SNS, 13) reporting suspicious individuals, 14) reporting bad behavior by colleagues, 15) reporting all security incidents, 16) physically securing personal electronic devices, 17) sending sensitive information via mobile networks, 18) checking work email via free network, 19) disposing of sensitive documents, 20) inserting USB devices, 21) leaving sensitive material unsecured. Results are shown in Table 2.

N o.	Item	MEAN (k)	STD (k)	MEAN (a)	STD (a)	MEAN (B)	STD (b)	MEAN (all)	STD (all)
1	Locking workstations	2,03	1,27	2,03	1,27	1,96	1,23	2,01	1,26
2	Password sharing	1,52	0,92	4,34	1,07	1,45	0,86	2,44	0,95
3	Choosing a good password	4,10	1,23	1,97	1,21	4,44	1,05	3,50	1,16
A	Password management	2,55	1,14	2,78	1,18	2,62	1,05	2,65	1,12
4	Forwarding emails	2,06	1,22	2,20	1,44	3,54	1,36	2,60	1,34
5	Opening attachments	1,48	0,87	1,34	0,59	2,80	1,66	1,87	1,04
6	IT department level of responsibility	1,52	0,95	1,77	1,18	3,98	1,34	2,42	1,16
B	Email use	1,69	1,01	1,77	1,07	3,44	1,45	2,30	1,18
7	Installing unauthorized software	2,47	1,31	3,87	1,22	1,93	1,15	2,76	1,23
8	Accessing dubious websites	3,66	1,39	4,48	0,85	2,39	1,22	3,51	1,15
9	Inappropriate use of internet	2,48	1,28	4,18	1,10	3,69	1,31	3,45	1,23
C	Internet use	2,87	1,33	4,18	1,06	2,67	1,23	3,24	1,20
10	Amount of work time spent on SNS	2,58	1,41	1,85	1,10	2,54	1,29	2,32	1,27
11	Consequences of SNS	2,63	1,44	1,74	0,92	4,53	0,90	2,97	1,09
12	Posting about work on SNS	1,55	0,79	4,54	0,83	1,36	0,74	2,48	0,79
D	Social Networking Sites (SNS)	2,25	1,21	2,71	0,95	2,81	0,98	2,59	1,05
13	Reporting suspicious individuals	3,59	1,10	1,91	0,91	3,85	0,88	3,12	0,96
14	Reporting bad behavior by colleagues	2,16	0,99	1,94	0,89	2,19	1,03	2,10	0,97
15	Reporting all security incidents	3,14	1,39	4,09	1,05	1,85	0,93	3,03	1,12
E	Incident Reporting	2,96	1,16	2,65	0,95	2,63	0,94	2,75	1,02
16	Physically securing electronic devices	3,18	1,49	1,19	0,50	1,37	0,89	1,91	0,96
17	Sending sensitive information via mobile networks	1,94	1,21	4,14	1,08	1,82	1,04	2,63	1,11
18	Checking work email via free network	2,80	1,43	4,14	1,08	1,82	1,04	2,92	1,18
F	Mobile computing	2,64	1,37	3,16	0,89	1,67	0,99	2,49	1,08
19	Disposing of sensitive information	1,51	1,02	1,61	0,90	4,38	1,10	2,50	1,01
20	Inserting USB devices	4,57	1,01	1,29	0,60	4,52	1,02	3,46	0,88
21	Leaving sensitive material unsecured	1,42	0,86	4,43	0,99	1,50	0,88	2,45	0,91
	Information handling	2,50	0,97	2,44	0,83	3,47	1,00	2,80	0,93
	MEAN	2,49	1,17	2,81	0,99	2,76	1,09	2,69	1,08

Table 2: The descriptive statistic for HAIS-Q

The present study investigated the status of password management and cybersecurity practices in Serbia. The results presented in Table 2 indicate that the mean score for password management is 2.65 (SD=1.12), which suggests a relatively modest level of password management in the population. Strong and unique passwords are a fundamental aspect of cybersecurity, and neglecting this aspect can make individuals vulnerable to cyber threats. The results also suggest that email use is the weakest point of cybersecurity in Serbia, with a mean score of 2.30 (SD=1.18). This finding is consistent with previous studies, which have highlighted the risks associated with email forwarding and attachment opening. Recent studies (Radonic et al. 2020) have also shown the increase in activities such as email forwarding and dangerous attachment opening during the pandemics (Borkovich and Skovira 2020). Additionally, the study found that respondents recognize internet use as a potential threat to cybersecurity with a mean score of 3.24 (SD=1.20). Earlier studies have also identified the internet as a main source of skepticism (Okanovic et al. 2013).

4.3. Summary of key findings

The most important finding of our study is that as many as 70% of respondents engage in some risky behavior. This includes employees who use the exact same password for all their accounts, both business and private, who share business information on social networks, those who tell their password to colleagues and don't lock the computer when they leave it, but also those individuals who do much more serious things such as opening emails from unknown senders, opening links and attachments from all emails, people who would insert the found USB into their business computer, or persons who access various websites from their businesses computers, which does not report and take no action regarding breaches of security rules by colleagues or third parties faces. Despite being one of the most commonly reported types of cyber-attacks, the results of our study indicated the respondents' significant exposure to phishing attacks. Specifically, 24 respondents reported that they would open every link from an email sent by sender they personally know, despite being aware they should not do that. Similarly, 6 respondents would open an email attachment from an unknown sender, despite being aware of the risks. Moreover, 17 participants reported that they might open an attachment from an email sent by an unknown sender. These results emphasize the need for increased awareness and training on safe practices for identifying and avoiding phishing attacks. Eight out of the total respondents indicated that they would connect a USB device of unknown origin to their work computer. Of these, six respondents were aware of the potential risks associated with such actions, but still proceeded with the activity. Furthermore, 10 respondents reported that they do not exercise caution when downloading files to their work computer, despite the possibility that such files may compromise the security of their system. These results highlight the need for increased awareness and training on safe practices for information security among the study population.

5. CONCLUSIONS

5.1. Novelty of the study

The primary objective of this study was to investigate the perceived exposure to cyber-attacks among individuals responsible for safeguarding digital assets in Serbian businesses. To achieve this goal, we employed the HAIS-Q survey instrument and collected responses from a sample of 100 participants. The study contributes to the existing literature by highlighting the human factor as a significant threat to the security of business information systems. Nevertheless, future advances in cybersecurity are expected to mitigate the risks posed by human behavior. For example, artificial intelligence and machine learning technologies are anticipated to improve threat detection capabilities. Cloud-based solutions are also expected to become more prevalent as businesses continue to migrate their assets and operations to the cloud.

The adoption of biometric and smart authentication solutions is likely to further reduce the risk of cyber-attacks. In addition to technological advancements, regulatory frameworks are expected to continue to evolve, and cyber insurance is expected to play an increasingly important role in risk management strategies.

5.2. Contributions and Implications

The era of digitization, often referred to as the digital revolution, has revolutionized the business landscape by offering numerous benefits such as increased efficiency, cost savings, market expansion, and customer acquisition. Nevertheless, this transformation has also introduced new challenges. In addition to the traditional risks faced by companies, there is now a new type of risk, known as cyber risk, which refers to the risk of cyber-attacks. The present study contributes to the growing body of evidence on self-perceived cybersecurity by examining the subjective perceptions of cybersecurity risks among participants. Previous studies have highlighted that human factors are the primary challenges to ensuring the security of business assets in the future (De Kimpe et al. 2021). Previous research suggests that education and training are the most effective strategies for enhancing cybersecurity in companies (He et al. 2019). This study builds on this research by identifying additional critical factors. As cyber threats continue to rise, businesses and companies are compelled to protect themselves from these threats. The primary defense mechanisms against cyber-attacks are technical solutions such as antivirus software, VPN, and similar tools, as well as employees who handle data and use computers. However, in the event of a security breach, insurance against cyber risks represents a third line of defense. Insurance coverage is typically sought only after the first two lines of defense have been breached and a loss has occurred. Given the increasing frequency of cyber-attacks and the growing number of victims who suffer significant losses, businesses must consider investing in additional forms of protection, such as cyber insurance, to mitigate the risk of cyber-attacks. The market for cyber insurance in Serbia and the Balkan region remains underdeveloped, despite increasing discussions and consideration of its potential benefits. The ongoing and anticipated digitization of the state and private sector will inevitably lead to an increase in cyber-attacks, resulting in financial losses. The present study has significant implications for a range of stakeholders. Primarily, IT security engineers in various organizations may find the study useful, given the valuable information held by industries such as finance, healthcare, government bodies, retailers, energy and utilities, technology, and software companies. Although stringent compliance measures are in place, identifying man-driven operational risks is crucial. The findings may also be of interest to regulators. Currently, there is no single global regulation for cyber risks, and existing laws and regulations vary widely across countries. The regulation of cyber risks is a complex and evolving area that involves a range of different organizations, agencies, and laws. Organizations need to be aware of the regulations and guidelines that apply to them, and to take a proactive approach to managing their cyber risks in order to protect their customers, employees, and business. These findings may also be interesting for cybersecurity software vendors. The cybersecurity software market has grown rapidly in recent years, driven by increasing concern about cyber attacks and the need to protect businesses and individuals from the growing threat of cybercrime. The market is highly competitive, with many companies offering a wide range of cybersecurity solutions, including antivirus software, firewalls, intrusion detection systems, and identity and access management solutions. There is also a growing demand for cloud-based security solutions, since businesses intensively move their operations to the cloud-based solutions. Despite the growth of the cybersecurity software market, the threat of cybercrime continues to evolve and become more sophisticated. Consequently, both businesses and individuals continue to seek for proactive, protective measures against cyber threats. Therefore, the demand for cybersecurity solutions is expected to continue growing, driving the further growth in cybersecurity software market in

the coming years. Finally, these findings may be of interest to insurance companies, particularly for the development of cyber insurance products. Currently, the market for cyber insurance in Serbia does not exist (Milanovic et al. 2023). Cyber insurance should provide coverage for businesses and individuals against losses and damages caused by cyber-attacks and other forms of digital risks, including data breaches, theft of sensitive information, loss of business income, and legal expenses associated with cyber incidents. The need for cyber insurance has become increasingly important in recent years due to strong increase in number and cost of cyberattacks. Consequently, the results of this study could propel the development of cyber insurance in Serbia.

5.3. Limitations and further recommendations

This study has a myriad of limitations and drawbacks. First, the study is based on representation of respondents from comparatively small sample sizes, thus far from being nationally representative. Future studies should include more diversified sample sizes to capture the under-represented strata. Second, this study relies on evidence from one country; generalizations to other regions and economies may be arguable. Further research can be conducted through cross-country studies and explorations. Third, this study is cross-sectional. Since both cyberattacks and cybersecurity evolve over time, these findings might be irrelevant in the future. Time-based analyses would create broader knowledge base.

LITERATURE:

1. Accenture (2020). *Cybersecurity Report 2020*. Retrieved 13.03.2023. from www.acenture.com.
2. Ahmetoglu, H., Das, R. (2022). A comprehensive review on detection of cyber-attacks: Data sets, methods, challenges, and future research directions. *Internet of Things*, 100615.
3. Aldawood, H., Skinner, G. (2019). Reviewing cyber security social engineering training and awareness programs—Pitfalls and ongoing issues. *Future Internet*, 11(3), 73.
4. Aslan, Ö. A., Samet, R. (2020). A comprehensive review on malware detection approaches. *IEEE Access*, 8, 6249-6271.
5. Blaise, A., Bouet, M., Conan, V., Secci, S. (2020). Detection of zero-day attacks: An unsupervised port-based approach. *Computer Networks*, 180, 107391.
6. Borkovich, D. J., Skovira, R. J. (2020). Working from home: Cybersecurity in the age of COVID-19. *Issues in Information Systems*, 21(4). https://doi.org/10.48009/4_iis_2020_234-246.
7. Bullock, J. A., Haddow, G. D., Coppola, D. P. (2021). Cybersecurity and critical infrastructure protection. *Introduction to Homeland Security*, 425-497.
8. Burak, B. (2021). An analysis of Serbia's cyber-political habitat. *MEST Journal*, Vol. 9, No. 2, pp. 7-14. <https://doi.org/10.12709/mest.09.09.02.02>.
9. Chen, Z., Liu, J., Shen, Y., Simsek, M., Kantarci, B., Mouftah, H. T., Djukic, P. (2022). Machine learning-enabled iot security: Open issues and challenges under advanced persistent threats. *ACM Computing Surveys*, 55(5), 1-37.
10. Conti, M., Dragoni, N., Lesyk, V. (2016). A survey of man in the middle attacks. *IEEE communications surveys & tutorials*, 18(3), 2027-2051.
11. De Kimpe, L., Walrave, M., Verdegem, P., Ponnet, K. (2021). What we think we know about cybersecurity: an investigation of the relationship between perceived knowledge, internet trust, and protection motivation in a cybercrime context. *Behaviour & Information Technology*, 41(8), 1796–1808. <https://doi.org/10.1080/0144929x.2021.1905066>.
12. Eliyan, L. F., Di Pietro, R. (2021). DoS and DDoS attacks in Software Defined Networks: A survey of existing solutions and research challenges. *Future Generation Computer Systems*, 122, 149-171.

13. Facchinetti, S., Osmetti, S. A., Tarantola, C. (2023). Network models for cyber attacks evaluation. *Socio-Economic Planning Sciences*, 101584.
14. Gupta, B. B., Tewari, A., Jain, A. K., Agrawal, D. P. (2017). Fighting against phishing attacks: state of the art and future challenges. *Neural Computing and Applications*, 28, 3629-3654.
15. He, W., Ash, I., Anwar, M., Li, L., Yuan, X., Xu, L., Tian, X. (2019). Improving employees' intellectual capacity for cybersecurity through evidence-based malware training. *Journal of Intellectual Capital*, 21(2), 203–213. <https://doi.org/10.1108/jic-05-2019-0112>.
16. Healey, J., Mosser, P., Rosen, K., Tache, A. (2018). The future of financial stability and cyber risk. The Brookings Institution Cybersecurity Project, 1-18.
17. Herath, T. B. G., Khanna, P., Ahmed, M. (2022). Cybersecurity Practices for Social Media Users: A Systematic Literature Review. *Journal of Cybersecurity and Privacy*, 2(1), 1–18. <https://doi.org/10.3390/jcp2010001>.
18. Jeong, J., Mihelcic, J., Oliver, G., Rudolph, C. (2019). Towards an Improved Understanding of Human Factors in Cybersecurity. *2019 IEEE 5th International Conference on Collaboration and Internet Computing (CIC)*. <https://doi.org/10.1109/cic48465.2019.00047>.
19. Kahrović, E., Avdović, A. (2021). Impact of Digital Technologies on Business Performance in Serbia. *Management: Journal of Sustainable Business and Management Solutions in Emerging Economies*. <https://doi.org/10.7595/management.fon.2021.0039>
20. Kamiya, S., Kang, J. K., Kim, J., Milidonis, A., Stulz, R. M. (2021). Risk management, firm reputation, and the impact of successful cyberattacks on target firms. *Journal of Financial Economics*, 139(3), 719-749.
21. Li, Y., Liu, Q. (2021). A comprehensive review study of cyber-attacks and cyber security; Emerging trends and recent developments. *Energy Reports*. doi:10.1016/j.egy.2021.08.126.
22. Ma, L., Zhao, D., Gao, Y., Zhao, C. (2019). Research on SQL injection attack and prevention technology based on web. In *2019 International Conference on Computer Network, Electronic and Automation (ICCNEA)*, 176-179.
23. Mallikarajunan, K. M. E. N., Preethi, S. R., Selvalakshmi, S., Nithish, N. (2019). Detection of Spyware in Software Using Virtual Environment. *2019 3rd International Conference on Trends in Electronics and Informatics (ICOEI)*. <https://doi.org/10.1109/icoei.2019.8862547>.
24. Milanović, N., Milosavljević, M., Joksimović, N. Ž. (2023). Digital Transformation of the Serbian Car Insurance Industry: A Mixed-Method Approach. *Contributions to Finance and Accounting*, 113–131. https://doi.org/10.1007/978-3-031-23269-5_7.
25. Minović, A., Abusara, A., Begaj, E., Erceg, V., Tasevski, P., Radunović, V., Klopfer, F. (2016). *Cybersecurity in the Western Balkans: Policy gaps and cooperation opportunities*. Geneva: DiploFoundation.
26. Nespoli, P., Gómez Mármol, F., Maestre Vidal, J. (2021). Battling against cyberattacks: Towards pre-standardization of countermeasures. *Cluster Computing*, 24, 57-81.
27. Okanovic, M., Milosavljevic, M., Cicvaric Kostic, S., Vlastelica Bakic, T. (2013). Drivers of unpleasant experiences in virtual social network context. *TTEM-Technics Technologies Education Management*, 8(4), 1804-1809.
28. Parsons, K., Calic, D., Pattinson, M., Butavicius, M., McCormac, A., Zwaans, T. (2017). The Human Aspects of Information Security Questionnaire (HAIS-Q): Two further validation studies. *Computers & Security*, 66, 40–51. <https://doi.org/10.1016/j.cose.2017.01.004>.

29. Parsons, K., McCormac, A., Butavicius, M., Pattinson, M., Jerram, C. (2014). Determining employee awareness using the Human Aspects of Information Security Questionnaire (HAIS-Q). *Computers & Security*, 42, 165–176. <https://doi.org/10.1016/j.cose.2013.12.003>.
30. Parsons, K., McCormac, A., Pattinson, M. R., Butavicius, M. A., Jerram, C. (2013). An Analysis of Information Security Vulnerabilities at Three Australian Government Organisations. In *EISMC*, pp. 34-44.
31. Pollini, A., Callari, T. C., Tedeschi, A., Ruscio, D., Save, L., Chiarugi, F., Guerri, D. (2021). Leveraging human factors in cybersecurity: an integrated methodological approach. *Cognition, Technology & Work*, 24(2), 371–390. <https://doi.org/10.1007/s10111-021-00683-y>.
32. Radonić, M., Milosavljević, M. (2019). Human resource practices, failure management approaches and innovations in Serbian public administration. *Transylvanian Review of Administrative Sciences*, 15(SI), 77-93. <https://doi.org/10.24193/tras.SI2019.5>.
33. Radonić, M., Vukmirovic, V. Milosavljević, M. (2021). The Impact of Hybrid Workplace Models on Intangible Assets: The Case of an Emerging Country. *Amfiteatru economic*, 23(58), pp. 770-786. <https://doi.org/10.24818/ea/2021/58/770>.

QUALITY-OF-LIFE INDEX ANALYSIS APPLIED TO BRICS AND G7 COUNTRIES

Gustavo Carolino Girardi

*Universidade Tecnológica Federal do Paraná (UTFPR), Ponta Grossa,
R. Doutor Washington Subtil Chueire, 330 - Jardim Carvalho, Brasil
gustavogirardi23@gmail.com*

Claudia Tania Picinin

*Universidade Tecnológica Federal do Paraná (UTFPR), Ponta Grossa,
R. Doutor Washington Subtil Chueire, 330 - Jardim Carvalho, Brasil
claudiapicinin@utfpr.edu.br*

Priscila Rubbo

*Universidade Tecnológica Federal do Paraná (UTFPR), Ponta Grossa,
R. Doutor Washington Subtil Chueire, 330 - Jardim Carvalho, Brasil
priscilarubbo@utfpr.edu.br*

Lilian Faxina Girardi

*Universidade Tecnológica Federal do Paraná (UTFPR), Santa Helena,
Prolongamento da Rua Cerejeira, s/n, São Luiz, Brasil
lilianfaxina2@gmail.com*

David Nunes Resende

*University of Aveiro, Águeda School of Technology and Management, Águeda
R. Cmte. Pinho e Freitas 28, 3750-127, Portugal
david@ua.pt*

ABSTRACT

The main aim of the current article is to compare economic and Quality of Life (QL) indices in G7- (Germany, France, United States, United Kingdom, Japan, Italy and Canada) and BRICS-member countries (Brazil, Russia, India, China and South Africa). The research was developed based on selecting indices available in the NUMBEO, UN (United Nations) and OECD (Organization for Economic Cooperation and Development) databases. Results have evidenced that emerging countries belonging to the BRICS bloc have shown lower QL indices than those observed for developed countries in the G7 bloc. With respect to economic data, the USA, China, Japan and Germany were the countries presenting the highest GDP growth. It was possible concluding that countries belonging to the G7 block have better economic and labor indices, which, in their turn, are associated with better QoL indices.

Keywords: *Quality of Life, BRICS, G7*

1. INTRODUCTION

Quality of life (QoL) can be understood as individuals' worldview about customs, beliefs, behaviors and uncertainties about the future (Who, 2007; Santos; Espinosa; Marcon, 2020). The association between QoL and environmental aspects is seen as social determinant; thus, there is concern in articulating health, emotional aspects, and social and economic contexts (Cortez et al., 2017). Performance indices, such as unemployment comparisons between men and women in the same country or between countries, are often used in research to measure QOL and socioeconomic development; social, economic and environmental indices also help measuring public development policies (Simões; Crespo; Castro, 2015); (Barrington-Leigh;

Escande, 2017); (Res, 2017); (Becker; Paruolo; Saisana, 2015); (Alaimo; Maggino, 2020); (Bianchi; Biffignandi, 2022). Therefore, comparing development indices between emerging and developed countries is a relevant factor in research conducted in this field. The BRICS bloc comprises the following countries: Brazil, Russia, India, China and South Africa. It was founded in 2009, as an alliance among emerging countries aimed at economic, political and military cooperation (Wilson, 2015). This bloc accounts for 43% of the world's population, as well as for 30% of its GDP and 17% of all trade, at global scale (Kilic; Cankaya, 2019). The G7, in its turn, started in 1975 and initially comprised six countries, namely: Germany, France, United States, United Kingdom, Japan and Italy. It was created by German Chancellor Helmut Schmidt and by French President Valéry Giscard d'Estaing. Canada joined the group in 1976 and became the seventh G7 member (Monteiro; Zylbersztajn, 2013). This bloc accounts for 10% of the world's population, as well as for 39% of its GDP and 32% of all trade, at global scale (Kilic; Cankaya, 2019). The aim of the current article was to compare economic, labor and QoL indices between G7 and BRICS member countries to investigate whether there is association between higher economic and labor indices, and QoL indices.

2. METHODOLOGY

Gross Domestic Product (GDP), QoL, female labor force participation, male labor force participation and purchasing power indices were the indicators used in the current study. NUMBEO, UN (United Nations) and OECD (Organization for Economic Cooperation and Development) platforms were herein selected because they hold consolidated data about all the analyzed countries. The adopted indices were selected based on their relevance and association with the QoL topic. Countries belonging to both the BRICS and G7 blocs were selected because they account for 53% of the world's population, as well as for 69% of its GDP and for 49% of all trade, at global scale (Kilic; Cankaya, 2019). The herein analyzed periods-of-time ranged from 1994 to 2021, for GDP; and from 2012 to 2022, for the following indicators: QoL, female labor force participation, male labor force participation and purchasing power indices. They were selected based on the availability of the most current data in the selected platforms. Collected data were transcribed into Excel spreadsheets for visualization, treatment and analysis purposes.

3. RESULTS

According to Mazumdar (1995), GDP and QoL indices are often used to measure countries' socioeconomic condition. GDP index represents the sum of all final goods and services produced by a given country (IBGE, 2022). Figure 1 summarizes the historical evolution of BRICS countries' GDP in comparison to that of G7 countries.

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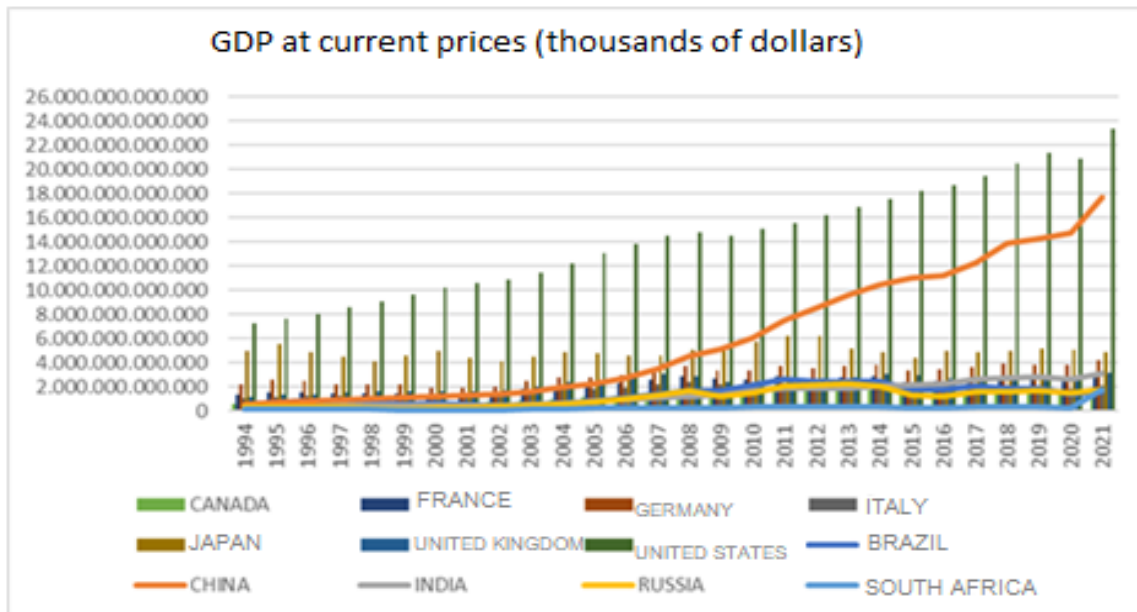


Figure 1: G7 bloc's GDP

(Source: Elaborated by the authors based on data available at the UN's platform (2022))

Based on Figure 1, all countries recorded GDP growth in the analyzed period-of-time, although there was slight setback in 2020, likely due to the COVID-19 pandemic. The United States (G7) stands out for presenting GDP higher than that of all countries forming the two economic blocs. Moreover, China (BRICS) experiences broad GDP growth and its economy is superior to that of countries belonging to the G7 bloc (except for the USA). Japan (G7) also differs from other countries, although its economy is smaller than that of the US and China. According to Kirton (2011), G7 countries are the core of global governance, since they act as global players, a role that should be played by the league of nations, or by the UN, after World War II. Based on the United Nations Economic Commission for Latin America and the Caribbean ECLAC's (2021) projection, advanced economies should resume their growth from 2022, onwards - after the COVID-19 pandemic - and reach growth higher than 0.9%, by 2024. On the other hand, developing economies, except for China, may remain 5.5% below the pre-pandemic projection for 2024, likely due to disparities in vaccination rates observed for emerging countries. However, economic growth analysis conducted in separate does not necessarily indicate better QoL conditions (Biswas, 2022). Thus, the QoL indicator encompasses parameters such as purchasing power, pollution rate, house income:price ratio, cost of living, safety, medical care, daily commuting and climate index. The higher their value, the higher the QoL estimate. Figure 2 depicts the QoL status of BRICS and G7 countries.

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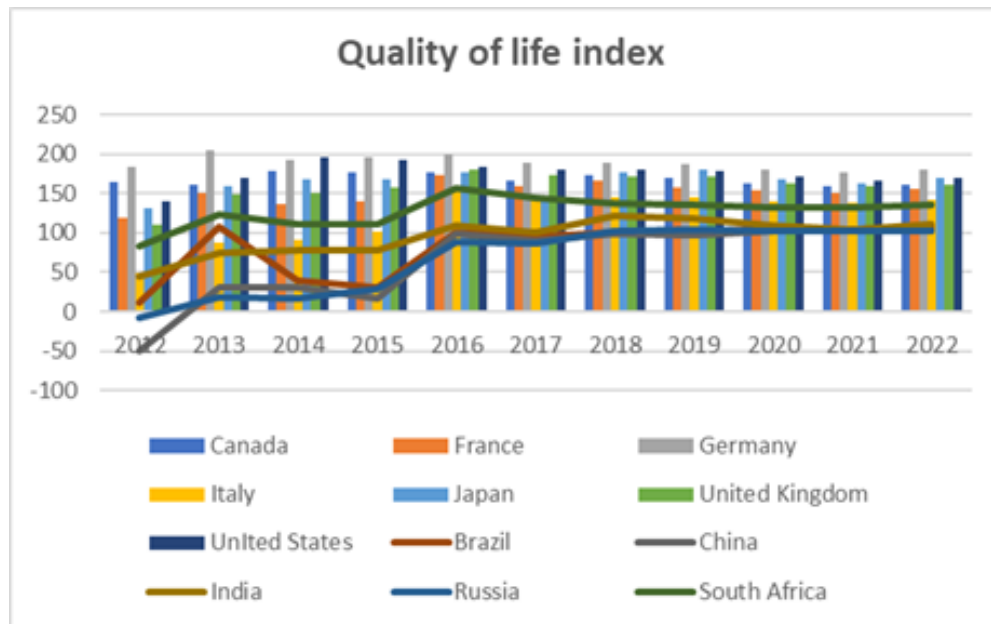


Figure 2: G7's QoL index

(Source: Elaborated by the authors based on data available at NUMBEO platform (2022))

South Africa and India were the BRICS bloc countries that have kept QoL growth stability within the analyzed period-of-time. All countries, except for South Africa and India, recorded low QoL rates in 2012. China and Russia, for example, recorded negative growth rates over the years. Brazil recorded growth peak in 2013, but it dropped in 2014 and 2015; the 2014 Brazilian economic crisis is likely the explanation for such a drop (ECO- et al., 2017). In addition, India and Russia were the only countries that did not record drop within this period (from 2014 to 2015), and it suggests that international factors may also have influenced the downward trend observed in indices recorded for other BRICS bloc countries. It is worth mentioning that South Africa (BRICS) - which holds the best QoL indicator among BRICS countries, as well as low GDP index - presents QoL index similar to that of Italy, which, in its turn, accounts for the worst QoL index in the G7 group. On the other hand, Germany holds the highest GDP index in the G7 group; it is followed by USA and Japan. This group comprises the most industrially developed countries, which hold the highest employment levels and income per capita (Alvarenga; Valny Giacomelli Sobrinho, 2018) - the highest QoL indices are included in this context. Moreover, sustainable practices have impact on QoL. Miranda et al (2021) carried out a literature review to identify the main green technology practices adopted in BRICS countries. China and India accounted for the largest number of studies about green technology, as well as presented better sustainable development, larger number of sustainable actions and greater interest in local universities. Brazil, Russia and South Africa did not stand out in the aforementioned study. Figure 3 depicts female labor force participation index in both BRICS and G7 countries; data referring to 2021 and 2022 were not published.

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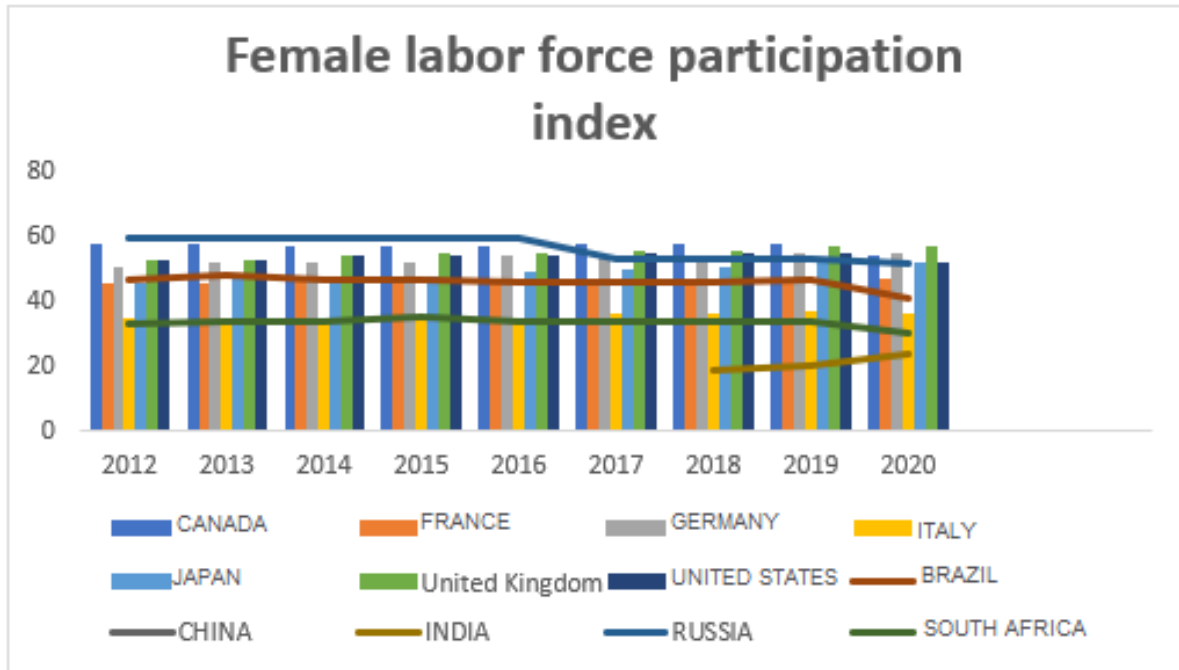


Figure 3: Female labor force participation index

(Source: Elaborated by the authors based on data available at OECD platform (2022))

China did not disclose data about this index, whereas India did not present data comprising the period from 2013 to 2017. Russia was the BRICS bloc country accounting for the best female labor force participation index; it was followed by Brazil. However, it is important emphasizing that most countries have shown downward trend in this index, in 2020, likely due to the COVID-19 pandemic, which have had significant impact on socioeconomic indices in all countries. Moreover, GDP (Figure 1) has also decreased within this period-of-time. According to Mar (2020), if, on the one hand, the COVID-19 pandemic has worsened gender segregation at work, on the other hand, it has shown that women played essential role as first responders, health professionals and volunteers in the fight against this health crisis. Fifty-seven percent (57%) of UK women had a job in 2020. Italy accounted for the lowest female labor force participation index (36%) among G7 bloc countries in that same year. It is important emphasizing that this index did not show significant reduction in the G7 bloc between 2019 and 2020, when the world was facing the pandemic. Russia (BRICS bloc) is the country that comes closest to female labor force participation indices recorded for G7 countries. Based on the male labor force participation index shown in Figure 4, BRICS countries' rates - except for that recorded for South Africa - are similar to those of G7 countries accounting for the best indices recorded for this variable (Japan, United Kingdom, USA and Canada).

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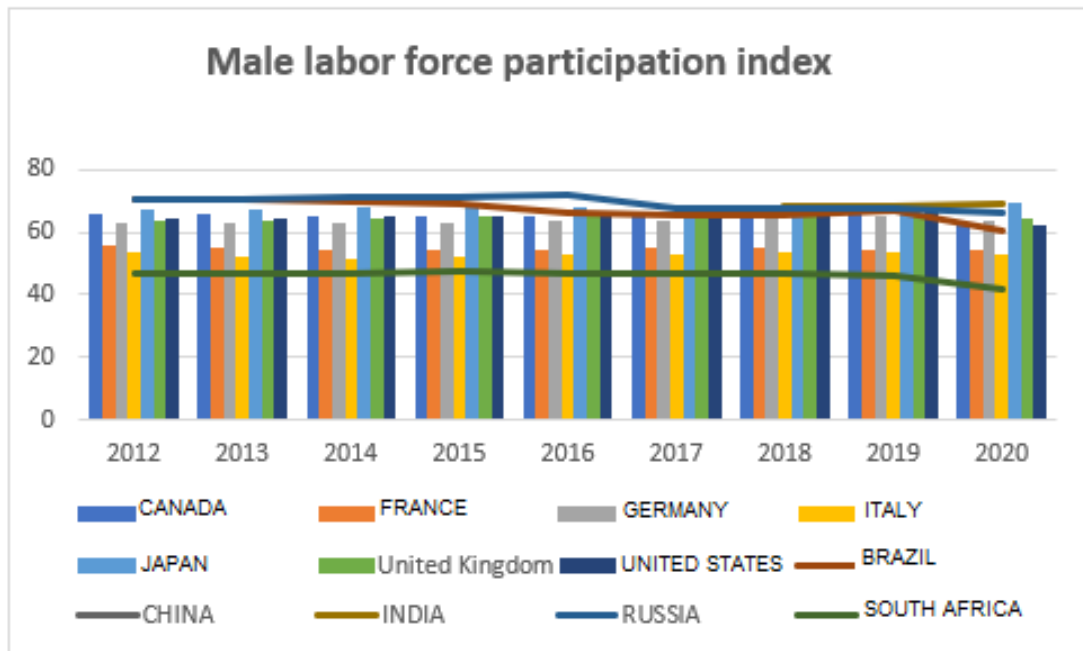


Figure 4: Male labor force participation index

(Source: Elaborated by the authors based on data available at OECD platform (2022))

There was also downward trend in this index in 2019 and 2020. China did not disclose its data and India did not present data referring to the period between 2013 and 2017. Among countries that have disclosed their data, South Africa had the worst performance, since only 41.5% of its male population was employed in the analyzed period-of-time. Russia and India presented similar data referring to the period between 2018 and 2020. Brazil has shown decrease in hiring rates from 2019 to 2020. Japan was the G7 bloc country with the best performance in male labor force participation index (69.3%). On the other hand, Italy recorded the lowest indicator for this index (52.9%). Thus, according to the herein analyzed data, Italy was the country accounting for the lowest employment rate, regardless of workers' sex. Economy, justice, health and environment are QoL-associated aspects that enable measuring individuals' comfort and well-being (Farsen et al., 2018). Workers' perception about the minimum wage policy has significant influence on their wage satisfaction and motivation to work (Che Ahmat; Arendt; Russell, 2019). Thus, individuals' power to purchase goods and services has relevant impact on worker's perception about fair wages and well-being. Purchasing Power Index shows goods and services' prices in comparison to the mean wage in a given country. For example, if the Brazilian purchasing power index reached 27.85% in 2022, it means that the population living in the country could buy 50.51% less than individuals living in South Africa, whose mean wage provided purchasing power index of 78.36%. Figure 5 lists the most prominent countries in the BRICS and G7 blocs. South Africa, India and China recorded the highest purchasing power indices in 2016, whereas all BRICS countries recorded downward trend in this index, both in 2020 and 2021. Slight recovery in this index was observed in 2022. Brazil was the country presenting the worst purchasing power performance in all analyzed years.

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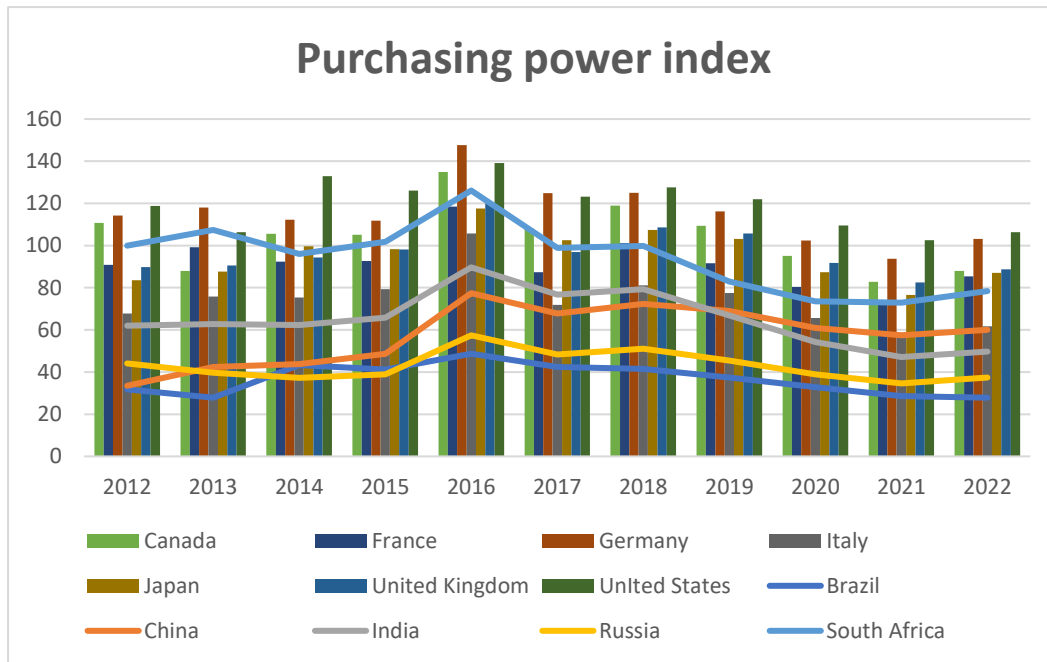


Figure 5: G7 countries' purchasing power index

(Source: Elaborated by the authors based on data available at NUMBEO platform (2022))

All countries recorded the best purchasing power performance in 2016; however, this index decreased in 2020, 2021 and 2022 (NUMBEO, 2022). Italy was the country accounting for the lowest purchasing power index (61.74%) in the G7 block in all analyzed years. Overall, G7 countries presented purchasing power 43% higher than that of emerging BRICS countries, on average. Business, commercial and economic cooperation to be among the largest economies in the world, for the next 50 years, was the reason for BRICS' creation (Skvarciany; Vidžiūnaitė, 2022). However, youth unemployment rates, low prices paid to rural producers, forestry and fishing were the factors showing weaknesses to achieve such a goal (Skvarciany; Vidžiūnaitė, 2022). Economic complexity and innovation were also indices used to complete the analysis of BRICS bloc's economic performance, since they play fundamental part in the analysis of countries' export capacity. According to Pilatti, Rubbo and Picinin (2021), India and Brazil recorded the worst drop in innovation rates between 2011 and 2014, in comparison to other BRICS countries. However, India presented projection of economic complexity growth up to 2024, whereas Russia recorded the worst economic complexity decrease within this same period. Although China remained stagnant in innovation, its economic complexity has increased. South Africa kept on rising in both rankings. Thus, it is possible inferring that investments in innovation and production capacity are associated with better employment, income and QoL conditions.

4. CONCLUSION

The aim of the current article was to compare economic, labor and QoL indices in G7- and BRICS-member countries. It was done to investigate whether there is association between higher economic and labor indices, and QoL indices. The approach focused on comparing economic, labor and QoL indicators in both BRICS and G7 blocs enabled identifying factors influencing the best QoL outcomes. Based on economic data, the USA, China, Japan and Germany are the countries accounting for the highest GDP growth. Moreover, South Africa and China are the countries presenting the highest purchasing power in the BRICS group, whereas the USA and Germany are the countries accounting for the highest purchasing power in the G7 group.

Based on the comparison of both groups, Italy was the country presenting the worst performance in all analyzed indices. Nevertheless, its economic and QoL indices were close to the ones observed for countries presenting the best performance in the BRICS bloc. Temporal analysis enabled seeing that BRICS bloc countries were the ones mostly affected by the COVID-19 pandemic; they recorded downward trends in economic and labor indices. The G7 group performed better in all indices and that it experienced the lowest pandemic impact in the 2019-2020 period. Thus, it was possible inferring that better economic and labor conditions led to better QoL indices in the analyzed countries. Other studies enabled concluding that investments in green technology, economic complexity and innovation can help improving both the production and labor sectors in BRICS countries. The current study has some limitations. Firstly, the non-disclosure of all data about all analyzed countries has led to failure in the temporal analysis of some indices. Another limitation lied on the political, territorial and economic features differentiating the analyzed countries in the two blocs; these differences were not taken into consideration in the composition of the analyzed indices. Thus, the analysis of results and comparison of indices to be performed in future studies should take into consideration the political, economic and territorial differences among countries, as well as their impact on QoL and labor. In addition, we also recommend using multivariate statistics to create models and to enable in-depth analyses.

LITERATURE:

1. Alaimo, Leonardo S.; Maggino, Filomena. Sustainable Development Goals Indicators at Territorial Level : Conceptual and Methodological Issues — The Italian. [s.l.] : Springer Netherlands, 2020. v. 147 DOI: 10.1007/s11205-019-02162-4.
2. Alvarenga, Samia Mercado; Valny Giacomelli Sobrinho. Indutores de impactos ambientais: uma análise comparativa entre BRICS E G7 (1992-2013). *Economia-Ensaio*, [S. l.], v. 2, n. 32, p. 125–150, 2018.
3. Barrington-Leigh, Chris; Escande, Alice. Measuring progress and well-being: A comparative review of indicators. [S. l.], p. 1–51, 2017. DOI: 10.1007/s11205-016-1505-0.
4. Becker, William; Paruolo, Paolo; Saisana, Michaela. Weights and Importance in Composite Indicators : Mind the Gap. [S. l.], p. 1–30, 2015. DOI: 10.1007/978-3-319-11259-6.
5. Bianchi, Annamaria; Biffignandi, Silvia. Workplace Social Environment Indicator : A Comparative Analysis of European Regions. *Social Indicators Research*, [S. l.], v. 161, n. 2, p. 669–688, 2022. DOI: 10.1007/s11205-020-02344-5.
6. Biswas, Sanjib. Comparing the Socioeconomic Development of G7 and BRICS Countries and Resilience to COVID-19 : An Entropy – MARCOS Framework. [S. l.], 2022. DOI: 10.1177/22785337211015406.
7. CEPAL. Estudio Económico. [s.l.: s.n.].
8. Che Ahmat, N. H.; Arendt, S. W.; Russell, D. W. Effects of minimum wage policy implementation: Compensation, work behaviors, and quality of life. *International Journal of Hospitality Management*, [S. l.], v. 81, p. 229–238, 2019. DOI: 10.1016/j.ijhm.2019.04.019.
9. Cortez, Pedro Afonso; Souza, Marcus Vinícius Rodrigues De; Amaral, Laura Oliveira; Silva, Luiz Carlos Avelino Da. A saúde docente no trabalho: apontamentos a partir da literatura recente. *Cadernos Saúde Coletiva*, [S. l.], v. 25, n. 1, p. 113–122, 2017. DOI: 10.1590/1414-462x201700010001.
10. ECO-, Cielo; Vargas, Getulio; ECON, Nova Matriz; CENTRAL, Banco. crise econômica de 2014/2017. [S. l.], v. 31, n. 89, p. 51–60, 2017.
11. farsen, T. C.; De Toledo Martins Boehs, S.; Ribeiro, A. D. S.; De Paula Biavati, V.; Silva, N. Quality of life, well-being and happiness at work: Synonyms or different concepts? . *Interacao em Psicologia*, [S. l.], v. 22, n. 1, p. 31–41, 2018.

12. IBGE, Instituto Brasileiro de Geografia e Estatística. PIB, Produto Interno Bruto. 2022.
13. Kilic, Erdem; Cankaya, Serkan. Oil prices and economic activity in BRICS and G7 countries. *Central European Journal of Operations Research*, [S. l.], 2019. DOI: 10.1007/s10100-019-00647-8.
14. Kirton, John. The diplomacy of concert : Canada , the G - 7 and the Halifax summit the diplomacy of concert : Canada , The G-7 and the halifax summit. [S. l.], n. April 2015, p. 37–41, 2011. DOI: 10.1080/11926422.1995.9673058.
15. Mar, Brief. Gênero e COVID-19 na América Latina e no Caribe: dimensões. [S. l.], v. 37, n. 2017, p. 1–3, 2020.
16. Mazumdar, Krishna. Krishna Mazumdar classification of countries: A socio-economic approach (Accepted 4 March, 1994). KluwerAcademic Publishers, [S. l.], n. iii, p. 261–273, 1995.
17. Monteiro, G. F. A.; Zylbersztajn, D. Economic governance of property rights: Comparative analysis on the collection of royalties in genetically modified soybean seeds. *Revista de Economia e Sociologia Rural*, Institute of Education and Research, Brazil, v. 51, n. 1, p. 25–44, 2013. DOI: 10.1590/S0103-20032013000100002.
18. NAÇÕES UNIDAS. PIB dos países pertencentes ao BRICS. 2022.
19. NUMBEO. Índice de qualidade de vida. 2022.
20. OECD. Gross domestic product (GDP) (indicator). OECD, [S. l.], 2022. DOI: 10.1787/dc2f7aec-en.
21. Pilatt, Luiz Alberto; Rubbo, Priscila; Picinin, Claudia Tania. Innovation and economic complexity in BRICS Innovation and economic complexity in BRICS Priscila Rubbo * Claudia Tania Picinin Luiz Alberto Pilatti. [S. l.], n. January, 2021. DOI: 10.1504/IJKMS.2021.10034273.
22. RES, Soc Indic. OECD : One or Many ? Ranking Countries with a Composite Well-Being Indicator. [S. l.], 2017. DOI: 10.1007/s11205-017-1747-5.
23. Santos, Edialida Costa; ESPINOSA, Mariano Martínez; Marcon, Samira Reschetti. Quality of life, health and work of elementary school teachers . *ACTA Paulista de Enfermagem*, [S. l.], v. 33, p. 1–8, 2020. DOI: 10.37689/ACTA-APE/2020AO0286.
24. Simões, Nádia; Crespo, Nuno; Castro, José. DEterminants of job quality – Evidence FOR european country groups *. [S. l.], v. 65, n. 2, p. 299–323, 2015. DOI: 10.1556/032.65.2015.2.6.
25. Skvarciany, Viktorija; Vidžiūnaitė, Silvija. Decent work and economic growth : the case study of the BRICS countries. [S. l.], v. 10, n. 2, 2022. DOI: 10.23762/FSO.
26. WHO, © World Health Organization. International Classification of Functioning , and. [s.l: s.n.].
27. Wilson, J. D. Resource powers? Minerals, energy and the rise of the BRICS. *Third World Quarterly*, Asia Research Centre, Murdoch University, Perth, Australia, v. 36, n. 2, p. 223–239, 2015. DOI: 10.1080/01436597.2015.1013318.

DOES GENDER MATTER FOR FINANCIAL IDENTITY? A STUDY FROM ALBANIA

Ines Dika

*Faculty of Economics, University of Tirana
Rruga Arben Broci 1, 1001 Tirana, Albania
ines.dika@virgilio.it*

Gentjan Cera

*Faculty of Economics and Agribusiness, Agricultural University of Tirana
Rruga Pajsi Vodica, 1029 Tirana, Albania
gcera@ubt.edu.al*

ABSTRACT

This study examines whether gender differences exist in financial identity, which consists of four aspects: achieved, foreclosed, moratorium, and diffused. The study uses a sample of over 250 respondents from Albania and performs the Mann-Whitney test to compare the scores of male and female respondents on each aspect of financial identity. The study finds that gender differences do exist in one aspect of financial identity, diffused. Specifically, males score higher on diffused than females, indicating that they may be more likely to engage in a broad range of financial activities and take risks in their financial decision-making. However, for the other aspects of financial identity (achieved, foreclosed, and moratorium), no significant gender differences were found. These findings have important implications for policymakers, financial educators, and financial service providers who may need to consider gender when designing and implementing financial education programs or financial products. Understanding the differences in financial identity between males and females can help to ensure that financial education programs are tailored to the specific needs and preferences of each gender. Furthermore, these findings highlight the importance of addressing gender differences in financial identity as a means of promoting financial inclusion and economic empowerment. By providing tailored financial education and financial products to both males and females, financial service providers can help to ensure that everyone has access to the tools and resources needed to achieve their financial goals. In conclusion, this study provides valuable insights into how gender may shape financial behavior and decision-making, and the importance of addressing gender differences in financial identity to promote financial inclusion and economic empowerment. The study's findings can inform the development of policies and interventions aimed at promoting financial inclusion and economic empowerment for all individuals, regardless of their gender.

Keywords: *Gender, Achieved, Foreclosed, Moratorium, Diffused, Mann-Whitney test, Non-parametric test*

1. INTRODUCTION

Financial identity has been defined as an individual's sense of self in relation to financial matters, including their attitudes, beliefs, values, and behaviors with regard to money (Friedline, Elliott, & Nam, 2015; Çera and Tuzi, 2019). It is an important concept to understand, as it can have a significant impact on an individual's financial well-being and overall quality of life. In recent years, researchers have become increasingly interested in the role of gender in shaping financial identity. In Albania, like many other countries, gender plays an important role in shaping social and economic outcomes. Albania is a patriarchal society, where traditional gender roles are still prevalent, particularly in rural areas (World Bank, 2020). Women face a number of barriers to financial inclusion, including limited access to credit, property rights, and

employment opportunities (World Bank, 2019). These barriers may also contribute to differences in financial identity between men and women. Gender differences in financial identity have been studied in a number of contexts, with mixed results (Chen and Volpe, 2002; Shim *et al.*, 2013; Bannier and Schwarz, 2018; Cupák *et al.*, 2018; Potrich, Vieira and Kirch, 2018). Some studies have found that men and women differ in their financial attitudes, beliefs, and behaviors, while others have found no significant differences (Lusardi & Mitchell, 2011; Furnham & Cheng, 2017). However, most studies have been conducted in high-income countries, and relatively little research has been done in low- and middle-income countries like Albania. In Albania, women face a number of challenges in accessing financial services and participating in the formal financial sector. According to a survey conducted by the World Bank, only 14% of women in Albania have an account at a formal financial institution, compared to 23% of men (World Bank, 2019). Women are also less likely to have access to credit, with only 8% of women in Albania reporting that they have borrowed from a financial institution in the past year, compared to 12% of men (World Bank, 2019). These gender differences in financial inclusion may also contribute to differences in financial identity between men and women (Chibba, 2009; Atkinson and Messy, 2013; Bongomin, Mpeera Ntayi and C. Munene, 2017; Çera *et al.*, 2021). For example, women who are excluded from the formal financial sector may have lower levels of financial literacy and confidence than men, which could in turn impact their financial attitudes and behaviors (Friedline, Elliott, & Nam, 2015). Additionally, women in Albania may be more likely than men to prioritize family responsibilities over financial goals, which could also influence their financial identity (Akgunduz, Berisha, & Kume, 2018). Despite these potential differences, there is currently a lack of research on gender and financial identity in Albania. This study aims to fill this gap by examining the relationship between gender and financial identity in Albania. Specifically, we will explore whether men and women in Albania differ in their financial attitudes, beliefs, and behaviors, and whether these differences can be attributed to gender or other factors, such as income, education, and employment status. Gender is an important factor in shaping social and economic outcomes in Albania, and may also influence financial identity. Women in Albania face a number of barriers to financial inclusion, which could impact their financial attitudes, beliefs, and behaviors. However, there is currently a lack of research on gender and financial identity in Albania. This study aims to address this gap by examining the relationship between gender and financial identity in Albania, and will contribute to our understanding of how gender shapes financial outcomes in low- and middle-income countries. The aim of this study is to investigate whether gender differences exist in financial identity among adults in Albania. Specifically, we aim to identify any differences in financial attitudes, beliefs, and behaviors between men and women in Albania, and explore the underlying factors that may contribute to these differences, such as income, education, and employment status. By understanding the relationship between gender and financial identity in Albania, we hope to provide insights that can inform policies and interventions aimed at promoting financial inclusion and improving financial well-being in the country.

2. LITERATURE REVIEW

Financial identity is an individual's sense of self in relation to financial matters, including their attitudes, beliefs, values, and behaviors with regard to money (Friedline, Elliott, & Nam, 2015). Identity formation is a complex process that involves the negotiation of individual, social, and cultural factors. According to Erikson's theory of psychosocial development, individuals go through different stages of identity development throughout their lives (Erikson, 1968). These stages include achievement, foreclosure, moratorium, and diffusion. Financial identity is influenced by a number of factors, including socioeconomic status, culture, and gender.

Gender is a socially constructed concept that refers to the roles, behaviors, and expectations associated with being male or female in a particular society (Connell, 2012). Gender differences in financial attitudes, beliefs, and behaviors have been studied in a number of contexts, with mixed results. Some studies have found that men and women differ in their financial identity, while others have found no significant differences. In this section, we will review the literature on financial identity and gender, focusing on the four identity statuses proposed by Marcia (1966): achievement, foreclosure, moratorium, and diffusion.

Achievement: Achievement is the identity status that reflects a high level of exploration and commitment in a particular area of life (Marcia, 1966). In the context of financial identity, individuals who have achieved a strong sense of financial identity have a clear understanding of their financial goals and priorities, and are able to make informed financial decisions. Several studies have found that men are more likely than women to have achieved a strong sense of financial identity (Lusardi & Mitchell, 2011; Furnham & Cheng, 2017). For example, Lusardi and Mitchell (2011) found that men in the United States were more likely than women to report feeling confident about their financial knowledge and skills.

Foreclosure: Foreclosure is the identity status that reflects a high level of commitment to a particular identity without having explored other options (Marcia, 1966). In the context of financial identity, individuals who are in foreclosure may have adopted financial attitudes and behaviors without fully considering their options or reflecting on their goals and priorities. Few studies have examined the relationship between gender and foreclosure in the context of financial identity. However, research on gender and financial decision-making suggests that women may be more likely than men to adopt financial behaviors based on social norms and expectations, rather than their own preferences and goals (Dwyer, 2016).

Moratorium: Moratorium is the identity status that reflects a high level of exploration without having made a commitment to a particular identity (Marcia, 1966). In the context of financial identity, individuals who are in moratorium may be actively seeking information and experimenting with different financial attitudes and behaviors. Research on gender and financial identity suggests that women may be more likely than men to be in moratorium (Furnham & Cheng, 2017). For example, Furnham and Cheng (2017) found that women in the United Kingdom were more likely than men to report feeling uncertain about their financial goals and priorities.

Diffusion: Diffusion is the identity status that reflects a low level of exploration and commitment in a particular area of life (Marcia, 1966). In the context of financial identity, individuals who are in diffusion may lack clear financial goals or a sense of direction in their financial decision-making. Few studies have examined the relationship between gender and diffusion in the context of financial identity. However, research on gender and financial literacy suggests that women may be more likely than men to lack basic financial knowledge and skills, which could contribute to a sense of diffusion (Lusardi & Mitchell, 2011).

Overall, the literature on financial identity and gender suggests that there may be gender differences in financial attitudes, beliefs, and behaviors, although the nature and extent of these differences may vary across cultures and contexts. Several factors may contribute to these differences, including social norms and expectations, access to resources, and cultural beliefs about gender roles and financial decision-making. For example, in some cultures, men may be expected to take on the role of financial provider for the family, which could lead to a greater sense of financial responsibility and achievement, while women may be expected to prioritize

other areas of life, such as caregiving and family responsibilities, which could contribute to a sense of diffusion or foreclosure in their financial decision-making. Based on the literature reviewed above, we hypothesize that there may be gender differences in financial identity among adults in Albania. Specifically, we expect that men in Albania will report higher levels of financial achievement than women, while women will be more likely than men to be in a state of moratorium or diffusion with regard to their financial decision-making. We also expect that these gender differences will be influenced by a number of factors, including income, education, and employment status. By exploring the relationship between gender and financial identity in Albania, we hope to contribute to a better understanding of the complex factors that shape individuals' financial attitudes, beliefs, and behaviors, and to inform policies and interventions aimed at promoting financial inclusion and improving financial well-being in the country.

3. RESEARCH METHODOLOGY

A questionnaire is developed based on the literature to collect primary data for individuals living in Albania. The final sample size consists of 273 valid responses. The analysis is based on this sample size. Financial identity is measured by 11 statements as proposed by Bennion et al. (1986), which are grouped into four sub-constructs: Achieved, Foreclosed, Moratorium, and Diffused. Each statement has five options as answers, varying from [1] strongly disagree to [5] strongly agree. The gender of the individuals is measured with a dichotomous variable, where 0 stands for female and 1 for male.

Items	Female	Male	Total
achieved1	3.51	3.58	3.53
achieved2	3.32	3.41	3.34
achieved3	3.16	3.47	3.24
moratorium1	3.01	2.95	3.00
moratorium2	2.63	2.82	2.68
foreclosed1	3.07	3.07	3.07
foreclosed2	2.39	2.47	2.41
foreclosed3	1.91	2.26	2.00
diffused1	2.43	2.51	2.45
diffused2	2.27	2.48	2.32
diffused3	2.15	2.79	2.32

*Table 1: Mean of each item by gender.
(Source: Own research)*

Principal component analysis with Varimax rotation was employed to reduce the number of factors dealing with financial identity (Fabrigar and Wegener, 2011). The output of the analysis is shown in Table 2. Factors with eigenvalues higher than one were kept. The Kaiser-Meyer-Olkin value and Barlett's test indicated the appropriateness of the factor analysis (Hair *et al.*, 2010). Three factors emerged from the factor analysis, explaining 69.982% of the variance in the sample, namely, 'achieved', 'moratorium', 'foreclosed', and 'diffused'. The factor loadings were above Stevens's (2015) benchmarks (.40), indicating evidence of constructs convergent validity.

Table following on the next page

Items	Component			
	1	2	3	4
achieved1	.794			
achieved2	.896			
achieved3	.801			
foreclosed1		.670		
foreclosed2		.818		
foreclosed3		.791		
diffused1			.766	
diffused2			.798	
diffused3			.567	
moratorium1				.838
moratorium2				.865
Eigenvalues	2.328	1.907	1.787	1.676
Explained variance (total = 69.982%)	21.165	17.336	16.244	15.238
<i>Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 6 iterations.</i>				

Table 2: Rotated component matrix.

(Source: Own research)

To test for differences between females and males on four aspects of financial identity, Mann-Whitney U test were used. The assumptions of applying t-test were not met, which imply the use of the Mann-Whitney U test. One of the assumptions of t-test deals with the fact that the variable should be normally distributed. All four items of CSR were not normally distributed (see Table 3). The latter test offer the opportunity to compare the scores a continuous variable for three or more groups. First, the scores are transformed into ranks, second, the mean rank of each group is compared (Gravetter and Wallnau, 2017).

Variable	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Achieved	.054	273	.049	.984	273	.003
Foreclosed	.071	273	.002	.985	273	.006
Diffused	.042	273	.200*	.987	273	.017
Moratorium	.046	273	.200*	.985	273	.005
* . This is a lower bound of the true significance.						
a. Lilliefors Significance Correction						

Table 3: Tests of normality.

(Source: Own research)

Mann-Whitney U test analysis the difference only between two groups. U statistic formula incorporates the number of the subject per each category and the sum of the ranks (R) for individuals in the respective sample, and between the following calculations, the lowest one represents the Mann-Whitney U value.

$$U_1 = n_1 n_2 + \frac{n_1(n_1+1)}{2} - \sum R_1$$

$$U_2 = n_1 n_2 + \frac{n_2(n_2+1)}{2} - \sum R_2$$

The Mann-Whitney U can be standardised using the following formula:

$$z = \frac{U - (n_1 n_2 / 2)}{\sqrt{n_1 n_2 (n_1 + n_2 + 1) / 12}}$$

The three tests explained above are nonparametric methods (Hollander, Wolfe and Chicken, 2013).

4. RESULTS

To test whether it is a difference between the future business climate levels or not, Mann-Whitney U test was performed (refer to Table 5 and 6). Before reporting the result of the non-parametric test, in Table 5 are summarized the mean rank and sum of ranks for each aspect of financial identity by gender (female vs male). One can notice that males reflected higher mean rank than females for all aspects of financial identity. Moreover, it is clear that the female's sum of ranks is higher than the male's one for all financial identity aspects. Mann-Whitney U test will provide statistical evidence whether the difference in Achieved, Foreclosed, Diffused, and Moratorium between females and males are present or not.

Variable	Gender	N	Mean Rank	Sum of Ranks
Achieved	Female	200	135.15	27029.00
	Male	73	142.08	10372.00
	Total	273		
Foreclosed	Female	200	134.59	26918.00
	Male	73	143.60	10483.00
	Total	273		
Diffused	Female	200	129.81	25961.00
	Male	73	156.71	11440.00
	Total	273		
Moratorium	Female	200	135.76	27151.00
	Male	73	140.41	10250.00
	Total	273		

Table 5: Ranks.
(Source: Own research)

The results of the Mann-Whitney U test are summarized in Table 6. It revealed that, diffused (aspect of financial identity) was statistically significant different between females and males ($U = 5861$, $z = -2.492$, $p = 0.013$). A close look at their mean ranks leads to the clarification of the different direction. Male-individuals scored higher in diffused (aspect of financial identity) than female counterparts. Therefore, the analysis shows that gender does matter for the diffused aspect of financial identity. On the other hand, the other aspects of financial identity are found to reflect no significant difference between males and females. Therefore, one can conclude that, in these cases, gender does not matter.

	Achieved	Foreclosed	Diffused	Moratorium
Mann-Whitney U	6929.000	6818.000	5861.000	7051.000
Wilcoxon W	27029.000	26918.000	25961.000	27151.000
Z	-.643	-.835	-2.492	-.431
Asymp. Sig. (2-tailed)	.521	.404	.013	.666

Grouping Variable: Gender

Table 5: Mann-Whitney test statistics.
(Source: Own research)

5. CONCLUSION

In conclusion, this study aimed to investigate whether gender differences exist in financial identity and to what extent they impact financial behavior and decision-making (Çera, Khan, Belas, *et al.*, 2020; Çera, Khan, Mlouk, *et al.*, 2020). The study found that gender differences do exist in one aspect of financial identity, diffused, where males scored higher than females. However, for the other aspects of financial identity (achieved, foreclosed, and moratorium), no significant gender differences were found. These findings provide important insights into the impact of gender on financial behavior and decision-making, highlighting the need to consider gender when designing and implementing financial education programs or financial products. Policymakers, financial educators, and financial service providers must take into account the differences in financial identity between males and females when developing financial literacy programs, tools, and resources. These findings have important implications for promoting financial inclusion and economic empowerment. The finding that males score higher on diffused than females suggests that males may be more likely to engage in a broad range of financial activities and take risks in their financial decision-making. However, the study's results also show that gender does not significantly impact other aspects of financial identity, such as achieved, foreclosed, and moratorium. This finding highlights the importance of considering the complexity of financial identity and the need for nuanced and targeted interventions to address the unique needs of each gender. Furthermore, the study's findings also emphasize the importance of addressing gender differences in financial identity as a means of promoting financial inclusion and economic empowerment. By providing tailored financial education and financial products to both males and females, financial service providers can help to ensure that everyone has access to the tools and resources needed to achieve their financial goals. This is particularly important given that access to financial services is still a significant challenge in many parts of the world, with gender being a significant factor in financial exclusion. Addressing the gender differences in financial identity is an essential step towards promoting financial inclusion, and this requires a multi-stakeholder approach. Governments, policymakers, financial educators, and financial service providers must work together to develop gender-sensitive strategies that ensure equal access to financial products and services for all. Such strategies should aim to address the underlying structural barriers that prevent women from accessing financial services and promote financial literacy among women. However, this study has several limitations that must be acknowledged. First, the study was conducted in Albania and may not be generalizable to other countries or regions. Second, the study relied on self-reported data, which may be subject to social desirability bias. Finally, the study only examined the impact of gender on financial identity and did not consider other potential factors that may influence financial behavior and outcomes. Further research is needed to investigate the intersectionality of gender with other factors such as income, education, and social status to gain a more comprehensive understanding of financial behavior and decision-making. Despite these limitations, this study makes an important contribution to the literature on gender and financial identity. The findings provide insights into how gender may shape financial behavior and decision-making and highlight the importance of addressing gender differences in financial identity to promote financial inclusion and economic empowerment. This study has important implications for policymakers, financial educators, and financial service providers who must consider gender when developing financial education programs and financial products that meet the needs and preferences of each gender. In conclusion, this study highlights the importance of addressing gender differences in financial identity to promote financial inclusion and economic empowerment. Financial service providers must work towards developing gender-sensitive strategies that ensure equal access to financial products and services for all. Such strategies should aim to address the underlying structural barriers that prevent women from accessing financial services and promote financial literacy among women.

Policymakers and financial educators must also consider the gender differences in financial identity when developing financial education programs and tools. Further research is needed to investigate the intersectionality of gender with other factors such as income, education, and social status to gain a more comprehensive understanding of financial behavior and decision-making. By doing so, we can develop more effective policies and interventions that promote financial inclusion and economic empowerment, and ultimately contribute to reducing poverty and inequality.

LITERATURE:

1. Akgunduz, Y., Berisha, K., & Kume, V. (2018). Gender norms and the economic empowerment of women: Evidence from Kosovo. *European Journal of Development Research*, 30(5), 780-797.
2. Atkinson, A. and Messy, F.-A. (2013) Promoting Financial Inclusion through Financial Education: OECD/INFE Evidence, Policies and Practice, pp. 02–44. Available at: <https://doi.org/10.1787/5k3xz6m88smp-en>.
3. Bannier, C.E. and Schwarz, M. (2018) ‘Gender- and education-related effects of financial literacy and confidence on financial wealth’, *Journal of Economic Psychology*, 67(May), pp. 66–86. Available at: <https://doi.org/10.1016/j.joep.2018.05.005>.
4. Bennion, L.D. and Adams, G.R. (1986) ‘A Revision of the Extended Version of the Objective Measure of Ego Identity Status: An Identity Instrument for Use with Late Adolescents’, *Journal of Adolescent Research*, 1(2), pp. 183–197. Available at: <https://doi.org/10.1177/074355488612005>.
5. Bongomin, G.O.C., Mpeera Ntayi, J. and C. Munene, J. (2017) ‘Institutional framing and financial inclusion’, *International Journal of Social Economics*, 44(12), pp. 1727–1744. Available at: <https://doi.org/10.1108/IJSE-02-2015-0032>.
6. Çera, G. and Tuzi, B. (2019) ‘Does gender matter in financial literacy? A case study of young people in Tirana’, *Scientific papers of the University of Pardubice, Series D*, 45(1), pp. 5–16.
7. Çera, G. et al. (2021) ‘Financial Advice, Literacy, Inclusion and Risk Tolerance: The Moderating Effect of Uncertainty Avoidance’, *E+M Ekonomie a Management*, 24(4), pp. 105–123. Available at: <https://doi.org/10.15240/tul/001/2021-4-007>.
8. Çera, G., Khan, K.A., Belas, J., et al. (2020) ‘The Role of Financial Capability and Culture in Financial Satisfaction’, *Economic Papers: A journal of applied economics and policy*, 39(4), pp. 389–406. Available at: <https://doi.org/10.1111/1759-3441.12299>.
9. Çera, G., Khan, K.A., Mlouk, A., et al. (2020) ‘Improving financial capability: the mediating role of financial behaviour’, *Economic Research-Ekonomska Istraživanja*, pp. 1–18. Available at: <https://doi.org/10.1080/1331677X.2020.1820362>.
10. Chen, H. and Volpe, R.P. (2002) ‘Gender differences in personal financial literacy among college students’, *Financial Services Review*, 11(3), pp. 289–307. Available at: <https://doi.org/10.5897/AJBM10.1267>.
11. Chibba, M. (2009) ‘Financial Inclusion, Poverty Reduction and the Millennium Development Goals’, *European Journal of Development Research*, 21(2), pp. 213–230. Available at: <https://doi.org/10.1057/ejdr.2008.17>.
12. Connell, R., (2012). Gender, health and theory: conceptualizing the issue, in local and world perspective. *Social science & medicine*, 74(11), pp.1675-1683.
13. Cupák, A. et al. (2018) ‘Decomposing gender gaps in financial literacy: New international evidence’, *Economics Letters*, 168, pp. 102–106. Available at: <https://doi.org/10.1016/J.ECONLET.2018.04.004>.
14. Dwyer, R. E. (2016). Masculinities and money: How men’s money concerns are articulated in qualitative research. *Men and Masculinities*, 19(2), 190–210.

15. Erikson, E. H. (1968). *Identity: Youth and crisis*. W. W. Norton & Company.
16. Fabrigar, L.R. and Wegener, D.T. (2011) *Exploratory Factor Analysis*. New York, NY: Oxford University Press.
17. Friedline, T., Elliott, W., & Nam, I. (2015). Linking financial education, financial literacy, and household savings behavior. *Journal of Consumer Affairs*, 49(1), 186-217.
18. Furnham, A., & Cheng, H. (2017). Gender and money attitudes in China and the United Kingdom. *Sex Roles*, 77(11-12), 822-835.
19. Gravetter, F.J. and Wallnau, L.B. (2017) *Statistics for the behavioral sciences*. CENGAGE Learning.
20. Hair, J.F. et al. (2010) *Multivariate Data Analysis*. 7th Editio. Harlow: Pearson Education Limited.
21. Hollander, Myles., Wolfe, D.A. and Chicken, E. (2013) *Nonparametric statistical methods*. New Jersey: Wiley.
22. Lusardi, A., & Mitchell, O. S. (2011). Financial literacy around the world: An overview. *Journal of Pension Economics and Finance*, 10(4), 497-508.
23. Marcia, J. E. (1966). Development and validation of ego-identity status. *Journal of Personality and Social Psychology*, 3(5), 551-558.
24. Potrich, A.C.G., Vieira, K.M. and Kirch, G. (2018) ‘How well do women do when it comes to financial literacy? Proposition of an indicator and analysis of gender differences’, *Journal of Behavioral and Experimental Finance*, 17, pp. 28–41. Available at: <https://doi.org/10.1016/J.JBEF.2017.12.005>.
25. Shim, S. et al. (2013) ‘Financial Identity-Processing Styles Among Young Adults: A Longitudinal Study of Socialization Factors and Consequences for Financial Capabilities’, *Journal of Consumer Affairs*, 47(1), pp. 128–152. Available at: <https://doi.org/10.1111/joca.12002>.
26. Stevens, J.P. and Pituch, K.A. (2015) *Applied Multivariate Statistics for the Social Sciences: Analyses with SAS and IBM’s SPSS*. 6th edn. Routledge.
27. World Bank. (2019). *Albania financial sector assessment program: Technical note on financial inclusion*. Retrieved from <https://openknowledge.worldbank.org/handle/10986/31706>
28. World Bank. (2020). *Gender in Albania: Improving economic opportunities for women*. Retrieved from <https://www.worldbank.org/en/country/albania/publication/gender-in-albania-improving-economic-opportunities-for-women>

PERCEPTION OF PERSONAL ORGANIZATIONAL CITIZENSHIP BEHAVIOR

Ivana Fosic

*Josip Juraj Strossmayer University of Osijek,
Faculty of Economics in Osijek,
Trg Ljudevita Gaja 7, Osijek, Croatia
ivana.fosic@efos.hr*

ABSTRACT

Workers' relationships with co-workers and supervisors at work are heterogeneous. Behavior, composed of attitudes, opinions, and value systems, is deeply rooted both in individuals and in the work organization itself. Organizational Citizenship Behavior (OCB) encompasses actions that employees perform outside the formal requirements of the workplace. It is critical to get a sense, from the employer's perspective as well as the employee's, of how and in what ways organizational citizenship behavior impacts the overall well-being of the organization and its employees. The main purpose of this paper is to expand the understanding of organizational citizenship behavior through a literature review and conducted research. It also highlights some descriptive facts about employee preferences in the workplace in the form of organizational citizenship behavior. The aim of the paper is to study organizational citizenship behavior and analyze the differences in organizational citizenship behavior with respect to different characteristics of employees (respondents). In organizations, it is important that all employees (stakeholders) support each other to achieve organizational goals. Organizational citizenship behavior plays a multifaceted role in an organization and manifests itself in creating a productive, efficient, and successful organization. It is important to emphasize that organizations must adapt their approach to human resource management without neglecting the importance of organizational citizenship behavior.

Keywords: *organizational citizenship behavior, organization, employees*

1. INTRODUCTION

In order for organizations to maintain competitive advantages, it is crucial to align management processes with their specific needs and to be flexible in adapting to changes in the business environment. A key role is also played by the organization's human resources management department, which should guide and direct employees, and propose solutions for any problems that may arise that will directly or indirectly affect relations between employees. However, the approach applied by organizations is not universal and cannot be equally applied to all organizations, as it depends on the different characteristics and specifics of each individual organization. The relationships of employees towards work colleagues and superiors are different, and it is organizational citizenship behavior that can be crucial for the success of the organization. The focus of the paper is on the analysis of organizational citizenship behavior of employees and the importance of their contribution to the success of the organization. The aim of this paper is to analyze the prevalence and perception of personal organizational citizenship behavior among employees, with special reference to the demographic characteristics of the respondents. The results of this research can indicate to the organization the importance of organizational citizenship behavior within the organization, and highlight the need to conduct an analysis of organizational citizenship behavior in order to create a better insight into this topic. This paper follows the standard structure of a research paper. The introduction emphasizes the aim of the paper, while chapter 2 provides an overview of the theoretical basis and previous research related to the research topic.

Chapter 3 describes the used methodology and data analysis, including the presentation of the results obtained from the research. Finally, in chapter 4, conclusions are drawn, limitations of the research are stated, and recommendations for future research are given.

2. THEORETICAL BACKGROUND AND PREVIOUS RESEARCH

Since the beginning of the eighties of the 20th century, the literature has been strongly concerned with organizational citizenship behavior (OCB), not only the nature of OCB has been studied, but also its dimensions and the causes that encourage it (Grego-Planer, 2019). Organizational citizenship behavior is firmly rooted in the field of organizational behavior and industrial-organizational psychology, given the large number of articles published over the past 25 years (N. P. Podsakoff et al., 2009). Recently, concepts such as organizational citizenship behavior (OCB), organizational culture, climate in the organization and trust in it have received a lot of attention when it comes to the maximum success of organizations and individuals (Sahin, 2013). If the question arises, what motivates and influences the behavior of employees in the organization? Olowookere & Adejuwon state that often when employees receive good service from an organization, they feel a duty to reciprocate and therefore engage in what is called organizational citizenship behavior, these employees become loyal to the organization and voluntarily express their commitment (Olowookere & Adejuwon, 2015). Organ defines organizational citizenship behavior as “individual behavior that is discretionary, not directly or explicitly recognized by the formal reward system, and that in the aggregate promotes the effective functioning of the organization. By discretionary, we mean that the behavior is not an enforceable requirement of the role or the job description, that is, the clearly specifiable terms of the person’s employment contract with the organization; the behavior is rather a matter of personal choice, such that its omission is not generally understood as punishable.” (Organ 1988, 4). The willingness of the participants to invest their own additional effort, which is not part of their formal duties, is considered an important component of the work of individuals in the organization. (Sahin, 2013). Examples of organizational citizenship behavior include helping colleagues with tasks, accepting and following orders without objection, facing challenges at work, maintaining an orderly workplace, providing constructive feedback for business improvement, creating a supportive work environment, and ensuring the safety and security of the organization (Verghese, 2020). Robbins & Judge (Robbins & Judge, 2009) explain organizational citizenship behavior as a dependent variable of organizational behavior emphasizing that employees who will strive beyond their standard work duties, show actions that are beyond the usual expectation of superiors to make organizations successful. The authors also emphasize that organizations need employees who will demonstrate an enviable level of organizational citizenship behavior, such as providing help to colleagues, voluntarily accepting additional tasks, avoiding conflicts, following regulations and guidelines, and politely enduring work-related disturbances. Organizational citizenship behavior (OCB), which includes employees' discretionary efforts to exceed the boundaries of their formal duties, is a key factor in achieving organizational success (Marinova et al., 2019). Organ 1988 identified five main dimensions or types of organizational citizenship behavior that were later defined by Podsakoff and colleagues (P. M. Podsakoff et al., 1990):

- Altruism - refers to behaviors that are discrete but aimed at helping another person facing an important organizational task or problem.
- Conscientiousness – refers to the discretionary behavior of employees that goes beyond the minimum requirements to perform their role in the organization, especially in areas such as regular attendance at work, compliance with rules and regulations, and taking breaks.
- Sportsmanship - refers to the employee's willingness to endure circumstances that are not ideal without complaining.

- Courtesy – refers to the individual's discretionary behavior with the aim of preventing possible problems in working with others.
- Civic virtue refers to individual behavior that indicates responsible participation, involvement, or concern for the welfare of society.

Lepine et al. (Lepine et al., 2002)*** discuss which operationalization of OCB is most appropriate, given the different approaches that have produced important findings. This question is not only important for the measurement of OCB, but also for the interpretation of research results. For example, is it possible to draw conclusions about OCB based on only one or two dimensions (eg, altruism or sportsmanship) or what kinds of conclusions can be drawn when the dimensions have different relationships with predictors or outcomes. However, the authors emphasize that Organ's five-component model of civic behavior is one of the most recognized and influential taxonomies in the literature (Lepine et al., 2002). Penezić et al (Penezić et al., 2013) conducted a research aimed at examining organizational citizenship behavior in the Croatian context using a survey. The results showed the existence of five dimensions of the construct: altruism, conscientiousness, civic virtues, civility and fair behavior. Also, differences in these dimensions were determined with regard to the sociodemographic characteristics of the respondents, and they emphasize that only the dimension of altruism is completely outside the work role of the employee. Williams and Anderson, as stated in the paper Promoting individual and organizational ocbs: The mediating role of work engagement (Urbini et al., 2020) distinguished Organizational Citizenship Behavior (OCB) according to the goal to which it is directed. They proposed a model that separates OCBs into two types: OCBs toward individuals (OCBs-I), which involves behaviors that benefit other members of the organization, such as volunteering to help colleagues at work, and OCBs toward the organization (OCBs-O), which it includes behaviors that benefit the organization, such as praising the organization to strangers. Organizational researchers have conducted a large number of empirical studies with the aim of understanding the motives and organizational practices that lead to organizational citizenship behavior (Michel, 2017). If the assumption that OCBs have a positive contribution to organizational performance is accepted, it would be useful to identify the factors that encourage these behaviors in organizational settings (N. P. Podsakoff et al., 2009). In order for organizations to achieve success, they need the support of employees through organizational citizenship behavior. Factors that promote OCB were highlighted in research conducted by Bolin and Turnley in 2003, as seen in the work Organizational Citizenship Behaviors - Antecedents, Outcomes & Paradoxes (Verghese, 2020) listed job satisfaction, supportive and transformational leadership, job involvement, job interest, organizational support, trust, organizational justice, psychological contract fulfillment and employee characteristics. Gaa as stated in the paper Organizational Citizenship Behavior and Impacts on Knowledge Sharing: An Empirical Study (Al-Zu'bi, 2011) state that individuals who are motivated by the achievement of a shared vision without expectation of personal gain often contribute to the achievement of workplace goals that go beyond the scope of their role. Followers do this because it gives them satisfaction when they contribute to the goal, which in turn increases their sense of personal worth. They also state that this type of motivation and contribution can contribute to achieving the organization's goals and improving the work environment for everyone involved. The role of organizational citizenship behavior in the organization is multifaceted by Podsakoff and others (N. P. Podsakoff et al., 2009) aimed to summarize existing research on the relationship between organizational citizenship behavior (OCB) and individual and organizational outcomes. An analysis of 168 independent samples showed that there is a positive relationship between OCB and various individual outcomes, such as managerial ratings of employee performance and reductions in turnover and absenteeism.

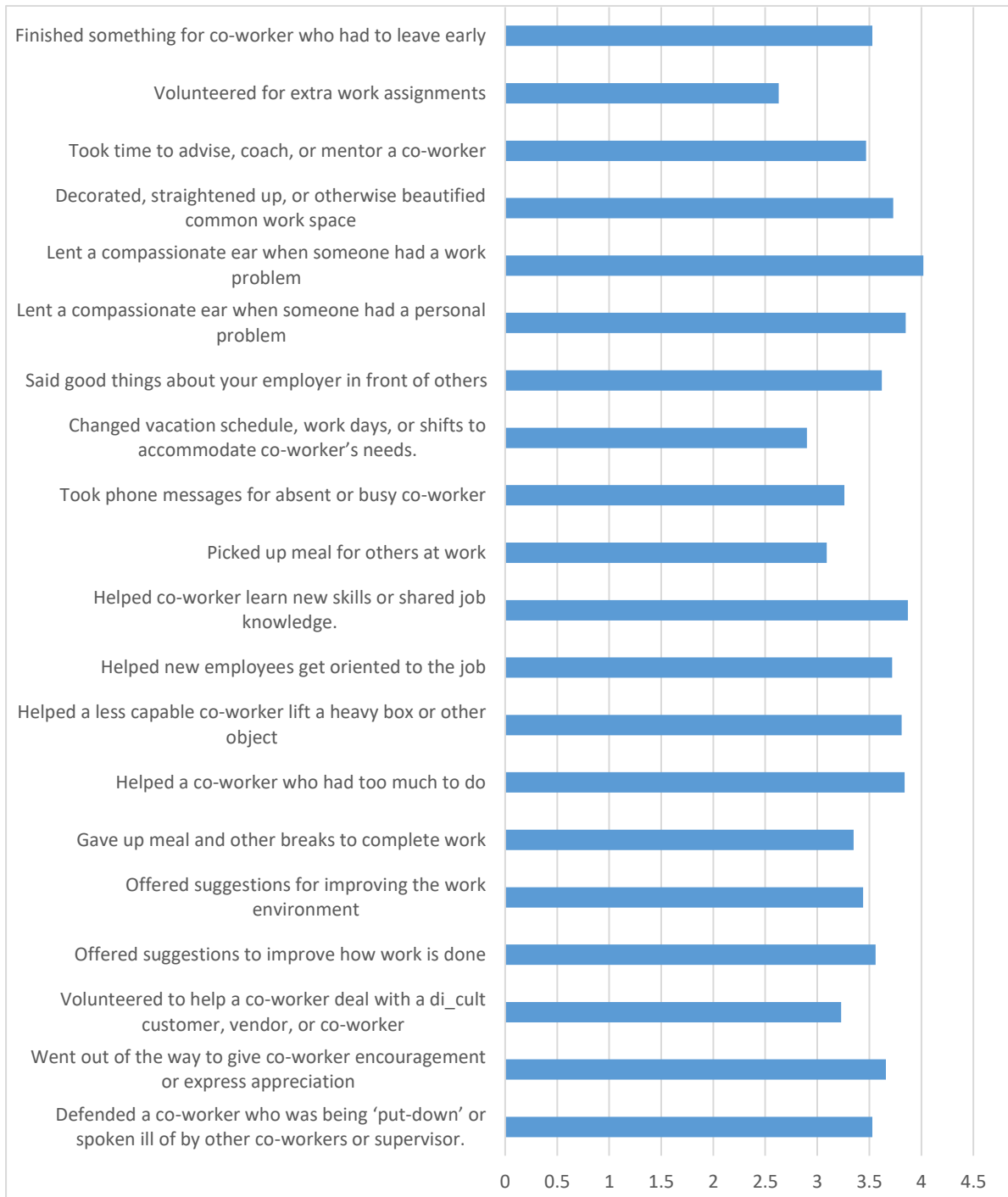
It has also been found that there is a positive relationship between OCB and organizational outcomes, such as increased productivity and customer satisfaction. Longitudinal studies have shown a stronger relationship between OCB and unit-level performance measures than cross-sectional studies, suggesting a causal relationship between OCB and these criteria. Podsakoff et al. (P. M. Podsakoff et al., 1997) conducted a study of how OCB affects work group or organizational performance in a sample of 218 employees in 40 machine crews at a paper mill in the Northeastern United States that found that helping behavior and sportsmanship improved performance quantity, while civic virtue had no effect on either. performance measures. Therefore, they conclude that organizational citizenship behavior has the potential to improve the effectiveness of work groups and organizations, but emphasize that further research is needed to determine its true value. It is necessary to emphasize the connection between the mediation mechanism of OCB and the influence of other variables on OCB. Farid and others (Farid et al., 2020) investigate the relationship between authentic leadership and organizational citizenship behavior (OCB) in the private banking sector. Through research, they found that authentic leadership positively affects OCB, as well as leading to higher levels of follower trust based on affective and cognitive abilities. You also found that affective and cognitive trust positively mediate the relationship between authentic leadership and OCB. Work by Tian et al (Tian et al., 2021) improve understanding of the mediating mechanism between workplace loneliness, gender, work engagement and organizational citizenship behavior (OCB). According to the results, work engagement mediates the negative effect of loneliness on OCB, especially for female employees. These findings highlight the importance of encouraging work engagement among female employees to reduce workplace loneliness and encourage organizational citizenship behavior. In accordance with the above, it can be concluded that there are numerous studies that investigate the factors that encourage organizational citizenship behavior and research that confirms the existence of a connection with independent variables of organizational behavior, as well as emphasizing the importance and significance of organizational citizenship behavior for the organization itself.

3. RESEARCH METHODOLOGY AND RESULTS

Quantitative methodology was used in this research with the application of a structured questionnaire. Primary data were collected using a simple random sampling method using a questionnaire filled out by the respondents themselves, and were then analyzed. For the purposes of this work, two parts of the questionnaire are used. The first part included demographic questions, such as gender, age of the respondent, level of education, work status, number of employees in the organization, form of ownership of the organization, level of the workplace in the organization, as well as the representation of certain forms of work in the workplace of the respondent. The second part of the questionnaire contained questions about organizational citizenship behavior. The Fox and Spector scale was used to measure organizational citizenship behavior (Spector et al., 2006, Grego-Planer, 2019) and organizational citizenship behavior checklist. The scale consists of 20 items that describe activities useful for associates and the organization and is used to assess the general level of organizational citizenship behavior (OCB) in employees (Spector et al., 2006). A Likert scale of frequency was used, whereby respondents rated how often they undertake the above-mentioned activities at their current job. They evaluated in five points, where 1 means never, 2 - once or twice, 3 - once or twice a month, 4 - once or twice a week, and 5 - every day. 39.7% of men and 60.3% of women of all age groups participated in the research. The most represented age group among respondents are people aged 36 to 45, with a share of 28.2%. They are followed by persons aged 46 to 55 with a share of 22.9%, while persons aged 18 to 25 are represented with a share of 21.4%. People between the ages of 26 and 35 make up 17.6% of respondents, while the least represented age group is over 56, with a share of 9.9%.

Regarding the educational level, the largest number of respondents has a secondary vocational education (41.2%), while 29.8% of respondents have a higher education. The share of respondents with higher professional education is 13.7%, while 9.2% of respondents have completed a master's degree, and 3.1% a doctorate. Most respondents (94.7%) work full-time, while only 5.3% work part-time. Regarding the size of the organizations in which they work, the largest share of respondents (51.9%) works in organizations with 50 to 250 employees, while organizations with up to 50 employees employ 48.1% of respondents. When it comes to the level of the workplace, the majority of respondents (72.5%) work in the position of operational employees, while 27.5% of respondents work at the level of middle management. The data visible from Chart 1 provide information on how often research participants undertook certain activities at their current workplace, which also represent organizational citizenship behavior. The scale used has five points, from 1 (never) to 5 (every day), and the participants had to choose the number that best corresponds to the frequency with which they undertook a certain activity. Based on the obtained data, it can be noted that the most frequently undertaken activities were sympathetically listening to work colleagues who had personal or business problems (4.02), helping colleagues with too much work (3.84) and helping to learn new skills or sharing knowledge about work (3.87). The activities that respondents undertook least frequently included volunteering for additional work tasks (2.63) and changing the schedule of holidays, working days or shifts to meet the needs of co-workers (2.90). The overall average for all activities included in this analysis is 3.49, which means that employees on average rate themselves at 3 (once or twice a month) to 4 (once or twice a week) for most of the listed activities. Overall, these data suggest that employees have a high level of engagement (organizational citizenship behavior) in performing certain workplace activities, but there is also room for improvement in some areas, such as volunteering for additional work tasks or changing schedules to meet the needs of co-workers.

Figure following on the next page



*Chart 1: Frequency of application of activities (organizational citizenship behavior) at the workplace (mean values)
(Source: author)*

For the purposes of this work, an analysis of variance (ANOVA) was conducted for each variable in which the respondents rate how often they apply the activities that characterize organizational citizenship behavior in the workplace. Differences according to demographic characteristics were analyzed for each activity. In the continuation of the work on tables 1-4 I can see statistically significant differences between individual activities of organizational citizenship behavior and demographic characteristics. Those activities where differences were shown according to demographic characteristics (age groups, work status, most completed training of respondents and number of employees in the organization) were singled out.

AGE STRUCTURE		Sum of Squares	df	Mean Square	F	Sig.
Volunteered for additional work tasks	Between Groups	22,759	4	5,690	2,942	,023
	Within Groups	243,653	126	1,934		
Received phone messages for an absent or busy associate	Between Groups	21,843	4	5,461	2,589	,040
	Within Groups	265,806	126	2,110		
They volunteered to help a colleague with a difficult customer, supplier or co-worker	Between Groups	16,364	4	4,091	2,463	,049
	Within Groups	209,300	126	1,661		
Defended a work colleague who was "humiliated" or bad-mouthed by other co-workers or superiors	Between Groups	19,780	4	4,945	3,371	,012
	Within Groups	184,815	126	1,467		

*Table 1: Comparison of activities of organizational citizenship behavior according to the age structure of employees
(Source: author)*

According to the data in Table 1, it can be concluded that there is a statistically significant difference in the participation of respondents of different age groups in workplace activities, taking phone messages for an absent or busy co-worker, and defending a co-worker who was "humiliated" or treated badly by other co-workers or superiors. talked about him also in a situation when it was necessary to voluntarily help a colleague with a difficult customer with other activities (variables). These results indicate that there is a difference in proactive workplace behavior between different age groups. Further research is needed to identify other factors that influence proactive behavior in the workplace. In accordance with the above, the activity in which the statistically significant difference is the most pronounced was singled out. This activity refers to the frequency of defending a colleague at work, who was humiliated or spoken badly about by other colleagues or superiors, in relation to the age of the respondent. The results show a statistically significant difference ($F = 3.37$, $p = 0.012$), where older employees (aged 46 to 67) defended a colleague significantly more often (30.5% daily) compared to younger employees (aged 18 to 25 years, 6.1% daily). However, it should be noted that this analysis does not take into account other factors that could influence these differences, such as work experience, work environment and social culture in which different age groups find themselves.

<i>Take the time to advise, teach or mentor a co-worker</i>										
	N	%	never	once or twice	once or twice a month	once or twice a week	every day	df	F	Sig.
<i>Work status</i>	131	100	9,9	13	23,7	26,7	26,7	1	5,040	,026
<i>Employed full time</i>	124	94,7	8,9	12,1	23,4	28,2	27,4			
<i>Employed part time</i>	7	5,3	28,6	28,6	28,5	0	14,3			

*Table 2: Comparison of activities of organizational citizenship behavior according to the work status of employees
(Source: author)*

In this case, according to Table 2, there is a statistically significant difference between the groups at the significance level of 0.05 ($p < 0.05$). This means that there is a difference in how often employees of different job statuses take time to advise, teach or mentor co-workers. In addition, the results show that there is a difference in frequency between full-time and part-time employees ($F= 5.040$, $p = 0.026$). This suggests that full-time employees are more likely than part-time employees to take time to advise, teach, or mentor co-workers.

EDUCATION		Sum of Squares	df	Mean Square	F	Sig.
<i>Help a less able colleague to lift a heavy box or other object</i>	Between Groups	30,452	5	6,090	3,875	,003
	Within Groups	196,464	125	1,572		
<i>Do your best to encourage a co-worker or express gratitude</i>	Between Groups	20,360	5	4,072	3,125	,011
	Within Groups	162,861	125	1,303		

Table 3: Comparison of organizational citizenship behavior activities according to employee training
(Source: author)

For the first independent variable (helping a less able colleague), the results show that there is a significant difference between the groups ($p < 0.01$). This means that there is a statistically significant difference in how often respondents with different levels of education help a less able co-worker to lift a heavy object. The results show that respondents with higher levels of education are less inclined to help coworkers every day, while respondents with lower levels of education are more willing to help coworkers. For the second independent variable (coworker encouragement), the results also show a significant difference between the groups ($p < 0.05$). This means that there is a statistically significant difference in how often respondents with different levels of education encourage a colleague or express gratitude. The results indicate that respondents with higher levels of education are less inclined to do their best, while respondents with lower levels of education are more likely to do their best to encourage a colleague or express gratitude.

<i>You said good things about your employer in front of others</i>										
	N	%	never	once or twice	once or twice a month	once or twice a week	every day	df	F	Sig.
<i>Number of employees in the organization up to 50 employees</i>	131	100	4,6	12,2	29	24,4	29,8	1	4,917	,028
<i>50-250 employees</i>	63	48,1	3,2	7,9	28,6	20,6	39,7			
	68	51,9	5,9	16,2	29,4	27,9	20,6			

Table 4: Comparison of organizational citizenship behavior activities according to the size of the organization
(Source: author)

According to Table 4, there is a statistically significant difference between the groups at the significance level of 0.05 ($p < 0.05$). Which means that there is a difference in how often employees of different organizations say positive things about their employer in front of others. In addition, the results show that there is a difference in frequency between organizations with less than 50 employees and organizations with 50-250 employees ($F= 4.917$, $p = 0.028$).

This suggests that employees in smaller organizations (up to 50 employees) are more likely to say positive things about their employer in front of others than employees in organizations with 50-250 employees.

4. CONCLUSION

Organizational citizenship behavior of employees plays a key role in organizational success and employee relations. Identification and analysis of organizational citizenship behavior can provide better insight into employees' personal perception of organizational citizenship behavior and help organizations create a more productive and efficient work environment. The conducted research collected data on the organizational citizenship behavior of employees at the workplace. The average score for all activities that describe the above behavior was 3.49. The above data suggest a high level of perception of personal organizational citizenship behavior of employees in the execution of certain activities at the workplace. However, an area for improvement was identified, such as greater employee engagement in volunteering for additional work assignments or adjusting schedules to accommodate co-workers' needs. Statistically significant differences were also observed between certain demographic characteristics of employees and certain activities of organizational citizenship behavior. Such an analysis provides important insights into the organizational citizenship behavior of employees in the workplace and their personal perception of the same. Emphasis should be placed on areas where there is room for improvement, which also allows employers to focus their efforts on areas that require greater attention and adaptation. In short, this kind of analysis provides a scientific basis for changes in organizational citizenship behavior of employees, which can have a positive effect on business efficiency and productivity. According to Williams and Anderson, as stated in the paper "Promoting individual and organizational ocbs: The mediating role of work engagement" (Urbini et al., 2020), as already stated in the literature review, they separate organizational citizenship behavior into two types: OCB towards individuals (OCBs-I) and OCB towards the organization (OCBs-O). If we want to explain the results of the conducted research according to the mentioned demarcation, it can be concluded that the findings of the conducted research indicate that employees of smaller organizations more often perform OCBs towards organizations (OCBs-O) compared to those in larger organizations. On the other hand, OCB activities towards individuals (OCBs-I) are more often performed as a whole. The overall level of employee engagement in performing OCB activities was high, but there are differences in the frequency of performing activities depending on the type of OCB and the size of the organization. From the aforementioned data analysis, it follows that there is a statistically significant difference in the behavior of employees at the workplace in relation to age, work status and level of education. However, it is necessary to conduct further research in order to determine other factors that can influence these differences, which should serve as a shortcoming of the conducted research and at the same time as a recommendation for future research.

LITERATURE:

1. Al-Zu'bi, H. A. (2011). Organizational Citizenship Behavior and Impacts on Knowledge Sharing: An Empirical Study. *International Business Research*, 4(3). <https://doi.org/10.5539/ibr.v4n3p221>
2. Farid, T., Iqbal, S., Khan, A., Ma, J., Khattak, A., & Naseer Ud Din, M. (2020). The Impact of Authentic Leadership on Organizational Citizenship Behaviors: The Mediating Role of Affective- and Cognitive-Based Trust. *Frontiers in Psychology*, 11. <https://doi.org/10.3389/fpsyg.2020.01975>

3. Grego-Planer, D. (2019). The relationship between organizational commitment and organizational citizenship behaviors in the public and private sectors. *Sustainability (Switzerland)*, *11*(22). <https://doi.org/10.3390/su11226395>
4. Lepine, J. A., Erez, A., & Johnson, D. E. (2002). The nature and dimensionality of organizational citizenship behavior: a critical review and meta-analysis. *The Journal of Applied Psychology*, *87*(1), 52–65. <https://doi.org/10.1037/0021-9010.87.1.52>
5. Marinova, S. v., Cao, X., & Park, H. (2019). Constructive Organizational Values Climate and Organizational Citizenship Behaviors: A Configurational View. *Journal of Management*, *45*(5), 2045–2071. <https://doi.org/10.1177/0149206318755301>
6. Michel, J. W. (2017). Antecedents of Organizational Citizenship Behaviors: Examining the Incremental Validity of Self-Interest and Prosocial Motives. *Journal of Leadership and Organizational Studies*, *24*(3), 385–400. <https://doi.org/10.1177/1548051816683895>
7. Olowookere, E. I., & Adejuwon, G. A. (2015). Development and Validation of Organizational Citizenship Behaviours Scale (OCBS) for the Nigerian Context. *Psychology*, *06*(05), 533–539. <https://doi.org/10.4236/psych.2015.65051>
8. Organ, D.W. (1988a). *Organizational citizenship behavior: The good soldier syndrome*. Lexington MA: Lexington Books.
9. Penezić, Z., Rak, I., & Slišković, A. (2013). Odgovorno organizacijsko ponašanje: Provjera konstrukta na Hrvatskom uzorku. *Drustvena Istrazivanja*, *22*(1), 121–141. <https://doi.org/10.5559/di.22.1.07>
10. Podsakoff, N. P., Whiting, S. W., Podsakoff, P. M., & Blume, B. D. (2009). Individual- and Organizational-Level Consequences of Organizational Citizenship Behaviors: A Meta-Analysis. *Journal of Applied Psychology*, *94*(1), 122–141. <https://doi.org/10.1037/a0013079>
11. Podsakoff, P. M., MacKenzie, S. B., Moorman, R. H., & Fetter, R. (1990). Transformational leader behaviors and their effects on followers' trust in leader, satisfaction, and organizational citizenship behaviors. *The Leadership Quarterly*, *1*(2), 107–142. doi:10.1016/1048-9843(90)90009-7
12. Podsakoff, P. M., Ahearne, M., & MacKenzie, S. B. (1997). Organizational citizenship behavior and the quantity and quality of work group performance. *Journal of Applied Psychology*, *82*(2), 262–270. doi:10.1037/0021-9010.82.2.262
13. Robbins, S. P., & Judge, T. A. (2009). *Organizacijsko ponašanje*, 12. izdanje (Mate d.o.o.).
14. Sahin, S. (2013). 'Examining Organizational Citizenship Behaviours (OCBs) of Teacher Candidates at the Faculty of Education', *Croatian Journal of Education*, *15*(Sp.Ed.3), str. 73-97 <https://hrcak.srce.hr/111351>
15. Spector, P. E., Fox, S., Penney, L. M., Bruursema, K., Goh, A., & Kessler, S. (2006). The dimensionality of counterproductivity: Are all counterproductive behaviors created equal? *Journal of Vocational Behavior*, *68*(3). <https://doi.org/10.1016/j.jvb.2005.10.005>
16. Tian, G., Pu, L., & Ren, H. (2021). Gender differences in the effect of workplace loneliness on organizational citizenship behaviors mediated by work engagement. *Psychology Research and Behavior Management*, *14*, 1389–1398. <https://doi.org/10.2147/PRBM.S329959>
17. Urbini, F., Chirumbolo, A., & Callea, A. (2020). Promoting individual and organizational ocbs: The mediating role of work engagement. *Behavioral Sciences*, *10*(9). <https://doi.org/10.3390/bs10090138>
18. Verghese, A. (2020). Organizational Citizenship Behaviours - Antecedents, Outcomes & Paradoxes: A Literature Review. *Ushus Journal of Business Management*, *19*(4), 27–37. <https://doi.org/10.12725/ujbm.53.3>

APPLICATION POSSIBILITIES OF BALANCED SCORECARD IN LATVIAN TRADE UNIONS

Antra Line

*University of Latvia,
Riga, Aspazijas Blvd.5, LV1011, Latvia
antra.line@lu.lv*

ABSTRACT

NGOs, including trade unions, play a significant role in the functioning of every democratic country. At the start of this century, NGOs became organisations that engage in social, political, environmental and economic processes at the national and international levels in order to represent the interests of various groups of society. In order for trade unions to adapt to today's changing environment and develop their organisational capacity, they should focus on developing strategic management. The significance and scientific importance of this study is based on the fact that there has been little research on European and Latvian trade union management, particularly with regard to strategic management and the application of the balanced scorecard in trade unions. This article presents a review and analysis of theoretical guidelines for applying the balanced scorecard in non-governmental organisations, including trade unions. The aim of the research is to provide a theoretical justification for the use of the balanced scorecard in non-governmental organisations and to develop a balanced scorecard model for Latvian trade unions. The research methods applied in this research include theoretical research methods, such as content analysis of management science literature, as well as empirical research methods, such as document analysis and expert interviews with leaders of Latvian trade unions. The main results of the study show that trade union leaders have a similar opinion regarding the potential application of the balanced scorecard in the strategic management of Latvian trade unions.

Keywords: *Balanced scorecard, Latvia, Strategic management, Trade unions*

1. INTRODUCTION

According to the International Classification of Non-Profit Organisations, trade unions are organisations that support, regulate and defend the rights and interest of employees. Trade unions are included in Group 11 of the NGO classification “Business and Professional Associations, Trade Unions”(International Classification of Non-Profit Organisations). The special role of trade unions as NGOs involves the aspect of social partnership: unlimited signing of partnership agreements and a social dialogue are integral parts of the European social model, which foresees close and regular cooperation with the government and employer organisations. The aim of the research is to provide a theoretical justification for the use of the balanced scorecard in non-governmental organisations and to develop a balanced scorecard model for Latvian trade unions. The novelty of the research is approved by the fact that there has been little research on European and Latvian trade union strategic management and the application of the balanced scorecard in trade unions. The conceptual article is based on the works of Kaplan R. and Norton D. (Kaplan, Norton, 1996, 2004), Niven P (Niven, 2006, 2008) on the development and application of balanced scorecard (BSC) in non-profit organisations, as well as previous research. (Holley et.al.,2012; Weil, 2002; Hannigan, 1998) on the strategic management of trade unions. Empirically, the article is based on document analysis and expert interviews with leaders of Latvian trade unions. This article includes four sections and conclusion.

2. LITERATURE REVIEW

In the early 1990s, scientists Kaplan R. and Norton D. created a balanced scorecard system that was originally designed for the private sector. Niven P. defined BSC „as a carefully selected set of measures derived from an organisation’s strategy. The measures selected for the scorecard represent a tool for leaders to use in communicating to employees and external stakeholders the outcomes and performance drivers by which the organisation will achieve its mission and strategic objectives“ (Niven, 2008). The BSC provides a balanced view of an organisation’s performance by considering not only financial measures, but also non-financial measures in four key perspectives: financial, customer, internal processes, and learning and growth. By measuring and managing performance across these four perspectives, organisations can gain a more comprehensive understanding of their performance and the factors driving it and make better-informed strategic decisions (Kaplan, Norton, 1996, 2004). The financial perspective focuses on traditional financial metrics such as revenue growth, profitability, and return on investment. The customer perspective considers factors such as customer satisfaction, retention, and loyalty, as well as market share and customer acquisition. The internal process perspective looks at the processes and systems within the organisation that drive performance, such as efficiency, quality, and innovation. The learning and growth perspective reveals the necessary infrastructure that needs to be established in order to ensure long-term growth and continuous improvement. The main sources of organisational growth and learning are people, systems, organisational procedures, and organisational culture. Indicators are related to employee satisfaction, loyalty, skills, and learning (Kaplan, Norton, 1996, 2004). BSC soon gained popularity among scholars and practitioners and has emerged as a proven tool to provide meaningful performance information in organisations. The researchers consider that BSC has been implemented in a multitude of organisations and have identified countries where it has developed most rapidly, such as the United States, United Kingdom, Norway, New Zealand, Canada, and other countries. (Gomes, Liddle, 2009).

2.1. Managing strategic performance in trade unions as NGOs: the previous approaches

Trade union researchers believe that studies on strategic issues at these organisations have not been as longitudinal and encompassing as for organisations at other sectors. Debates in relation to strategic planning at trade unions were started only in the 1980s. Theorists Heckscher Ch., Jacobs D., Lawler J., Murray A., Reshef Y., as well as Weil D. attended to the issue of introducing changes to trade union activity with the help of strategic planning. These changes are required in order to strengthen the position of these organisations at both organisational and national level (Gahan, 1998). In scientific literature on trade union management, researchers have expressed the view that in recent years, many trade unions have begun to integrate strategic planning approaches and techniques used in business. By using these approaches, trade unions have discovered that they help to adapt to changing external environment demands (Holley et al., 2012). Several studies indicate that strategic performance evaluation is necessary to improve the effectiveness of trade union work (Weil, 2005). According to the opinion of the researchers of trade unions Holley W. et al. strategic planning in trade unions comprises the following steps: defining the mission; analysis of the external environment, which envisages the analysis of the political and legal environment, the labour market, the specific industry and the employer, as well as the assessment of the image of the trade union; defining long-term and short-term goals; strategy development, which ensures attainment of the long-term goals of the trade union and the growth of the trade union as an organisation (Holley et al., 2012). Whereas, Weil D. has named three strategic planning stages: strategy formulation, strategy implementation and strategy evaluation (see Table 1).

Strategic planning stage	Tools for analysis
1. Strategy formulation	Environmental analysis: market/economic; technological; political/regulatory Member-driven priorities: demographic analysis; membership pools Institutionally driven priorities
2. Strategy implementation	Resource allocation analysis: financial health; resources analysis Organisational structure: formal organisation; people; human resource system; culture
3. Strategy evaluation	Evaluation techniques: cost/benefit analysis; benchmarking

*Table 1: Strategic planning stages in trade unions
(Source: Weil, 2002)*

The ability of the trade union's structure to achieve new goals is determined, and the results of previously chosen strategies are analysed. Weil D. argues that the basis of trade union strategy consists of four main types of priorities: priorities set by the external environment, member-oriented priorities, as well as officially and politically determined priorities. The author of the article states that the analysis of external environmental influence is similar to that in business management, however, the other three priorities are different and specific. The prioritization of member needs and expectations is related to member satisfaction and is considered a type of priority for trade unions. The officially established priorities derive from the democratic nature of trade unions, which are determined by their traditions and ideology. Political priorities help trade unions to achieve political goals in order to effectively represent the interests of different social groups (Weil, 2002). The approach of trade union researcher Hannigan T. includes the presence of a mission and vision and reveals strategic planning as a continuous and one-time plan development process. The author emphasizes that goal setting should consider the previous results of trade union activities and the experience of resource utilization. Hannigan's T. strategic planning model is slightly broader than D. Weil's model. In strategy formulation, implementation, and evaluation, first and foremost, trade union leaders and boards are involved. Personnel involvement increases during the plan implementation phase, but there is no provision for personnel involvement in the strategy development phase; nor is there any mention of the need to formulate values, which the author of the article considers as a weakness of this approach (Hannigan, 1998). Line A. (Līne, 2016) conducted a study on strategic management in Latvian trade unions, offering an expanded view of strategic management in trade unions by proposing a 10-step process for implementing a strategic management model. This process emphasizes the interaction between steps, as well as the importance of mission, internal and external vision, values, leadership, and communication. It is evident that three out of the four approaches described lack a systemic view of the strategic management process, as the emphasis is mainly on the strategy development stage. This indicates the need for increased researcher interest in strategic management issues in trade unions. Since the beginning of the 1990s, Clark P. and colleagues have studied the administrative functions, leadership, and strategic planning of trade unions in the US and other countries. The studies confirm that trade unions have modernized and professionalized their internal administrative and management practices over time, in response to changing contexts and challenges they face (Bamber, 2022). Therefore, it can be stated that the improvement of strategic leadership in trade unions is highly necessary and relevant. The main objective of strategic management for NGOs, including trade unions, is to ensure that the organisation's mission better serves the needs of society.

Secondly, the aim of strategic management is to achieve the involvement of stakeholders in change (Allison, 2005). Kaplan R. and Norton D. claimed that by adapting the Balanced Scorecard to the goals of NGOs, it can become a measurement and strategic management system in these organisations. The authors argued that “migration” of the BSC to the non-profit/government organisations to be “one of the most gratifying extensions of the original concept” (Kaplan, Norton, 2004).

2.2. BSC as a strategic performance improving tool in NGOs

The development of the Balanced Scorecard for NGOs begins with the formulation or renewal of the mission. The mission of NGOs should be placed at the top of the balanced scorecard, because „the mission rather than the financial/shareholder objectives drives the organisation’s strategy“ (Kaplan, 2001). Drucker P. acknowledged that an NGO's mission must be practical; otherwise, it is merely a good intention. The mission should be simple and clear to employees, volunteers, and every member of the NGO (Drucker, 2006). According to Hannigan T. (Hannigan, 1998), the mission of trade unions distinguishes them from each other. The mission provides general strategic planning guidelines and serves as the driving force of the organisation. The importance of the customer perspective is emphasized after the mission and explores the definition of customers and the creation of value for them (Niven, 2006). The significance and placement of BSC perspectives depend on the type and activities carried out by the NGO. Niven P. underlined financial, customer, internal process, learning and growth perspectives linked with the mission and asked important questions, the answers to which are the basis for formulating perspectives (Niven, 2008) (see Figure 1).

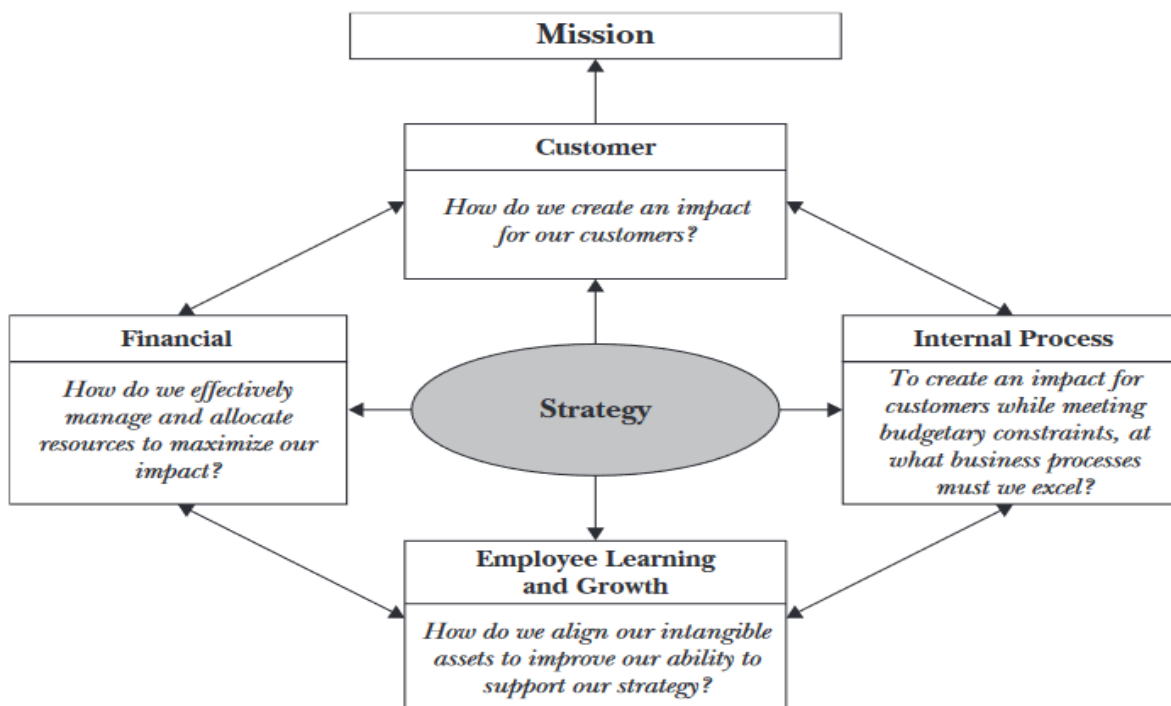


Figure 1: Balanced Scorecard for the Public and Nonprofit Sectors
(Source: Niven, 2008)

Kaplan R. and Norton D. have pointed out that not all NGOs can use the same BSC model, as there are many differences among NGOs, and that the current model can be supplemented with other relevant perspectives, as well as new perspectives can be added to strengthen the model (Kaplan, Norton, 2000).

For example, author Ungureanu E. et al. adapted the model for Romanian political parties, creating the following perspectives based on indicators of political party activity: electoral, participative, financial, and parliamentary (Ungureanu et al., 2021). In turn, Lianto L. analysed credit union BSC and emphasized the member perspective, stating that increasing the number of members is the primary objective as it leads to an increase in market share. The main activities in the internal process perspective are related to the delivery of values to the credit union members, which provided by the three important stages: stage of creation, stage of manufacture, and the stage of after-sales service. Regarding learning and growth perspective the author emphasized resources empowerment: human resources capability, information system capability, and organisational capability. The financial perspective is viewed as a lagging or outcomes indicator that is formed from another perspective (leading indicator) (Lianto, 2018). Greiling D. conducted a study on the implementation of BSC in German NGOs, revealing that in addition to the traditional BSC perspectives, 19 NGOs have formulated the following perspectives: outcome perspective, employee perspective, and output perspective. The results of this study also showed that the classical profit sector perspectives dominate in non-profit organisations in the healthcare and social services sectors. This can be partly explained by the fact that BSC is considered a modern and reliable management tool. (Greiling, 2010). Alfirevic E. et al., while studying the implementation of BSC in the Commercial Trade Union of Croatia (CTU), have found that “The union's mission is to construct an active, independent and strong organisational network through comprehensive initiatives for promotion of trade workers’ rights, economic and social justice”. The authors have analysed: internal processes efficiency perspective, user satisfaction perspective, financial sustainability perspective, learning and growth perspective. The internal processes perspective includes ensuring social dialogue at the industry level; monitoring the implementation of collective agreements at the company and regional levels; communicating with members about their workplace issues and holding various levels of union leaders accountable for their performance. The user satisfaction perspective includes: maintenance of a membership database - this database records the data of current and former trade union members, as well as reasons for leaving the trade union; quarterly evaluation of the work of enterprise trade union leaders; measurement of member satisfaction through surveys and telephone interviews. Financial sustainability perspective - the main task is to ensure the sustainable operation of CTU. The perspective includes the recording and control of membership fee payments, which are the main source of financial income. Donations and EU structural fund financing are mentioned as additional sources of income. The learning and growth perspective demonstrates that the program for training trade union leaders is strongly recommended. In order to improve the performance and engagement of its voluntary staff, CTU has established a non-financial bonus program. Furthermore, training programs have been created for both employees and volunteers to enhance their knowledge on current topics related to workplace safety, labour laws, and other relevant issues (Alfirević et al., 2005). These studies demonstrate that in the implementation of the BSC for NGOs, various perspectives are used - both traditional and adapted to the nature of NGO activities. The significant role of BSC development is the cause-and-effect chain, which is the main principle of BSC formation and runs through all its perspectives. The measurement system must clearly demonstrate the relationships between objectives and measures in different perspectives to make them realistic and controllable (Kaplan, Norton, 1996). This indicates that there is a causal relationship between employee satisfaction, member satisfaction, member loyalty, and financial income in trade unions. The authors have emphasized that BSC is also an important communication tool to communicate with employees in various ways about the organisation’s strategy, vision, values, and thus ensure that leaders and employees at various levels know and understand the strategy and see their place in its implementation (Kaplan, Norton, 1996). This principle applies to both business sector organisations and NGOs.

3. EMPIRICAL RESULTS

3.1. Analysis of the Latvian trade unions documents

LBAS (Free Trade Union Confederation of Latvia) is the only trade union confederation in the country, serving as the official social partner for cross-sectoral issues, and operating as a member of both the European Trade Union Confederation (ETUC) and the International Trade Union Confederation (ITUC). As of November 1, 2022, *LBAS* has 18 member organisations representing various industries and professions (*LBAS* Dalīborganizācijas). The author of the paper analysed the mission, vision, and value statements of Latvian trade unions, using as a basis the statements of the member organisations of the *LBAS*. These statements were included in the statutes or websites of the trade unions. A total of 18 Latvian industry/professional trade union statutes and information posted on their websites were analysed. Statutes of *LBAS* member organisations reveal, that not all *LBAS* member organisations have formulated a mission, vision, and values. For instance, the Latvian Trade Union of Education and Science Employees (*LIZDA*) has proclaimed self-governance, democracy and openness as the main principles of its activity (*LIZDA* Statutes). While the Latvian trade union “*Energija*” considers its main values to be “solidarity, equality, self-governance, democracy and openness” (Trade Union *Energija* Statutes). The mission and vision formulations of the largest *LBAS* member organisation *LIZDA* can be found on the website of the organisation: the mission is formulated as “to represent, express and defend the economic, social and legal interests of *LIZDA* members, by creating a social dialogue at all levels”. The formulated vision: “the most impactful and largest trade union, which unities active, knowledgeable members interested in processes. We are supported by society and respected by social partners” (*LIZDA* Par mums). The mission of the Federation of Latvian Aviation Trade Unions is broader and more descriptive, as follows: “is to communicate, coordinate and facilitate among the various constituencies in order to achieve this goal of “A rising tide lifts all boats” to the benefit of all Latvians in every walk of society” (*LAAF* About us). The author believes that such formulations of missions corresponds to the theoretical guidelines and motivates trade union members to become engaged in achieving goals. Based on the analysis of documents from *LBAS* member organisations, it can be concluded that a large portion of trade unions have not formulated their mission, values, and vision statements. Therefore, it is necessary to improve the determination of strategic direction in these unions so that a Balanced Scorecard can be developed based on the mission, vision, and values of each trade union.

3.2. Summary of the findings of expert interviews

Different Latvian industry/professional trade union leaders with trade union managing experience of 7 years or more and with experience in trade union strategic management were chosen as experts. The average age of the experts is 57 years, and the average leader work experience is 12 years. Eleven *LBAS* member organisation leaders, which is 61% of the total amount of the member organisation leaders, were interviewed in November 2022. The interviews were firstly audio recorded, then they were transcribed – qualitative transformation of the results in a printed form; based on the transcript information, a qualitative content analysis was performed. Based on the content analysis, it is evident that there is a dominant opinion that traditional perspective names are suitable for trade unions, with a preference for using “member perspective” instead of “customer perspective” since members are the unions' clients. All respondents believe that the mission is crucial for creating a strategic vision, and the essence of the mission for trade unions is “to be the defenders of their members.” At the same time, it is acknowledged that not all trade unions have formulated a mission statement, but they know and take it into account in their activities. It is recognized that members are the cornerstone of trade unions, and the member perspective is the most significant of the four perspectives.

Trade unions play an important role in advocating for their members' social and labour rights and interests. When members are satisfied with the services provided by the union, they are less likely to leave, and it is easier to maintain their loyalty to the union. Union leaders emphasize that the company level is the most crucial because “members at the workplace need to feel that the union cares for them, protects their interests in labour and occupational safety issues, and ensures the implementation of the collective agreement.” Company-level union leaders are closest to members, and members notice their work effectiveness the fastest. Collaboration with stakeholders is significant for defending members' interests and attracting new partners for cooperation, such as youth organisations and municipalities, who are regularly referred to as cooperation partners. The most significant internal processes of trade unions are characterized as follows: first, the provision of social partnership starting from the company level up to the industry and national level. Actions related to engaging new members are emphasized because “without the presence of members, finances and involvement, the operation of trade unions is not possible.” Almost all leaders emphasize the importance of internal communication processes in trade union work, as situations where labour rights are violated in companies need to be rapidly addressed. It is also stressed that the transmission of various current information to enterprise union leaders and members is crucial. In relation to learning and growth, the opportunities offered by the LBAS Training Centre for acquiring new knowledge and skills are emphasized - leaders of various trade unions, staff, and members are invited to acquire new knowledge and skills on various issues - labour law, occupational safety and health, gender equality, and NGO management issues. The majority of respondents consider member involvement and loyalty to be a difficult issue to address, as “members may be loyal to the trade union in words, but it is not easy to ensure their participation in pickets with a large number of participants. ” It is emphasized that it is important to regularly evaluate the level of member participation in trade union activities. The issue of motivating volunteers is also not simple - while material incentives may be used to motivate personnel in accordance with the budget, such incentives are rarely available for volunteers, and non-material motivation opportunities must be sought. Opinion on finance perspective - all respondents acknowledge the importance of monitoring regular payment of membership fees by all members, which ensures the financial stability of the trade union. The achievement of this objective is closely linked to the retention of existing members and the involvement of new members, as “members are the financiers of the trade union.” The financial contribution of members is significant, particularly in trade unions representing less paid professions and sectors, which requires “very strict expense control” in trade unions. In general, the results of the interviews indicate that the trade union leaders have a similar opinion regarding the potential application of the balanced scorecard in the strategic management of Latvian trade unions: BSC can be applied in Latvian industry unions, but it will require serious learning on the creation and application of BSC in trade unions.

4. APPLICATION OF BSC IN LATVIAN TRADE UNIONS

To facilitate the application of the balanced scorecard (BSC) in Latvian trade unions, the author has developed a BSC model specifically for this purpose. The development of the model was based on several sources, including the theoretical guidelines for creating BSC in NGOs by authors Kaplan R., Norton D.(1996, 2004), and Niven P (2008) and an analysis of documents from Latvian trade unions, as well as findings from expert interviews on BSC application possibilities in Latvian trade unions (see Table 2).

Table following on the next page

Trade union mission, vision, values		
Perspective	Strategic objectives	Measures
1. Member perspective <i>How do we create an impact for our members?</i>	Provision of trade union services	The level of member satisfaction with received services
	Retention of existing members	The level of member satisfaction with received services The proportion of loyal members The impact of the trade union on society as a whole
	Collaboration with stakeholders	Stakeholder engagement level and results of collaboration
2. Internal process perspective <i>How to create an impact for members while meeting budgetary constraints, at what internal processes must we excel?</i>	Ensuring the involvement of new members	The revenue from a single new member compared to the resources spent on attracting them The impact of the trade union on society as a whole
	Providing social partnership at all levels	The number of concluded general agreements and collective bargaining agreements
	Ensuring internal communication processes	Reduction in communication exchange time with members and structural units
	Promoting overall trade union effectiveness	Specific indicators of the trade union's effectiveness
3. Learning and growth perspective <i>How do we align our intangible assets to improve our ability to support our strategy?</i>	Motivation of personnel and volunteers	Results of surveys of personnel and volunteers
	Growth of leaders at various levels	Increase in leader knowledge and skills
	Member learning	Increase in member knowledge and skills
	Member involvement and loyalty	Proportion of member participation in trade union actions Results of member surveys
4. Finance perspective <i>How do we effectively manage and allocate resources?</i>	Regular provision of stable income	Control of membership fee Control of expenses in accordance with the approved budget EU structural fund financing Income from economic activity (if any)
	Profitability of members	Average monthly amount of membership fee per member

Table 2: BSC model for Latvian industry/professional trade unions adapted from Kaplan and Norton 1996, 2004, Kaplan, 2011, Niven, 2008
(Source: Produced by the author)

The model comprises four perspectives: the first being the member perspective, followed by the internal processes perspective, the learning and growth perspective, and finally, the finance perspective. Strategic objectives and measures are incorporated into the model. To apply BSC in Latvian trade unions, the author of the article suggests that Latvian trade unions should establish strategy development teams and strategic management training programs on the creation and importance of BSC. The author emphasizes that Latvian industry/professional trade unions that want to use this approach need to specify measures, develop targets and initiatives, and detail the application of this model, considering their unique situation and

previous strategic management results. The application of this model will broaden the trade unions' perspective on the strategic management process, improve goal achievement, and overall effectiveness of the trade unions'.

5. CONCLUSION

The literature analysis suggests that in the management literature of trade unions, strategic management is mainly analysed within the framework of strategic planning, which is just one of the functions of management. Little attention is given to the development of mission and vision, and the formulation of values in relation to strategy development is not evaluated comprehensively. A comprehensive concept of strategic management for trade unions, as well as practical methods for its implementation, are offered minimally. Research indicates that the BSC can also be applied in NGOs and trade unions. Several adaptations of the BSC model by Kaplan R. and Norton D. have been made in various NGO contexts. The creators of the BSC approach believe that its migration to NGOs is another success of this approach. The results of the empirical study indicate, firstly, that based on the analysis of documents from the member organisations of LBAS, it can be concluded that a number of trade unions have not formulated their mission, values, and vision statements in a written form. Therefore, it can be argued that these trade unions require improvement in the determination of their strategic direction. Secondly, the results of the interviews indicate that the trade union leaders have a similar opinion regarding the potential application of the BSC in the strategic management of Latvian trade unions: BSC can be applied in Latvian industry/professional unions, but it will require serious learning on the creation and application of BSC in trade unions. The author believes that the proposed improvements in the strategic management process - BSC model for Latvian industry/professional trade unions serve as a contribution to trade union management theory and practice.

LITERATURE:

1. Alfirić, N. et.al. (2005). The Balanced Scorecard (BSC) Approach to Performance of a Nonprofit in the Transition Environment: The Case of the Commercial Trade Union of Croatia (CTU). *Proceedings of the 6th International Conference "Enterprise in Transition"* University of Split. pp. 5-19.
2. Allison, M., Kaye J. (2005). *Strategic planning for nonprofit organizations: a practical guide and workbook*. USA: John Wiley Sons, Incorporated.
3. Bamber, G. J. Jerrard, M. A. , Clark, P.F. (2022). How do trade unions manage themselves? A study of Australian unions' administrative practices. *Journal of Industrial Relations*. Vol. 64(5) pp.623–644.
4. Drucker, P.F. (2006). *Managing the Nonprofit Organization*. New York: Harper Business.
5. Gahan, P. (1998). *Union strategy: a conceptual framework*. Sydney: University of New South Wales.
6. Gomes, C., R., Liddle, J. (2009). The Balanced Scorecard as a Performance management tool for third sector organizations: the case of the Arthur Bernardes Foundation, Brazil, *Brazil Administration Review*. Vol. 6(4) pp. 354-366.
7. Greiling, D. (2010). Balanced scorecard implementation in German non-profit organisations. *International Journal of Productivity and Performance Management*. Vol. 59 No. 6. pp.534-554.
8. Hannigan, T. (1998). *Managing tomorrow's high - performance unions*. London: Quorum Books.
9. Holley, W. H., Jennings, K. M., Wolter, R. S. (2012). *The Labor Relation Process*. South-Western: Cengage Learning.

10. International Classification of Non-Profit Organisations . (2022). Retrieved 02.10.2022 from: <https://www150.statcan.gc.ca/n1/pub/13-015-x/2009000/sect13-eng.htm#group11>.
11. Kaplan, R., Norton, D. (1996). *The Balanced Scorecard: Translating Strategy into Action*. Boston: Harvard Business School Press.
12. Kaplan, R., Norton, D. (2000). *The Strategy-focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment*. Harvard: Harvard Business Review Press.
13. Kaplan, R. (2001). Strategic Performance Measurement and Management in Nonprofit Organizations. *Nonprofit Management & Leadership*. Vol.11(3). pp.353-370.
14. Kaplan, R., Norton, D. (2004). *Strategy Maps: Converting Intangible Assets into Tangible Outcomes*. Boston: Harvard Business School Press.
15. Kaplan, R., Norton, D. (2000). *The Strategy-focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment*. Harvard: Harvard Business Review Press.
16. Lianto, L.A. (2018). Balanced Scorecard Execution: A Key to Success for a Sustainable Credit Union. *Jurnal Terapan Manajemen dan Bisnis*. Vol. 4. pp. 151-162.
17. Niven, P. (2006). *Balanced Scorecard Step-by-Step 2nd Edition*. Canada: Wiley & Sons.
18. Niven, P.R. (2008). *Balanced scorecard step-by-step for government and nonprofit agencies*. Canada: Wiley & Sons.
19. *Trade Union Energija: Statutes*. (2020). Retrieved 07.12.2022 from: <https://www.energija.lv/2021/02/22/statuti/>.
20. *LAAF: About us*. (2022). Retrieved 09.12.2022 from <http://www.laaf.lv/about-us/>.
21. *LBAS: Dalīborganizācijas*. (2022). Retrieved 01.11.2022. from <https://arodbiedribas.lv/daliborganizacijas/>.
22. *LIZDA: Par mums*. (2022). Retrieved 07.12.2022 from: <http://www.lizda.lv/lv/par-mums>.
23. *LIZDA: Statutes*. (2020). Retrieved 10.12.2022 from: <http://www.lizda.lv/lv/par-mums/statuti>.
24. Līne, A. (2016). *Latvijas arodbiedrību stratēģiskās vadīšanas pilnveide*. (Promocijas darbs). Latvija: Latvijas Universitāte.
25. Ungureanu, E.C. et.al. (2021). Political Party Balanced Scorecard Concept for Analysis of the Performance Management of the Activity of Political Parties in Romania. *Journal of Public Administration, Finance and Law*. Iss: 22. pp. 227-300.
26. Weil, D. (2002). *Strategic Planning for Labor Unions*. Massachusetts: Xanadu Publishing
27. Weil, D. (2005). Strategic Choice Framework for Union Decision Making. *The Journal of Labor and Society*. Vol. 8.pp. 327–334.

NEETS IN SLOVAKIA: SITUATION AND LABOUR MARKET MEASURES

Natalia Pozsonyiova

*University of Economics in Slovakia, Dolnozemská cesta 1, Bratislava, Slovakia
Natalia.pozsonyiova@euba.sk*

ABSTRACT

The aim of this paper is to describe the situation of NEETs (neither in education, employment or training) which are mainly young people up to 29 years in Slovakia and the labour market measures that are available and aimed at solving unemployment of young people. Young unemployed are often faced with too many obstacles keeping them from finding the right career path for them. It is often difficult for them to match their skills with the requirements of the labour market. We will analyze the situation of this unemployed group of people and their development during recent years and try to find the reasons for their difficult position when entering the labour market. At the same time we will focus on the employment services and job-training programmes designed especially at helping them to find the way to join the labour market. From the job-training programmes we will try to assess the effectiveness of graduate or school-leave practice and training which is mainly oriented at giving the graduates new chances at employment. We will mention projects that are currently running at the employment offices designed to help young unemployed. At the end of this paper we will decide which labour market measure is the most efficient one in Slovakia. The result should also conclude some advice for the future job-training programmes.

Keywords: *employment services, graduates, job-training, labour market measures, young unemployed*

1. INTRODUCTION

NEETs in Slovakia represent a specific group of unemployed that are under 29 years of age. NEET is defined as neither in employment, education and training and represents young people who are struggling to find permanent employment. After finishing their studies young people are confronted with situations for which they were not prepared that the labour market is not always open to inexperienced even educated people and that often what the labour market needs are people who can adapt to the fast-changing working environment. As the students in Slovakia have often little to no experience that would match the requirements therefore landing a dream job is often very hard. This paper aims to analyze the situation of NEETs in Slovakia, and how the labour market is prepared to take in an additional amount of new workers. Nowadays NEETs are very often the focus of analytics and that is due to the fact that unemployed young people are a global phenomenon and not just in some countries. Advanced and also less advanced countries all face the same problem of young people trying to find a job that matches their experience and education. The question arises if the problem lies in the education system, in young people themselves or in the labour market. The gap between these three forces seems to have gone deeper as in recent years the phenomena of NEET have been a worldwide and still a more difficult problem to solve individually.

2. LITERATURE OVERVIEW

NEETS or the overall unemployed have been studied by many authors. If we focus solely on papers that have been published based on data from Slovakia we can mention a few of them. Based on the paper by Štefánik, Karasová and Studená (2020) in which the authors analyze whether the support given to recent graduates in the form of workplace insertions can help them to maintain a long-term job in the future.

After graduating from secondary school or college the most commonly used active labour market policy programme is graduate practice. Authors have analyzed the impact of graduate practice in Slovakia in the years when it was implemented (2007 and 2008) and the impact on the earnings of its participants five years after participation in the programme. They have found that it has an overall positive effect on employability of participants. Three years after finishing the programme the authors found out that participation has a positive effect on the employability of participants working in the public sector and it was a medium-term effect. The long-term increase was caused by the career effect, suggesting that assisted work experience provided in the early stages of the career might be linked with an increase in employment chances in the later stages of the career. Interestingly was also the finding of the authors that in the private sector short-term effect of the programme can be higher if the overall labour market situation is more favourable. This can be driven by the participants that are concluding the workplace insertion at the same employer. After completing the graduate programme if the economic situation is favourable the share of those remaining at the workplace after the support dries out is higher. In the paper by Bram van Dijk (2006) where the author analyzes the situation of overall unemployed and how the job-training helps them. He analyzes the effect of three programmes school leave project, training and work habit maintenance. He claims that unemployment is long-term by people who are unhealthy, old or have been unemployed longer. If the individual has a higher education or previous employment or has never been unemployed before has good chance of finding a job thus entering the labour market. The author has also found out that an individual who is 34 years old when becoming unemployed has the highest chance of finding a job. The problem with the job-training programmes which the author states is that people with higher education are usually selected for job training programmes and people with lower education are sent to work for municipalities. For the training programme, the treatment response is larger for individuals with a low education than for people with a middle or high education. However, middle and high-educated people have a larger probability of entering the training programme, which is not efficient. This is also true for the graduate practice programme, although the differences in treatment response are not significant for this programme. He concluded that two programmes shorten the unemployment duration quite substantially: training programmes and graduate practice. The third programme, work habit maintenance, makes the unemployment duration actually larger, but that is also because of the nature of the programme. If an individual is already unemployed for a long time he gets to do socially meaningful activities.

2.1. Current struggles of young unemployed in EU

According to Minguez, A. (2013) since the economy crisis in 2008 and also shortly before many young people have started to work on temporary or part-time employment. As is stated in this paper temporary employment is an important step in the transition from education into the labour market. Fixed-term contracts can be a valuable way for young people to make the initial move into employment to acquire the initial training and experience they need to do a particular job, and for employers to assess their suitability and their capacity to perform the tasks involved. At the same time, such contracts offer employers a way to avoid the costs of dismissing workers who have standard contracts of employment, giving them more flexibility to adjust their workforce as business conditions change. Equally however, for the young people concerned, such contracts tend to imply less security and can potentially be a dead end rather than a stepping stone to a more permanent job. Indeed, there is a risk that young people can become trapped in temporary work, moving from one fixed-term contract to another, often with a spell of unemployment in between. There are also other forms of non-standard employment for young people in EU countries.

For example bogus self-employment when independent workers are contracted to provide services to a single client or work provider in much the same way as if they were an employee. Also quite often is family working when wives or children work in the family business without any formal contract of employment and without regular wage can be insecure for them and it can offer very little prospect of advancement. For visualization in Table 1 are presented the data of employment of age group 15-29 in EU based on part-time and temporary contract in year 2021 and 2022. As we can see the EU average is much higher than in Slovakia or the neighbouring countries. It is much less common practice for young people in Slovakia to work part-time or have a temporary contract.

	2021	2022
European Union - 27 countries (from 2020)	22,7	23,1
Slovakia	4,1	4,8
Czechia	8,5	8,8
Hungary	5,4	5,2
Poland	7,3	8,0

*Table 1: Share of part-time employment and temporary contracts for age 15-29 years in years 2021-2022 in percentage.
(Source: Eurostat)*

The European commission has acknowledged several problems of young unemployed and has taken an action to solving them. The overall problems that are addressed by the EU can be seen in Table 2 together with the possible solution that EU offers and has taken an action.

Problems Affecting Youth Employment Addressed in This Package and Possible EU-Level Actions

Problem	Possible remedy	EU-level tool/action
Young people face difficulties in finding a strong foothold on the labour market	Take measures supporting young people's inclusion on the labour market, such as facilitating school-to-work transitions, reforming labour market regulation/institutions to make them more employment-friendly and addressing labour market segmentation	Adopt and implement relevant country-specific recommendations in the context of the European semester (Section III and annex II of the European Commission, SWD (Staff Working Paper) (2012, p. 406)).
Young people, particularly from vulnerable or disadvantaged groups, dropping out of education or work; rising long-term unemployment and inactivity	Set up youth guarantee schemes; use ESF (European Social Fund) funding effectively in their implementation	Support youth guarantee schemes (incl. through exchange of best practice; ESF funding). The commission is proposing a council recommendation on establishing a youth guarantee (Section IV).
Difficult school-to-work transitions	Increase the supply of quality traineeships and apprenticeships	Take decisive steps in promoting quality traineeships, and apprenticeships: (1) The commission is launching a second stage social partner consultation on a Quality Framework for Traineeships (Section V.1); (2) The commission will set up a European Alliance for Apprenticeships (Section V.2).
Substantial number of vacancies coexists with high unemployment rates, growing skills, and geographical mismatches	Reduce obstacles to mobility to allow companies to recruit workers, apprentices, and trainees from other EU countries	Reinforce EU financial instruments on intra-EU mobility. The commission will launch, in the first half of 2013, a stakeholder consultation on a future EURES (European employment services) jobs for young people programme (Section V.3).

Note. Source: European Commission (2012b), *Moving Youth Into Employment*.

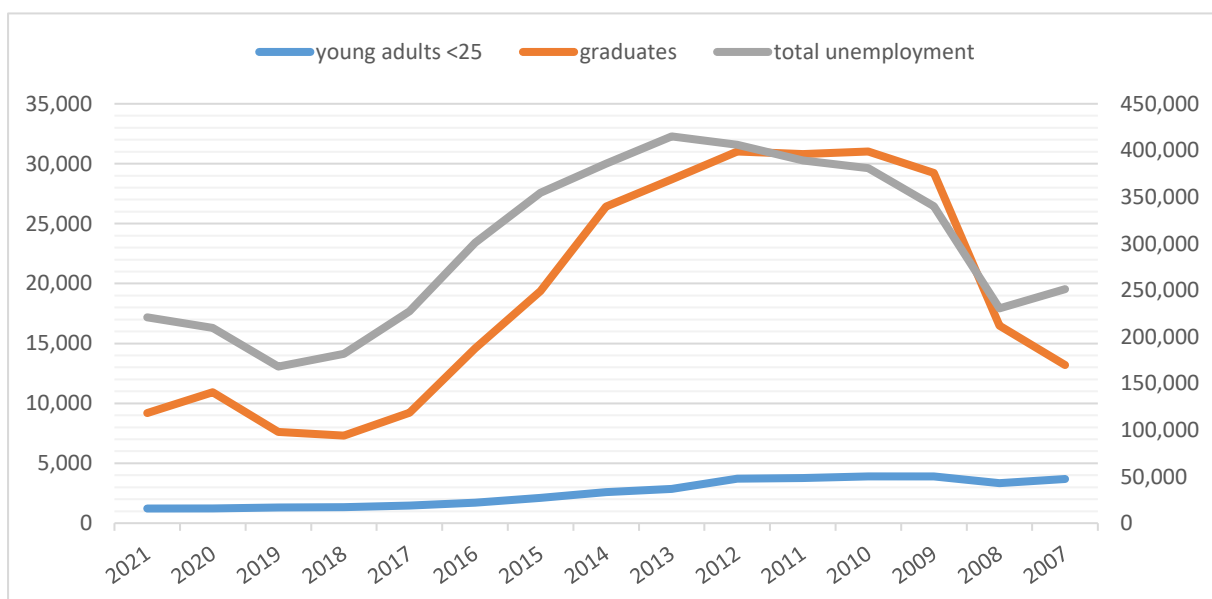
*Table 2: Problems affecting youth employment addressed by EU-level actions
(Source: European Commission 2012)*

2.1.1. Data and methodology

In this category of unemployed (NEET) we will count graduates up to 29 years of age and also young adults. We will focus on the development of NEETs in Slovakia using the data from Statistical Office of the Slovak Republic and the Central Office for Labour, Social Affairs and Family in Slovakia. For the comparison of the unemployment rate of EU countries and Slovakia, we will use data from Eurostat. We will be comparing also the unemployment rate based on gender in Slovakia and EU countries. We will also try to analyze if the part-time contracts would influence the overall employment of NEETs in Slovakia. In the second part, we will analyze the efficiency of unemployment programmes for young people and try to determine what would happen if they were not launched. In the final part, we will try to determine which of the programmes was the most efficient one.

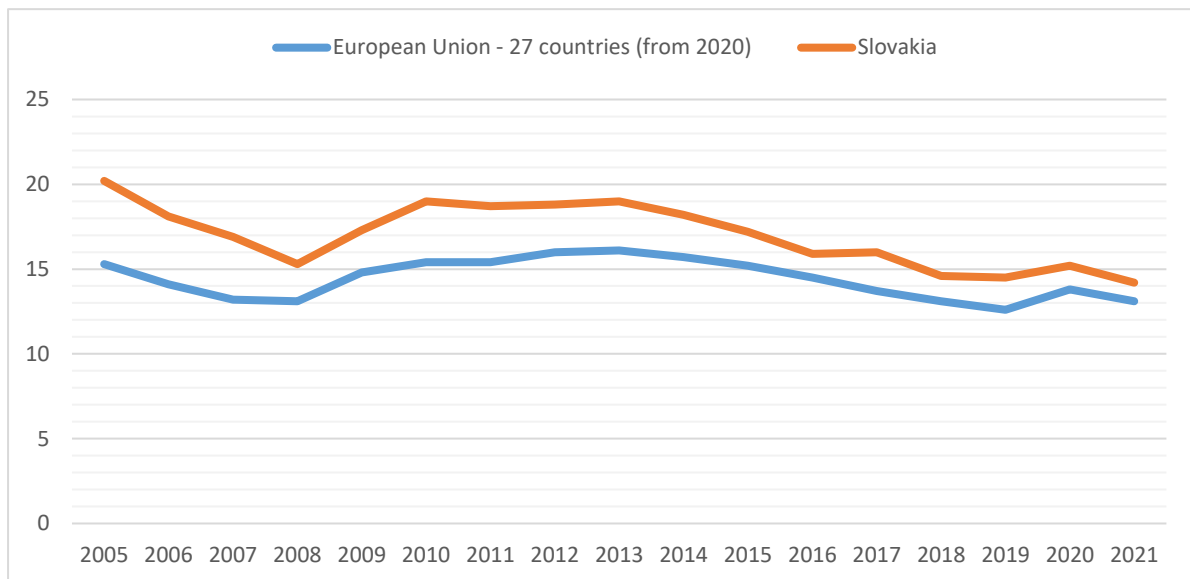
3. CURRENT SITUATION OF NEETS IN SLOVAKIA

When we analyze the development of young unemployed in Slovakia as we can see in Graph 1 The situation of NEETs in recent years has been changing. When we look solely at development the number of unemployed young people from the year 2007 to 2021 has decreased rapidly. If in the year 2007 the number of unemployed graduates was in the amount 13191 in the year 2021 it was just 9184 unemployed graduates. A similar development was by the young adults up to 18 years of age where the amount of this category of unemployed has also decreased from 3 687 in 2007 to 1 222 in the year 2021. The overall development can be seen in Graph 1, where on the second axis is also the overall amount of unemployed in Slovakia from the year 2007 to 2021. According to Nałęcz, S.(2021) taking into account the longitudinal perspective, the transition from school to the workplace has been delayed for a bigger and bigger groups of young people due to longer education periods. Unfortunately in Poland, the Czech Republic and Slovakia tertiary education graduates often lack work experience or face a mismatch of their competencies with expectations of employers. Still, these problems are not so difficult to deal with as to overcome the results of longtime unemployment or inactivity which happens to roughly every second person of people aged 25-29, who completed not more than lower secondary school. These young adults often fall into the category of long-term unemployed or discouraged NEETs and require longer, more holistic programmes covering not only hard skills development but also mental support and development of social competencies or soft skills.



Graph 1: Unemployment development of NEETs in Slovakia from 2007-2021
(Source: Statistical Office of the Slovak Republic)

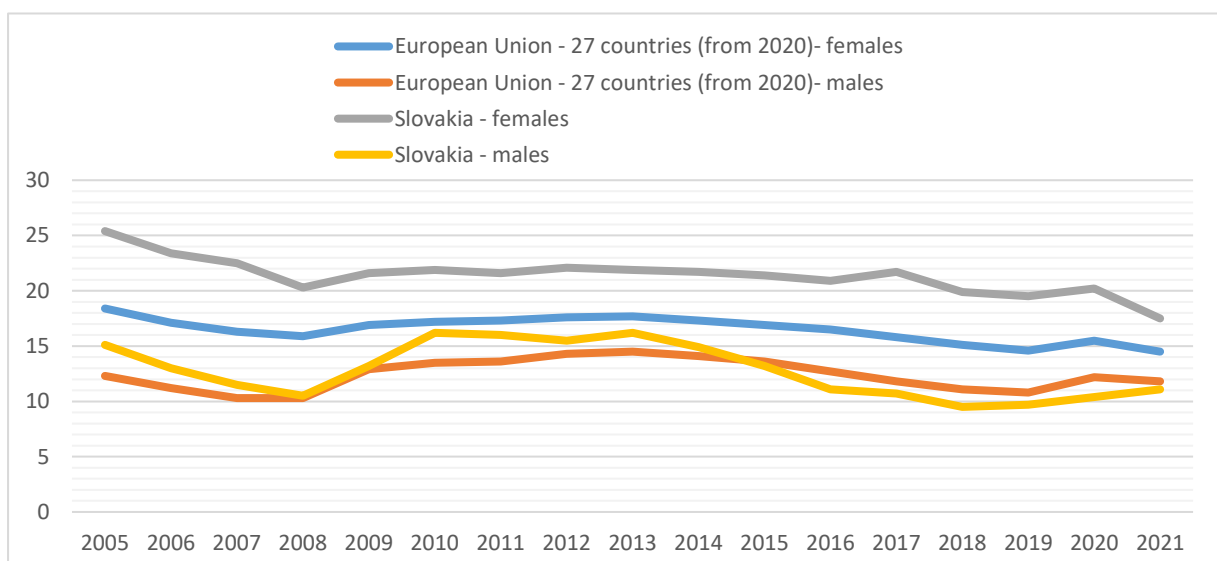
When on the other side we compare the unemployment rate of NEET in EU average and Slovakia in Graph 2, we can see the unemployment rate in Slovakia was slightly higher than the average unemployment rate in the EU countries until 2017. Nowadays the unemployment rate is nearly even with the EU average as can be seen in the graph.



Graph 2: Unemployment development of NEETs age 15-29 in EU and Slovakia from 2005-2021

(Source: Eurostat)

When we examine the NEETs based on gender, women have a higher unemployment rate even among NEETs. Authors (Alonso et al. 2022) have claimed that women show greater participation in education, especially in adolescence but less employability when they enter the labour market. Based on this when we look at the situation in Slovakia in Graph 3 we can clearly see that based on gender the unemployment rate for females is higher in Slovakia and also the EU.



Graph 3: Unemployment rate of NEETs age 15-29 in EU and Slovakia from 2005-2021 based on gender

(Source: Eurostat)

The unemployment rate in Slovakia for females from age 15 to 29 years was in 2021 on average 17,5% which is 6,7 percentage points higher than the average unemployment rate for males in Slovakia which was around 11,1%. The unemployment rate for males in Slovakia is even lower than the EU average rate in 2021 11,8%. The average EU unemployment rate for females from 15-29 years was in 2021 14,5%. One of the solutions could be for this higher rate of unemployment for young people more part-time job offers as we could see in Table 1 the amount of temporary contracts in Slovakia is really low compared to the EU only 4,8% in 2022 compared to 23,1% in EU average. This would be welcomed especially by young people to gain work experience and could prevent to being long-term unemployed. In a theoretical model, if we would assume that the employment of part-time workers in Slovakia would be on the same level as the EU in 2021 22,7%, the employment rate of NEETs in Slovakia would be even higher than the EU average as we can see in Table 3.

Country	2021		
	Employment rate (in %)	Part-time rate (in %)	Employment rate by the part-time rate 22,7%
European union	62,9	22,7	62,9
Slovakia	58,5	4,1	69,38

*Table 3: Employment rate in EU and Slovakia based on part-time employment age 15-29 years
(Source: Eurostat)*

3.1. Efficiency of unemployment services in Slovakia

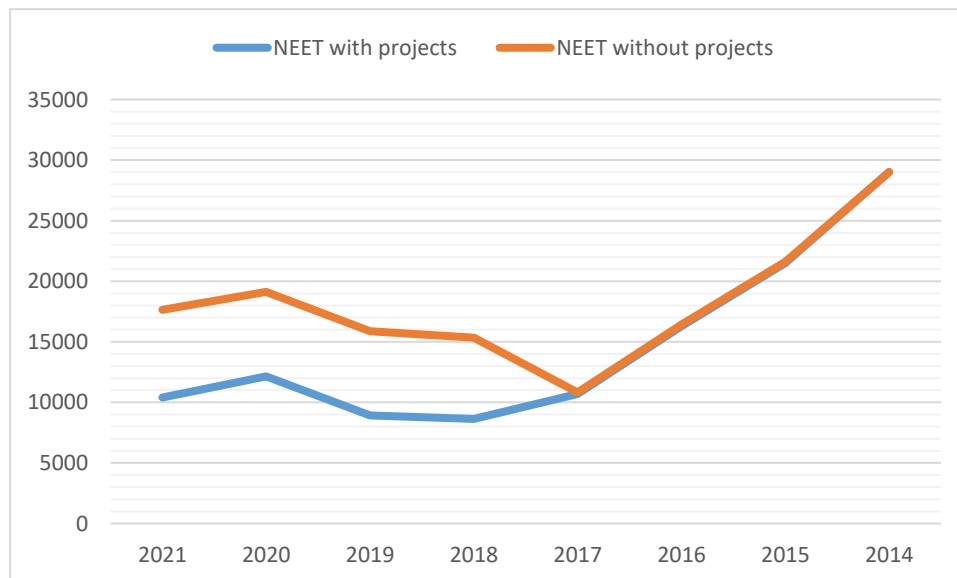
When we look at the success rate of employment policy for young adults, we can do so based on data from the Central Office for Labour, Social Affairs and Family (COLSAF). In Slovakia, there are many programmes available for graduates or unemployed people in general. Currently, in Slovakia there are national projects aimed at helping NEETs back to the labour market which is organized based on the national plan Guarantees for young people in the Slovak Republic, which the Slovak government took note on 5 February 2014. The national projects are financed by the national budget together with funds from the EU. Reciprocity between means co-financing is 33.43% of the special allocation for the implementation of the Initiative for the employment of young people, 56.58% from the European Social Fund and 9.99% from the state budget. When we focus on projects that are aimed at helping young people to get back into the labour market we can mention a few of them. National project "Practice to Employment 2" - its goal is to acquire and deepen of professional skills, knowledge and practical experience of young people up to 29 years of age, which correspond to their level of education in the form of mentored placement and practice with an employer who will create a job in the territory of the Slovak Republic outside of Bratislava region for the purpose of their placement and retention at the labour market. The success rate of completion in this project was 67,28% which represents the number of participants that have stayed at the position for at least 6 months. For example, the project especially aimed at young people up to 29 years called „Be active and find a job“. This project was implemented at the Pezinok labour office in accordance with the National Plan for the Implementation of the Guarantee for Young People in Slovakia in 2014. The goal of the project is to motivate young unemployed up to 29 years of age to increase employment, by increasing their interest in applying acquired skills, knowledge and practical experience in practice on the open labour market, but also their employability. As part of the project, the unemployed had the opportunity to use several labour market measures or tools, participate in national and regional projects implemented by the office, an internet portal for searching current job offers - www.istp.sk. 92.68% of young applicants under the age of 29 registered at the time the authorities were involved in the project.

When we look at the participation rate in projects by young unemployed and the completion rate of these programmes was quite high in general which means that the interest from the young people to participate in these programmes is really high. We can see in Table 4 the overall success rate of each programme which means the number of participants that have found a job after completing the project (number of participants that have found a job divided by the total amount of participants).

Project name	Period	Participants no.	Found job no.	Success rate
National project "Practice to employment 2"	2019-2023	1140	767	67,28%
National project "Graduate practice starts employment"	2015-2021	1158	667	57,59%
National project "Successfully on the labor market"	2015-2022	308	229	74,35%
National project "Seize your chance"	2021-2023	408	270	66,17%
Restart for young unemployed	2018-2021	32703	26299	80,42%

Table 4: Overview of NEET unemployment projects in Slovakia in period 2015-2023 (Source: COLSAF)

If they didn't participate in these programmes we can assume that the unemployment rate would be much higher than it is nowadays. Based on a simple analysis we can calculate the numbers of unemployed that have found a job by joining and completing one of these programmes. If we assume that in the period of 2015-2021 (the year for which the data of unemployed are shown in Graph 1), the participants that have found a job by participating in the projects wouldn't have taken part in the projects the unemployment level would be different. The result of these calculations is shown in Graph 4.



Graph 4: Comparison of unemployment rate of NEETs age 15-29 in Slovakia from 2014-2021 based on participation in unemployment projects (Source: COLSAF)

As we can see in Graph 4 the unemployment rate would be higher if we would assume that the young unemployed were not involved in any project from the unemployment services.

The main difference would be from the year 2018 when most of the projects were running in Slovakia. We can assume that even if this scenario (the line NEET without projects) is not real because the unemployed would have found a job by other means the unemployment rate would still be higher if these projects were not launched.

4. CONCLUSION

Nowadays it is really necessary to support the labour market with projects that can boost the employment of young people, and with the current support from projects by COLSAF we could see that the unemployment level of NEET was on a good way compared to EU average. The unemployment rate of NEETs in Slovakia has been in the past years mainly up to the year 2017 much higher than the EU average rate. Since 2018 when many projects for young unemployed have been launched the unemployment rate in Slovakia has dropped and is just at a slightly higher level than the EU average. One of the possible solutions to lower unemployment could be except projects, creating more part-time work positions, as an example in other countries, where it is more common. Because compared to the EU where 23,1% of young people work part-time in Slovakia it is just 4,8%. While working part-time graduates and young people can gain essential skills for the future and could prevent being long-term unemployed. When we look at the efficiency of the projects aimed at helping young people to find a placement we could say that the most successful one was the project Restart for young unemployed which was running from years 2018-2021 and from the participants 80,42% found a job after receiving this form of support. We could claim that it would be worth reconsidering financing it for a longer period.

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LITERATURE:

1. Štefánik M., Karasová K., Studená I.(2018). *Can supporting workplace insertions of unemployed recent graduates improve their long-term employability? (Evidence on the treatment effects of the Contribution for the Graduate practice in Slovakia)* (Research report no. 10.1007/s10663-018-9413-y). Article in *Empirica*.
2. Mínguez, A.M. (2013). *The Employability of Young People in Spain: The Mismatch Between Education and Employment*. *US-China Education Review B*, Vol. 3, No. 5, 334-344. ISSN 2161-6248
3. Bram van Dijk (2006). *Treatment effect of job-training programmes on unemployment duration in Slovakia* (Research report no. 1). Location: Statistica Neerlandica.) Vol. 60, nr. 1, pp. 57–72
4. Nałęcz, S.(2021). *Young adult NEETs aged 25-29 in Poland, Czech Republic and Slovakia*. Jerzy Regulski Foundation. Retrieved 27.03.2023 from http://www.youth-impact.eu/wp-content/uploads/2022/03/Expert-study_3.pdf.
5. Alonso et al. (2022). *Barriers That Keep Vulnerable People as NEETs*. *Social sciences 11*: 253. Retrieved 28.03.2023 <https://doi.org/10.3390/socsci11060253>
6. www.upsvar.gov.sk. *Vyhodnotenie uplatňovania aktívnych opatrení na trhu práce za rok 2021*. Retrieved 25.3.2023 from https://www.upsvr.gov.sk/statistiky/aktivne-opatrenia-tp-statistiky/aktivne-opatrenia-trhu-prace-2021.html?page_id=1188106
7. European commission (2012). *Moving youth into employment*. Retrieved 2.4.2023 from <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SWD:2012:0406:FIN:EN:PDF>

EXPLAINING ENTREPRENEURIAL FEAR OF FAILURE THROUGH FINANCIAL IDENTITY: AN ORDERED REGRESSION APPROACH

Ines Dika

*Faculty of Economics, University of Tirana
Rruga Arben Broci 1, 1001 Tirana, Albania
ines.dika@virgilio.it*

Gentjan Cera

*Faculty of Economics and Agribusiness, Agricultural University of Tirana
Rruga Pajsi Vodica, 1029 Tirana, Albania
gcera@ubt.edu.al*

ABSTRACT

This paper aims to explore the relationship between financial identity and entrepreneurial fear of failure, through the use of an ordered regression analysis. Financial identity is captured in this study by examining four different aspects: achieved, foreclosed, moratorium, and diffused. The study investigates how each of these aspects of financial identity influences the level of fear of failure experienced by entrepreneurs. The study used a sample of 273 respondents from Albania, to collect data on their financial identity and fear of failure towards entrepreneurial intention. The results show that achieved financial identity is negatively related to fear of failure, while moratorium is positively related to it. Foreclosed and diffused aspects of financial identity, however, do not seem to have a significant impact on the level of fear of failure. The findings suggest that entrepreneurs who have achieved a clear financial identity and have a solid understanding of their financial goals and priorities are less likely to experience fear of failure. On the other hand, those who are in the moratorium phase of financial identity, where they are still exploring and experimenting with different financial goals and priorities, may experience higher levels of fear of failure. The study has important implications for entrepreneurs, as it suggests that having a clear understanding of one's financial identity and financial goals can help to mitigate the fear of failure. This can, in turn, lead to more successful entrepreneurial outcomes. The study also contributes to the literature on financial identity and entrepreneurship, highlighting the importance of examining the various aspects of financial identity in understanding entrepreneurial behavior.

Keywords: *Fear of failure, Financial identity, Achieved, Foreclosed, Moratorium, Diffused, Entrepreneurship, Negative log-log*

1. INTRODUCTION

Entrepreneurship as a field of study has experienced a great increase in interest in both academic research and practice in recent years. This is because the entrepreneurial activity is now seen as closely related to the creation of value, having a significant impact on the economic development of a country, the continuous renewal of business, and the creation of free jobs (Botsaris and Vamvaka, 2016; Tsai, Chang and Peng, 2016). Entrepreneurship can be considered the engine of the economic and social growth of a nation. In addition to the benefits of entrepreneurship in society, being an entrepreneur also brings various advantages and benefits to individuals such as freedom, being one's boss, financial gain, etc. It is no wonder that many individuals dream of becoming an entrepreneur and owning their businesses. So why exactly are these individuals reluctant to become entrepreneurs considering all the tempting benefits and opportunities? From an investment perspective, the investment opportunities that offer the greatest benefits are those that are also the riskiest. The greater the benefit, the higher the risk that the investment carries.

It is understood that the sweet rewards are only one side of the coin of being an entrepreneur, and just as entrepreneurship has its advantages, entrepreneurial initiatives also carry risks that should not be ignored. A business comes with various risks. From the moment a person takes action to open their own business to the moment the person has managed to create the business and now has to keep it afloat, an entrepreneur faces various obstacles, challenges, and risks and it is precisely these obstacles and challenges that can cause would-be entrepreneurs, their enthusiasm and initiative to wane and stop (Norton and Moore, 2002). Factors such as a country's economic growth, low start-up activity, political climate, culture and reputation, financial capital, and last but not least, fear of failure prevent individuals from becoming an entrepreneur (Singh Sandhu, Fahmi Sidique and Riaz, 2011; Dvorský *et al.*, 2019; Çera *et al.*, 2021). There are many studies about the factors mentioned so far such as economic growth, politics, culture, financial capital, and their influence on the entrepreneurial initiative, but for various reasons, the studies focused on the fear of failure, the connection of this factor with other factors and entrepreneurial initiative are few even though the fear of failure plays a very important role in terms of the entrepreneurial initiative of individuals and the actions, way of thinking and behavior of the individual about the external factors that surround him (Hayton *et al.*, 2013). As can be seen from the figure presented above, which expresses the connection of obstacles to the entrepreneurial initiative, the fear of failure plays a mediating role for other factors. Studies have shown that in cases of unpromising economic growth, business-unfriendly policies, insufficient financial capital, and a culture that does not support young entrepreneurs, all these factors lead to an increase in the fear of business failure, which naturally affects negatively in the initiative of individuals to become entrepreneurs (Chua and Bedford, 2016; Çera, Belas and Zapletalikova, 2019). The fear of failure seems to play an important role in the intention of individuals to become an entrepreneur and will be the focus of this study. Entrepreneurship is an activity that individuals engage in that is characterized by original thinking, innovation, and risk-taking to create a new business or grow an existing business, while an entrepreneur is seen as a person who can explore and identify opportunities for improvement, to mobilize resources and implement actions to maximize the benefit of these opportunities that are considered as situations that bring new goods, services, raw materials as well as methods of organization that enable the sale of output at a price higher than the cost of production (Kojo Oseifuah, 2010; Askari and Geibel, 2014; Çera *et al.*, 2019). Entrepreneurship and finance are closely related. It is generally accepted that entrepreneurs regularly engage in decision-making activities related to the acquisition, use, and allocation of resources. These activities inevitably have financial implications, and for business activities to function effectively, entrepreneurs must be financially literate or have positive financial behaviors and attitudes. According to Abad-Segura and González-Zamar (2019), individuals without sufficient financial knowledge are unable to make important decisions when it comes to their savings and investments. Also, individuals lacking such financial knowledge tend to choose to work for someone instead of being an entrepreneur. Basic financial knowledge such as reading a balance sheet, and knowledge of loans and budgets are essential to growing a business and keeping an enterprise alive. Unfortunately, not many individuals show interest in financial literature or acquire basic financial knowledge. There is very little research on financial identity and how it affects the choices we make and our well-being, despite the importance of personal finance in an individual's life. In a world of fierce competition, personal finance, financial knowledge, and skills are key factors to help us be able to manage our money in the right way whether we are working for someone or being an entrepreneur. However, many studies report that few individuals know how to manage their finances or are educated about it (Danes and Brewton, 2014; Çera *et al.*, 2020), which is quite worrying if they consider the importance of finance in entrepreneurship. The lack of basic financial knowledge, negative financial behavior and attitude, and an unachieved financial identity often led to depression and reduced self-

esteem and productivity, which negatively influence a person's behavior and attitude. All this leads to negative beliefs, and negative beliefs increase the impact of fear of failure on us and make us delay taking the decision and action to become an entrepreneur (Shim *et al.*, 2013).

2. LITERATURE REVIEW

While factors such as economic growth, politics, financial capital, culture, etc. seem (and undoubtedly are) quite serious issues, they do not have such a drastic negative impact on entrepreneurial initiatives compared to the fear of failure (Cacciotti *et al.*, 2020). Fear of failure compared to other factors has received less attention because it is a psychological factor and at first glance has no relation to business or the economy. How much can such a "small" factor influence our decision to become an entrepreneur? Compared to other factors such as the economic growth of a country or politics, this psychological factor seems very insignificant. Fear of failure is a very serious problem when it comes to our entrepreneurial intention. The fact that fear of failure is the main reason given by individuals worldwide for hesitation and the decision not to be an entrepreneur shows this quite well (Sandhu *et al.*, 2011). Studies have shown that all other factors first lead to an increase in the fear of business failure, which negatively affects entrepreneurial initiative. Many others have used the theory of behavioral intention to explain how the initiative and desire to become an entrepreneur leads to the action to become one, and if the fear of failure becomes stronger in us than our desire then we do not we will take no action (Botsaris & Vamvaka, 2016). According to Ajzen (1991) who studied the theory of planned behavior, intention leads to action. Individuals who have a positive attitude toward action will also have a positive increase in the intention to act and will ultimately "orchestrate" the action in question so that fear of failure leads to a decrease in the intention to act. naturally reduces or eliminates our chances and desire to act. No action is taken. The desire to avoid the act of acting becomes stronger than the temptation to be an entrepreneur and individuals remain stuck in a state where individuals have an earnest desire to start a business in front of a high wall created by negative thoughts, behaviors negativity and fear of failure, which prevent individuals from becoming entrepreneurs. Since entrepreneurship is of considerable importance when it comes to the economic and social development of a country, there will naturally be various studies dealing with entrepreneurship such as What is entrepreneurship, its advantages, and disadvantages, obstacles in general, characteristics and qualities of a successful entrepreneur, etc. (Gartner, 2017), but unfortunately, there are not enough studies that address the fear of failure and how individuals can escape from the clutches of this phenomenon by not allowing it to negatively influence their decision-making (Askari and Geibel, 2014; Sepúlveda and Bonilla, 2014; Martins, Monsalve and Martinez, 2018; Cacciotti *et al.*, 2020). Unlike other variables that hinder entrepreneurship, fear of failure is a mental, psychological state that reflects an individual's identity, way of thinking, beliefs, and attitude of the person about external factors and cannot be "get rid of" or is easily changed, unlike other factors. Fear of failure does not suddenly appear out of nowhere and unfortunately is not the result of a recent situation. It takes years of struggling with very important components that surround us throughout our lives to grow the fear of failure into a psychological problem serious enough to prevent us from achieving our goals such as: being an entrepreneur, achieving our financial goals, and business, and career (Hayton *et al.*, 2013). Factors such as society, culture, education, family, the way one has been treated, the way one has grown up and learned to see oneself, interactions with others, etc. have played and continue to play a critical role in shaping one's personality, views and beliefs of an individual (Tubadji *et al.*, 2021). Something that is ingrained in a person's mind influencing their beliefs, behavior, and decisions is a very complex factor to control or get rid of. It is worth noting that the fear of failure exists wholeheartedly in every person without exception and will continue to exist in us until death does us part.

Fear itself, although at first glance it seems like something negative, is a defense mechanism of our brain that prevents us from taking actions that our brain believes will harm us emotionally, physically, and in many other ways. Psychologically, it is impossible to eradicate such a state of mind as fear, however, it is possible to choose whether you will continue to nurture that state to the point where it becomes a shackle that prevents you from achieving what you want or giving. less important when it comes to the choices you will make. Our brain is still a mystery to this day. The way our brain works and responds to the outside world is complex and unpredictable. Identity – having a clear sense of who you are helps an individual navigate important transitional periods of life and engage in more positive behaviors. The same goes for our financial identity. Knowing and being aware of our attitude, knowledge, behavior, and approach to financial matters and being aware of our financial identity can help us navigate life smoothly and make better and more responsible financial choices. to maximize the benefit (financial, knowledge, experience, fulfillment, etc.). A well-developed sense of identity is important for society and individuals (Schwartz *et al.*, 2011). Young people who do not know who they are and where they want to go are less likely to capitalize on the opportunities presented to them in life. Furthermore, individuals with an unclear sense of their identity may experience social, personal, and psychological stress (eg, anxiety, depression, etc.) which may lead to low self-esteem and fear of entrepreneurship challenges. Taking all this into consideration it is safe to say that being unaware of financial identity will undoubtedly affect not only a person's health/mental state (negatively leading to increased fear) but will also hinder a person made the right decisions and benefiting from profitable opportunities. Undoubtedly, in a world where money is an extremely important factor in living, negative financial attitudes and lack of financial knowledge will only harm us. The question arises, is just knowing our financial identity and our behaviors enough to reduce the impact of the fear of failure? Unfortunately, not. As we continue further and look more into financial identity and all the forms it can take, we notice surprisingly that financial identity itself takes 2 types of forms which are positive and negative. Which of them can influence the fear of failure remains to be seen and will be the focus of this paper. According to Shim et al. (2013), financial identity is defined as one's understanding and expression of who that individual is concerning the management and practice of personal finance. In their study, Shim et al. (2013), discovered three different styles of identity processing. The informational identity style is used by those individuals who purposefully seek, process and evaluate new information to make informed choices. Individuals who adopt this style are likely to actively explore different options or may have made personal or meaningful commitments to a particular set of values and beliefs about managing and practicing financial management (Berzonsky and Luyckx, 2008; Çera and Tuzi, 2019). A normative identity style is used by those who tend to manifest the standards, goals, or values of those close to them without critical evaluation. Those who adopt this style are likely to have adopted the financial management style of their parents or someone else without questioning or exploring other options (Berzonsky, 2004). And finally, the diffuse-avoidant identity style is characteristic of persons who tend to avoid identity conflicts and daily commitments and focus more on the immediate rewards of the situation than on making informed decisions or following normative standards. Those who adopt this style are likely to express a lack of interest or concern for financial management (Berzonsky, 2009). Compared to the other two individuals characterized by the informative style are more likely to collect and evaluate evidence from several choices before concluding. These individuals are also more associated with emotional and academic autonomy and are characterized by self-efficacy, and a strong will or ability to control their impulses. This leads us to believe that the fear of failure may not greatly affect their intention to become an entrepreneur. Meanwhile, avoidant style people are characterized by active exploration without a commitment or lack of interest and avoidance of exploration and engagement.

It is worth adding that all financial outcomes such as objective and subjective financial knowledge, financial efficiency, financial control, financial attitude, budgeting, repayment, borrowing, investment, and saving are different in the three styles (Shim *et al.*, 2013). The informative style showed better financial skills than the other two styles along with more extensive financial knowledge.

3. RESEARCH METHODOLOGY

A questionnaire is designed to collect primary data in Albania. The final sample size counts 273 valid responses. The analysis is based on this sample size. Fear of failure is measured with a single question, which read “To what extent do you think that the fear of business failure prevents you from starting a new business?” Its possible answers are: [1] completely hinders me, [2] it hinders me the most, [3] at least it doesn't bother me, and [4] it doesn't stop me. Financial identity is measured by 11 statements as proposed by Bennion *et al.* (1986), which are grouped into four sub-constructs: Achieved, Foreclosed, Moratorium, and Diffused. Each statement has five options as answers, varying from [1] strongly disagree to [5] strongly agree.

Question	Answer	Count	Column N %
To what extent do you think that the fear of business failure prevents you from starting a new business?	[1] completely hinders me	25	9.2%
	[2] it hinders me the most	126	46.2%
	[3] at least it doesn't bother me	77	28.2%
	[4] it doesn't stop me	45	16.5%
	Total	273	100.0%

*Table 1: Fear of failure.
(Source: Authors)*

There is a method used to predict ordinal level of the output variables with a set of independent variables. Output variable is an ordinal variable (fear of failure) and independent variable can be continuous or categorical. There are five types of ordinal regressions: logit, probit, negative log-log, complementary log-log and cauchit (Harrell, 2015). The nature of the dependent variable determines which of them to use. Our dependent variable resulted in having more probable lower levels than the higher ones, implicating the use of negative log-log function. The analyses are executed by using computer statistical software SPSS 26. Its form can be written as below:

$$\begin{array}{ll} \text{Function form} & P(\gamma) = e^{-e^{-(\beta_0 + \beta_{1i} X_{1i})}} \\ \text{Inverse form} & -\ln(-\ln \gamma) = \beta_0 + \beta_{1i} X_{1i} \end{array}$$

4. RESULTS

Principal component analysis with Varimax rotation was employed to reduce the number of factors dealing with financial identity (Fabrigar and Wegener, 2011). The output of the analysis is shown in Table 2. Factors with eigenvalues higher than one were kept. The Kaiser-Meyer-Olkin value and Barlett's test indicated the appropriateness of the factor analysis (Hair *et al.*, 2010). Three factors emerged from the factor analysis, explaining 69.982% of the variance in the sample, namely, 'achieved', 'moratorium', 'foreclosed', and 'diffused'. The factor loadings were above Stevens's (2015) benchmarks (.40), indicating evidence of constructs convergent validity.

Component name and its items	Component			
	1	2	3	4
achieved1	.794			
achieved2	.896			
achieved3	.801			
moratorium1				.838
moratorium2				.865
foreclosed1		.670		
foreclosed2		.818		
foreclosed3		.791		
diffused1			.766	
diffused2			.798	
diffused3			.567	
Eigenvalues	2.328	1.907	1.787	1.676
Explained variance (total = 69.982%)	21.165	17.336	16.244	15.238

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 6 iterations.

Table 2: Rotated component matrix.
(Source: Authors)

According to the negative log-log link function's output (see Table 4), two out of four sub-constructs of financial identity significantly influence entrepreneurial fear of failure. Based on the analysis, the higher the score on Achieved, the lower are the chances to fear of entrepreneurial failure ($W = 4.155, p < .05$). This means that when individuals have higher levels in achieved aspect of financial identity, the entrepreneurial fear of failure is lower. This finding is statistically significant. On the other hand, higher levels in Moratorium increases the entrepreneurial fear of failure. This relationship is shown by the negative sign of the estimate, which is -0.135 ($W = 3.714, p < .10$). However, the analysis shows that Foreclosed and Diffused are not significantly associated with entrepreneurial fear of failure.

Variable	Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval		
						Lower Bound	Upper Bound	
Threshold [Fear of failure = 1]	-1.873	.434	18.628	1	.000	-2.724	-1.023	
	[-Fear of failure = 2]	-.417	.424	.967	1	.326	-1.249	.414
	[-Fear of failure = 3]	.783	.438	3.187	1	.074	-.077	1.642
Location	Gender	.098	.156	.393	1	.531	-.208	.404
	Age	-.040	.017	5.518	1	.019	-.074	-.007
	Achieved	.145	.071	4.155	1	.042	.006	.283
	Foreclosed	-.101	.069	2.129	1	.145	-.237	.035
	Diffused	-.029	.069	.173	1	.677	-.165	.107
	Moratorium	-.135	.070	3.714	1	.054	-.271	.002

Table 3: Parameter estimates. (Link function: Negative Log-log.)
(Source: Authors)

The analyses indicate that the overall model was significant, $\chi^2(6, n = 273) = 12.153, p < .10$. Furthermore, according to Deviance criterion there was a good model fit on the basis of the employed covariates, $\chi^2(729, n = 273) = 659.386, p > .10$.

Additionally, the slope coefficients in the model were the same across dependent variable categories (and lines of the same slope were parallel), as the parallel lines assumption was not violated, $\chi^2(12, n = 273) = 14.842, p > .10$.

5. CONCLUSION

In conclusion, this study has explored the relationship between financial identity and entrepreneurial fear of failure, finding that achieved and moratorium aspects of financial identity have a significant impact on the level of fear of failure experienced by entrepreneurs. The study highlights the importance of understanding the various aspects of financial identity in predicting entrepreneurial behavior and outcomes. The findings of this study suggest that entrepreneurs who have achieved a clear financial identity and have a solid understanding of their financial goals and priorities are less likely to experience fear of failure. This finding has important implications for entrepreneurs, who may benefit from reflecting on their financial identity and goals as a means of mitigating the fear of failure that may be holding them back. Furthermore, the positive relationship between moratorium and fear of failure suggests that entrepreneurs who are still exploring and experimenting with different financial goals and priorities may be more prone to experiencing fear of failure. This finding highlights the importance of providing support and resources to entrepreneurs in the early stages of their financial identity development to help them navigate this potentially challenging period. The study has several limitations that should be acknowledged. First, the study relied on self-reported data, which may be subject to social desirability bias. Future studies may benefit from using multiple methods of data collection to address this limitation. Second, the study only examined the impact of financial identity on fear of failure and did not consider other potential factors that may influence entrepreneurial behavior and outcomes. Future studies may benefit from examining the impact of other factors such as social support, risk tolerance, and opportunity recognition on entrepreneurial behavior. Finally, the study used a sample of 273 individuals drawn from various industries, which may limit the generalizability of the findings. Future studies may benefit from using a larger and more diverse sample to enhance the external validity of the findings. Despite these limitations, this study has made an important contribution to the literature on financial identity and entrepreneurship. By examining the impact of different aspects of financial identity on fear of failure, the study has highlighted the importance of understanding the complex relationship between financial identity and entrepreneurial behavior. The study's findings have practical implications for entrepreneurs, policymakers, and support organizations, who may use this knowledge to help entrepreneurs overcome the fear of failure and achieve greater success in their ventures.

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LITERATURE:

1. Abad-Segura, E. and González-Zamar, M.-D. (2019) 'Effects of Financial Education and Financial Literacy on Creative Entrepreneurship: A Worldwide Research', *Education Sciences*, 9(3), p. 238. Available at: <https://doi.org/10.3390/educsci9030238>.
2. Ajzen, I. (1991) 'The theory of planned behavior', *Organizational Behavior and Human Decision Processes*, 50(2), pp. 179–211. Available at: [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T).
3. Askari, H. and Geibel, R. (2014) 'How do certain Factors affect the fear of Failure in Entrepreneurship?', in *International Conference on Business Strategy and Organizational Behaviour (BizStrategy). Proceedings*. Global Science and Technology Forum, p. 21.

4. Bennion, L.D. and Adams, G.R. (1986) 'A Revision of the Extended Version of the Objective Measure of Ego Identity Status: An Identity Instrument for Use with Late Adolescents', *Journal of Adolescent Research*, 1(2), pp. 183–197. Available at: <https://doi.org/10.1177/074355488612005>.
5. Berzonsky, M.D. (2004) 'Identity Style, Parental Authority, and Identity Commitment', *Journal of Youth and Adolescence*, 33(3), pp. 213–220. Available at: <https://doi.org/10.1023/B:JOYO.0000025320.89778.29>.
6. Berzonsky, M.D. (2009) 'Identity Style and Well-Being: Does Commitment Matter?', 3(2), pp. 131–142.
7. Berzonsky, M.D. and Luyckx, K. (2008) 'Identity Styles, Self-Reflective Cognition, and Identity Processes: A Study of Adaptive and Maladaptive Dimensions of Self-Analysis', *Identity*, 8(3), pp. 205–219. Available at: <https://doi.org/10.1080/15283480802181818>.
8. Botsaris, C. and Vamvaka, V. (2016) 'Attitude Toward Entrepreneurship: Structure, Prediction from Behavioral Beliefs, and Relation to Entrepreneurial Intention', *Journal of the Knowledge Economy*, 7(2), pp. 433–460. Available at: <https://doi.org/10.1007/s13132-014-0227-2>.
9. Cacciotti, G. *et al.* (2020) 'Entrepreneurial fear of failure: Scale development and validation', *Journal of Business Venturing*, 35(5), p. 106041. Available at: <https://doi.org/10.1016/j.jbusvent.2020.106041>.
10. Çera, G. *et al.* (2019) 'The Effect of Business Enabling Policies, Tax Treatment, Corruption and Political Connections on Business Climate', *Acta Polytechnica Hungarica*, 16(4), pp. 113–132. Available at: <https://doi.org/10.12700/APH.16.4.2019.4.6>.
11. Çera, G. *et al.* (2020) 'Improving financial capability: the mediating role of financial behaviour', *Economic Research-Ekonomska Istraživanja*, pp. 1–18. Available at: <https://doi.org/10.1080/1331677X.2020.1820362>.
12. Çera, G. *et al.* (2021) 'Entrepreneurial intention as a function of university atmosphere, macroeconomic environment and business support: a multi-group analysis', *European Journal of Training and Development*, 45(8/9), pp. 706–724. Available at: <https://doi.org/10.1108/EJTD-08-2019-0148>.
13. Çera, G., Belas, J. and Zapletalikova, E. (2019) 'Explaining business failure through determinist and voluntarist perspectives', *Serbian Journal of Management*, 14(2), pp. 257–275. Available at: <https://doi.org/10.5937/sjm14-23348>.
14. Çera, G. and Tuzi, B. (2019) 'Does gender matter in Financial literacy? A case study of young people in Tirana', *Scientific Papers of the University of Pardubice, Series D: Faculty of Economics and Administration*, 27(45).
15. Chua, H.S. and Bedford, O. (2016) 'A Qualitative Exploration of Fear of Failure and Entrepreneurial Intent in Singapore', *Journal of Career Development*, 43(4), pp. 319–334.
16. Danes, S.M. and Brewton, K.E. (2014) 'The Role of Learning Context in High School Students' Financial Knowledge and Behavior Acquisition', *Journal of Family and Economic Issues*, 35(1), pp. 81–94. Available at: <https://doi.org/10.1007/s10834-013-9351-6>.
17. Dvorský, J. *et al.* (2019) 'Important factors for the entrepreneurship in Central Europe', *Innovative Marketing*, 15(2), pp. 71–83. Available at: [https://doi.org/10.21511/im.15\(2\).2019.06](https://doi.org/10.21511/im.15(2).2019.06).
18. Fabrigar, L.R. and Wegener, D.T. (2011) *Exploratory Factor Analysis*. New York, NY: Oxford University Press.
19. Gartner, W.B. (2017) "'Who Is an Entrepreneur?'" Is the Wrong Question', *Entrepreneurship Theory and Practice*, 13(4), 47–68., pp. 25–46. Available at: <https://doi.org/10.1177/104225878901300406>.

20. Hair, J.F. *et al.* (2010) *Multivariate Data Analysis*. 7th Editio. Harlow: Pearson Education Limited.
21. Harrell, F.E. (2015) *Regression Modeling Strategies: With Applications to Linear Models, Logistic and Ordinal Regression, and Survival Analysis*. Springer. Available at: https://doi.org/10.1007/978-3-319-19425-7_1.
22. Hayton, J. *et al.* (2013) *Understanding fear of failure in entrepreneurship: a cognitive process framework*.
23. Kojo Oseifuah, E. (2010) 'Financial literacy and youth entrepreneurship in South Africa', *African Journal of Economic and Management Studies*. Edited by R. Rugimbana, 1(2), pp. 164–182. Available at: <https://doi.org/10.1108/20400701011073473>.
24. Martins, I., Monsalve, J.P.P. and Martinez, A.V. (2018) 'Self-confidence and fear of failure among university students and their relationship with entrepreneurial orientation: Evidence from Colombia', *Academia Revista Latinoamericana de Administración*, 31(3), pp. 471–485. Available at: <https://doi.org/10.1108/ARLA-01-2018-0018>.
25. Norton, W.I. and Moore, W.T. (2002) 'Entrepreneurial Risk: Have We Been Asking the Wrong Question?', *Small Business Economics*, 18(4), pp. 281–287. Available at: <https://doi.org/10.1023/A:1015231318265>.
26. Schwartz, S.J. *et al.* (2011) 'Examining the Light and Dark Sides of Emerging Adults' Identity: A Study of Identity Status Differences in Positive and Negative Psychosocial Functioning', *Journal of Youth and Adolescence*, 40(7), pp. 839–859. Available at: <https://doi.org/10.1007/s10964-010-9606-6>.
27. Sepúlveda, J.P. and Bonilla, C.A. (2014) 'The factors affecting the risk attitude in entrepreneurship: evidence from Latin America', *Applied Economics Letters*, 21(8), pp. 573–581. Available at: <https://doi.org/10.1080/13504851.2013.875104>.
28. Shim, S. *et al.* (2013) 'Financial Identity-Processing Styles Among Young Adults: A Longitudinal Study of Socialization Factors and Consequences for Financial Capabilities', *Journal of Consumer Affairs*, 47(1), pp. 128–152. Available at: <https://doi.org/10.1111/joca.12002>.
29. Singh Sandhu, M., Fahmi Sidique, S. and Riaz, S. (2011) 'Entrepreneurship barriers and entrepreneurial inclination among Malaysian postgraduate students', *International Journal of Entrepreneurial Behavior & Research*, 17(4), pp. 428–449. Available at: <https://doi.org/10.1108/13552551111139656>.
30. Stevens, J.P. and Pituch, K.A. (2015) *Applied Multivariate Statistics for the Social Sciences: Analyses with SAS and IBM's SPSS*. 6th edn. Routledge.
31. Tsai, K.-H., Chang, H.-C. and Peng, C.-Y. (2016) 'Refining the linkage between perceived capability and entrepreneurial intention: roles of perceived opportunity, fear of failure, and gender', *International Entrepreneurship and Management Journal*, 12(4), pp. 1127–1145. Available at: <https://doi.org/10.1007/s11365-016-0383-x>.
32. Tubadji, A. *et al.* (2021) 'Fear-of-failure and cultural persistence in youth entrepreneurship', *Journal of Small Business & Entrepreneurship*, 33(5), pp. 513–538. Available at: <https://doi.org/10.1080/08276331.2019.1692999>.

THE INFLUENCE OF INFLATION ON THE LIVING STANDARD OF CROATIAN CITIZENS

Petar Kurecic

*University North, Varazdin and Koprivnica, Croatia
pkurecic@unin.hr*

Ana Scuka

*Graduate student at University North, Varazdin, Croatia
anscuka@unin.hr*

Filip Kokotovic

*TaskUs Croatia Ltd., Zagreb, Croatia
filip.kokotovic@hotmail.com*

ABSTRACT

After a period of several years of slower market price growth than the long-term average, price inflation accelerated again in 2021 and, accordingly, the mentioned topic became the main focus of the public and the media. The war in Ukraine raised the prices of energy products on the world market, and since the countries of the EU mainly rely on oil and gas, the growth of these has spilled over into the European market. The main goal of the research is to analyze the impact of inflation during 2021 and 2022 on the standard of living of the citizens of Croatia. The research aims to explain the willingness of the citizens of Croatia to pay higher energy prices in order to sanction Russia. The research was conducted through a questionnaire in which a total of 247 respondents participated. The hypotheses of the work were confirmed and/or refuted after processing the data through the calculation of the Cronbach Alpha coefficient, the implementation of the T-test and the analysis of descriptive statistics. The last part of the paper refers to making a general conclusion based on the research results.

Keywords: *price growth, inflation, energy products, oil, gas, war in Ukraine, Russia, standard of living*

1. INTRODUCTION

Energy prices and their fluctuations during a certain period play a major role in economic activity and the achievement of well-being in a certain country. Croatia, which has the characteristics of an open and relatively small economy, is significantly subject to movements and the influence of energy prices on a global level. In other words, the effects of "economic shocks" that occur on the world market can be transferred to the final consumers in the country. As one of such shocks, the rise in energy prices as a result of the start of the war in Ukraine should be singled out. A significant increase in inflation certainly affects the standard of living of consumers in each of the affected countries, and in domestic circumstances, the rise in energy prices also increases the prices of gas, water, electricity and other communal services. For a better understanding of inflationary processes, it is important to analyze in what way and how consumers perceive inflation. Inflationary perception has proven to be very important for many scientific studies that investigate the deviation of consumer opinion from actual price movements recorded in official statistics. For many scientists in the field of economics, the focus of research is on understanding consumer perception towards daily price changes on the market (Stanislawska, 2019). The perception of inflation is influenced not only by the prices of goods and services, but also by media announcements, the movement of real estate prices, and expectations of inflation in the minds of consumers. The data collected by the Croatian Central Bank point to the fact that throughout the observed period in 2021, the perceived inflation was

significantly higher than the actual inflation. One of the most important effects of inflation is precisely the distribution of income and wealth, because if inflation increases continuously over the years, for example, the lender will receive less and less money through instalment payments because the value of money is decreasing. The aim of this paper is to prove whether there is a connection between inflation and consumer behaviour. Furthermore, the paper analyses changes in the consumer price index during the period of the beginning of inflation growth in 2021. The aim of the paper is to check which goods and services have increased in price during the onset of inflation in 2021 and 2022. The subject of the paper is to study the relationship between real inflation and expected consumer inflation and to check whether the real level of inflation is the same as the perceived consumer inflation according to the official data of the Croatian Bureau of Statistics. At the beginning of 2022, the war in Ukraine began, the consequences of which left their mark on the increase in the prices of goods and services in Croatia. More precisely, the paper investigates the impact of war on current economic events in the world, especially the impact of the increase in energy prices on the lives of consumers.

2. RESEARCH FRAMEWORK AND METHODOLOGY

2.1. Subject, aim, and hypotheses of the research

The subject of the research is to analyze the effect of the increase in oil and/or gas prices on the world market on the standard of living of the citizens of Croatia. The aim of the research is to investigate the impact of the war in Ukraine on the personal consumption and savings of the citizens of Croatia and the impact of the global increase in inflation rates on the change in the financial structure of the household. It is also important to know how consumers perceive inflation due to its significant impact on the level of consumption and thus savings. The aim of the research is to explain the cause-and-effect relationship between the impact of the rising inflation rate and the life of the citizens of Croatia. The work is aimed at analysing the views of the respondents on the sanctions of the EU against Russia, that is, the work aims to investigate the willingness of citizens to accept higher prices for goods and services in order to punish the aggressor. Furthermore, citizens' views on accepting Ukraine as a new member of the EU were examined in order to reduce the consequences of the war for the aforementioned country and to resolve the war as soon as possible.

The following research hypotheses were formed:

- H1: Due to the increase in market prices of oil and gas, the financial situation of the citizens of Croatia is changing.

This hypothesis aims to investigate the impact of the global increase in oil and/or gas prices on the change in the respondents' financial structure. More specifically, we want to analyze the impact of inflation on consumption, savings, disposable income and the satisfaction of basic life needs (food, housing, water) of the household. The hypothesis also deals with the question according to which (or not) goods and services the respondents reduced their expenditures due to the increase in prices.

- H2: Citizens of Croatia are ready to pay higher oil and/or gas prices for years in order to maintain sanctions against Russia.

The aforementioned hypothesis examines the readiness of the citizens of Croatia to face the consequences of inflation in order to punish Russia for invading Ukraine. Furthermore, the hypothesis analyses the attitudes of respondents related to the acceptance of Ukraine as a new member of the EU and the attitudes related to the sanctions imposed against Russia.

2.2. Methodology

In the conducted research, an inductive method was used, which draws general conclusions from individual cases. In other words, through induction, one learns, that is, makes a conclusion about new laws and facts based on individual knowledge and/or cases. The advantage of the survey is that the respondents remain anonymous, which increases the possibility of collecting objective answers. The research was conducted on online samples that are daily active on social networks such as Facebook and Instagram. Therefore, the survey questionnaire could be completed by the population that knows how to use the Internet and the Google form tool. The survey was open for completion from April 27, 2022 to May 10, 2022. The total number of respondents who completed the survey was 247. The survey consisted of a total of 18 questions, of which the first seven questions were intended to collect socio-demographic data about the respondents, such as gender, age group, monthly income, place of residence and the like. Other questions related to confirming or rejecting the two hypotheses. The questions were in the form of scales, i.e. Likert's scale for examining respondents' attitudes from 1 to 5. Grade 1 means I completely disagree with the statement, grade 2 - I disagree, grade 3 - neither agree nor disagree, grade 4 - I agree and score 5 - I completely agree. Furthermore, the interpretation of the collected data is presented in the form of a graph. Some values are shown as percentages, and numerical and percentage values are listed in the graph description. In the discussion of the results, some of the tests for proving the hypotheses were carried out. The Cronbach Alpha coefficient was performed on 10 items, and the coefficient indicates the validity of the measurement scale, that is, it measures its reliability. Reliability in this case indicates the absence of measurement errors in the test, that is, it indicates the accuracy of measurements during research. The Cronbach Alpha coefficient can take on values from 0 to 1, and the closer the value is to 1, the more reliable the measurement scale is. The results of the questions that were carried out using the Likert scale were presented using descriptive statistics, which calculated the maximum and minimum value of the answer, the mean value, the arithmetic mean and the variance for each of the questions. In addition, a T-test was performed for hypothesis 1 and 2, which tests the significance of the differences between the samples. In other words, the T-test compares the arithmetic means of the statements. The last tool used for data processing is the Pearson coefficient, which is used to analyze the extent to which one variable affects another, that is, to analyze the cause-and-effect relationship between variables.

2.3. Results

The research was conducted on a total of 247 respondents. Out of a total of 247 respondents, there were 180 female (72.9%) and 67 male respondents (27.1%). The highest percentage of the age group is the group from 25 to 34 years old with a share of 36.8%. The age group from 18 to 24 years accounts for a share of 25.1%, while the least respondents are 60 years and older, which accounts for 1.6%. Most respondents have a secondary vocational education, 51% of them, and accordingly 74.1% of them are employed. As for other employment status data, the unemployed make up a share of 4.9%, and pensioners 3.2%. Respondents most often have a monthly income of HRK 5,001 to HRK 7,000 (1 EURO is fixed to 7.5345 HRK), which is 23.9%. The smallest number of respondents, six of them, have a monthly income of HRK 15,001 or more. Furthermore, most respondents live in Koprivnica-Križevci County, 36.4%, and from Međimurje County with a share of 36.4%. Among the respondents, the largest number of household members consists of 3 to 4 members with a percentage of 50.2%.

Table following on the next page

<i>DESCRIPTION</i>	<i>n</i>	<i>%</i>
GENDER		
Female	180	72,9%
Male	67	27,1%
AGE		
18-24 years	62	25,1%
25-34 years	91	36,8%
35-44 years	51	20,6%
45-54 years	30	12,1%
55-64 years	9	3,6%
65+ years	4	1,6%
EDUCATION LEVEL		
Primary education	5	2%
Secondary education	126	51%
Bachelor level	54	21,9%
Master level	61	24,7%
PhD	1	0,4%
ACTIVITY STATUS		
Employed	183	74,1%
Unemployed	12	4,9%
Full time student	38	15,4%
Retired	8	3,2%
Other	6	2,4%
MONTHLY INCOME		
Zero income	28	11,3%
1-3000 HRK	31	12,6%
3001-5000 HRK	46	18,6%
5001-7000 HRK	59	23,9%
7001-9000 HRK	42	17%
9001-12000 HRK	19	7,7%
12001-15000 HRK	16	6,5%
15001+ HRK	6	2,4%
NUMBER OF HOUSEHOLD MEMBERS		
One	15	6,1%
Two	44	17,8%
Three to four	124	50,2%
Five to six	53	21,5%
Seven and more	11	4,5%

Table 1: Socio-demographic structure of respondents

In Table 2, the Cronbach Alpha coefficient was measured for a total of 10 items, or particles. In order to determine the reliability of the research, the specified coefficient was calculated. The Cronbach Alpha coefficient of the data collected by the research is 0.718, which means that the reliability of the measurement scales can be considered as very good.

Cronbach Alpha coefficient	N of items
0,718	10

Table 2: Cronbach Alpha coefficient

Table 3 shows the questions related to confirming or rejecting hypothesis H1 and hypotheses H2. Hypothesis H1 is defined as "Due to the increase in the market prices of oil and gas, the financial situation of the citizens of Croatia changes", while hypothesis H2 defined as "Citizens of Croatia are ready to pay higher oil and/or gas prices for years in order to maintain sanctions against Russia". It was possible to evaluate the questions related to the hypotheses on a Likert scale from 1 to 5 (1-Completely disagree, 2-Disagree, 3-Neither agree nor disagree, 4-Agree, 5-Completely agree).

According to the descriptive statistics, the highest arithmetic mean, which is 4.64, has the statement "Russia and Ukraine should reach an agreement as soon as possible in order to reconcile the state of war and return the prices of oil and gas as they were before", i.e. the most respondents believe that war should be reconciled as soon as possible in order to reduce the prices of energy products on the market. The lowest arithmetic mean, which is 3.25, is the statement "The EU should speed up the procedure for the entry of Ukraine as a new member", that is, of all the statements offered, the fewest respondents agree with the statement that Ukraine should become a member of the EU due to the war.

	Min.	Max.	Mean	Standard deviation
The increase in oil and/or gas prices has affected the reduction of your monthly savings.	1	5	3,84	1,354
Your household's disposable income has decreased significantly due to higher expenses for oil and/or gas.	1	5	3,66	1,303
Due to the high prices of oil and gas, I have reduced my shopping for luxury goods.	1	5	3,67	1,317
A further increase in oil and/or gas prices will affect the satisfaction of your basic life needs. (food, drink, rent payment)	1	5	3,60	1,271
Do you support EU sanctions against Russia? (flight ban, limited export, bans on sports competitions)	1	5	3,88	1,282
The EU should conclude contracts with other countries for the import of oil and/or gas.	1	5	4,56	,813
The increase in the price of oil and gas will increase citizens' interest in the use of electric cars, solar panels and greater use of renewable energy sources.	1	5	3,55	1,205
Russia and Ukraine should come to an agreement as soon as possible in order to reconcile the state of war and return oil and gas prices to what they were before.	1	5	4,64	,730
The Government of Croatia should have adopted more effective measures in order to stop the further increase in energy prices.	1	5	4,62	,806
The EU should speed up the procedure for the entry of Ukraine as a new member.	1	5	3,25	1,266

Table 3: Descriptive statistics for hypothesis 1 and 2

	The increase in oil and/or gas prices has affected the reduction of your monthly savings.	Your household's disposable income has decreased significantly due to higher expenses for oil and/or gas.	Due to the high prices of oil and gas, I have reduced my shopping for luxury goods.	A further increase in oil and/or gas prices will affect the satisfaction of your basic life needs. (food, drink, rent payment).
Mean	3,84	3,66	3,67	3,60
Median	4,00	4,00	4,00	4,00
Mode	5	5	5	5
Standard deviation	1,354	1,303	1,317	1,271
N=247				

Table 4: Descriptive statistics for hypothesis 1

	Mode	Mean	Variance
The increase in oil and/or gas prices has affected the reduction of your monthly savings.	3,84	3,84	,008
Your household's disposable income has decreased significantly due to higher expenses for oil and/or gas.	3,66	3,66	,007
Due to the high prices of oil and gas, I have reduced my shopping for luxury goods.	3,67	3,67	,007
A further increase in oil and/or gas prices will affect the satisfaction of your basic life needs (food, drink, rent payment).	3,60	3,60	,007
N=247			

Table 5: T-test for H1

Table 5 shows the results of the T-test for hypothesis 1, which tests the significance of the differences between the samples. By analysing the results, statements whose arithmetic mean is greater than 3, which represents neither agree nor disagree with the stated statement, are confirmed, and statements whose arithmetic mean is less than 3 are rejected. All statements related to hypothesis H1 can therefore be confirmed because the arithmetic mean is more of 3 with a low standard deviation in the interval of 0.007-0.008.

		The increase in oil and/or gas prices has affected the reduction of your monthly savings.	Your household's disposable income has decreased significantly due to higher expenses for oil and/or gas.	Due to the high prices of oil and gas, I have reduced my shopping for luxury goods.	A further increase in oil and/or gas prices will affect the satisfaction of your basic life needs. (food, drink, rent payment)
The increase in oil and/or gas prices has affected the reduction of your monthly savings.	Pearson's coefficient	1	,732	,635	,500
Your household's disposable income has decreased significantly due to higher expenses for oil and/or gas.	Pearson's coefficient	,732	1	,719	,552
Due to the high prices of oil and gas, I have reduced my shopping for luxury goods.	Pearson's coefficient	,635	,719	1	,534
A further increase in oil and/or gas prices will affect the satisfaction of your basic life needs. (food, drink, rent payment)	Pearson's coefficient	,500	,552	,534	1

Table 6: Pearson's coefficient for H1

It was determined that the variable "The increase in oil and/or gas prices affected the reduction of your monthly savings" has a positive correlation with all other statements and is statistically significant for the hypothesis H1. The variable "Increase in oil and/or gas prices affected the reduction of your monthly savings" has a positive correlation, that is, it affects the disposable income of the household where the value of the coefficient is 0.732. The observed variable is also positively correlated with the variable related to the purchase of luxury goods, where the coefficient is 0.635, and it also affects the variable of meeting basic life needs (food, drink, paying rent) due to the increase in oil and/or gas prices with a coefficient of 0.500. The second variable "The disposable income of your household has decreased significantly due to higher expenses for oil and/or gas" has a positive correlation, i.e. it affects the respondent's monthly savings, where the coefficient is 0.732. Furthermore, the observed variable affects shopping for luxury goods with a coefficient of 0.719, as well as the satisfaction of basic life needs, where the coefficient is 0.552. The third variable "Due to high oil and gas prices, I reduced my shopping for luxury goods" is positively correlated with the variable that defines the change in monthly savings due to higher oil and gas expenses, where the coefficient is 0.635. Also, the observed variable affects the disposable income of the household with a coefficient of 0.719 and is positively correlated with the variable that defines the satisfaction of basic life needs with a coefficient of 0.534. The last variable "Further increase in oil and/or gas prices will affect the satisfaction of your basic life needs (food, drink, rent payment)" is positively correlated with the variable that defines the impact of the increase in oil and gas prices on the respondents' monthly savings, and the coefficient is 0.5. The observed variable has a positive relationship with the change in disposable income, where the value of the coefficient is 0.552, and it also affects the variable that observes shopping for luxury goods with a coefficient of 0.534. According to the analysis of the Pearson coefficient, it is concluded that all variables are in a positive relationship and are statistically significant for the research.

	Do you support EU sanctions against Russia? (flight ban, limited export, bans on sports competitions)	The EU should conclude contracts with other countries for the import of oil and/or gas.	The increase in the price of oil and gas will increase citizens' interest in the use of electric cars, solar panels and greater use of renewable energy sources.	Russia and Ukraine should come to an agreement as soon as possible in order to reconcile the state of war and return oil and gas prices to what they were before.	The Government of Croatia should have adopted more effective measures in order to stop the further increase in energy prices.	The EU should speed up the procedure for the entry of Ukraine as a new member.
Mean	3,88	4,56	3,55	4,64	4,62	3,25
Median	4,00	5,00	4,00	5,00	5,00	3,00
Mode	5	5	5	5	5	3
Standard deviation	1,282	,813	1,205	,730	,806	1,266
N=247						

Table 1: Descriptive statistics for H2

Table following on the next page

		Do you support EU sanctions against Russia? (flight ban, limited export, bans on sports competitions) gas.	The EU should conclude contracts with other countries for the import of oil and/or gas.	The increase in the price of oil and gas will increase citizens' interest in the use of electric cars, solar panels and greater use of renewable energy sources.	Russia and Ukraine should come to an agreement as soon as possible in order to reconcile the state of war and return oil and gas prices to what they were before.	The Government of Croatia should have adopted more effective measures in order to stop the further increase in energy prices.	The EU should speed up the procedure for the entry of Ukraine as a new member state.
Do you support EU sanctions against Russia? (flight ban, limited export, bans on sports competitions)	Pearson's coefficient	1	,280	,241	,109	,105	,189
The EU should conclude contracts with other countries for the import of oil and/or gas.	Pearson's coefficient	,280	1	,143	,151	,157	,131
The increase in the price of oil and gas will increase citizens' interest in the use of electric cars, solar panels and greater use of renewable energy sources.	Pearson's coefficient	,241	,143	1	,111	,080	,205
Russia and Ukraine should come to an agreement as soon as possible in order to reconcile the state of war and return oil and gas prices to what they were before.	Pearson's coefficient	,109	,151	,111	1	,397	,125
The Government of Croatia should have adopted more effective measures in order to stop the further increase in energy prices.	Pearson's coefficient	,105	,157	,080	,397	1	,121
The EU should speed up the procedure for the entry of Ukraine as a new member state.	Pearson's coefficient	,189	,131	,205	,125	,121	1

Table 8: Pearson's coefficient for H2

Using Pearson's correlation coefficient, in Table 8, the connection between the variables defined in hypothesis H2 was tested. It was determined that the variable "Do you support EU sanctions against Russia?" (ban on flights, limited exports, bans on sports competitions)" in a positive correlation, i.e. that it affects the variable related to the signing of contracts with other countries for the import of energy by the EU, the coefficient is 0.280. The observed variable has a positive correlation with the variable that observes citizens' interest in the use of electric cars, solar panels and the use of renewable energy sources due to the increase in oil and/gas prices with a coefficient of 0.241. Also, the variable affects the adoption of an agreement to reconcile the state of war between Ukraine and Russia, where the coefficient is 0.109, and it also affects the adoption of more effective measures by Croatia to regulate the price of energy products with a coefficient of 0.105. The observed variable has a positive relationship with the variable related to the acceleration of the procedure for the entry of Ukraine as a new member of the EU, and the coefficient is 0.189.

3. DISCUSSION

According to the results of the research carried out in the paper, respondents on average agree with the imposed European sanctions against Russia and agree with the statement that Croatia should enter into contracts with other countries for the import of oil and/or gas. According to the forecasts of the European Central Bank (hereafter: the ECB), if stricter sanctions continue to be imposed on Russia, there will be greater disruptions in global value chains because a permanent reduction in the import of Russian gas will result in higher energy costs and will have a negative effect on the economy within the entire euro area. The ECB appeals that in this case the effects of the war would be temporary until Russian energy is replaced with other energy sources. Accordingly, the GDP growth rate within the euro area would amount to 2.5% in 2022, while inflation would grow by as much as 5.9% (ECB, 2022). Certainly, the humanitarian crisis and lost human lives are the biggest negative consequences of the war in Ukraine. In addition, looking from the economic aspect, it can be concluded that the war brings with it a great risk and uncertainty regarding the global energy supply, because the rise in the prices of food products and energy results in the growing inflation that consumers have to face. Russian and Ukrainian influence on the global economy is significant because these countries together account for 20% of the world's wheat exports, 20% of the world's exports of artificial fertilizers and corn, and 11% of the oil exports that were exported, and on which many European countries depend (ECB, 2022). If this price increase continues, the price of inputs for producers will also increase accordingly, which will eventually "pass" the price increase on to end consumers. As confirmed in the empirical research carried out in the paper, this kind of price growth greatly affects the personal income, consumption and savings of consumers, which ultimately affects the standard of living of the country's population. Another issue imposed by the war is the issue of nature protection. Namely, the transition of member states to an energy system using renewable energy sources is one of the main tasks of the EU until 2050. Achieving such a system requires major changes in sustainable investment, the acquisition of technology and techniques for such a system, the gradual abolition of fossil fuels, but it also requires a change in consumer awareness regarding environmental protection. The war in Ukraine has consequently affected the interruption of energy and food supplies, which may in the future be a start towards investment in renewable energy sources (Steffen and Patt, 2022).

4. CONCLUSIONS

Energetics such as oil and gas are one of the main drivers of inflation in the world. That changes in energy prices affect the general level of prices is evident through indirect and direct effects. How and to what extent changes in energy prices will affect general inflation and, consequently, the standard of living of consumers depends on the importance of raw materials, i.e. energy, in

the total export or import of a given country. For example, in countries where poverty and low living standards prevail, a drop in the general level of energy prices will result in economic growth. On the other hand, the increase in energy prices on the world market can lead to a serious increase in inflation, which mainly affects the end consumers the most. In the period of rising inflation, there are changes in consumption, savings, investments and the overall standard of living. The main task of any country's monetary policy is to maintain price stability, which can be achieved through controlled inflation. A stable and low level of inflation is associated with a higher level of economic development and activity and an increase in employment. Such inflation contributes to the transparency of prices, in other words, inflation helps consumers to receive quality and true information about the relative value of individual goods through prices, which makes it easier for consumers to make rational decisions about consumption and savings, and thus increases the well-being of the population. According to the data on the Consumer Price Index in Croatia in 2022, it can be concluded that there was an increase in prices in the groups of all goods and services, and the largest price increase on an annual level was recorded in the Energy group with a price increase of 21.5% in May 2022. compared to the same month in 2021. The research carried out in the paper confirms the hypothesis "Due to the increase in the market prices of oil and gas, the financial situation of the citizens of Croatia is changing." Namely, 45.7% of the respondents fully agreed with the statement that the increase in oil and/gas prices had an effect on the reduction of monthly savings, and 35.6% fully confirmed that the monthly household incomes decreased. It can be concluded that due to the increase in oil and/or gas prices, monthly expenses decreased the most in the Expenditure for trips/travel category, which was confirmed by 57.1% of respondents. Furthermore, the respondents confirmed that the sudden growth of inflation during 2022 affects the satisfaction of basic life needs such as food, drinks and housing, which is proof that the livelihood of the citizens of Croatia is in question and that the monetary policy of the state should adopt more effective measures as soon as possible. The research also confirmed the second hypothesis, which reads "Citizens of Croatia are ready to pay higher oil and/or gas prices for years in order to maintain sanctions against Russia." More precisely, the majority of respondents support the sanctions imposed by the EU against Russia, which refers to flight bans, limited exports and bans on sports and other competitions. As many as 46.2% of respondents fully agreed with this statement, and only 7.3% of them do not support the imposition of sanctions against Russia. In addition, the majority of respondents believe that the EU should conclude contracts with other countries for the import of oil and gas. In the end, the survey confirmed that respondents are dissatisfied with the state's measures against inflation and believe that the state should adopt more effective measures to reduce the effects of the increase in oil and gas prices on the living standards of the citizens of Croatia.

LITERATURE:

1. Državni zavod za statistiku (2022). Indeksi potrošačkih cijena u svibnju 2022. URL: https://podaci.dzs.hr/media/wvshxaaq/cij-2022-1-1_5-indeksipotro%C5%A1a%C4%8Dkih-cijena-u-2022.pdf.
2. European Central Bank (ECB). (2022). ECB staff macroeconomic projections for the euro area. URL: https://www.ecb.europa.eu/pub/projections/html/ecb.projections202203_ecb_staff~44f998dfd7.en.html.
3. Fioretti, L. et al. (2021). Inflacija i percepcija inflacije u Hrvatskoj. *Službene stranice Hrvatske narodne banke*. URL: <https://www.hnb.hr/-/inflacija-i-percepcija-inflacije-u-hrvatskoj>.
4. Hrvatska narodna banka (2022). Zašto je inflacija posljednjih mjeseci znatno porasla? URL: <https://www.hnb.hr/javnost-rada/aktualno-o-inflaciji/html>.

5. Stanisławska, E. (2019). Consumers' Perception of Inflation in Inflationary and Deflationary Environment. *Journal of Business Cycle Research*, (15) 41–71.
6. Steffen, B. and A. Patt. (2022). A historical turning point? Early evidence on how the Russia-Ukraine war changes public support for clean energy policies. *Energy Research & Social Science*, 91 (2022) 102578.

TERRITORIAL SETTLEMENT OF EDUCATIONAL INSTITUTIONS: MAIN LOCATIONAL FACTORS

Daniel Mendes Pires Haack

*Universidade Federal Fluminense, Brazil
danielhaack@id.uff.br*

Stella Regina Reis da Costa

*Universidade Federal Fluminense, Brazil
stella@ufrj.br*

Julio Vieira Neto

*Universidade Federal Fluminense, Brazil
julion@id.uff.br*

David Nunes Resende

*GOVCOPP, ESTGA, Universidade de Aveiro, Portugal
david@ua.pt*

ABSTRACT

This work has as its theme the influence of the most relevant locational factors in the process of territorial settlement of educational institutions. Its relevance is perceived through the conception that the locational process of structures properly accomplished is capable of mitigating diverse risks, ranging from issues related to people's comfort to, even, institutional security. As a problem, the questioning about which are the most relevant locational factors that should be considered in the process of territorial settlement of educational institutions stands out. The objective of this study is to identify the main locational factors to be considered in the process of territorial allocation of educational institutions. To this end, a qualitative approach of a basic nature and exploratory objective was used as a methodology, employing a bibliographical and documental review as a procedure. The limitation of this work was that it did not consider locational factors fragmented by geographic regions, and this refinement could be the subject of future studies. As the main result obtained by this research were identified the 9 main locational factors capable of influencing the territorial settlement process of educational institutions: accessibility condition; infrastructural conditions for implementation; relationship between demand and the concentration/offering of the service or stuff; disasters risks; comfort index; provision of basic infrastructure; security conditions; gross domestic product per capita; distance from headquarters. Among the practical implications of this work, the contribution to the deepening of existing knowledge about the locational factors that affect the territorial location of educational institutions stands out, as well as the possibility of associating the 9 main locational factors identified by this study with the decision support models in order to enable a greater degree of efficiency in the territorial dispersion process of institutions of an educational nature.

Keywords: *Territorial Settlement, Location Criteria, Locational Factors, Educational Institutions*

1. INTRODUCTION

On locational issues that correlate with the scope of educational institutions, Al-Sabbagh (2020) states that a non-ideal geographic distribution of these organizations can make it difficult for populations to access school locations, promoting an increase in school dropout and evasion rates, while an adequate spatial dispersion of educational units is capable of boosting the

improvement of the educational process itself. Suggests Sakti et al (2022) that the establishment of an educational unit in a location that has ideal conditions for the execution of the activities to be practiced by that institution also facilitates the achievement of education goals. In this sense, in order to achieve success in this process, according to Phongpipattanapan and Dasananda (2013), an analysis is necessary that does not fail to cover, among other points, issues related to the demography and spatial distribution of the local population. Complementing the idea of the importance of analyzing demographic and spatial issues for the process of allocating educational institutions, Araya et al (2012) suggest that it does not make sense to install such units in regions with low demand for the educational service to be offered, nor in locations where, even if the demand is present, there is already a robust offer for that product, in order to avoid incurring in the underutilization of the educational unit due to insufficient demand or excessive regional supply, negatively impacting the relationship between the volume of capital applied and the degree of benefit returned to populations.

2. METHODOLOGY

This study used a research with a qualitative approach and of a basic nature. In attention to the objectives, there is, in this study, a general predominance of an exploratory profile, while, procedurally, bibliographical and documental research were adopted in relation to data collection. This procedural apparatus for data collection was carried out through a systematic scan of the Scopus base – bibliometric research –, by works concentrated on 2 specific themes: i - decision support models applied to the territorial settlement of teaching institutions; ii - locational factors applied to the territorial settlement of diverse structures, added to a complementary, non-systematized search, on the same scopus base, on the subject locational factors applied to the territorial settlement of diverse structures. Associated with the reported procedures, still in order to collect data that supported the identification of the locational factors reported in this study, a survey of the locational factors arranged in the Simulation for Reorganization of the units of the Brazilian Federal Network of Professional, Scientific and Technological Education was carried out.

3. THEORETICAL FOUNDATION

In order to contribute to the settlement of educational institutions in suitable locations for the execution of their activities, a systematic review of the literature was carried out on the most relevant locational factors to be considered in the process of choosing the location of educational establishments, categorized, as shown in table 1, under the 3 fundamental pillars of sustainability.

Locational Factors	Adhering Pillars of Sustainability
Accessibility Conditions	Social and Economic
Infrastructural Conditions for Implementation	Environmental, Social and Economic
Supply/Demand Ratio of a Service or Good	Environmental, Social and Economic
Disaster Risk	Environmental, Social and Economic
Comfort Index	Social and Economic
Provision of basic Infrastructure	Environmental, Social and Economic
Security Condition	Social and Economic
Gross Domestic Product Per Capita	Environmental, Social and Economic
Distance from the Administrative Headquarters	Environmental, Social and Economic

*Table 1: Relationship between the 9 locational factors identified in this study and their adherence to the fundamental pillars of sustainability
(Source: Prepared by the authors themselves)*

3.1. Accessibility Conditions

The planning of new installations, especially public ones, must include the study of the ideal locations where such establishments will be settled, this process being a key factor for sustainable urban planning. To this end, accessibility emerges as a relevant locational factor among the most varied forms of establishments (Elsheikh, 2022). In light of authors such as Strutynska et al (2018), Al-Sabbagh (2020); Alhothali et al (2022) and Ferrari et al (2022), the availability of structured and diversified passenger transport networks and lines with high capillarity is capable of helping to guarantee highly efficient accessibility to populations. The central idea would be that the availability of these transport structures, mainly public ones, would be able to increase the ability to come and go of local and regional populations, ensuring that they do not fail to enjoy certain services and goods due to incapacity or difficulty in Locomotion. A relevant factor is also the structural and operational conditions of the sets of roads that make up the closest regions. In this sense, for example, aspects such as the dimensions and state of conservation of the roads, their general traffic conditions, the type of road, the existence or not of duplicate roads, will facilitate or hinder access to those places (Al-Sabbagh, 2020; Alhothali et al, 2022; Elsheikh, 2022). Intrinsically linked to road conditions and the capacity of the transport offer is the duration of trips. Lin and Xu (2022) understand the duration of trips, that is, the time spent in moving populations to certain locations, as well as the distance between them, as relevant obstacles to accessibility to a given region. (Alhothali et al, 2022). In continuity, it is stated by Al-Sabbagh (2020) that adequate spatial distribution favors efficient accessibility, producing shorter travel times and thus boosting results in the educational process. For the aforementioned author, highly efficient accessibility is the main factor in choosing to enroll a student among schools with similar teaching capacity, with distance and travel time between the student's home and the school unit being the preponderant elements. Therefore, it is possible to infer that accessibility is one of the main locational factors, if not the most relevant in numerous scenarios, for the establishment of the most diversified human organizations, being composed not only of aspects related to the physical distance between the user and the organization and the time of displacement between them, as well as less obvious parameters, such as the availability of a people transport system and the structural and operational conditions of the sets of roads that cross the regions of greater geographic proximity.

3.2. Infrastructural Conditions for Implementation

The selection of a land for the settlement of buildings must consider restrictions of multiple nature, encompassing geophysical, environmental and cultural aspects (Delivand et al, 2015). According to Delivand et al (2015) and Ferrari et al (2020), land with excessively steep conditions should be avoided. Their proportions should also be considered, since they are capable of intensely affecting the activities carried out there, whether in defining their usefulness or establishing their price, or even as a guarantee tool for banks to access credit, the size of the land exerts a direct influence on the most varied human activities (Abebe et al, 2022; Bulut and Celik, 2022; Li, Li and Nutapong, 2022; Maffezzoli, Ardolino and Bacchetti, 2022; Worlanyo, Alhassan and Jiangfeng, 2022; Zurek, 2022). A sub-factor to be observed, also linked to the proportions of the land, is whether the size of the site is able to support a parking capacity compatible with the number of people who will frequent the site (Alhothali, 2022). Equally relevant to this process are the economic value of the land available, the costs related to works, renovations and building maintenance, the amounts to be used in the acquisition of certain equipment that are necessary for the implementation of the establishment, or even the amounts to be made available to property lease title or acquisition of the land itself (Saktiet al, 2022; Strutynska et al, 2018).

Therefore, the particularities of each region will demand a specific infrastructural framework to house educational institutions, requiring careful evaluation in this regard during the locational process.

3.3. Supply/Demand Ratio of a Service or Good

The relationship between demand and concentration of services in a given location is yet another locational factor to be evaluated in the process of choosing locations for the settlement of educational institutions. When seeking an adequate geographical distribution of establishments of the same nature in a given territory, it is of great importance to assess the relationship between the local demand for the provision of the service offered and the concentration of providers of that service already existing in those locations, in order to avoid competition between the structures and the possible occurrence of a disordered geographic coverage (Alhothali et al, 2022; Ebrahimiet al, 2022; Saktiet al, 2022). According to Ferrari et al (2022), the concept of demand point, used by this work, is connected to the idea of a place representing a certain group of people or things that require goods and services from the facilities. Armed with this understanding, it is plausible to assert that, by allocating an organization's facilities in the regions with the highest demand points, or at least in their vicinity, it is possible to minimize the travel time/distance between the demand points and the settled facilities (Alhothali et al, 2022). Ferrari et al (2022) even point out that the lower the costs and the time/distance to travel to the destination, the greater the demand will tend to be. However, demand tends to decrease as the distance – and its implications: cost and travel time – between the point of demand and the facility expands. For Saktiet al (2022), the main subfactor that feeds demand is the degree of population density existing in each region. Thus, the more densely populated a geographic region is, the greater its demand for products and services in general, including education, will tend to be. It is also indicated, however, that throughout the territorial allocation process of educational institutions, the relationship between the demand and the offer of the activities that will be developed by them in the region be considered, in order to enable balance to this dynamic (Al-Sabbagh, 2020; Saktie et al, 2022). With the purpose of promoting a regional proportionality in the relationship between the points of demand and supply, it is common to distribute educational units by coverage zone in order to meet the spatially distributed population demands, settling the establishments in such a way that they can attract stakeholders from a set of nearby locations, establishing a geographical area covered by the power of attraction, influence or action of each of the settled units (Alhothali et al, 2022). The geographic distribution by area of scope or coverage is abundantly used to determine the ideal territorial dispersion of school units, university campuses, police stations, vaccination centers, as in the cases portrayed, respectively, by the works of Al-Sabbagh (2020), Morrill and Beyers (1991), Elsheikh (2022) and Alhothali et al (2022). Therefore, the relationship between demand and supply works as a kind of marker to help in the decision of where to set up an educational institution, with scenarios where demand is higher than the service supply capacity in the region, favorable to the establishment of new facilities, while in locations with demand lower than such capacity, inadvisable to the establishment of new units (Al-Sabbagh, 2020; Saktiet al, 2022).

3.4. Disaster Risk

There are several works that raise various locational factors capable of influencing the choice of the ideal location for the settlement of the most different types of structures or organizations, however, there are almost no studies that include among these factors the risk for disasters, whether due to biological risk or multiple natural hazards (Sakti et al, 2022). According to Taet al (2022), the risk for technological disasters can also be added to the two subtypes of risks already presented, which encompass a range of events, such as, for example, catastrophes

caused by chemical products. In what Papavasileiou et al (2021) thinks, such risks bring with them not only aspects correlated to the actual occurrence of disasters, but also the feeling of psychological insecurity regarding the mere possibility of their occurrence, triggering feelings of fear, vulnerability and lack of safety, which can, in turn, negatively influence the work performance of human beings. Evidence that the incidence of disasters actively impacts human activities, including educational ones, is the result provided through a study that evaluated the dynamics of enrollment rates in secondary schools in Malaysia, in the period from 1970 to 2014, which concluded that the disasters that occurred in a given region, in general terms, negatively impacted enrollment rates in secondary schools in the locations where the disasters occurred (Kaur, Habibullah and Nagaratnam, 2018). Therefore, in a broad way, treating the risk of disasters as a whole, encompassing its three variants – biological risk, natural risk and technological risk –, it is obviously imperative to carry out a careful assessment of such hazards throughout the process of analysis for the territorial allocation of educational institutions.

3.5. Comfort Index

The concept of comfort has a close correlation with the idea of alleviating discomfort for not meeting basic human needs, as well as ensuring mental, physical and environmental well-being, emerging as influential factors for well-being, in this context, aspects such as a healthy, silent environment with adequate temperature (Freire et al, 2021; Xiao, 2022). In the light of deXiao (2022), it is suggested that there is a strong negative impact of atmospheric pollution on the governance capacity of institutions and on their human capital, reducing not only working hours, but also the productivity of employees, conceiving the hypothesis that organizations located in regions with severe air pollution tend to experience high problems in their managerial capacity. Regarding noise pollution, in developed and developing countries this type of pollution is one of the most relevant causes of reduced well-being of populations, negatively affecting their satisfaction with life (Yang, D. et al, 2022). Equally impacting the comfort index is the temperature of the environments, both indoors and outdoors. Excessively hot or cold spaces weaken people's health, deteriorating their sense of well-being and, consequently, their productive capacity (Alam, Sharma and Salve, 2022). On the subject, Abdallah (2022) postulates that thermal comfort in the premises of the buildings of educational institutions is a critical issue, since adequate temperatures for the comfort of students are necessary in order to encourage them to develop their daily study routines and interact with other members of the academic community. Therefore, in order to think of an index that is capable of measuring human comfort as close to its totality, according to Sakti (2022), one should not neglect aspects related, at least, the quality of the air to be breathed, the noise level to which it will be exposed for a prolonged period and the average temperature of the environments to be frequented.

3.6. Provision of Basic Infrastructure

According to Fisch-Romito (2021), access to infrastructure services is essential to meet basic human needs. Therefore, when selecting the territorial location in the settlement process of educational organizations, the convenience of choice should be guided by geographic and social factors, contemplating the provision of basic infrastructure present in each of the candidate regions (Strutynska et al, 2018). For Fish-Romito (2021) and Gai, Sir and Maulida (2022), the supply of electricity, water supply and availability of basic sanitation services are considered among the most basic infrastructure devices, as they meet the basic daily needs of societies. Permeated by a character of essentiality, the communication infrastructure, especially with regard to the internet and telephony, has a strong influence on economic and social aspects, being indispensable to the process of development of nations or regions, also establishing an intrinsic connection with basic infrastructural issues (Ighodaro, 2021). Equally composing the group of locational subfactors that are part of the subsidiary infrastructure, the local capacity to

provide regular access to fuels emerges, whether aiming to safeguard the locomotion capacity, through automotive fuels, or in order to enable the operation of certain commercial and industrial activities (Strutynska et al, 2018; Maurya, P., Muthukumar, P. and Anandalakshmi, R., 2022). In summary, it can be concluded that thinking about locational factors for educational institutions without taking into account the diverse issues that involve the basic infrastructure of the different regions, whether those of a more essential nature or those with subsidiary characteristics, presents itself as an overly reckless situation. , because, as stated by Fisch-Romito (2021), those are intended to meet the most elementary human needs.

3.7. Security Condition

According to Gai, Sir and Maulida (2022) security is one of the essential critical issues, which can act as a decisive factor in influencing the choice or not for a location in which to set up an establishment, since, as conceived by Hoffman and Shelby (2017), the feeling of insecurity tends to stimulate avoidance behavior. the latter, the sense of security itself, should also be considered in the design of spatial security conditions, and the analysis of security conditions should also be applied, as a priority, on a regional scale, to the detriment of an individual one (Berthold, Meyer and Dahlen, 2022). In order to address the issue of the relevance of the locational security factor, a study published by Hanchard (2020) sought to understand how data related to criminal statistics present in digital maps, such as Google Maps, influence people in their daily decision-making, resulting in the idea that the sense of security, generated by data such as crime rates present in digital maps, interfered with the experience of using spaces, having changed the way bodies feel. distributed in it, influencing different aspects of human life. In this sense, the result of the research published by Hanchard (2020), went beyond demonstrating that a sense of security is a highly important aspect for human beings, but that, in addition, the security condition is capable of interfering with man's disposition in space, influencing his decision-making, including with regard to locational issues.

3.8. Gross Domestic Product Per Capita

The allocation of developments in a region is not just a disconnected dynamic of a larger context, it is interconnected with the regional development process itself, possessing the capacity, depending on the nature of the establishments to be settled, of generating new opportunities for work, education and income to local populations. Therefore, obviously, this driving force originating from the installation of new organizations, especially educational ones, is endowed with higher social relevance in poor areas than in more affluent regions (Bojesen, Boerboom and Skov-Petersen, 2015; FERRARI et al, 2022). For this reason, Bojesen, Boerboom and Skov-Petersen (2015) and Ferrari et al (2022) suggest that searching, throughout the locational dynamics, for locations with a lower per capita GDP (gross domestic product) condition can benefit the development of those regions, providing a positive effect, for example, on job creation. However, complement Grizane and Jurgelane-Kaldava (2019), that robust organizations, such as universities, settled in a specific location influence not only their settlement region, but a multiple set of surrounding territorial entities. In this sense, the presence of educational institutions can lead to the locations of their allocation, as well as those surrounding them, an interconnected network to encourage local and regional development, which makes it obvious, of course, that the choice of such locations for allocations should also meet criteria that include demands linked to social responsibility.

3.9. Distance from the Administrative Headquarters

Corporations, according to De Beule et al (2022), seek various forms of structuring themselves and relationships with other organizations in order to optimize resources and, consequently, costs, with physical proximity emerging as a relevant factor in this process, in particular the

proximity between the parent company and its subsidiaries. Such geographic proximity is still able, for example, to provide management teams with access to a wider range of information sources, which tends to increase their monitoring capacity, in addition to reducing costs related to ensuring an adequate information flow (Firoozi, Magnan and Fortin, 2019).

4. CONCLUSION

Aspects of Geography are capable of broadly influencing the most varied spheres of human society, acting as constraints on human actions. In view of this, the selection of the geographic location for undertakings of the most diverse natures, in particular, in this case, that of educational establishments, emerges as an important critical success factor. Therefore, the development of the nine fundamental locational factors capable of influencing the territorial settlement process of teaching institutions – accessibility conditions; infrastructural conditions for implementation; supply/demand ratio of a service or good; disaster risk; comfort index; provision of basic infrastructure; security condition; gross domestic product per capita; distance from the administrative headquarters –, made possible by this work through the carrying out of an in-depth documental and bibliographical research of an exploratory nature, in addition to contributing to the deepening of the existing knowledge about locational factors that affect the process of territorial settlement of educational organizations, brings the possibility of associating the identified factors with decision support models in order to make it possible to increase efficiency in the process of territorial dispersion of institutions of an educational nature, which may prevent losses arising from an inadequate geographic distribution of educational establishments. As a limitation to this research, mention is made of the fact that public and private educational institutions are endowed with distinct particularities, which, naturally, are capable of affecting certain traits of the locational factors that influence the process of territorial settlement of educational organizations, therefore, future work on the subject is suggested, segmented by locational factors adherent to public educational institutions and locational factors more aligned to private educational units.

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LITERATURE:

1. Abdallah, A. S. H. (2022). Passive design strategies to improve student thermal comfort in Assiut University: a field study in the Faculty of Physical Education in hot season. *Sustainable Cities and Society*, 86. Doi: 10.1016/j.scs.2022.104110
2. Abebe, F. *et al.* (2022). The influences on farmers' planned and actual farm adaptation decisions: Evidence from small-scale irrigation schemes in South-Eastern Africa. *Ecological Economics*, 202, 1-22. Doi: 10.1016/j.ecolecon.2022.107594
3. Al-Sabbagh, T. A. (2020). GIS location-allocation models in improving accessibility to primary schools in Mansura city-Egypt. *Geojournal*, 87(2), 1009-1026. Doi: <https://doi.org/10.1007/s10708-020-10290-5>
4. Alam, M. S.; Sharma, M.; Salve, U. R. (2022). Assessment of thermal comfort in a hot and humid indoor built environment of a kitchen at a university canteen. *Work*, 72(1), 189-199. Doi: 10.3233/WOR-205174
5. Alhothali, A. *et al.* (2022). Location-allocation model to improve the distribution of COVID-19 vaccine centers in Jeddah city, Saudi Arabia. *International Journal of Environmental Research and Public Health*, 19(14). Doi: 0.3390/ijerph19148755

6. Berthold, M., Meyer, M., Dahlen, L. (2022). Einfluss der stadtstruktur auf das raumbezogene sicherheitsgefühl. *Monatsschrift für Kriminologie und Strafrechtsreform*, 105(1), 17-34. Doi: 10.1515/mks-2021-0119
7. Bojesen, M., Boerboom, L., Skov-Petersen, H. (2015). Towards a sustainable capacity expansion of the Danish biogas sector. *Land Use Policy*, 42, 264-277. Doi: 10.1016/j.landusepol.2014.07.022
8. Bulut, M., Celik, H. (2022). Farmers' perception and preference of Islamic Banking in Turkey. *Agricultural Finance Review*, 82(5), 871-889. Doi: 10.1108/AFR-02-2021-0022
9. De Beule, F. et al.(2022). Proximity at a distance: The relationship between foreign subsidiary co-location and MNC headquarters board interlock formation. *International Business Review*,31(4). Doi: 10.1016/j.ibusrev.2021.101971
10. Delivand, M.K. et al. (2015). Optimal locations of bioenergy facilities, biomass spatial availability, logistics costs and GHG (greenhouse gas) emissions: A case study on electricity productions in South Italy. *Journal of Cleaner Production*, 1-11. Doi:10.1016/j.jclepro.2015.03.018
11. Ebrahimi, Z. D. et al. (2022). Using a GIS-based spatial approach to determine the optimal locations of bikeshare stations: the case of Washington D.C. *Transport Policy*, 127, 48-60. Doi: 10.1016/j.tranpol.2022.08.008
12. Elsheikh, R. (2022). GIS-based services analysis and multi-criteria for optimal planning of location of a police station. *Gazi University Journal of Science*, 35(4), 1248-1258. Doi: 10.35378/gujs.828663
13. Ferrari, G. et al. (2022). Network analysis for optimal biomethane plant location through a multidisciplinary approach. *Journal of Cleaner Production*, 378, 1-15. Doi: 10.1016/j.jclepro.2022.134484
14. Firoozi, M., Magnan, M., Fortin, S. (2019). Does proximity to corporate headquarters enhance directors' monitoring effectiveness? A look at financial reporting quality. *Corporate Governance: An International Review*, 27(2), 98-119. Doi: 10.1111/corg.12264
15. Fish-Romito, V. (2021) Embodied carbon dioxide emissions to provide high access levels to basic infrastructure around the world. *Global Environmental Change*, 70. Doi: 10.1016/j.gloenvcha.2021.102362
16. Freire, S. M. L. et al.(2021). Meaning and dimensionality of state of comfort in patients with chronic hemodialysis kidney disease. *Texto Contexto*, 30. Doi: 10.1590/1980-265X-TCE-2020-0037
17. Gai, A. M., Sir, M. M., Maulida, R. R. (2022).Influence analysis of regional loans on basic infrastructure establishment to recover economy during the Covid-19 Pandemic in Sikka Regency, East Nusa Tenggara, Indonesia. *IOP Conference Series: Earth and Environmental Science*, 1015. Doi: 10.1088/1755-1315/1015/1/012012
18. Grizane, T.; Jurgelane-Kaldava, I. (2019).The contribution of universities to regional development. *Research for Rural Development*, 2, 247-254. Doi: 10.22616/rrd.25.2019.076
19. Hanchard, M. S. (2020). Digital maps and senses of security: the influence of a veracious media on urban life. *Urban Planning*, 5(4), 301-311. Doi: 10.17645/up.v5i4.3452
20. Hoffman, A. M., Shelby, W. (2017). When the “laws of fear” do not apply: effective counterterrorism and the sense of security from terrorism. *Political Research Quarterly*, 70(3), 618-631. Doi: 10.1177/1065912917709354
21. Ighodaro, C. A. (2021). infrastructure development and economic growth in Sub-Saharan Africa: insight from electricity, internet usage and mobile phone. *Nigerian Journal of Economic and Social Studies*, 63(2), 187-207. Disponível em: <https://njess.org/journal/njess/articles?id=62>. Acesso em: 27 dez. 2022.
22. Kaur, H., Habibullah, M. S., Nagaratnam, S. (2018). The impact of natural disasters on secondary school enrollment rates. 7(3), 299-305. Doi: 10.14419/ijet.v7i3.25.17586

23. Li, N., Li, R. Y. M., Nuttapong, J. (2022). Factors affect the housing prices in China: a systematic review of papers indexed in Chinese Science Citation Database. *Property Management*, 40(5), 780-796. Doi: 10.1108/PM-11-2020-0078
24. Lin, H., Xu, M. (2022). Capacitated preventive health infrastructure planning with accessibility-based service equity. *Journal of Urban Planning and Development*, 149(1). Doi: 10.1061/jupddm.upeng-4104
25. Maffezzoli, F. A., Ardolino, M., Bacchetti, A. (2022). The Impact of the 4.0 Paradigm in the Italian Agricultural Sector: A Descriptive Survey. *Applied Science (Switzerland)*, 12(18). Doi: 10.3390/app12189215
26. Maurya, P., Muthukumar, P., Anandalakshmi, R. (2022). Methanol cookstove a potential alternative to LPG cookstove: Usability, safety and sustainability studies. *Sustainable Energy Technologies and Assessments*, 53. Doi: 10.1016/j.seta.2022.102508
27. Morrill, R., Beyers, W. (1991). Locating branch campuses for the university of Washington. *Journal of Geography in Higher Education*, 15(2), 161-171. Doi: 10.1080/03098269108709145
28. Papavasileiou, C. et al. (2021). Perception of biohazards: a focus on schools in Western Attica, Greece. *Euro-Mediterranean Journal for Environmental Integration*, 6(1). Doi: 10.1007/s41207-020-00231-6
29. Phongpipattanapan, S., Dasananda, S. (2013). Spatial modelling for optimal locations and allocations of schools in educational service area office-2, Nakhon Pathom province, Thailand. *The Social Sciences*, 8(4), 359-364. Doi: 10.36478/sscience.2013.359.364
30. Sakti, A. D. et al. (2022). School location analysis by integrating the accessibility, natural and biological hazards to support equal access to education. *Internacional Journal of Geo-Information*, 11(12), 1-27. Doi: 10.3390/ijgi11010012
31. Strutynska, L. R. et al. (2018). Determining the sites of optimal location of regional logistics centers. *Naukovyi Visnyk NHU*, 6, 148-155. Doi: 10.29202/nvngu/2018/16
32. Ta, G. C. et al. (2022). Prevention of technological disasters: Adoption of indicative criteria associated with GHS in regulating major accident hazards. *Process Safety and Environmental Protection*, 162, 583-594. Doi: 10.1016/j.psep.2022.04.017
33. Worlanyo, A. S., Alhassan, S. I., Jiangfeng, L. (2022). The impacts of gold mining on the welfare of local farmers in Asutifi-North District in Ghana: a quantitative and multi-dimensional approach. *Resources Policy*, 75. Doi: 10.1016/j.resourpol.2021.102458
34. Xiao, H. (2022). How does air pollution affect corporate information environment? *The Journal of Financial Research*, 45(4), 987-1016. Doi: 10.1111/jfir.12305
35. Yang, D. et al. (2022) Relation between noise pollution and life satisfaction based on the 2019 Chinese Social Survey. *International Journal of Environmental Research and Public Health*, 19(12). Doi: 10.3390/ijerph19127015
36. Zurek, M. (2022). Real Estate markets and lending: does local growth fuel risk? *Journal of Financial Services Research*, 62, 27-59. Doi: 10.1007/s10693-021-00358-9

ASSESSING FINANCIAL LITERACY IN NORTH MACEDONIA USING INFE OECD METHODOLOGY

Petar Janakievski

*Individual researcher, ss. Cyril and Methodius University in Skopje,
Faculty of Economics – Skopje, North Macedonia
perojanakieski@gmail.com*

Kiril Jovanovski

*ss. Cyril and Methodius University in Skopje,
Faculty of Economics – Skopje, North Macedonia
kirilj@eccf.ukim.edu.mk*

ABSTRACT

Financial literacy is crucial for making informed financial decisions and managing financial resources effectively. This study assesses financial literacy levels in North Macedonia using the International Network on Financial Education (INFE) methodology developed by the Organization for Economic Co-operation and Development (OECD). The study compares financial literacy levels in North Macedonia with the global average and examines the relationship between financial literacy and various socio-economic factors. The study finds that financial literacy levels in North Macedonia are lower than the global average and that many individuals need to gain knowledge of basic financial concepts. Financial literacy levels vary among age groups, genders, education levels, and income groups, with younger and less-educated individuals, women, and low-income groups having lower financial literacy levels. The study proposes a set of activities, measures, and recommendations to improve financial literacy levels in North Macedonia, including promoting financial education in schools, developing financial literacy programs for adults, and enhancing the availability of financial information and advice. The study emphasizes the importance of collaboration between government, private sector, and civil society organizations to improve financial education at all levels. In conclusion, the study highlights the critical importance of financial literacy in North Macedonia, particularly in globalization and the increasing availability of financial products. Improving financial literacy is essential for sustainable economic growth and can help individuals make informed financial decisions, protect against financial risks, and enhance their financial well-being.

Keywords: *financial education, financial literacy, globalization, INFE methodology, North Macedonia, sustainable economic growth*

1. INTRODUCTION

At certain moments, people face the burden of making significant life decisions (employment, car purchase, family establishment, providing their own home, better education for their children, etc.). Considering the severity of the financial responsibility that arises in carrying out these decisions, a rise in the population's financial literacy level is imposed to deal more successfully with the challenges ahead. Financial literacy is understanding and effectively managing personal financial matters (Lusardi & Mitchell, 2014). Thus, financial literacy combines the awareness, knowledge, skills, attitude, and behavior necessary to achieve sound financial decisions, financial stability, and well-being¹. This comprehensive definition is more of a traditional view of financial literacy, which focuses on awareness and knowledge of the critical financial concepts needed to manage personal finance, including mathematics.

¹ OECD/INFE Financial Literacy Measurement Toolkit, OECD definition for financial literacy, 2008, p.4

The paper aims to emphasize the importance and benefits of financial education for the population in North Macedonia and thus encourage the creation of a financial system that will generate better financial products and services, which provide social value and limits the possibility of financial fraud, manipulation, and abuses are aimed at improving the financial well-being of individuals and that of improving overall socio-economic development. One added value of this paper is an analysis of financial literacy and financial inclusion in North Macedonia with a comparison to world averages, analyzing reports of relevant international institutions. The paper continues with a second part on the issues related to the measurement of financial literacy, followed by the financial inclusion discussion as the third part, and financial endurance and financial well-being as the fourth and fifth part. The paper finishes with a conclusion as a wrap-up of the previous analysis.

2. MEASUREMENT OF FINANCIAL LITERACY

Financial literacy has become an important topic recently, with researchers and policymakers recognizing its importance. However, the first challenge in studying financial literacy is defining and measuring it. One commonly used tool is the Financial Literacy Survey (FLS), which was developed by the National Bureau of Economic Research (NBER) in 2006 (Lusardi & Mitchell, 2014). The FLS measures financial knowledge and behaviors related to budgeting, saving, investing, and credit management. Other popular tools include the Financial Capability Survey (FCS), which was developed by the Consumer Financial Protection Bureau (CFPB) in 2009 (Collins et al., 2014), and the Financial Well-being Scale, which the Consumer Financial Protection Bureau developed in 2015 (CFPB, 2015). Recently, financial literacy has been assessed and measured based on survey research and according to the standard INFE methodology (OECD)². The OECD/INFE questionnaire contains questions for determining financial literacy to obtain a representation of the basic knowledge of the respondent and to point out his ability to obtain information and use knowledge of specific problems. Questions differ in style and content to avoid bias caused by the different ways of interpreting information by certain people or certain cultural norms. Some questions require an utterly free answer, while some offer a list of possible answers from which the respondent must choose. The questionnaire also encourages respondents to say if they do not know the answer to a question to convince them of accidental intrusion of the answers.

2.1. Financial Literacy in North Macedonia

What is reflected in the financial literacy in the analyzed country, we will primarily present and analyze the figures from the study and research of the OECD in which, according to the methodology of the OECD/INFE, the assessment of financial literacy is performed value that ranges between values 1 and 21 and consists of three elements: The range of financial knowledge is presented at the interval between 0-7, and our country holds the result of 3.9, while the average value for all countries involved in the research is 4.4. Then the next element is the assessment of the financial asset behavior moving in intervals 0 – 9, i.e., in the case of North Macedonia, the result is 5.1, close to the average value for the entire sample, which in this case is 5.3. The last element of the final grade represents the financial position moving in the interval of 1-5 and averages 3. At the same time, in the case of the analyzed country, it takes a value of 2.8. By completing the elements and their summation, the final grade of 11.8 is obtained index points for financial literacy from this research any participatory of 1076 respondents for the country of origin, i.e., say the value obtained is lower than the average

² Organization for Economic Cooperation and Development (OECD) and International Network for Financial Education (INFE)

obtained for all countries involved in the survey of 12.7, which confirms the fact that our country has room for progress and greater involvement of institutions to improve these conditions.

	Financial literacy score	%	Financial knowledge	%	Financial behavior	%	Financial attitude	%
N. Macedonia	11.8	56.1%	3.9	56.1%	5.1	56.2%	2.8	56.1%
Average	12.7	60.5%	4.4	62.8%	5.3	59.2%	3	61.6%

Table 1: Results for the level of financial literacy

(Source: Adapted from: OECD/INFE International Survey of Adult Financial Literacy, 2020, p.15)

3. FINANCIAL INCLUSION

The term inclusion refers to the process of promoting acceptable, timely, and appropriate access to a wide range of regulated financial products and services and expanding their use from all segments of society through the implementation of convenient existing and innovative approaches, including financial awareness and education with a view to promoting financial well-being, as well as economic and social inclusion (Atkinson and Messy, 2013). It is globally acknowledged that financial literacy and inclusion, along with the robust financial framework for consumer protection, are vital to strengthening personal finances in individuals and can contribute to the financial system's stability. That is why it's worthwhile for policymakers to have information on the level of financial involvement of consumers along with data on their financial literacy. Regarding financial inclusion, the OECD findings say that the population of countries³ covered by the survey is generally aware of financial products and services, but the use is relatively low. Less than half of the respondents used a financial product or service. Payment services are used primarily, and insurance products are the least. Financial involvement is a two-way process, which requires providing appropriate financial products on the supply side and the awareness of those products on the demand side. The chart shows that awareness is not a question in most economies covered in this study, with 83% of respondents, on average, responding that they are aware of at least 5 different financial products. Still, it can be noted that 23% of respondents reported, on average, that they had addressed their families and friends needing certain financial services. In the case of our country, this percentage is slightly higher, or 27% of Macedonian citizens said they had asked for help from their families and friends when faced with financial challenges. We can conclude that in North Macedonia and the region, there still is a traditional approach to support and trust, i.e., the expression of the synergy in the traditional families on which these citizens can always rely when needed.

Chart following on the next page

³ Participating countries and economies in alphabetical order are: Austria; Bulgaria; Colombia; Croatia; Czech Republic; Estonia; Georgia; Germany; Hong-Kong; China; Hungary; Indonesia; Italy; Korea; Malaysia; Moldova; Montenegro; Peru; Poland; Portugal; Republic of North Macedonia; Romania; Russia and Slovenia excludes France, Malta and Thailand.

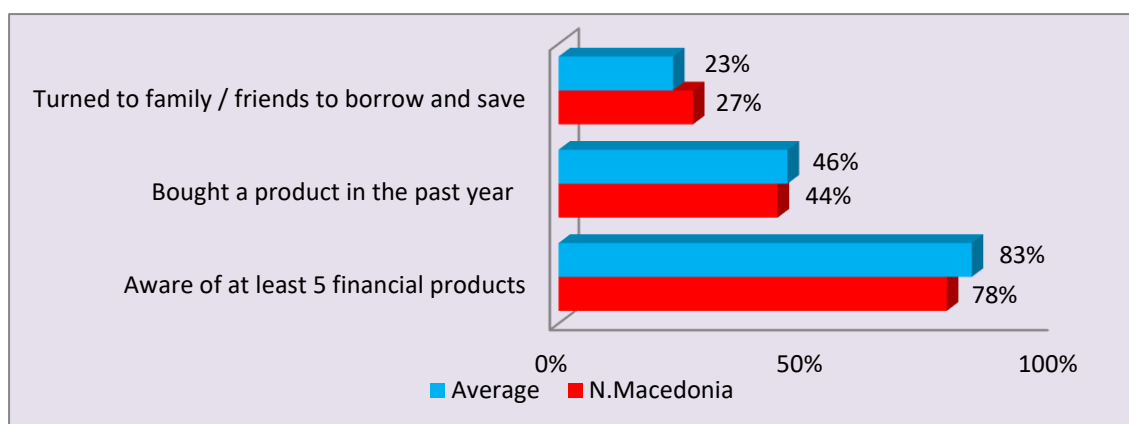


Chart 1: Financial inclusion indicators

(Source: Adapted from: OECD/INFE International Survey of Adult Financial Literacy, 2020, p.30)

3.1. Holding (use) of financial products

In this part of the research, a set of four indicators are considered that respondents currently own:

- Savings, investment, or retirement products that are not mandatory (such as state pension, compulsory health insurance, or other).
- Payment products (or transaction accounts), such as current accounts or payment cards (except for credit cards, which are counted as credit products and other types of accounts that may offer payment assets as savings accounts), debit cards, or prepaid payment cards.
- Insurance products (for a vehicle, health, personal liability, or domestic content) and
- Credit product (a formal bank loan or mortgage).

In North Macedonia, people usually use payment services (67% of respondents), 44% are credit product users, and 36% had declared that they own a specific form of savings (deposit, share in an investment fund, savings for retirement, etc.) However, the data shows that only 5% of respondents in North Macedonia are users of some insurance product. As can be seen from the chart, the country needs to catch up to the highly developed countries in this segment and the average of all countries involved in research in which as many as 37% of respondents use some insurance.

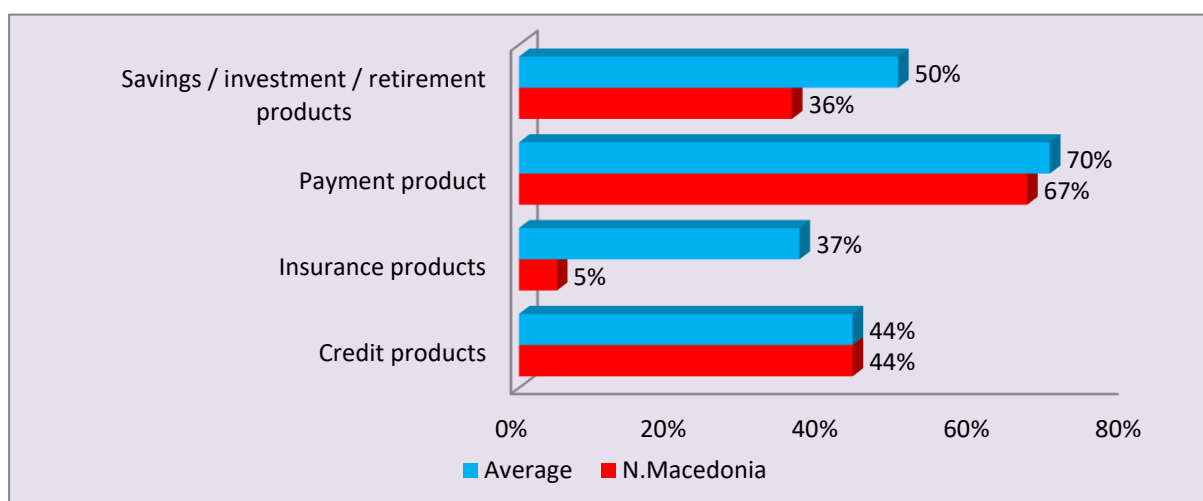


Chart 2: Holding (use) of financial product

(Source: Adapted from: OECD/INFE International Survey of Adult Financial Literacy, 2020, p.32)

4. FINANCIAL ENDURANCE

Financial endurance is the ability to withstand life events that affect someone's income and/or property, i.e., some stressful financial events, such as unemployment, divorce, disability, and health problems affecting people individually in a different way⁴. Financial endurance is an essential feature for citizens everywhere; individuals must be able to cope with predictable financial choices and difficulties in life, so they will provide enough savings for a more extended period to retire comfortably, but also with unpredictable and highly unexpected shocks like the recent COVID-19 pandemic or global price rising.

Individual financial resistance is composed of six elements as follows:

- Keeping control over money: regular monitoring of someone's financial situation and avoiding indebtedness can minimize the risks of financial stress.
- Expenditure care: a sign of financial caution, and thus resistance to individuals is a good concern with costs through effective planning and the availability of purchases.
- Availability of financial pillow: availability of savings and ability to support yourself in the forearm period without income. Individuals probably will experience periods when they must live from their savings, and while some are planned (study or training periods, for example), others, as the current economic crisis, cannot be planned and it is likely to result in a loss of income for segments of societies on a global level.
- Dealing with financial shortcomings: the frequency of experience lacks and care, i.e., dealing with it, reveals the financial endurance of individuals.
- Planning individual finances: active austerity and long-term achievement for financial purposes should be activities that have financial resistance to individuals.

	Financial planning		Keeping control of money	Taking care with expenses		Not meeting costs
	Active saver	Long-term financial goal	Keeping watch on finances	Paying bills on time	Carefully considered purchase	In the past year
N. Macedonia	67.8%	34.9%	71.1%	74.6%	74.4%	36.5%
Average	70.4%	48.8%	67.2%	79.4%	71.1%	35.3%

Table 2: Results of statements associated with financial resilience.

(Source: Adapted from: OECD/INFE International Survey of Adult Financial Literacy, 2020, p.32)

Table 2 in the first part illustrates the answers of the surveyed adults who reported that they were actively saving those who have created specific financial purposes in the future. On average, 70.4% of respondents have identified as active savers; in North Macedonia, that percentage is slightly lower and is 67.8%. In the second component, only 34.9% of respondents in North Macedonia declared that they had set specific longer-term financial purposes. Tracking money flows, such as cost planning and recording, storage budget, and making a passive income that coincides with or is greater than the expenditure, is a crucial feature of financial endurance. Regarding this part, the respondent has a higher percentage of applications than the average for all countries. Carefully considering costs versus needs and meeting financial liabilities on time to avoid surcharges and transaction costs are signs of financial caution and endurance. Most respondents in the research said they had been carefully thinking about each buying about 70% and paying the bills on time (about 80%). While in our country are confirmed identically for both components, about 74% of the respondents.

⁴ Steps Toward Financial Resilience- Barbara O'Neill, Ph.D., CFP®, August 2011.

The percentage of respondents who reported that they had experienced financial lackage (costs higher than the income) in the past 12 months was about 36%, identical to our country and average countries.

5. FINANCIAL WELL-BEING

In cooperation with CFPB 5, the OECD produced a measure of financial well-being based on analytical principles, allowing policymakers to discuss financial well-being internationally while maintaining flexibility at the national level to adopt appropriate policies corresponding to financial measures literacy and its elements. CFPB has proposed the following definition of financial well-being: „a state in which persons can fully meet current financial obligations, they can feel safe in their financial future and make choices that allow them to enjoy life“⁵.

In other words, the definition of CFPB for financial well-being implies financial security and freedom of choice in the present and the future.

	Present	Future
Security	Control over your day to day, month-to-month finances	Capacity to absorb a financial shock
Freedom of choice	Financial freedom to make choices to enjoy life	On track to meet your financial goals

Table 3: Financial well-being includes the following four elements:

Source: Adapted from: *Financial well-being, the goal of financial education, CFPB, 2015, p.19*

After developing the definition of financial well-being and its main consumer-driven components, CFPB has turned it into a concrete measuring scale that can be used globally. However, the main scale of CFPB contains ten statements. Additionally, a shorter scale containing five statements has been developed to analyze the data from the shorter measuring scale. The maximum achievable assessment of financial well-being is 20, and the minimum is 0.21. CFPB proposes to interpret a higher rating as an indicator of a higher level of measured financial assets, i.e., well-being. However, because this is the result based on a self-estimated scale, there is no specific cross-section for „good“ or „bad“ results for financial well-being.

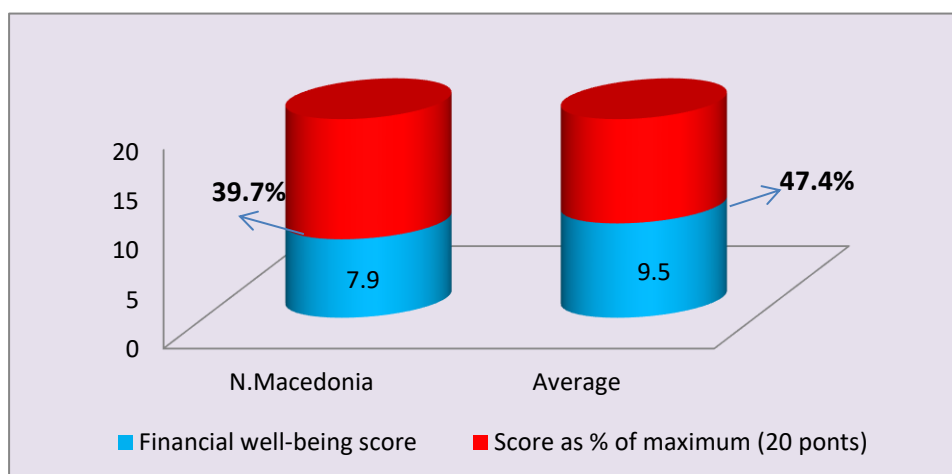


Chart 3: Financial Welfare Results

(Source: Adapted from: *OECD/INFE International Survey of Adult Financial Literacy, 2020, p.55*)

⁵ Financial well-being, The goal of financial education, CFPB, 2015.

The average result of all participants is 9.5 or 47.4% of the maximum possible 20 points, while respondents from our country received a value of 7.9 or 39.7% of our country's maximum points. This measure was built by a set of self-estimated statements, and that way, it would strive for the average value and not to the extremes. However, the result below the average for our country means that respondents are less confident in controlling their finances, feel less confident in their ability to absorb financial shocks in the future, are increasingly inclined to agree that their finances limit their life choices and thus eventually lag their lives long-term financial plans. Specifically, in the case of our country, there is a great deal of space for improvement in this area.

6. ACTIVITIES, MEASURES, AND RECOMMENDATIONS FOR INCREASING FINANCIAL LITERACY

Financial education is a relatively new activity in the financial system domain, becoming important in the last decade. It is mainly associated with some of the visible consequences of the last global financial crisis. Regulatory institutions, especially central banks, usually play a leading role in the process of promotion of financial education among the population as a kind of public good, which in the future should lead to a higher level of financial involvement, i.e., greater involvement of the population in the domain of use diverse financial services. The benefits of financial education are bilateral – for the population and central education banks. The financially educated population better understands the financial system, and there is the ability to make sustainable financial decisions and, in a while, better protect against financial risks. Looking at central banks, the financially educated population better understands monetary policy and how financial markets function, contributing to easier transmission of monetary market signals to economic agents. Financially educated customers use better the advantages of existing financial products, which ultimately contributes to sustainable and inclusive economic growth⁶. What is common to the examples of developed countries is that the most common carriers of the broader population's financial education processes are central banks and other regulatory institutions. According to the available data, it can be concluded that the same is the case in North Macedonia. In this part, the authors reference the activities in this area for the case country. In 2013, the Coordinating Body of Regulatory Institutions for financial education to strengthen cooperation between regulatory institutions in the field of financial education. The members of the Coordinating Body are The National Bank of the Republic of Northern Macedonia (NBRSM), the Ministry of Finance of the Republic of North Macedonia, the Insurance Supervision Agency (ASO), the Securities Exchange Commission (KHV), and the Agency for Supervision of Capital-funded Pension Insurance (MAPAS). In 2019, the body increased its competencies in financial inclusion and was renamed the Coordinating Body for financial education and inclusion. The latest significant activity this body has implemented is the development of the Financial Education and Financial Strategy inclusion of North Macedonia 2021-2025. However, the data and analysis in this paper show that our country has a lot of space for progress. Hence, a few key recommendations could be separated for improving the situation with financial education of the population of North Macedonia and thus raising the degree of financial literacy:⁷

- Greater coordination and inter-institutional cooperation of critical institutions in the area (National Bank, Ministry of Finance, Securities Exchange Commission, Macedonian Stock Exchange, MAPAS, ASO, and others.);

⁶ Aneta Krstevska, Christina Paulska, Financial Literacy as a prerequisite for greater financial inclusion and inclusive development: Turning to the situation and challenges in the Macedonian economy September 2019, p.16

⁷ Martin Noveski, Boban Stojanoski, Slavica Taseva, Maria Micevska – Lazarova, „ Financial Education for smart decisions“ - Financial literacy in the Republic of Northern Macedonia, Skopje, 2021, p.42

This coordination and cooperation are key in creating policies for the financial education of the population, given the different expertise of each institution.

- Greater cooperation of the competent institutions with the non-governmental sector and private financial institutions in the population's financial education field.
From the point of view of the long-term perspective of financial education, it is especially important in the process of planning and policy-making public institutions to include civil society organizations, educational institutions (schools and faculties) and academic community; banks and other financial institutions (investment funds, financial companies, insurance companies).
- Cooperation with international institutions (World Bank, OECD, EBRD, etc.);
Cooperation with international institutions is necessary for exchanging information experience, knowledge, and new technologies, given their many years of experience in the financial education of the principality.
- Involvement of financial education in formal educational programs for primary and secondary education through customized teaching content.
By including financial education in education, starting with primary and further into secondary education, it can directly affect an increase in the level of financial literacy of the population, primarily young people.
- Creating educational content and financial education programs through the application of modern technologies.
Examples from developed countries show that the application of new information technologies, based on previous behavioral analyzes, bring excellent results when it comes to the financial education of the population in modern society. Creating interactive and educational websites, mobile applications, interactive games, and quizzes can effectively reach different groups of the population.
- Making a digital platform and content for financial education.
Making a centralized platform wherein a straightforward way could find all the necessary and relevant financial education content would significantly increase this process's efficiency.

7. CONCLUSION

The benefits of financial literacy of the population, for which in the past years many international institutions speak, have increasingly been recognized and accepted to world level many countries. However, using different approaches emphasizes the financial education of the population, which is becoming a trend nowadays. Financial education leads to greater financial well-being for individuals. It creates a critical society that would actively engage in policy-making, especially in finances and the financial system. Governments worldwide are interested in finding practical approaches to improve financial literacy among their populations. Most are creating or running a national financial education strategy to provide learning opportunities throughout the person's life. North Macedonia is following the steps of governments in the world. It is wholly dedicated as never before, and more emphasis puts on raising financial literacy and educating the country's population at one higher level. The need is also based on the relatively low rankings of the country for which there were data and analysis shown in this research paper, i.e., shown that in the case of the country, there is a lot of space for progress. In conclusion, making significant life decisions requires financial literacy, and North Macedonia's financial literacy score of 11.8 is lower than the average score of all countries involved in the survey. The data shows room for improvement in financial literacy, and the traditional approach to support and trust in families and friends is still prevalent. North Macedonia needs to catch up in the insurance segment, and only 34.9% of respondents declared that they had set specific longer-term financial purposes.

The result below the average for our country regarding financial confidence means there is much space for improvement. Institutions should take measures and develop activities that increase financial literacy and promote financial confidence. A general conclusion that we can draw is that important, and the benefits of financial education are far-reaching and significant, through which the differences are noted between those who are controlled by money and those who reign as masters of money. Proper planning and managing someone's finances improve self-confidence and increase respect for friends and family, i.e., when people learn to make cautious financial decisions and avoid frequent traps that impose living itself. Finally, if we invest in our financial education, it will not only improve our lives, but it will also improve the lives of everyone around us.

LITERATURE:

1. Atkinson, A., & Messy, F. (2013). Measuring financial literacy: Results of the OECD/International Network on Financial Education (INFE) pilot study. *OECD Journal: Financial Market Trends*, 2013(2), 33-44. <https://doi.org/10.1787/fmt-2013-5k49dfhjk9mr>
2. Barbara O'Neill, Ph.D., CFP®. (2011, August). Steps Toward Financial Resilience.
3. CFPB. (2015). Financial well-being, the goal of financial education.
4. Chen, H., & Volpe, R. P. (1998). An analysis of personal financial literacy among college students. *Financial services review*, 7(2), 107-128.
5. Consumer Financial Protection Bureau. (n.d.). About us. Retrieved from <https://www.consumerfinance.gov/about-us/>
6. Hung, A. A., Parker, A. M., & Yoong, J. (2009). Defining and measuring financial literacy. *Journal of Consumer Affairs*, 43(2), 199-221.
7. Klapper, L., Lusardi, A., & van Oudheusden, P. (2016). Financial literacy around the world: Insights from the Standard & Poor's Ratings Services Global Financial Literacy Survey. *The World Bank Research Observer*, 31(1), 29-55. <https://doi.org/10.1093/wbro/lkv013>
8. Krstevska, A., Paulska, C., & NBRM. (2019, September). Financial literacy as prerequisite for greater financial inclusion and inclusive development: Twisting of the situation and challenges in the Macedonian economy. *Journal of Applied Economics and Business*, 7(4), 49-65. <https://doi.org/10.22367/jaeb.v7i4.133>
9. Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature*, 52(1), 5-44.
10. Mottola, G. R. (2015). Financial knowledge, behaviour and confidence in adults: Results from a national survey. Financial Consumer Agency of Canada.
11. Noveski, M., Stojanoski, B., Taseva, S., & Micevska – Lazarova, M. (2021). Financial education for smart decisions – Financial literacy in Republic of Northern Macedonia. *Journal of Finance and Accounting Research*, 3(2), 19-26.
12. OECD. (2018). OECD/INFE toolkit for measuring financial literacy and financial inclusion. <http://www.oecd.org/finance/financial-education/Measuring-Financial-Literacy-and-Financial-Inclusion-OECD-INFE-Toolkit.htm>
13. OECD. (2020). OECD/INFE 2020 international survey of adult financial literacy. <https://www.oecd-ilibrary.org/docserver/870d1f94-en.pdf?expires=1657483767&id=id&acname=guest&checksum=92C65D02C517F90C2E46F95B987D876F>
14. OECD. (2022). OECD/INFE toolkit for measuring financial literacy and financial inclusion 2022. https://www.oecd-ilibrary.org/finance-and-investment/oecd-infe-toolkit-for-measuring-financial-literacy-and-financial-inclusion-2022_bca70b72-en
15. Organisation for Economic Co-operation and Development. (n.d.). Home page. Retrieved from <https://www.oecd.org/>
16. Remund, D. L. (2010). Financial literacy explicated: The case for a clearer definition in an increasingly complex economy. *Journal of Consumer Affairs*, 44(2), 276-295.

17. Securities Commission. (2019). Financial education program 2019-2022.
18. Shim, S., Barber, B. L., Card, N. A., Xiao, J. J., & Serido, J. (2010). Financial socialization of first-year college students: The roles of parents, work, and education. *Journal of Youth and Adolescence*, 39(12), 1457-1470.
19. Stango, V., & Zinman, J. (2011). Exponential growth bias and household finance. *Journal of Finance*, 66(6), 2133-2172.
20. Strategy for Financial Education and Financial Inclusion of the Republic of North Macedonia 2021-2025. (2020, July).
21. Tennyson, S., & Nguyen, T. B. (2013). An examination of the determinants of financial literacy. *Journal of Financial Counseling and Planning*, 24(2), 50-62.
22. Tinghög, G., Ahmed, A., Barrafreem, K., Lind, T., Skagerlund, K., & Västfjäll, D. (2021). Gender differences in financial literacy: The role of stereotype threat. *Journal of Economic Psychology*, 85, 105004. <https://doi.org/10.1016/j.joep.2020.105004>
23. Toronto Leadership Center. (2018, January). Financial literacy.
24. Vieira, K. M., & Vieira, T. M. (2016). Financial literacy and stock market participation. *Journal of Financial Counseling and Planning*, 27(1), 44-57.
25. Xu, Y., & Zia, B. (2012). Financial literacy around the world: An overview of the evidence with practical suggestions for the way forward. *World Bank Policy Research Working Paper*, (6107).

THE IMPACT OF QUANTITATIVE EASING ON THE WELFARE OF GERMANY AND THE USA: A COMPARATIVE ANALYSIS

Sonja Ivanova

*ss. Cyril and Methodius University in Skopje,
Faculty of Economics – Skopje, North Macedonia
sonja.ivanova@yahoo.com*

Kiril Jovanovski

*ss. Cyril and Methodius University in Skopje,
Faculty of Economics – Skopje, North Macedonia
kirilj@eccf.ukim.edu.mk*

ABSTRACT

This paper examines the impact of Quantitative Easing (QE) on the welfare of Germany and the USA. QE is a monetary policy measure implemented during extreme economic conditions that aim to improve economic conditions and avoid replaying the latest depression. The study explores how the different approaches of Germany and the USA regarding QE, in terms of timing, intensity, and policy implementation, influenced the quality of people's lives. The analysis considers the secondary effects of QE on the well-being of economic agents. The study acknowledges that long-term measures to address poverty may be reversed quickly due to high inflation and that inflation stabilization takes priority. The lack of adequate redistribution programs may also lead to insufficient real economic growth. The study seeks to analyze the impact of QE on welfare today, over a decade since it was officially implemented as a measure. The success of economic measures depends on their design and implementation rather than on universal connections or generalized expectations. Furthermore, appropriate complementary measures must be implemented to support the effects of a policy measure. Failure to meet the necessary prerequisites may lead to undesired results. Therefore, the paper explores the impact of QE on welfare from the perspectives of growth, trade, political relations, health care, and income. The study also considers the differences in institutions, structures, and people and how policies are implemented in the two countries. These differences provide a comprehensive overview of how the same policies yield different results regarding people's welfare. The heterogeneity of markets and the position of the population in relation to the adoption of macroeconomic policies and their impact are also analyzed. Overall, this study provides insights into the impact of QE on welfare in Germany and the USA. The findings can inform policy decisions to improve economic conditions and the population's well-being.

Keywords: *Complementary Measures, Economic Development, Germany, Heterogeneity, Monetary Policy, Policy Implementation, Quantitative Easing, USA, Welfare*

1. INTRODUCTION

The paper aims to examine the impact of Quantitative Easing (QE) on the welfare of Germany and the USA, exploring how the different approaches in timing, intensity, and policy implementation influenced people's lives. The analysis considers the secondary effects of QE on economic agents' well-being, acknowledging the potential trade-offs between poverty reduction and inflation stabilization. The study seeks to analyze the impact of QE on welfare a decade after its implementation as a measure. The literature on QE and its impact on welfare has grown recently. One approach study examines the impact of QE on economic growth, employment, and inflation, showing mixed results. The impact of quantitative easing (QE) on the welfare state is a subject of continuous debate among policymakers. The question is whether QE can help stimulate the economy and reduce unemployment or it instead leads to inflation,

eroding the purchasing power of social welfare programs (Chadha & Nolan, 2014). Other studies have explored the impact of QE on asset prices and financial stability, highlighting potential risks and trade-offs. Some studies have also analyzed the distributional effects of QE, showing that it may exacerbate income inequality and social exclusion (Cœuré, 2019; Stein, 2013; Yellen, 2017). In that manner, QE can intensify income inequality since the benefits of lower interest rates and asset purchases are often concentrated among the wealthiest people (Kaplan & Mollins, 2016). On the other hand, one can say that QE can indirectly benefit the welfare state by stimulating economic growth and increased tax revenue, which can fund social programs (Gürkaynak, 2013). The relationship between QE and the welfare state is complex and multifaceted, and its long-term effects are still being studied. Regarding country-specific studies, several papers have examined the impact of QE in Germany and the USA. Some studies have highlighted the differences in QE implementation between the two countries, with Germany being more cautious and emphasizing price stability while the US being more aggressive and focuses on employment. Other studies have shown that QE may affect welfare differently in different countries, depending on the institutional context, political environment, and economic structures (Higgins, Klitgaard, & Ammer, 2015; Paetz, 2016). Quantitative easing (QE) is a monetary policy tool central banks use to stimulate the economy by increasing the money supply and lowering interest rates (Taylor, 2014). This is done by purchasing government securities and other assets from financial institutions, injecting money into the economy, and encouraging lending and spending. The effectiveness of QE as a policy tool is still debated among economists, with some arguing that it can lead to inflation and asset bubbles. In contrast, others believe it is necessary to prevent deflation and support economic growth (Bernanke, 2012). QE has been used extensively by central banks worldwide in response to the global financial crisis of 2008 and the COVID-19 pandemic (Blanchard, 2020), and its long-term effects on the economy are still being studied. The welfare state is a concept that refers to the system of government programs and policies designed to provide social support and economic security to citizens. This can include healthcare, education, unemployment benefits, and social security programs. The effectiveness of the welfare state as a policy tool is still debated among scholars and policymakers, with some arguing that it promotes dependency and reduces incentives to work. In contrast, others believe that reducing inequality and ensuring social justice is necessary (Esping-Andersen, 1990). The welfare state has been implemented to varying degrees in different countries worldwide, with some providing more comprehensive social support than others (Pierson, 2001). The future of the welfare state is uncertain, with concerns about aging populations and the cost of providing social services. Still, it remains a crucial area of policy debate and reform.

2. QE – STARTING POINT

We will start this paper by asking the question, what exactly is economic development? What economic policy contributes best to build the country's welfare and, in parallel, positively impacts the economic conditions? Our focus of analysis will be Quantitative Easing as a measure constituted in severely extreme economic conditions that, in a way, saved the economies from a sure replay of the latest depression. We will analyze the economies of Germany and the USA. The authors chose these countries primarily because they had an opposite approach regarding Quantitative Easing in terms of conducting it, timing, and intensity. The purpose here is to conclude and answer how the different approaches influence the quality of people's lives and whether the one approach is better. While analyzing wealth and the quality of living, we must consider some facts:

- There is a broad spectrum of effects that come as secondary while activating monetary measures to deal with a crisis in the economy that affect the well-being of the economic agents in the economy. One economy may conduct long-term measures to deal with

poverty. Everything accomplished can be reversed only in one year when the inflation is higher, and the measures are concentrated on dealing with this situation. Inflation stabilization, after all, has a higher priority. Also, more redistribution programs may be needed to ensure real economic growth. These are why we seek to analyze the impact that Quantitative Easing had on welfare today, more than a decade after it was officially started as a measure.

- While implementing some policies, we must consider when a measure functions and when and why it fails. Considering the context and the limitations of the situation itself, we can quickly agree that establishing universal connections and generalizing expectations does not work in economies. The success depends on the design and the implementation, where we will conduct our analysis.
- If we expect one economic measure to work, it must have the appropriate complementary measures to support its effectiveness. If a particular set of prerequisites is not satisfied, it will not give the desired result, much like giving the wrong medicine for diagnoses that do not correspond to it. Many economists imply that it is impossible to analyze the economic measures to help the countries without analyzing them from the perspective of growth, trade, and political relations. Also, until now, the measures conducted by the government and the institutions have taken a secondary place, but in this new era, the roles are changing. A discussion begins about the possibility of improving health as a driving force of development and the possibility of governments delegating appropriate attention to health care and an appropriate income increase. The well-being of people does not depend exclusively on their wealth but also on a mix of other preconditions that will be analyzed accordingly.
- The differences in institutions, structures, and people and in the way of implementing the policies give us a comprehensive overview of how the same measures give different results regarding people's wealth in different periods and places. That is why the USA and Germany are excellent examples to analyze with the heterogeneity of the markets and the position of the population in relation to the adoption of macroeconomic policies and their impact.

3. THE IMPACT OF QE

The Quantitative Easing in the USA has begun in a severe amount of panic regarding the economy being pulled into a deflation spiral, so expectedly, the rules of conducting the monetary policy of the Central Banks, such as Taylor's rule, indicated that additional monetary easing is a must, or that in practice low level of interest rates must be applied. But the central bank's policies, as they were already set at that time, dictated that interest rates were already at their practical lower bounds, so the authorities should urgently consider unconventional monetary policies to reduce borrowing costs further and increase aggregate demand or at least stabilize it. If we see the historical standards, we can agree that financial conditions have become unusually tight despite record-low interest rates. This reflects that the monetary transmission mechanism became seriously impaired as financial markets and the banking system no longer functioned properly, banks no longer lent to each other, and bank lending standards for loans to the private sector tightened dramatically. The FED finally started the Quantitative Easing in November 2008 by buying large amounts of assets. Opposed to this approach conducted by the FED, the European Central Bank did not initiate the Quantitative Easing that fast. It undertook massive and substantial lending programs to financial institutions labeled as "Enhanced Credit Support," which were "taken to enhance the flow of credit above and beyond what could be achieved through policy interest rate reductions alone", (Trichet 2009). Another fact made late Quantitative Easing Possible - As a critical moment in this crisis in the Eurozone, one must mention the famous speech of the President of the ECB, Mario

Draghi, who said that "the ECB is ready to do whatever it takes to preserve the Euro" in July 2012 year and the subsequent disclosure of the program for Outright Monetary Transactions. It is essential to mention that the ECB never actually had to use the Outright Monetary Transactions Program because only its willingness to use this potentially potent tool was enough to calm the financial markets. Herein, against a highly muted and sluggish economic backdrop and with most measures of inflation extremely low as well as fears of rising deflation risks, the quantitative easing program was finally announced in January 2015, with the announcement of asset purchases worth up to 60 billion euros per month starting from March 2015, until the end of September 2016. The interest of this paper is the effects of this implementation. Quantitative Easing, a measure used by Central Banks, was conducted when the economies faced severe recessions, massive unemployment, and an impaired transmission mechanism. This is the only standard measure that would give satisfactory results. Even though different economies used Quantitative Easing at different times from 2008 to 2015, they all had only one goal, increasing weak economic development, reducing the risk of deflation and depression, and bringing inflation to the desired target. The result shows a large amount of money in circulation in the economies in the hands of households and the corporate sector, and even in the banking sector. Truth be told, that was the goal of Quantitative Easing - to give money to the economies was accomplished. However, it did not result in a proportional level of investment. Investments have increased in the observed period, with noticeable economic growth. Still, it follows a different tendency of growth of money than families and companies hold because primarily Quantitative Easing did not encourage lending or giving loans by banks, but investments in financial instruments.

3.1. Human Development Index

All above leads us to examine whether and how differences in the reactions of the FED and the ECB contributed to differences in people's well-being. And if they exist, how are these differences felt even today, in conditions of enormous inflation, when it seems the world is on the verge of another crisis? First, we will study the GDP of Germany and the United States.

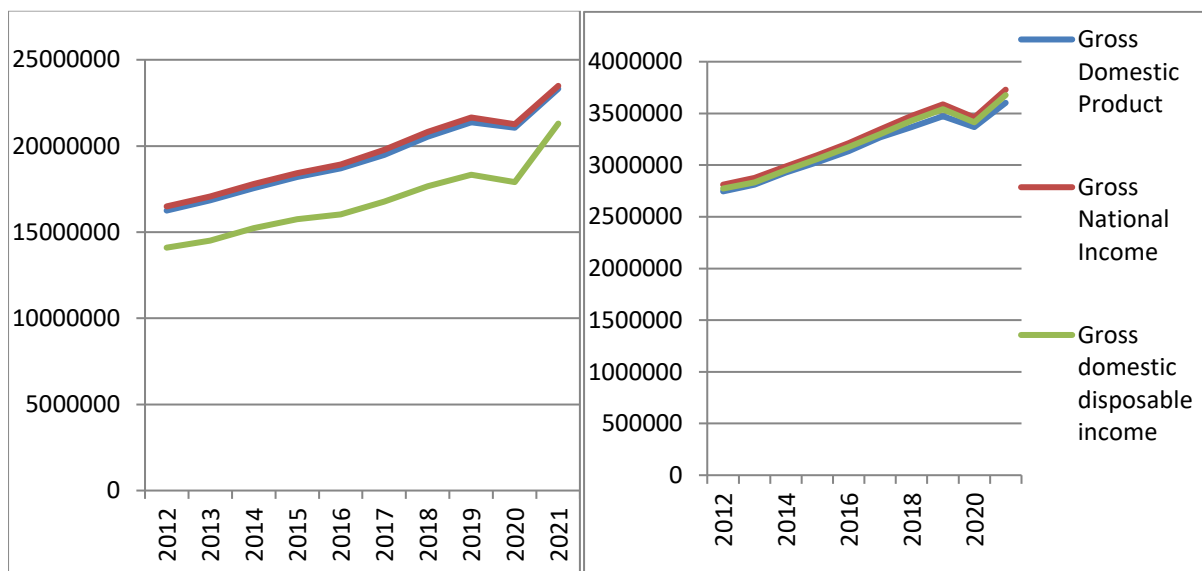


Chart 1: Gross domestic product, Gross national income, and Gross domestic disposable income for Germany (left) and the USA (right) (shown in millions of euros)
(Source: National bank reports on National Accounts)

If we look at the growth trend in the GDP, especially in gross domestic disposable income in the years of Germany's recovery from the crisis and under the conditions of already started Quantitative Easing, we will conclude that there is constant and stable growth. The exception is 2020, where we see a decline due to the Covid crisis, but in the next year, we can witness growth, which is relatively accelerated. Judging by this, can we conclude that people's well-being has also increased, with a slight decrease in 2020? People's disposable income cannot measure many values in people's lives but can be measured by adding variables such as education, health, and environment. Therefore, in addition to these trends, for Germany, we will also look at the Human Development Index, which represents the geometric mean of the life expectancy for population, education, and gross national product per capita. Life expectancy calculates the effects of demographic factors such as year of birth and current age on individuals, education represents the mental capacities of the population, and GNI per capita represents the standard of living of the given country. The purpose of this indicator is to show us that economic growth is not crucial for improving the population's well-being, as is giving the residents the opportunity to realize their full potential in all aspects of living. In the following, we will look at the Human development index and its components for Germany before comparing the same values with the United States.

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Life expectancy	80,5	80,5	80,9	80,6	80,8	80,9	81,2	81,6	81,1	80,6
Years of Schooling	16,7	16,7	16,7	16,8	16,9	17	16,9	17	17	17
Mean Years of schooling	14	14	14	14,1	14,1	14,1	14,1	14,1	14,1	14,1
Gross national income per capita	50124	50315	51269	52201	53350	54336	54981	55565	53078	54534
HDI	0,933	0,934	0,937	0,938	0,941	0,944	0,945	0,948	0,944	0,942

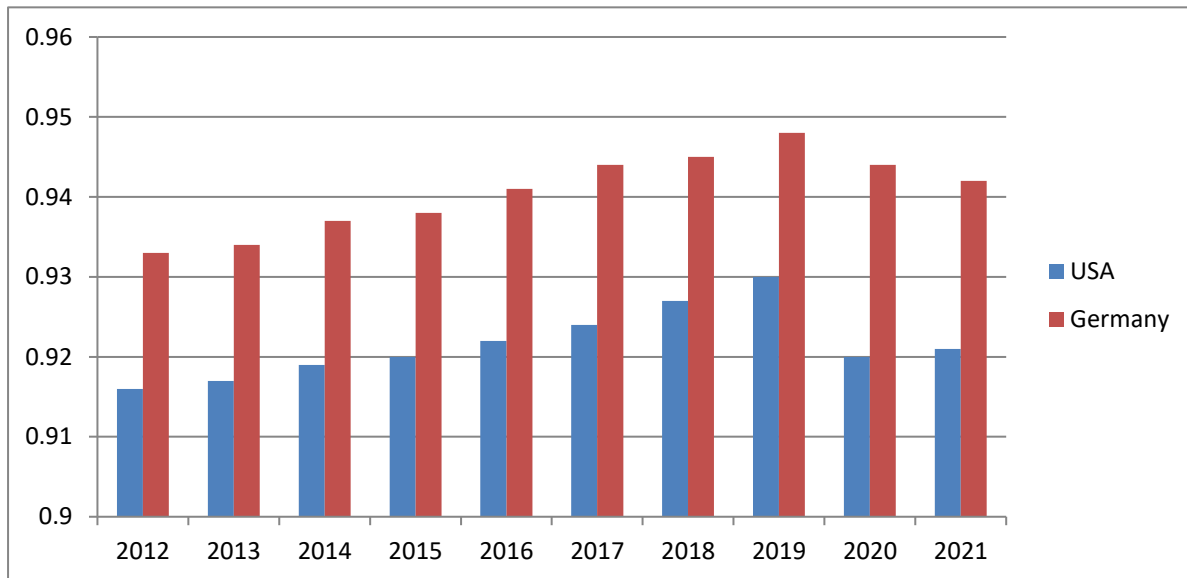
Table 1: Human Development Index, Германија
(Source: <https://hdr.undp.org>)

Let's consider the results from the table above, knowing that any score above 0.8 is considered a country with a high level of human development. We can conclude that Germany has consistently high development. Life expectancy in Germany is extremely high, the average number of years of schooling indicates a high quality of education, and GNI is continuously increasing except for 2020. Looking at the chart above for the United States, we can conclude that the GDP, GNI, and Gross domestic disposable income situation is particular. When GDP and GNI follow the same trend, the Gross domestic disposable income is a little smaller. This is due to the USA's transfers to the rest of the world. The Gross domestic disposable income of the USA has a more pronounced growth trend than Germany, which is most likely due to the early and more intensive implementation of Quantitative Easing. Interestingly, the COVID-19 crisis caused only a slight drop in 2020, so we will again have significant growth in Gross domestic disposable income in the year 2021.

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Life expectancy	78,9	79	79	78,9	78,8	78,8	79	79,1	77,4	77,2
Years of Schooling	16,1	16,1	16,1	16,2	16,3	16,3	16,3	16,3	16,3	16,3
Mean Years of schooling	13,1	13,1	13,2	13,3	13,3	13,4	13,5	13,6	13,7	13,7
Gross national income per capita	56403	56905	58314	59683	59969	61186	62626	63615	61462	64765
HDI	0,916	0,917	0,919	0,92	0,922	0,924	0,927	0,93	0,92	0,921

Table 2: Human Development Index, САД
(Source: <https://hdr.undp.org/>)

The results here show that in the USA, as well as in Germany, there is a high level of human development. What is evident is that life expectancy is lower than Germany's, a gap widening in recent years. The growth of the Gross National Product per capita is more significant than the growth in Germany, especially in those years after the intensification of Quantitative Easing, but that growth did not materialize in the growth of the Human Development Index of the United States.



*Chart 2: Human Development Index Trend, Germany and USA
(Source: Authors' representation)*

What can we conclude from the display of the Human Development Index, put in context with Quantitative Easing? Despite the incredible intensity of Quantitative Easing in the USA in contrast to Germany, we can still conclude that Germany has a higher human growth rate than the USA. Germany's Human Development index growth has increased since Quantitative Easing began, but not to the same extent as the USA. Consequently, the drop in HDI in Germany caused by the Covid crisis is smaller than in the USA. One conclusion is that Quantitative Easing in the United States while considering all the intensity and speed of its implementation, did not significantly contribute to improving the general well-being of the people.

3.2. Happy Planet Index

Next, we will analyze the Happy Planet Index for Germany and the USA, adding the environment as another dimension that contributes to the general well-being of people. This index is guided by the fact that people can improve their well-being without negatively impacting the planet. Based on the premise that we do not have a spare planet, it would be wrong to talk about human development without noting that human happiness should not be at the expense of creating a sustainable environment for the future. The happy planet index is computed by calculating the well-being variables, shown through life scale, life expectancy, and ecological footprint. In this model, well-being is measured through a survey, where everyone is asked to rate where they stand on a so-called life scale, where 10 is the best life, and 0 is the worst for that individual. Any value above 7 is in the green zone, which is acceptable as positive. Life expectancy is the same as in the previous model, with any weight over 75 years in the green zone. What is characteristic of this index is the ecological footprint. This variable shows us the average amount of land needed per capita to achieve the typical consumption for the given country.

By area, we mean land needed to grow food, the area covered by infrastructure, and land needed to absorb CO₂ emissions. For resources to remain for the rest of life on Earth, the economy needs to spend less than the maximum for a planet like ours. Acceptable as a value of less than one planet is 2.1 global hectares of land.

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Life expectancy	80,5	80,5	80,9	80,6	80,8	80,9	81,2	81,6	81,1
Ladder of life	6,7	6,97	6,98	7,04	6,87	7,07	7,12	7,04	7,31
Ecological footprint	5,05	5,07	4,96	4,86	4,76	4,7	4,58	4,44	3,93
Happy Planet Index	47,9	49,4	50	50,7	50,3	51,7	52,5	52,7	56,8

*Table 3: Happy planet index, Germany
(Source: <https://happyplanetindex.org/hpi/>)*

We will first examine the components of the Happy Planet Index for Germany. On the life scale, we can form some correlation between Quantitative Easing and people's feelings about their lives. Quantitative Easing began to influence the improvement of the economic situation in the country, and this contributed to the advancement of people's view of life in general. We also see an improvement in terms of the ecological footprint, that is, in reducing the area that Germany uses from the planet Earth.

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Life expectancy	78,9	79	79	78,9	78,8	78,8	79	79,1	77,4
Ladder of life	7,02	7,25	7,15	6,86	6,8	6,99	6,88	6,94	7,03
Ecological footprint	8,04	8,27	8,22	8,07	8,17	8,04	8,15	8,21	7,2
Happy Planet Index	38,6	39	38,6	37,7	37,2	38,3	37,4	37,4	39,7

*Table 4: Happy Planet Index, USA
(Source: <https://happyplanetindex.org/hpi/>)*

Next, we will examine the components of the Happy Planet Index for the USA. The sheer intensity of Quantitative Easing and the early reaction didn't improve how people felt about their lives. Yet, quite the opposite, they felt worse as the economy recovered. We also see that the US does not seek to reduce the use of global hectares in proportion to our planet's space. We will get the following if we compare the indices for Germany and the USA.

Chart following on the next page

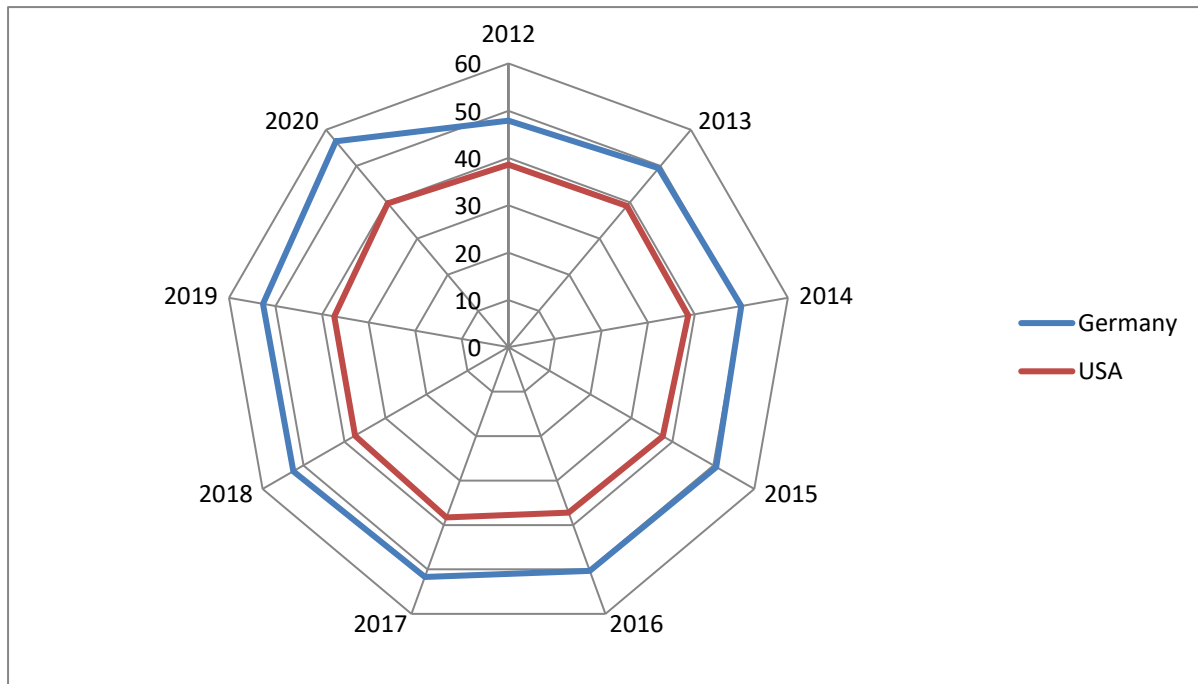


Chart 4: Happy Planet Index, Germany, and USA
(Source: <https://happyplanetindex.org/hpi/>)

4. CONCLUSION

Overall, the paper provides a short analysis of the literature on QE and welfare, analyzing the impact of this policy measure on different aspects of people's lives in Germany and the USA. The findings can inform policymakers' decisions and provide insights into QE implementation's potential risks and trade-offs. The paper focuses on the analysis of Quantitative Easing as a measure constituted in severely extreme economic conditions that, in a way, saved the economies from a sure replay of the latest depression. More specifically, the analysis focuses on the case of Germany and the USA. These countries were selected primarily because they had an opposite approach regarding Quantitative Easing in terms of conducting it, timing, and intensity. The purpose here is to conclude and answer how the different approaches influence the quality of people's lives and whether the one approach is better. The critical measures in the paper are the Human Development Index and the Happy planet index. The motive for QE can be found in the historical standards, and we can agree that financial conditions have become unusually tight despite record-low interest rates. This reflects that the monetary transmission mechanism became seriously impaired as financial markets and the banking system no longer functioned properly, banks no longer lent to each other, and bank lending standards for loans to the private sector tightened dramatically. Consequently, FED started the Quantitative Easing in November 2008 by buying large amounts of assets. Oppose to this approach conducted by the FED, the European Central Bank did not initiate the Quantitative Easing that fast. Next year, ECB undertook massive and substantial lending programs to financial institutions labeled as "Enhanced Credit Support," which were taken to enhance the flow of credit. The analysis in the paper from the display of the Human Development Index, put in context with Quantitative Easing, shows that despite the incredible intensity of Quantitative Easing in the USA in contrast to Germany, we can still conclude that Germany has a higher human growth rate than the USA. Germany's Human Development index growth has increased since Quantitative Easing began, but not to the same extent as the USA. Consequently, the drop in HDI in Germany caused by the Covid crisis is smaller than in the USA. One conclusion is that Quantitative Easing in the United States while considering all the intensity and speed of its implementation, did not significantly contribute to improving the general well-being of the people.

Additionally, the Happy Planet index is significantly higher in Germany than in the US, and, more importantly, it is improving over time. We see that the Quantitative Easing and the Corona crisis had significantly affected the activity in the United States in terms of encouraging economic growth and revitalizing economic activity, but this did not materialize in terms of environmental care and improving the well-being of the population. After all, we can agree that human well-being is most important in one economy.

LITERATURE:

1. Bernanke, B. S. (2012). *Monetary policy since the onset of the crisis*. Speech at the Federal Reserve Bank of Kansas City Economic Symposium, Jackson Hole, Wyoming.
2. Bernanke, B. S. (2012). *The Federal Reserve and the financial crisis*. Princeton University Press.
3. Blanchard, O. (2020). *Public debt: Fiscal and welfare implications in a low interest rate world*. Peterson Institute for International Economics.
4. Blanchard, O. (2020). The macroeconomic effects of the COVID-19 pandemic: Six lessons. *Journal of International Money and Finance*, 107, 1-17.
5. Carney, M (2019), The growing challenges for monetary policy in the current international monetary and financial system, *Speech given at the Jackson Hole Symposium*, Wyoming, August 27, 2019
6. Chadha, J. S., & Nolan, C. (2014). Fiscal policy and the financial crisis. *National Institute Economic Review*, 227(1), R9-R20.
7. Chadha, J. S., & Nolan, C. (2014). QE and the welfare state. *National Institute Economic Review*, 229(1), R34-R41.
8. Cœuré, B. (2019). The international monetary and financial system: past, present, and future. Speech at the Banque de France conference on “Rethinking the International Monetary System,” Paris.
9. Esping-Andersen, G. (1990). *The three worlds of welfare capitalism*. Polity Press.
10. Gürkaynak, R. S. (2013). Monetary policy and financial stability. *BIS Papers*, No. 73.
11. Gürkaynak, R. S. (2013). Quantitative easing and the Turkish economy. *Central Bank Review*, 13(1), 1-13.
12. Higgins, P. C., Klitgaard, T., & Ammer, J. (2015). The international role of the dollar and trade balance adjustment. *Economic Policy Review*, 21(1), 19-41.
13. Kaplan, G., & Mollins, J. (2016). Inequality and monetary policy: A framework with answers to three questions. *Journal of Economic Perspectives*, 30(1), 75-96.
14. Kaplan, S. N., & Mollins, J. (2016). The Federal Reserve’s tools for maintaining monetary stability: The role of financial stability. *Annual Review of Financial Economics*, 8(1), 63-85.
15. Kuttner, K (2018), Outside the box, unconventional monetary policy in the great recession and beyond, working paper no 47, Williams College, Brookings Institute, October 2018.
16. Lavigne, R, Sarker, S and Vasishtha, G (2014), Spillover effects of quantitative easing on emerging market economies, *Bank of Canada review*, Autumn 2014
17. Paetz, M. (2016). Central bank independence and transparency: Evolution and effectiveness. *IMF Working Paper*, WP/16/46.
18. Pierson, P. (2001). *The new politics of the welfare state*. Oxford University Press.
19. Stein, J. C. (2013). *Overheating in credit markets: Origins, measurement, and policy responses*. Speech at the Federal Reserve Bank of St. Louis Community Banking Research and Policy Conference, St. Louis, Missouri.
20. Taylor, J. B. (2014). The effectiveness of central bank asset purchases: Lessons from the United States. *National Institute Economic Review*, 230(1), R15-R24.

21. Taylor, J. B. (2014). The strategy of monetary policy: Lessons from the crisis. *National Institute Economic Review*, 229(1), F6-F16.
22. Trichet, J. C. (2009). *Central banking in extraordinary times*. Speech at the Federal Reserve Bank of Kansas City Economic Symposium, Jackson Hole, Wyoming.

HOW CONSUMER ELECT AN ORGANIC WINE?

Keylor Villalobos Moya

Universidad Nacional de Costa Rica, Costa Rica

Keylor.villalobos.moya@una.cr

Maria Raquel Lucas

Universidade de Évora, Portugal

mrlucas@uevora.pt

ABSTRACT

Despite organic wine has a positively market impact due to major environmental concern and awareness of consumer health, it remains an economic activity with a very small market in Portugal. The aim of this work was to analyze consumer behavior in relation to organic wine and to identify and characterize its needs and profiles. This was done through descriptive statistics and cluster analyzes to obtain consumer criteria willing to consume and purchase organic wine. The research was descriptive, with quantitative data collection from an online questionnaire. The results disclosed consumer needs and segments according to their intentions towards organic wine consumption and purchase which could be the basis for future marketing strategies.

Keywords: *Consumer behavior, needs, acceptance, profile, organic wine, segments*

1. INTRODUCTION

Despite the importance of the wine industry in Portugal, due to various factors such as the number of companies involved and volume produced (Banco de Portugal, 2017), its positioning in exports, among the largest in the world (IVV, 2017) and the Portuguese strong consumer culture (Nielsen, 2017), the growth of the organic wine market has not evolved in an adjusted way, nor has it offered a positive impact on the national market (DGADR, 2017 a, b), as has happened in other European wine producing countries. Hence, the objective of this work was to study the behavior of the Portuguese organic wine consumer, namely, their purchase intention. Consumer behavior is a fundamental concept in agri-food marketing as companies seek to achieve their goals and satisfy the needs, desires and expectations of the consumers. This consumer orientation implies, on the part of companies, knowledge of their behavior (Lucas, 2006). Because consumers are diverse, one way of studying their behavior is through the process of market segmentation, which consists of identifying groups of consumers with homogeneous characteristics, with the aim of establishing a differentiated targeted offer, thus meeting higher expectations and satisfying the specific needs of the target consumers (Schiffman & Kanuk, 2010; Galicia & López, 2015). There are few studies on consumer segmentation in the wine and organic wine markets in Portugal, there are other investigations on wine which are worth mentioning. Among the variables reported for the segmentation of wine consumers, there are sociodemographic variables, namely age group (Olsen, Thach, & Nowak, 2007; Thach & Olsen, 2006); purchasing behavior (preferences); consumption habits (Thomas, & Pickering, 2003); lifestyle (Bruwer, Li, & Reid, 2004; Geraghty, & Torres, 2009); involvement (Johnson & Bastian, 2015; Hollebeek, Jaeger, Brodie, & Balemi, 2007; Thach & Olsen, 2004); the level of knowledge (Pomarici, et al., 2017) and attitudes towards local wine (Kolyesnikova, Dodd, & Duhan, 2008) as well as motivation (Seghieri, Casini, & Torrisi, 2007).

2. METHODOLOGY

This study considered the empirical research carried out by Kim and Bonn (2015) and Rojas-Méndez et al. (2015). Based on the consumer segmentation studies reviewed in the literature, the following variables were considered so to identify and describe the organic wine consumer behaviour in Portugal: i) Individual consumer factors (short-term willingness to consume and buy organic wine, level of knowledge, consumption and purchase habits, attitudes towards organic wine, health awareness); ii) External consumer factors (sociodemographic aspects). The research universe consisted of all the elements who had one or more than one common characteristic (Malhotra, 2011), meaning, Portuguese individuals residing in Portugal, aged 18 plus and the habit of consuming wine (this requirement being mandatory) and organic wine. The sample was constructed through the non-probabilistic sampling method, for convenience, known as the snowball (Silvério, 2000). The sample consisted of a total of 220 individuals. The data collection included the application of a questionnaire, which was the research instrument specifically adapted for this purpose. Following ethical principles, response and data confidentiality were guaranteed. The questionnaire was elaborated on the Google Form digital platform and its link was shared through social networks and by email with explanatory messages of the research objective. The questionnaire remained active online for three months (March-May 2019).

3. RESULTS DISCUSSION

3.1. Consumers' sociodemographic characteristics

The consumer of organic wine is mainly characterized by being male and aged between 25 and 54 years old, although a good frequency of females was also found. In relation to educational qualifications, mostly these are graduates and masters, with a family consisting of four elements, whose predominant monthly income varies between 2000 and 3000 €, although there were also families with different-sized households and an income between 1500-2000 € (Table 1).

Gender		Age				
Male	Female	18-24	25-34	45-54	55-64	65+
59,4%	40,6%	7,1%	20,8%	24,9%	12,7%	0%
Education						
Basic Education	Highschool Level	Degree	Postgraduate	Masters	Doctorate	Post-Doc
0,5%	10,3%	35,4%	10,8%	26,2%	4,1%	4,1%
Monthly Net income (family)						
Below 750 €	Between 750 and 1000 €	Between 1500 and 2000 €	Between 2000 and 3000 €	Between 3000 and 4000 €	Between 4000 and 5000 €	Over 5000 €
4,6%	13,7%	16,2%	22,3%	10,2%	4,1%	6,1%
Household Size						
1	2	4	5	6	10	
15,2%	21,8%	30,5%	6,1%	1,5%	0,5%	

Table 1: Consumer Sociodemographics

3.2. Consumer needs and profiles

Figure 1 shows four distinct consumers groups or clusters that was identify considering their needs and profiles. They are the following:

- 1) Unwilling to consume and buy Organic Wine in the short term: there is little willingness to consume and purchase organic wine. Consumer does not seem to have positive attitudes towards organic wine. They consider that organic wine is not of greater quality, nor is it tastier or more attractive than other wines.

They also don't think organic wine is sustainable, or healthier. On the premise of Organic Wine being a fraud, they maintain a neutral position, although they disagree with recommending Organic wine in the short term. They seem to have a neutral degree of health consciousness though they are used to making sacrifices for health.

- 2) Willing to consume Organic Wine but not willing to buy it in the short term: This group of consumers have a neutral position, that is, they neither agree nor disagree with buying or recommending Organic Wine, but the averages obtained are much closer to agreement than to disagreement with the statements. The most positive part of this segment is that they are willing to consume Organic Wine in the short term, which is a potential segment for this market. They are characterized for having a health conscience and for neither agreeing nor disagreeing with the statements presented.
- 3) Willing to consume and purchase Organic wine in the short term: Consumer has a positive attitudes and greater health awareness. Therefore, there are consumers willing to consume, purchase and even recommend Organic Wine. They consider that Organic Wine is healthier and more sustainable but also that it can be harmful to their health. They do not believe that Organic Wine is a fraud or a fad, although they have a neutral opinion when comparing Organic Wines with other wines in aspects such as quality, attractiveness, taste and price. In terms of health, they are very conscious people, who consider it important to know what they consume, and are even willing to change their habits for healthier consumption.
- 4) Neutral disposition towards consuming and purchasing Organic Wine in the short term: This group is characterized by neither agreeing nor disagreeing with the consumption or purchase of Organic Wine in the short term, so it may be a potential segment to consider. Despite their neutral stance, in most respects they appear not to have a positive attitude towards the quality, attractiveness and taste of the Organic wine. They consider it important to know if what they consume is healthy.

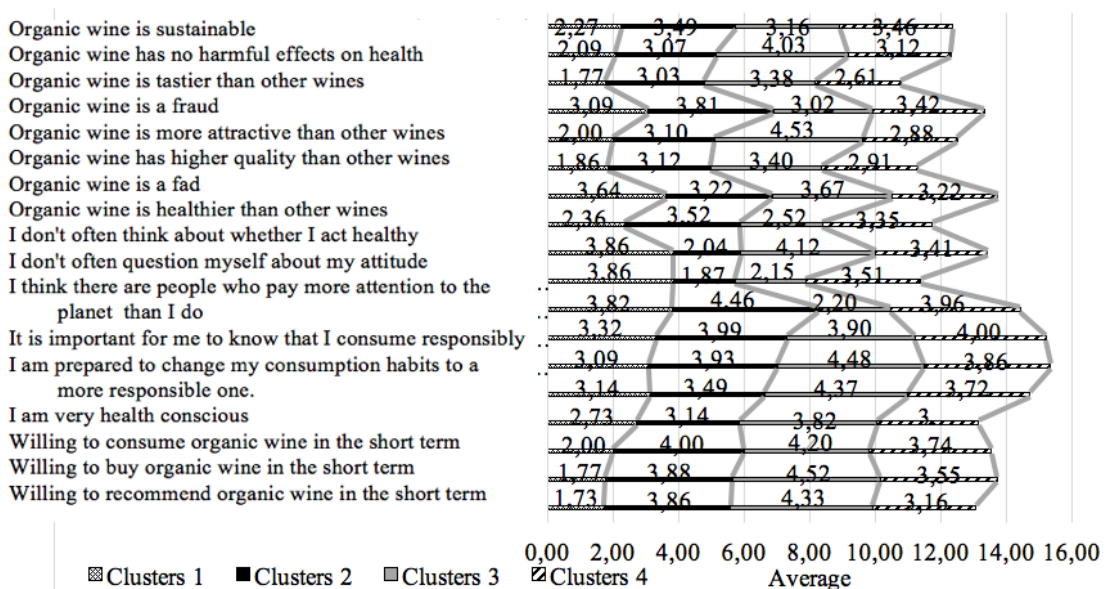


Figure 1: Distinct consumers groups

The aspects shared by all groups are the sporadic consumption of organic wine and, for most of the individuals in each group, consuming a volume of less than 1L per month, with a preference for red Organic wine, although they also consume white Organic wine. The level of knowledge in wine is intermediate, except for the first cluster, which has, mainly, an advanced knowledge. Some differences between the groups was found, considering variables related to the consumption habits and the purchase of Organic wine (Table 2), in addition to the degree

of knowledge on this type of wine. Among the aspects shared by all the segments, are the sporadic consumption of organic wine and, for most of the individuals in each group, consuming a volume of less than 1L per month, with a preference for red Organic wine, although they also consume white Organic wine. The level of knowledge in wine is intermediate, except for the first group, which has, mainly, an advanced knowledge. In the crossing with socioeconomic variables, no great difference was found among the consumers. As the sample mainly consisted of individuals from Évora, all the groups were equally characterized as belonging to this district of the country. In almost all groups, the household of 4 individuals predominated, except in group 1, in which the households mostly amount to 3 people. In group 1, the male gender prevails, unlike group 4, where women dominate, while groups 2 and 3 were more balanced in terms of gender. Having a degree was the most evident literary qualification in most groups, except in group 3 with an equal proportion of individuals holding a master's degree. The highest household net monthly income was found in group 3 (between €2,000-3,000), and the lowest in groups 2 and 4 (€1,000-1,500). Regarding age, group 1 seems to be composed of younger individuals (from 25 to 44 years old). In groups 2 and 3, people aged between 25 and 54 stand out, with the last group being the most balanced, with identical proportions between each of the age groups. In terms of residence, it was not possible to reveal differences, due to the high concentration of people in Évora.

Variables	Group 1	Group2	Group 3	Group 4
Consumed Organic Wine	Yes (68%)	Yes (61%)	Yes (85%)	Yes (58%)
Primary reason for not consuming Organic Wine	Lack consumption habits (29%) – High prices(29%)	Lack consumption habits (56%) – Not available at the location (26%)	Lack consumption habits (50%) - Not available at the location (50%)	Lack consumption habits (45%)- Não Not available at the location (34%)
What would lead to organic wine motivation	Obtain more information on the product (43%)	Obtain more information on the product (52%)	Greater offer at the selling points (44%)	Obtain more information on the product (55%)
Frequency of Organic Wine Consumption	Once a year (46,7%)	Once, every two months (28,6%)	Once every two weeks (21,6%) and once every two months (21,6%)	Once every two months (27%)
Monthly Organic wine consumption (L/month)	< 1L (80%)	< 1L (76%) - 1-2 L (19,5%)	< 1L (61%) - 3-4L (19,5%)	< 1L (87%)
Type of Organic wine that is most consumed	Red (71%) -White (21%)	Red (64%) - White (24%)	Red (74,5%) -White (20%)	Red (82%) -White (15%)
Place of purchase of the organic wine they consume	I don't purchase, I only drink it when someone offers it to me (60%)	Cellars (24%) - I don't purchase, I only drink it when someone offers it to me (21,4%)	Directly from the producers, winemakers, cooperatives (33%) - Supermarkets and Hipermarkets (22%)	Supermarkets and Hipermarkets (32%) - Directly from the producers, winemakers, cooperatives (17%)
Where they get the information on the organic wine they consume	Specialists (Viticulturists, Oenologists, Oenophiles, Sommelier) (53,3%)	Family / Friends (36%) -Specialists (31%)	Internet (Blogs, social media, online shops, websites...) (27%)- Specialists(25%)	Family / Friends (27%) -Especialistas (22%)
Occasions when organic wine is consumed	At home with friends/ family (46%)	At home with friends/ family (76%)	At home with friends/ family (78%)	At home with friends/ family (67%)
Willingness to pay more for organic wine	Yes (13 %)	Yes (45%)	Yes (69%)	Yes (35%)
Maximum value that they are willing to pay for organic wine	> € 4 (60%)	> € 4 (41%)	> € 4 (37%)	> € 4 (41%)

Table 2: Consumer habits and organic wine purchase

4. CONCLUSION

Even though organic wine is widely analyzed in the literature, there are no studies in Portugal on consumer behavior on organic wine, that allow us to understand the situation and potential evolution of organic wine's current reduced market. This study, which objective was to understand consumer behavior, is thus a modest contribution to filling this knowledge gap. This study allowed us to identify the profile of the organic wine consumer as well as its feasible segments with the potential to purchase and consume these wines. This profile includes, above all, male consumers, aged between 25 and 54, with academic qualifications at the bachelor's (higher degree) or master's level, and a family's net monthly income of between €2,000 and €3,000. A group of consumers cluster was found with a high market potential for organic wine, due to the frequency of consumption by its consumers, and because they are very willing to purchase, consume and recommend this product. However, identifying and characterizing consumers in terms of demographic and personal aspects (such as attitudes and habits), main forms of purchase, sources of information used and the reasons that would lead them to consume, remain as an opportunity for those responsible for marketing, with a view towards achieving a better company-consumer connection. The sector owes consumers a greater offer at the main points of sale, diversification of communication strategies, with traditional (events, information from the producer) and innovative proposals, in the field of digital marketing (Google Ad, social networks, website, blog, online stores) and, in content (articles, images, gif, audios, podcast, videos, stories, live broadcasts, among others), allowing for an interaction which makes known the value (stimuli) of the product, generates notoriety and attracts a greater number of people who are willing to buy, consume and recommend organic wine (group 3), or with a neutral condition (groups 2 and 4), including actions aimed at changing attitudes and perceptions of those not willing to buy, consume or recommend (group 1). More research about the field of consumer behavior relating organic wine is needed and should be done in future.

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LITERATURE:

1. Banco de Portugal (2017). *Análise das empresas da indústria das bebidas. Estudos da Central de Balanços Janeiro, 2017*. Acedido em https://www.bportugal.pt/sites/default/files/anexos/pdf-boletim/estudos_da_cb_27_2017.pdf.
2. Bruwer, J., Li, E., & Reid, M. (2004). Segmentation of the Australian Wine Market Using a Wine-Related Lifestyle Approach. *Journal of Wine Research*, 13(3), 217–242. <https://doi.org/10.1080/0957126022000046510>
3. DGADR(Direção Geral de Agricultura e Desenvolvimento Rural). (2017a). *Estratégia Nacional para a Agricultura Biológica*. Acedido em setembro 9, 2018, em <https://www.portugal.gov.pt/media/26727833/20170329-mafdr-estrategia-agricultura-biologica.pdf>
4. DGADR (Direção-Geral de Agricultura e Desenvolvimento Rural). (2017b). *A Produção Biológica. Dados e evolução em Portugal. Medidas de apoio 2007-2020. Planos de ação*. Lisboa. Acedido em setembro 15,2018, em https://www.dgadr.gov.pt/images/docs/val/mpb/AB_Dados_tendencias_2015.pdf
5. Freund, J. (2004). *Economia, Administração e Contabilidade – Estatística Aplicada* (11^a ed.). São Paulo : Bookman.
6. Galicia, L., & López, F. (2015). *Entorno e información de mercados: Aproximación a la investigación comercial*. Vigo: Ideaspropias Editorial.
7. Geraghty, S. & Torres, A. (2009). The Irish wine market: a market segmentation study. *International Journal of Wine Business Research*, 21(2), 143–154.

8. Hair, J. F., Anderson, R. E., Tatham, R., & Black, W. (1999). *Análisis Multivariante* (5^a ed.). Madrid: Prentice Hall Iberia.
9. Hollebeek, L. D., Jaeger, S. R., Brodie, R. J., & Balemi, A. (2007). The influence of involvement on purchase intention for new world wine. *Food Quality and Preference*, 18(8), 1033–1049. <http://dx.doi.org/10.1016/j.foodqual.2007.04.007>.
10. IVV (Instituto da Vinha e do Vinho). (2017). Vinhos e Aguardentes de Portugal. Acedido em [https://www.ivv.gov.pt/np4/%7B\\$clientServletPath%7D/?newsId=1736&fileName=IVV_WEB_TB.PDF](https://www.ivv.gov.pt/np4/%7B$clientServletPath%7D/?newsId=1736&fileName=IVV_WEB_TB.PDF)
11. Johnson, T. E., & Bastian, S. E. (2015). A fine wine instrument – An alternative for segmenting the Australian wine market. *International Journal of Wine Business Research*, 27(3), 182–202. <http://dx.doi.org/10.1108/IJWBR-04-2014-0020>.
12. Kim, H., & Bonn, M. A. (2015). The moderating effects of overall and organic wine knowledge on consumer behavioral intention. *Scandinavian Journal of Hospitality and Tourism*, 15(3), 295–310.
13. Klohr, B., Fleuchaus, R., & Theuvsen, L. (2014). *Who is buying sustainable wine? A lifestyle segmentation of German wine consumers. Proceedings of the 8th International Conference of the Academy of Wine Business Research*,. Geisenheim, Germany. Obtido de https://www.hs-heilbronn.de/6528157/sus02_klohr_bastian.pdf
14. Lucas, M. R. (2006). *Handbook of Consumer Behaviour*. Acedido em <http://agrimba.sggw.waw.pl/>.
15. Malhotra, N. K. (2011). *Pesquisa de Marketing* (3^a ed.). Sao Paulo: Pearson Prentice Hall.
16. Olsen, J., Thach, E. & Nowak, L. (2007). Wine for My Generation: Exploring How US Wine Consumers are Socialized to Wine. *Journal of Wine Research*, 18 (1-18). <https://doi.org/10.1080/09571260701526816>.
17. Pestana, M. H., & Gageiro, J. N. (2014). *Análise de dados para ciências sociais: a complementaridade do SPSS* (6^a ed.). Lisboa: Edições Silabo.
18. Pomarici, E., Amato, M., & Vecchio, R. (2016). Environmental friendly wines: A consumer segmentation study. *Agriculture and Agricultural Science Procedia*, 8, 534–541.
19. Pomarici, E., Lerro, M., Chrysochou, P., Vecchio, R., & Krystallis, A. (2017). One size does (obviously not) fit all: Using product attributes for wine market segmentation. *Wine Economics and Policy*, 6(2), 98–106. <https://doi.org/10.1016/j.wep.2017.09.001>
20. Nasir, V. A., & Karakaya, F. (2014). Consumer segments in organic foods market. *Journal of Consumer Marketing*, 31(4), 263–277.
21. Nielsen. (2017). *Vinhos crescem 8% no On Trade e 4% do Off Trade*. Acedido <http://www.nielsen.com/pt/pt/insights/news/2017/wines-grow-8-percent-in-on-trade-and-4-percent-in-off-trade.html>. Último acesso março, 2018.
22. Rojas-Méndez, J. I., Le Nestour, M., & Rod, M. (2015). Understanding attitude and behavior of canadian consumers toward organic wine. *Journal of Food Products Marketing*, 21(4), 375–396. <https://doi.org/10.1080/10454446.2014.885869>.
23. Santesmases, M., Valderrey, F., & Guzmán, A. (2014). *Fundamentos de Mercadotecnia. Receptor*. D.F. México: Grupo Editorial Patria, S.A.
24. Schiffman, L., & Kanuk, L. (2010). *Comportamiento del Consumidor* (10^a ed.). México: Pearson Education.
25. Seghieri, C., Casini, L., & Torrisi, F. (2007). The wine consumer’s behaviour in selected stores of italian major retailing chains. *International Journal of Wine Business Research*, 19, 139–151.
26. Silvério, M. (2000). *Análise do mercado de vinho e das zonas vitivinícolas nacionais. Posicionamento, segmentação, preferências e atitudes. Caso particular: As sub-regiões do Alentejo* (Tese de Doutoramento). Universidade de Évora, Portugal.

27. Thach, E. C., & Olsen, J. E. (2004). The search for new wine consumers: Marketing focus on consumer lifestyle or lifecycle. *International Journal of Wine Marketing*, 16(3), 44–57. <http://dx.doi.org/10.1108/eb008778>.
28. Thach, E. C., & Olsen, J. E. (2006). Market segment analysis to target young adult wine drinkers. *Agribusiness*, 22(3), 307–322. <https://doi.org/10.1002/agr.20088>
29. Thomas, A., & Pickering, G. (2003). Behavioural segmentation: A New Zealand wine market application. *Journal of Wine Research*, 14(2–3), 127–138. <https://doi.org/10.1080/09571260410001677941>
30. Author surname, Author name initial. (Year of publication). *Title: subtitle* (Research report no. XX). Location: Publisher. Retrieved DD.MM.YYYY from <http://www.example.si/raziskovalnoporočilo.pdf>.
31. Surname, Name initial. (Year). *Title: subtitle* (edition). Location: Press. Retrieved DD.MM.YYYY from <http://www.example.si/example>.
32. Author surname, Author name initial. (DD.MM.YYYY). Article title: article subtitle. *Newspaper title: newspaper subtitle*, pages

ON BENEFICIAL CONNECTIONS AMONG SHORT AGRI-FOOD SUPPLY CHAINS AND CIRCULAR BIOECONOMY

Giannis T. Tsoulfas

*Laboratory of Organizational Innovation & Management Systems (ORIMAS),
Department of Agribusiness & Supply Chain Management,
Agricultural University of Athens, Greece
giannis@aua.gr*

Yannis Mouzakitis

*Division of Management & Organization Studies, Department of Mechanical Engineering &
Aeronautics, University of Patras, Greece,
Laboratory of Organizational Innovation & Management Systems (ORIMAS),
Department of Agribusiness & Supply Chain Management,
Agricultural University of Athens, Greece
ymouzakit@upatras.gr*

Maria Kontopanou

*Laboratory of Organizational Innovation & Management Systems (ORIMAS),
Department of Agribusiness & Supply Chain Management,
Agricultural University of Athens, Greece
kontopanou@aua.gr*

ABSTRACT

The concepts of short agri-food supply chains and circular bioeconomy are complementary and mutually reinforcing, while they may play an important role in sustainability transitions. The elimination of middlemen and the possibilities of forward vertical integration of farmers are the key components of short agri-food supply chains, while bioeconomy refers to the sustainable production and use of biological resources stemming from forestry, agriculture, fisheries, and waste streams. The development of closed-loop systems where waste is converted into new resources, lies in the core of circular bioeconomy, which seeks to reduce waste and maximize resource usage. A sustainable and regenerative economy where waste is viewed as a resource and the use of finite resources is decreased is what this strategy seeks to achieve. When combined, short agri-food supply chains and circular bioeconomy can support sustainable economic growth, social advancement, and environmental protection by encouraging local manufacturing, minimizing waste, and developing innovative bio-based goods and procedures. In this article, we examine the benefits which occur in short agri-food supply when they adopt the principles of circular bioeconomy. Also, we examine how can the ideas of the circular bioeconomy be applied to short agri-food supply chains in order to minimize waste and maximize resource usage. In addition, we explore the corresponding difficulties and opportunities for creating bio-based goods and procedures in short agri-food supply chains. Last but not least, we discuss the effects of short agri-food supply chains and the circular bioeconomy on global agri-food systems and how these concepts are connected with issues at stake, such as food security and sustainability.

Keywords: *bio-based resources, circular bioeconomy, global agri-food systems, short agri-food supply chains, sustainability*

1. INTRODUCTION

The agri-food business is gaining the spotlight. Many experts feel the current food and agricultural system is unsustainable due to carbon emissions, adverse environmental impacts,

and resource depletion. Indeed, automation, heavy fertilizers, and pesticides boost agricultural output, which pollutes the air, water, and land. This sector also generates significant amounts of waste (Abbate *et al.*, 2023). Food supply networks are being restructured. Consumer behavior has changed as a result of the unexpected COVID-19 outbreak, the war in Ukraine, further straining the conventional food supply networks (Tsoulfas *et al.*, 2023). Novel approaches to food production and consumption have emerged in today's setting, along with a wide range of efforts looking for sustainable models in the agri-food industry. Since the 1960s, a variety of creative responses known as alternative food networks have been expanding steadily with the goal of offering viable alternatives to the predominately globalized agri-food system (Ibáñez-Jiménez *et al.*, 2022). In this vein, the goal of a short agri-food supply chain (SAFSC) is to facilitate direct sales between consumers and producers, thereby reducing the need for intermediaries and allowing for the final distribution of goods to take place in the same production area (Lanfranchi and Giannetto, 2015). At the same time, in the ongoing discussions about sustainability, the effective use of natural resources in circular production systems is a compelling argument. Businesses and scientists are becoming more involved in the valorization of agri-food waste in order to reach a greater sustainability level (Klein *et al.*, 2022). In the scientific world, the recycling and revalorization of agri-food sector wastes have become a multidisciplinary research area within the context of the circular bioeconomy (CBE). The agri-food sector's leftovers and byproducts are an excellent source of raw materials with growing social and economic benefits (Mir-Cerdà *et al.*, 2023). The idea of reuse through reduction, recycling, and material recovery during the manufacturing, distribution, and consumption is a foundational principle of the bioeconomy. Other authors emphasize the need for a more comprehensive understanding of the CBE that focuses on resource efficiency and sustainability rather than just technological and financial concerns. In any case, bioresources, which are characterized by a continuous production process, serve as the foundation for their growth. Biogas plants are leading the way for the CBE's future thanks to its sustainable usage for energy (Chodkowska-Miszczuk *et al.*, 2021). In a CBE, underused bio-based food resources should be considered on all fronts, with their greatest environmental, social, and economic worth being extracted, as well as methods for their sustainable and worldwide distribution. It is crucial to bear in mind that significant economic and energy losses may be avoided by turning this waste into value-added goods (Fernández Fortunato *et al.*, 2023). In this article we employ inductive thematic analysis to address the connections among SAFSCs and CBE. In particular, we examine the benefits for SAFSCs in advancing the idea of the CBE. Also, we examine to apply the ideas of the CBE to SAFSCs in order to minimize waste and maximize resource usage. In addition, we examine the difficulties and opportunities for creating bio-based goods and procedures in SAFSCs. Last but not least, we discuss the effects of SAFSCs and the CBE on global agri-food systems.

2. METHODOLOGY

This paper is a literature-based paper where we have addresses observations and findings of relevant studies to to address the following research questions:

- Which are the benefits for SAFSCs when they adopt the principles of the CBE?
- How can CBE be applied to SAFSCs in order to minimize waste and maximize resource usage?
- What are the difficulties and the opportunities for developing bio-based products and processes in SAFSCs?
- What are the effects of SAFSCs and CBE for global food systems?

The statement of these research questions guided the search for relevant literature and ensure that the study is focused and targeted.

We decided to use the Scopus database for the identification of relevant academic literature. To our surprise, the number of papers which deal with short supply chains and CBE in the the agri-food sector is very limited. This may have two interpretations: i) the academic community and practitioners do not regard these topics as important, or ii) these are emerging research topics with very important potential. We strongly support the latter especially when considering the major implications for global food systems due to the COVID-19 pandemic and the war in Ukraine. In order to synthesise the evidence thematic analysis was used. Thematic analysis is used to find, examine, and present patterns or themes in qualitative data (Braun and Clarke, 2012). It is an approach that is versatile and adaptive and can be used with various data sources. By carefully examining the data, classifying it, and noting any patterns or themes that stand out, thematic analysis employs a systematic method for finding themes. Inductive thematic analysis incorporates open coding and iterative analysis to find patterns and themes in qualitative data. Iterative data analysis is used in inductive thematic analysis, when themes and patterns are derived entirely from the data. This enables the appearance of novel ideas that would not have been taken into account otherwise. When investigating novel or understudied phenomena, where pre-existing theoretical frameworks or notions may not be appropriate, inductive thematic analysis is particularly helpful. Researchers must approach the data with an open mind and be prepared to allow the themes spontaneously emerge from the data. They need to be careful not to apply their theoretical frameworks or preexisting prejudices to the evidence. New theoretical frameworks or notions that can guide future study may result from this. Inductive thematic analysis could have the drawback of being time- and resource-consuming, especially when studying huge datasets. Accurately doing the analysis also needs a high level of ability and competence. Inductive thematic analysis has its limitations, just like any other research method. The researcher's interpretation of the data is crucial to inductive thematic analysis, which might result in biases and mistakes. The results of inductive thematic analysis cannot be readily generalized. Inductive thematic analysis can be subjective, and the methods used to find and analyze themes are not always clear. This might make it challenging for other researchers to conduct a similar study and confirm its results.

3. RESULTS

3.1. Benefits for SAFSCs when they adopt the principles of the CBE

SAFSCs can be very helpful for the CBE. In order to advance the CBE, SAFSCs can benefit in the following major areas:

- *Decreased waste* (Brandão *et al.*, 2021; Fărcaș *et al.*, 2021; Khounani *et al.*, 2021; Otoni *et al.*, 2021): One SAFSC that lowers waste is a local farmer's market. The risk of food deterioration and waste is decreased by putting farmers in close contact with customers, which reduces the need for transportation and storage of perishable goods. For instance, a local farmer may sell their tomatoes directly to customers at the market instead of shipping them across the country, which not only lowers waste but also helps the community's economy. The design of agro-biorefineries may take into account the production of edible olive oil from fruit and pomace and the growing of olives. Additionally, the leftover pomace after oil extraction was fed to animals. An alternative is to produce biodiesel.
- *More resource efficiency* (Brandão *et al.*, 2021; Ferreira *et al.*, 2019; Klein *et al.*, 2022): One example of a SAFSC that improves resource efficiency is a community-supported agriculture (CSA) program. Under CSA, local farmers may sell shares of their produce to customers, giving them a stable income and reducing the need for artificial fertilizers and pesticides. For instance, a farmer can grow crops using the natural nutrients produced by the farm's animals while using less synthetic fertilizers, minimizing the impact on the environment and conserving resources.

- *Enhanced economic gains* (Joltreau and Smith, 2020; Klein *et al.*, 2022; Lanfranchi and Giannetto, 2015): A farm-to-table eatery is an example of a SAFSC that helps nearby towns economically. The restaurant promotes the neighborhood economy and adds jobs by obtaining its food from nearby farmers and producers. When a restaurant buys its meat locally, for instance, it helps the neighborhood economy and has less of an environmental impact than when it buys beef from afar.
- *Increased food quality and safety* (Ibáñez-Jiménez *et al.*, 2022; Prain *et al.*, 2022): A farmer's market is another illustration of a SAFSC that increases food quality and security since it sells locally farmed, fresh produce, which gives customers confidence in the food's safety and quality. For instance, a farmer who sells fresh eggs at a neighborhood market gives customers a product that is both safe and of excellent quality, lowering the possibility of contracting a foodborne illness.
- *Minimized environmental impacts* (Fernández Fortunato *et al.*, 2023; Kiehadrouinezhad *et al.*, 2023; Torquati *et al.*, 2021): One example of a SAFSC that minimizes environmental impact is a farm that practices regenerative agriculture. Regenerative agriculture is a farming method that places an emphasis on enhancing soil biodiversity and health while lowering greenhouse gas emissions. For instance, a farmer can use cover crops to enhance soil health, lessen the need for artificial fertilizers, and store carbon in the soil, lowering the impact of agriculture on the environment.

3.2. Application of CBE to SAFSCs in order to minimize waste and maximize resource usage

There are numerous approaches to apply the CBE to SAFSCs to minimize waste and maximize resource use:

- *Upcycling of waste or by-products into new goods with higher value* (Brandão *et al.*, 2021; Mir-Cerdà *et al.*, 2023; Otoni *et al.*, 2021; Tufail *et al.*, 2022): Fruit and vegetable peels, for instance, can be used to generate animal feed and fertilizers from food processing waste. Another illustration is the manufacturing of bio-based products, such bioplastics, from agricultural waste such as maize stalks or wheat straw. SAFSCs may cut waste and generate new money by upcycling trash.
- *Closing the nutrient loop* (Dsouza *et al.*, 2021; Kristensen *et al.*, 2016; Prosperi, 2022): To increase soil fertility and lessen the demand for synthetic fertilizers, closing the nutrient loop entails recycling nutrients from waste back into the soil. For instance, composting food scraps and utilizing them as crop fertilizer can assist to cut waste and enhance soil health. SAFSCs can do this to lessen their dependency on synthetic fertilizers, which can be expensive and have detrimental effects on the environment.
- *Local food systems* (Galeano-Barrera *et al.*, 2022; Ibáñez-Jiménez *et al.*, 2022; Poponi *et al.*, 2021; Tsoulfas *et al.*, 2023): These systems rely on obtaining food locally to cut down on the need for storage and shipping, which can help prevent food waste. SAFSCs can decrease waste and improve the effectiveness of food production and distribution by linking local farmers, producers, and consumers. Also, this may help the local economy grow and strengthen the food system's resilience.
- *Sustainable packaging* (Cristofoli *et al.*, 2023; Mir-Cerdà *et al.*, 2023; Otoni *et al.*, 2021): Biodegradable, compostable, or recyclable materials are used in sustainable packaging. SAFSCs may cut waste and advance a circular economy by employing sustainable packaging. For instance, utilizing biodegradable packaging for fresh fruit can help the food sector produce less plastic waste. Compostable packaging made from materials like cornstarch or sugarcane pulp is one option for small-scale bakeries.
- *Energy production* (Chodkowska-Miszczuk *et al.*, 2021; Díaz *et al.*, 2022): SAFSCs can also use anaerobic digestion or other types of bioenergy to produce energy from waste.

For instance, a farm may use animal excrement to create biogas, which could then be used to generate energy or heat the facility. By doing this, the farm may lessen waste and make more money by producing energy. Use of biofuels like ethanol or biodiesel derived from agricultural waste like maize cobs or soybean oil is another illustration. Furthermore, with the help of microalgae-based technology, wastewater may be bioremediated while producing algal biomass and using its nutrients.

3.3. Difficulties and opportunities for developing bio-based products and processes in SAFSCs

The development of bio-based products and processes in SAFSCs is faced with several challenges and opportunities mainly stemming from the external macro-environment. These challenges and opportunities shape the potential and the dynamics of the sector.

3.3.1. Challenges

The major challenges are the following:

- *Insufficient infrastructure* (Aznar-Sánchez *et al.*, 2020; Fierascu *et al.*, 2019; Gkountani and Tsoulfas, 2023; Karwowska *et al.*, 2021). SAFSCs may not have the necessary infrastructure and technology for developing bio-based goods and processes. Because of this, implementing these principles may be difficult and expensive. For example, to create biogas from cow dung, a small dairy farm may want to establish an anaerobic digester. The farm might not have the infrastructure or technical know-how to build and maintain the digester, which makes it difficult to use this technology.
- *Restricted access to capital* (Adamashvili *et al.*, 2020; Paiva *et al.*, 2020; Tsoulfas *et al.*, 2023; Wreford *et al.*, 2019): SAFSCs frequently experience financial limitations that may restrict their capacity to invest in innovative procedures and technology. The development of bio-based goods and procedures that demand up-front investments may be hampered by this. For example, an organic farming transition and a range of organic vegetable-based goods may be desired by a small-scale vegetable farm. The farm may, however, experience financial limitations that prevent them from making the investments in infrastructure, certifications, and marketing needed to introduce the new goods.
- *Limited technological know-how* (Birch *et al.*, 2010; Borrello *et al.*, 2016; DeMaria *et al.*, 2020; Lainez *et al.*, 2018): Creating and putting into use new technologies and procedures might call for specific knowledge and skills that might not be present in SAFSCs. Adopting new techniques may be difficult as a result, and it may be necessary to seek out partnerships or further training. For example, a small-scale meat producer could want to investigate the use of bio-based packaging for their goods. The processor, however, might not have the technical know-how required to choose the proper packing material and guarantee that it complies with legal standards.
- *Restricted market demand* (Chmieliński and Wieliczko, 2022; Duque-Acevedo *et al.*, 2020; Ioannidou *et al.*, 2020): The market's potential for bio-based items may be restricted, which might restrict its ability to generate income and make it challenging to defend the expense of creating new goods and procedures. For example, a small-scale bakery could desire to create a line of baked goods made with bio-based components that are free of gluten. It may be challenging to justify the expense of producing the new items due to the potential for a small market for these goods.

3.3.2. Opportunities

The major opportunities are the following:

- *Diversification of income streams* (Brennan *et al.*, 2022; Chodkowska-Miszczuk *et al.*, 2021; De Keyser and Mathijs, 2023): Creating bio-based goods and procedures can add new

revenue streams to SAFSCs, decreasing their reliance on conventional agricultural products and opening up new prospects for expansion and profitability. For example, a small dairy farm may create a line of plant-based, biodegradable animal bedding from leftover agricultural waste. As a result, there may be a new source of income for the farm and less waste overall.

- *Benefits for the environment* (Brandão *et al.*, 2021; do Canto *et al.*, 2021; Ferreira *et al.*, 2019; Khouani *et al.*, 2021): Using bio-based goods and procedures might lessen the environmental harm caused by conventional farming methods including the use of pesticides and synthetic fertilizers. SAFSCs may be more resilient and sustainable as a result. For example, a small vegetable farm may establish a closed-loop system where organic waste is composted and used to fertilize crops. This would lessen the demand for synthetic fertilizers and enhance the condition of the soil.
- *Increasing customer demand* (Davis, 2020; Galati *et al.*, 2022; Natsvlishvili *et al.*, 2020): As consumers grow more environmentally conscious and look for more environmentally friendly items, there may be an increase in demand for goods made from bio-based materials. This can open up new market potential for SAFSCs and aid in justifying the expense of creating new goods and procedures. For example, a small-scale meat processor may create a line of plant-based meat substitutes utilizing organic ingredients that are sourced locally. There may be a rise in demand for these items as customers become more conscious of environmental concerns and look for sustainable products, opening up new market potential for the processor.
- *Value-added products* (Fernández Fortunato *et al.*, 2023; Lanfranchi and Giannetto, 2015; Mir-Cerdà *et al.*, 2023; Tufail *et al.*, 2022): Traditional agricultural goods generally have a lower perceived value than bio-based products, which results in shorter agri-food supply chains with the possibility for larger profit margins and more market competition. For example, a small brewery may use leftover grain from the brewing process to make bio-based goods like bread or crackers. These added-value goods can increase the brewery's income streams and cut down on waste. Furthermore, the creation, processing, and use of biocomposite materials constitute a viable option that can aid in the urgent switch from a linear to a circular economic paradigm. In addition, for use in chemical, nutraceutical, and food science applications, by-products high in polyphenols are produced using extracts from agri-food waste.

3.4. Implications of SAFSCs and CBE for global food systems

The CBE and SAFSCs have a significant impact on world food systems and can be used in a variety of ways to address sustainability and food security concerns.

- *Resilience* (Egea *et al.*, 2021; Prain *et al.*, 2022; Proserpi, 2022; Tsoulfas *et al.*, 2023): Traditional agricultural goods generally have a lower perceived value than bio-based products, which results in shorter agri-food supply chains with the possibility for larger profit margins and more market competition. For example, a small brewery may use leftover grain from the brewing process to make bio-based goods like bread or crackers. These added-value goods can increase the brewery's income streams and cut down on waste. Due to border closures, travel restrictions, and other measures during the COVID-19 epidemic, several nations encountered interruptions in their food supply systems. Since they rely on local production and distribution, SAFSCs like CSA programs and farmers' markets have shown to be more resistant to these disturbances. For instance, France's government encouraged the use of CSA programs and provided financial support to farmers' markets to encourage the establishment of SAFSCs during the epidemic.
- *Local economic development* (Elghannam and Mesias, 2019; Galeano-Barrera *et al.*, 2022; Ibáñez-Jiménez *et al.*, 2022; Lanfranchi and Giannetto, 2015; Salavisa and Ferreiro, 2020):

SAFSCs can support local economic growth by assisting small-scale farmers and regional food producers. By increasing income, generating employment, and doing so, this can help to eradicate poverty in rural and peri-urban areas. Such initiatives encourage the establishment of neighborhood agroecological networks among farmers, consumers, and other stakeholders, fostering regional economic growth and boosting food security.

- *Conservation of biodiversity* (Bastos Lima, 2021; Bele *et al.*, 2018; Espro *et al.*, 2021; Klein *et al.*, 2022; Marsden, 2013): The use of biodegradable and renewable resources is promoted in a CBE, which can help preserve biodiversity and use less non-renewable resources. This can aid in preserving ecosystem services, such as pollination, soil fertility, and water management, which are essential for the growth of food. For example, the Biorefinery for Sustainable Production of Bioactive Compounds project in Denmark seeks to create a CBE based on the exploitation of marine resources like seaweed and microalgae. In addition to the extraction of bioactive chemicals for use in pharmaceutical and cosmetic products, the project encompasses the manufacturing of bio-based goods including biofertilizers, animal feed, and bioplastics. By utilizing renewable and biodegradable elements, the initiative encourages the preservation of marine biodiversity.
- *Climate change mitigation* (Kiehadrouinezhad *et al.*, 2023; Klein *et al.*, 2022; Muscio and Sisto, 2020): The CBE can aid in mitigating climate change by reducing greenhouse gas emissions and promoting carbon sequestration. For instance, using bio-based goods and methods can contribute to lowering the consumption of fossil fuels and greenhouse gas emissions. Thus, global warming is decreased. The production of bioenergy from a variety of feedstocks, such as agricultural waste, forestry waste, and biowaste, contributes to a reduction in greenhouse gas emissions and promotes carbon sequestration. The organization promotes encouraging laws and plans that encourage the growth of a bioenergy-based CBE.
- *Food safety and quality* (Fărcaș *et al.*, 2021; Joltreau and Smith, 2020; Prain *et al.*, 2022; Sacchi *et al.*, 2018; Sassatelli and Davolio, 2010): By minimizing the distance between producers and consumers and by encouraging the use of locally grown and seasonally available foods, SAFSCs can improve food safety and quality. This can support ensuring that food is safe, wholesome, and fresh. The Slow Food movement in Italy encourages the consumption of regional and traditional foods that are made using traditional and sustainable techniques. The movement advocates for the use of SAFSCs, such as farmers' markets and direct sales, and it supports small-scale farmers. The movement also promotes the preservation of regional food cultures and traditional food variations, which improves food quality and safety.
- *Access to food* (Borsellino *et al.*, 2020; Galli *et al.*, 2020; Guffey Calkins and Mance, 2021; Prain *et al.*, 2022): By minimizing food waste and boosting food availability in underprivileged regions, SAFSCs can help to improve access to food. In particular in metropolitan settings, this can aid in addressing the problems of food insecurity and malnutrition. The Farm to Food Bank initiative in the United States encourages the production of wholesome food for food banks and other charity groups. The initiative encourages the use of SAFSCs to decrease food waste and boost food availability. It brings together farmers, volunteers, and food banks. By giving underprivileged individuals access to fresh and healthy food, the project helps to address challenges of food insecurity and malnutrition.

4. CONCLUSION

In this paper we have tried to enhance existing connections and establish new ones for the concepts of SAFSCs and CBE. Towards this end we employed an inductive thematic analysis approach which was applied in the rather limited body of relevant literature. SAFSCs may support CBE in a variety of ways, such as lowering environmental impact, lowering resource

consumption, lowering waste, and delivering economic advantages. CBE can be implemented in SAFSCs in a number of ways to minimize waste and maximize resource use, including upcycling leftovers, closing the nutrient loop, supporting regional food systems, using sustainable packaging, and creating energy from waste. SAFSCs may develop a more resilient and sustainable food system and lessen their environmental effect by putting these strategies into reality. Certainly, there are various opportunities and challenges associated with creating bio-based goods and processes in SAFSCs. Even if there can be technical and financial obstacles to overcome, there are also chances to diversify revenue streams, lessen environmental effects, satisfy customer demand, and produce goods with value-added features. SAFSCs may build a more resilient and sustainable food system by recognizing and resolving these issues. Overall, through fostering regional economic growth, biodiversity conservation, climate change mitigation, food safety and quality, and access to food, the concepts of SAFSCs and CBE have the potential to address the issues of food security and sustainability. The creation of beneficial policies and strategies at the local, national, and international levels is nonetheless necessary for the application of these notions.

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LITERATURE:

1. Abbate, S., Centobelli, P., Cerchione, R., Giardino, G. and Passaro, R. (2023). Coming out the egg: Assessing the benefits of circular economy strategies in agri-food industry. *Journal of Cleaner Production*, Vol. 385, 135665.
2. Adamashvili, N., Colantuono, F., Conto, F. and Fiore, M. (2020). Investigating the role of community of practice for sharing knowledge in agriculture sector. *Journal for Global Business Advancement*, Vol. 13 No. 2, pp. 162–184.
3. Aznar-Sánchez, J.A., Velasco-Muñoz, J.F., García-Arca, D. and López-Felices, B. (2020). Identification of Opportunities for Applying the Circular Economy to Intensive Agriculture in Almería (South-East Spain). *Agronomy*, Vol. 10 No. 10, 1499.
4. Bastos Lima, M.G. (2021). Corporate Power in the Bioeconomy Transition: The Policies and Politics of Conservative Ecological Modernization in Brazil. *Sustainability*, Vol. 13 No. 12, 6952.
5. Bele, B., Norderhaug, A. and Sickel, H. (2018). Localized Agri-Food Systems and Biodiversity. *Agriculture*, Vol. 8 No. 2, 0022.
6. Birch, K., Levidow, L. and Papaioannou, T. (2010). Sustainable Capital? The Neoliberalization of Nature and Knowledge in the European ‘Knowledge-based Bio-economy’. *Sustainability*, Vol. 2 No. 9, 2898.
7. Borrello, M., Lombardi, A., Pascucci, S. and Cembalo, L. (2016). The Seven Challenges for Transitioning into a Bio-based Circular Economy in the Agri-food Sector. *Recent Patents on Food, Nutrition & Agriculture*, Vol. 8 No. 1, pp. 39–47.
8. Borsellino, V., Schimmenti, E. and El Bilali, H. (2020). Agri-food markets towards sustainable patterns. *Sustainability*, Vol. 12 No. 6, 2193.
9. Brandão, A.S., Gonçalves, A. and Santos, J.M.R.C.A. (2021). Circular bioeconomy strategies: From scientific research to commercially viable products. *Journal of Cleaner Production*, Vol. 295, 126407.

10. Braun, V. and Clarke, V. (2012). Thematic analysis. In Cooper, H., Camic, P.M., Long, D.L., Panter, A.T., Rindskopf, D. and Sher, K.J. (Eds.), *APA Handbook of Research Methods in Psychology, Vol 2: Research Designs: Quantitative, Qualitative, Neuropsychological, and Biological.*, American Psychological Association, Washington, pp. 57–71.
11. Brennan, L., O’Gorman, A., Barth, S., Cadden, T., Dean, M., Doohan, F., Henchion, M., *et al.* (2022). An innovative food system approach to diversifying protein intake: Protein-I: Shared Island sustainable healthy nutrition. *Nutrition Bulletin*, Vol. 47 No. 4, pp. 516–523.
12. do Canto, N.R., Grunert, K.G. and De Barcellos, M.D. (2021). Circular Food Behaviors: A Literature Review. *Sustainability*, Vol. 13 No. 4, 1872.
13. Chmieliński, P. and Wieliczko, B. (2022). Research and innovation challenges for better policies in food systems and bioeconomy transitions – evidence from Poland. *International Food and Agribusiness Management Review*, Vol. 25 No. 5, pp. 789–801.
14. Chodkowska-Miszczuk, J., Martínát, S. and van der Horst, D. (2021). Changes in feedstocks of rural anaerobic digestion plants: External drivers towards a circular bioeconomy. *Renewable and Sustainable Energy Reviews*, Vol. 148, 111344.
15. Cristofoli, N.L., Lima, A.R., Tchoukouang, R.D.N., Quintino, A.C. and Vieira, M.C. (2023). Advances in the Food Packaging Production from Agri-Food Waste and By-Products: Market Trends for a Sustainable Development. *Sustainability*, Vol. 15 No. 7, 6153.
16. Davis, G. (2020). Sustaining Queensland’s Agricultural Sector: Challenges and Opportunities from the Bioeconomy and the Circular Economy. In Omran, A. and Schwarz-Herion, O. (Eds.), *Sustaining Our Environment for Better Future: Challenges and Opportunities*, Springer Singapore, Singapore, pp. 117–144.
17. De Keyser, E. and Mathijs, E. (2023). A typology of sustainable circular business models with applications in the bioeconomy. *Frontiers in Sustainable Food Systems*, Vol. 6, 1028877.
18. DeMaria, F., Zezza, A., DeMaria, F. and Zezza, A. (2020). Drivers and barriers of process innovation in the EU manufacturing food processing industry: exploring the role of energy policies. *Bio-based and Applied Economics Journal*, Vol. 9 No. 1, 308834.
19. Díaz, V., Leyva-Díaz, J.C., Almécija, M.C., Poyatos, J.M., del Mar Muñío, M. and Martín-Pascual, J. (2022). Microalgae bioreactor for nutrient removal and resource recovery from wastewater in the paradigm of circular economy. *Bioresource Technology*, Vol. 363 127968.
20. Dsouza, A., Price, G.W., Dixon, M. and Graham, T. (2021). A Conceptual Framework for Incorporation of Composting in Closed-Loop Urban Controlled Environment Agriculture. *Sustainability*, Vol. 13 No. 5, 2471.
21. Duque-Acevedo, M., Belmonte-Ureña, L.J., Toresano-Sánchez, F. and Camacho-Ferre, F. (2020). Biodegradable Raffia as a Sustainable and Cost-Effective Alternative to Improve the Management of Agricultural Waste Biomass. *Agronomy*, Vol. 10 No. 9, 1261.
22. Egea, F.J., López-Rodríguez, M.D., Oña-Burgos, P., Castro, A.J. and Glass, C.R. (2021). Bioeconomy as a transforming driver of intensive greenhouse horticulture in SE Spain. *New Biotechnology*, Vol. 61, pp. 50–56.
23. Elghannam, A. and Mesias, F. (2019). Short food supply chains from a social media marketing perspective: A consumer-oriented study in Spain. *New Medit*, Vol. 18 No. 1, pp. 79–90.
24. Espro, C., Paone, E., Mauriello, F., Gotti, R., Uliassi, E., Bolognesi, M.L., Rodríguez-Padrón, D., *et al.* (2021). Sustainable production of pharmaceutical, nutraceutical and bioactive compounds from biomass and waste. *Chemical Society Reviews*, Vol. 50 No. 20, pp. 11191–11207.

25. Fărcaș, A., Drețcanu, G., Pop, T.D., Enaru, B., Socaci, S. and Diaconeasa, Z. (2021). Cereal processing by-products as rich sources of phenolic compounds and their potential bioactivities. *Nutrients*, Vol. 13 No. 11, 3934.
26. Fernández Fortunato, E., Jiménez-Sáez, F. and Hontoria, E. (2023). Can Industry Counteract the Ecological Crisis? An Approach for the Development of a New Circular Bioeconomic Model Based on Biocomposite Materials. *Sustainability*, Vol. 15 No. 4, 3382.
27. Ferreira, V.J., Arnal, Á.J., Royo, P., García-Armingol, T., López-Sabirón, A.M. and Ferreira, G. (2019). Energy and resource efficiency of electroporation-assisted extraction as an emerging technology towards a sustainable bio-economy in the agri-food sector. *Journal of Cleaner Production*, Vol. 233, pp. 1123–1132.
28. Fierascu, R.C., Fierascu, I., Avramescu, S.M. and Sieniawska, E. (2019). Recovery of Natural Antioxidants from Agro-Industrial Side Streams through Advanced Extraction Techniques. *Molecules*, Vol. 24 No. 23, 4212.
29. Galati, A., Migliore, G., Thrassou, A., Schifani, G., Rizzo, G., Adamashvili, N. and Crescimanno, M. (2022). Consumers' Willingness to Pay for Agri-Food Products Delivered with Electric Vehicles in the Short Supply Chains. *FIB Business Review*, doi: 10.1177/23197145221112743.
30. Galeano-Barrera, C.J., Mendoza-García, E.M., Martínez-Amariz, A.D. and Romero-Riaño, E. (2022). Theoretical model of territorial agro-industrial development through multi-focus research analytics. *Journal of Rural Studies*, Vol. 94, pp. 295–304.
31. Galli, F., Prosperi, P., Favilli, E., D'Amico, S., Bartolini, F. and Brunori, G. (2020). How can policy processes remove barriers to sustainable food systems in Europe? Contributing to a policy framework for agri-food transitions. *Sustainable Food Systems for Healthy Diets in Europe and Central Asia*, Vol. 96, 101871.
32. Gkountani, V.A. and Tsoulfas, G.T. (2023). Circular Bioeconomy: A Review on the Current State and Future Opportunities. In Busu M. (Ed.), *Digital Economy and the Green Revolution, Springer Proceedings in Business and Economics*, Springer Nature, pp. 277–286.
33. Guffey Calkins, J. and Mance, C. (2021). How partnerships shaped the Dane CARES Farm-to-Food Bank program. *Journal of Agriculture, Food Systems, and Community Development*, Vol. 10 No. 4, pp. 33–36.
34. Ibáñez-Jiménez, Á., Jiménez-Olivencia, Y., Mesa-Pedrazas, Á., Porcel-Rodríguez, L. and Zimmerer, K. (2022). A Systematic Review of EU-Funded Innovative Agri-Food Projects: Potential for Transfer between Territories. *Land*, Vol. 11 No. 4, 0519.
35. Ioannidou, S.M., Pateraki, C., Ladakis, D., Papapostolou, H., Tsakona, M., Vlysidis, A., Kookos, I.K., *et al.* (2020). Sustainable production of bio-based chemicals and polymers via integrated biomass refining and bioprocessing in a circular bioeconomy context. *Bioresource Technology*, Vol. 307, 123093.
36. Joltreau, T. and Smith, A. (2020). Short Versus Long Supply Chains in Agri-Food Sectors: Peaceful Coexistence or Political Domination? The Case of foie gras in South-West France. *Sociologia Ruralis*, Vol. 60 No. 3, pp. 680–697.
37. Karwowska, M., Łaba, S. and Szczepański, K. (2021). Food Loss and Waste in Meat Sector—Why the Consumption Stage Generates the Most Losses?. *Sustainability*, Vol. 13 No. 11, 6227.
38. Khounani, Z., Hosseinzadeh-Bandbafha, H., Moustakas, K., Talebi, A.F., Goli, S.A.H., Rajaeifar, M.A., Khoshnevisan, B., *et al.* (2021). Environmental life cycle assessment of different biorefinery platforms valorizing olive wastes to biofuel, phosphate salts, natural antioxidant, and an oxygenated fuel additive (triacetin). *Journal of Cleaner Production*, Vol. 278, 123916.

39. Kiehadrouinezhad, M., Merabet, A. and Hosseinzadeh-Bandbafha, H. (2023). A life cycle assessment perspective on biodiesel production from fish wastes for green microgrids in a circular bioeconomy. *Bioresource Technology Reports*, Vol. 21, 101303.
40. Klein, O., Nier, S. and Tamásy, C. (2022). Towards a Circular Bioeconomy? Pathways and Spatialities of Agri-Food Waste Valorisation. *Tijdschrift Voor Economische En Sociale Geografie*, Vol. 113 No. 2, pp. 194–210.
41. Kristensen, D.K., Kjeldsen, C. and Thorsøe, M.H. (2016). Enabling Sustainable Agro-Food Futures: Exploring Fault Lines and Synergies Between the Integrated Territorial Paradigm, Rural Eco-Economy and Circular Economy. *Journal of Agricultural and Environmental Ethics*, Vol. 29 No. 5, pp. 749–765.
42. Lainez, M., González, J.M., Aguilar, A. and Vela, C. (2018). Spanish strategy on bioeconomy: Towards a knowledge based sustainable innovation. *Bioeconomy*, Vol. 40, pp. 87–95.
43. Lanfranchi, M. and Giannetto, C. (2015). A case study on the role of farmers' markets in the process of shortening the food chain and the possible economic benefits for consumers. *Quality - Access to Success*, Vol. 16 No. 144, pp. 94–98.
44. Marsden, T. (2013). Sustainable place-making for sustainability science: the contested case of agri-food and urban–rural relations. *Sustainability Science*, Vol. 8 No. 2, pp. 213–226.
45. Mir-Cerdà, A., Nuñez, O., Granados, M., Sentellas, S. and Saurina, J. (2023). An overview of the extraction and characterization of bioactive phenolic compounds from agri-food waste within the framework of circular bioeconomy. *TrAC - Trends in Analytical Chemistry*, Vol. 161, 116994.
46. Muscio, A. and Sisto, R. (2020). Are Agri-Food Systems Really Switching to a Circular Economy Model? Implications for European Research and Innovation Policy. *Sustainability*, Vol. 12 No. 14, 5554.
47. Natsvlishvili, I., Kharashvili, E. and Lazariashvili, T. (2020). Bio-products market in Georgia: current challenges and development perspectives. *International Journal of Markets and Business Systems*, Vol. 4 No. 1, pp. 81–98.
48. Otoni, C.G., Azeredo, H.M.C., Mattos, B.D., Beaumont, M., Correa, D.S. and Rojas, O.J. (2021). The Food–Materials Nexus: Next Generation Bioplastics and Advanced Materials from Agri-Food Residues. *Advanced Materials*, Vol. 33 No. 43, 2102520.
49. Paiva, T., Ribeiro, M. and Coutinho, P. (2020). R&D Collaboration, Competitiveness Development, and Open Innovation in R&D. *Journal of Open Innovation: Technology, Market, and Complexity*, Vol. 6 No. 4, 0116.
50. Poponi, S., Arcese, G., Mosconi, E.M., Pacchera, F., Martucci, O. and Elmo, G.C. (2021). Multi-actor governance for a circular economy in the agri-food sector: Bio-districts. *Sustainability*, Vol. 13 No. 9, 4718.
51. Prain, G., Simon, D., Halliday, J. and Drechsel, P. (2022). Investment priorities for research and innovation in urban agri-food systems: Toward more resilient cities in the Global South. *Frontiers in Sustainable Food Systems*, Vol. 6, 965011.
52. Prospero, P. (2022). Circular bioeconomy of agri-food value chains: Innovative, sustainable, and circular business models' contributions to sustainable diets and food systems. In Kevany, K. and Prospero, P. (Eds.), *Routledge Handbook of Sustainable Diets*, Routledge, pp. 479–495.
53. Sacchi, G., Cei, L., Stefani, G., Lombardi, G.V., Rocchi, B., Belletti, G., Padel, S., *et al.* (2018). A multi-actor literature review on alternative and sustainable food systems for the promotion of cereal biodiversity. *Agriculture*, Vol. 8 No. 11, 0173.

54. Salavisa, I. and Ferreiro, M.F. (2020). Business Model Innovation and Transition to a Sustainable Food System: A Case Study in the Lisbon Metropolitan Area. In Matos, F., Vairinhos, V., Salavisa, I. Edvinsson, L., and Massaro, M. (Eds.), Knowledge, People, and Digital Transformation, *Contributions to Management Science*, Springer, pp. 69–84.
55. Sassatelli, R. and Davolio, F. (2010). Consumption, Pleasure and Politics: Slow Food and the politico-aesthetic problematization of food. *Journal of Consumer Culture*, Vol. 10 No. 2, pp. 202–232.
56. Torquati, B., Cecchini, L., Paffarini, C. and Chiorri, M. (2021). The economic and environmental sustainability of extra virgin olive oil supply chains: An analysis based on food miles and value chains. *Economia Agro-Alimentare*, Vol. 23 No. 1, pp. 1–28.
57. Tsoulfas, G.T., Trivellas, P., Reklitis, P. and Anastasopoulou, A. (2023). A Bibliometric Analysis of Short Supply Chains in the Agri-Food Sector. *Sustainability*, Vol. 15 No. 2, 1089.
58. Tufail, T., Ain, H.B.U., Saeed, F., Nasir, M., Basharat, S., Mahwish, Rusu, A.V., *et al.* (2022). A Retrospective on the Innovative Sustainable Valorization of Cereal Bran in the Context of Circular Bioeconomy Innovations. *Sustainability*, Vol. 14 No. 21, 14597.
59. Wreford, A., Bayne, K., Edwards, P. and Renwick, A. (2019). Enabling a transformation to a bioeconomy in New Zealand. *Environmental Innovation and Societal Transitions*, Vol. 31, pp. 184–199.

DECREASING CONTENT OF SOIL ORGANIC MATTER AS DIRECT LOST OF NITROGEN AND MONEY FROM SOIL

Zdenko Loncaric

*Faculty of Agrobiotechnical Sciences Osijek, V. Preloga 1, Osijek, Croatia
zdenko.loncaric@fazos.hr*

Domagoj Rastija

*Faculty of Agrobiotechnical Sciences Osijek, V. Preloga 1, Osijek, Croatia
drastija@fazos.hr*

Hrvoje Hefer

*Croatian Agency for Agriculture and Food, Vinkovačka cesta 63c, Osijek, Croatia
hrvoje.hefer@hapih.hr*

Milena Andrisic

*Croatian Agency for Agriculture and Food, Vinkovačka cesta 63c, Osijek, Croatia
milena.andrisic@hapih.hr*

Daniel Rasic

*Croatian Agency for Agriculture and Food, Vinkovačka cesta 63c, Osijek, Croatia
daniel.rasic@hapih.hr*

Ivana Zegnal

*Croatian Agency for Agriculture and Food, Vinkovačka cesta 63c, Osijek, Croatia
ivana.zegnal@hapih.hr*

Ruzica Loncaric

*Faculty of Agrobiotechnical Sciences Osijek, V. Preloga 1, Osijek, Croatia
ruzica.loncaric@fazos.hr*

ABSTRACT

The success and profitability of growing crops depends significantly on the fertility of the soil, i.e. the amount of required fertilizers. On the other hand, the reduction of humus content is among the most significant indicators of soil degradation in Croatia. For this reason, 1,000 composite soil samples on a depth of 0-30 cm in eastern Croatia were collected firstly in 2005 and 2006 (500 samples each year), and then again from the same locations after 15 years, i.e. in 2020 and 2021. In total, 2,000 samples from 1,000 different production plots were collected and this paper presents an analysis of changes in soil organic matter content on 780 plots under crops production. In the initial set of samples (2005 and 2006), an average of 2.25% soil organic matter (SOM) was determined, and after 15 years, an average of 1.99% SOM was determined, i.e. 9.89% less SOM. The decrease in SOM was determined on three quarters of analyzed arable soils in Croatia which indicates a very serious degradation of soil fertility. An average of 21.7 t/ha of SOM was lost (9.9% of initial SOM content) in these soils over a period of 15 years (1.45 t/ha per year), which represents a significant loss of nitrogen pool of 1.086 kg/ha, i.e. an annual loss of 72.43 kg/ha. The decrease in humus content results in a decrease of the mineralization potential by an average of 18.7%, but in 43% of the soils the mineralization potential is reduced by more than 20%. The determined reduction of the N pool over 15 years indicates that more than 1% of the initial amount of nitrogen has been mineralized per year, and therefore models that predict mineralization of more than 1.5% of

nitrogen in the conditions of continental Croatia should be used. The result of humus degradation is also reflected in the fact that more than 195 kg/ha of N is needed for corn fertilization on more than three quarters of the analyzed soils, and 15 years ago this was needed on half of the soils. The losses of the nitrogen pool and the consequent higher need for fertilization show how important it is to stop the degradation of the humus content in soils, even if only the direct reduction of the N content is taken into account.

Keywords: soil degradation, mineralization, nitrogen fertilization, fertilization costs, organic agriculture

1. INTRODUCTION

Soil fertility is extremely significant for successful and profitable agricultural production. In fertile soils, fertilization and other agrotechnical measures are aimed at maintaining fertility and degradation of fertility is unacceptable, and in soils with insufficient fertility, agrotechnical measures are aimed at improving or increasing soil fertility (Lončarić et al., 2015). The reduction of soil organic matter (SOM) or humus content, together with soil acidification, is among the most significant processes of soil degradation in Croatia. Fertilization with organic fertilizers, especially on soils with decreased SOM content, is necessary for sustainable agricultural production (Lončarić et al, 2022). Problems such as loss of organic carbon from the soil (Nkoa, 2014), the high cost of fertilization, soil acidification and increased risk of low yields are more and more common in agricultural production. Among all other properties, humus as a stable fraction of organic colloids is extremely important for soil fertility. Higher SOM (humus) content increases the mineralization potential, elasticity and buffering properties of the soil, soil exchange capacity, and the availability of nutrients. The annual N mineralization potential in soils with <1% SOM is lower than 20-25 kg/ha, in soils with 2% SOM around 45-55 kg/ha, and in soils >4% SOM the potential is more than 90 kg/ha. The elasticity and buffer properties of the soil are very important for neutralizing unfavorable conditions in the soil (eg unfavorable seasonal changes in humidity, conductivity and soil reaction). Soils with low SOM content lack elasticity and stressful conditions have a direct harmful effect on the plant because the soil cannot "absorb" them. The amount of humus in the soil greatly affects the chemical and physical properties of the soil, such as water capacity, buffer capacity, metal binding capacity, sorption of hydrophobic organic compounds, stability of aggregates of soil particles, etc. (Wershaw, 1993), therefore, it is very important to maintain an adequate level of humus in agricultural soils. Agricultural practice in Croatia for the last few decades includes adequate mineral fertilization, but very often insufficient use or even complete omission of organic fertilization (Halter et al, 2021) and in last three years, the about 50% of the analysed soils were poor in humus (SOM) content (Hefer et al, 2023). The aim of paper was to analyze the level of SOM content and N pool over 15-year period in crop production and impact of possible soil degradation by SOM content decreasing on needs in fertilization by nitrogen.

2. MATERIAL AND METHODS

2.1. Soil samples collection

For this research, 2,000 composite soil samples in total were collected in eastern Croatia, as a geographical concept, according to Bašić et al. (2017). The plots for soil sampling were selected based on the spatial distribution on fields under cultivation of crops or permanent plantations (in ration 3:1, approximately). The first 1,000 soil samples were collected firstly in 2005 and 2006 (500 samples each year), and then again from the same locations after 15 years, i.e. in 2020 and 2021. The composite samples were collected from a soil depth of 0-30 cm using control circular sampling according to Lončarić et al. (2014). In total, 2,000 samples from 1,000 different production plots were collected for analysis. This paper presents the results of analysis of soil organic matter content on 780 plots under crops production (a total of 1,560 samples).

2.2. Soil analyses

Composite soil samples were transported to the agrochemical laboratory and prepared for analyses according to ISO 11464 (ISO, 1994) in drying oven. All the basic agrochemical properties of the soil were analyzed, and the results of the soil pH values, as well as the humus content and the physical properties of the soil textures were used in this research. The determination of soil pH was made according to ISO 10390 (ISO, 1994) in two different soil suspension 1:5 (v/v): soil suspension in deionized water and in a 1M potassium chloride (KCl) solution. The soil organic matter (SOM) was determined by sulfochromic oxidation method according to ISO 14235 (ISO, 1998). The soil texture was determined using ISO 11277 method for sieving and sedimentation (ISO, 1998).

2.3. Calculating amount of SOM and N, mineralization and fertilization needs

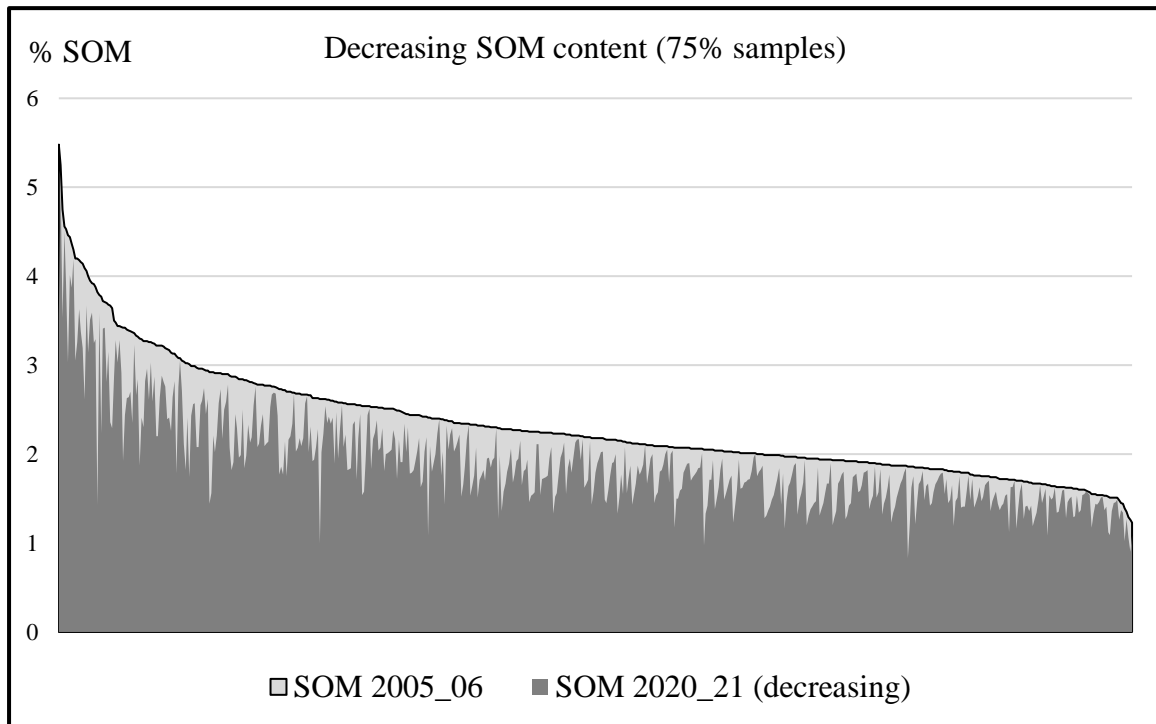
The total SOM content in the top soil layer was calculated from the laboratory result (% SOM in dry soil samples), soil depth of 30 cm and soil bulk density, and expressed in kg/ha or t/ha. The N pool in the soil used in this research represents the N contained in SOM, and was calculated on the assumption that humus in arable soils of eastern Croatia contains an average of 5% N. Mineralization potential was estimated using a mineralization model (Lončarić et al, 2006) based on humus content, soil texture and soil reaction (pH in soil suspension in water and KCl solution). Informing about the prices of mineral fertilizers on the domestic market was carried out by reviewing the available price lists, contacting producers and distributors of mineral fertilizers. The starting point for forming the prices of mineral fertilizers are the real prices in the period from 2011 to 2022 that agricultural producers paid when buying mineral fertilizers. The prices included in the research are average prices for Osijek-Baranja County or the Republic of Croatia (Nikolin, 2022).

3. RESULTS AND DISCUSSION

3.1. Changes in soil organic matter (SOM) content

In the initial set of samples (2005 and 2006), an average of 2.25% soil organic matter (SOM) was determined, with a range of 1.06% to 5.48% SOM. At the same time, 41.79% of the soil was poorly in SOM (< 2% SOM), 47.05% with moderate SOM content (2-3%), and 11.16% with high SOM content (>3 % SOM). After 15 years, an average of 1.99% SOM was determined, i.e. 9.89% less SOM compared to 2005 and 2006. Thus, after 15 years, even 60.64% of the soil was poorly in SOM, 32.69% with moderate, and only 6.67% with high SOM content. The decrease in SOM was determined on 75% of the analysed arable land (585 out of a total of 780 samples), the increase in SOM was on 24.36%, and there was no change in SOM on 0.64% of the analysed arable land. The lighter gray area in Graph 1 shows the lost humus over 15 years. But, it is also very significant that the decline of SOM during 15 years in 56,15% analysed soils was up to 25%, in 18,08% soils 25-50%, and in 0,77% soils even > 50% of the SOM content.

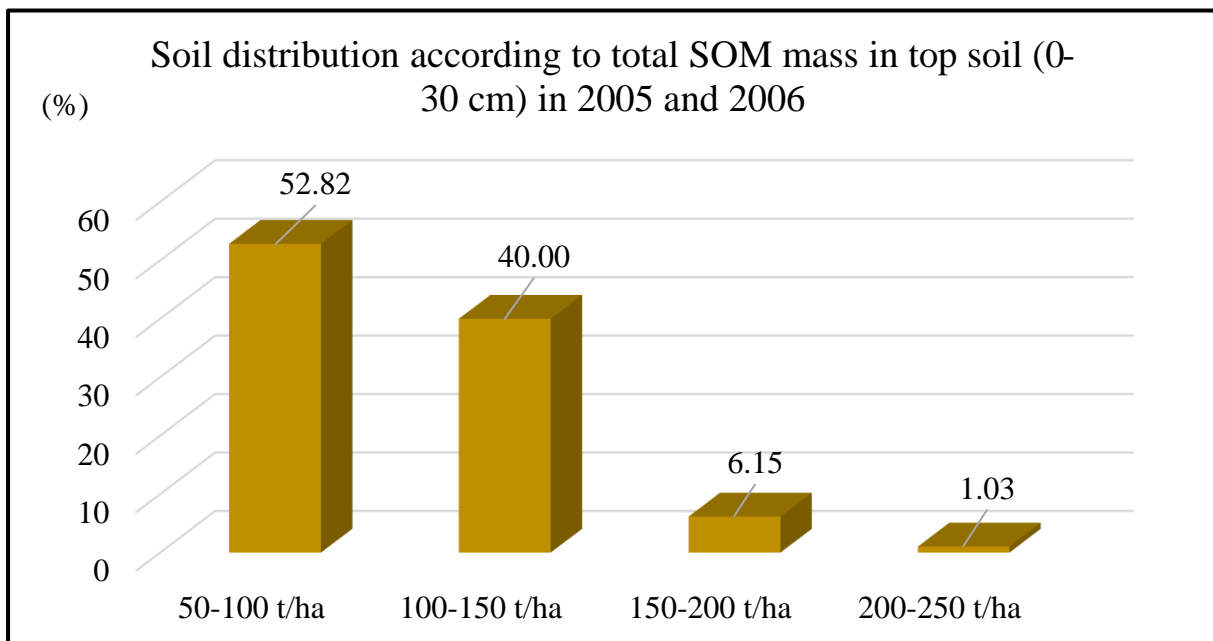
Graph following on the next page



Graph 1: Decreasing SOM content over 15 years in 75 % of analysed arable land

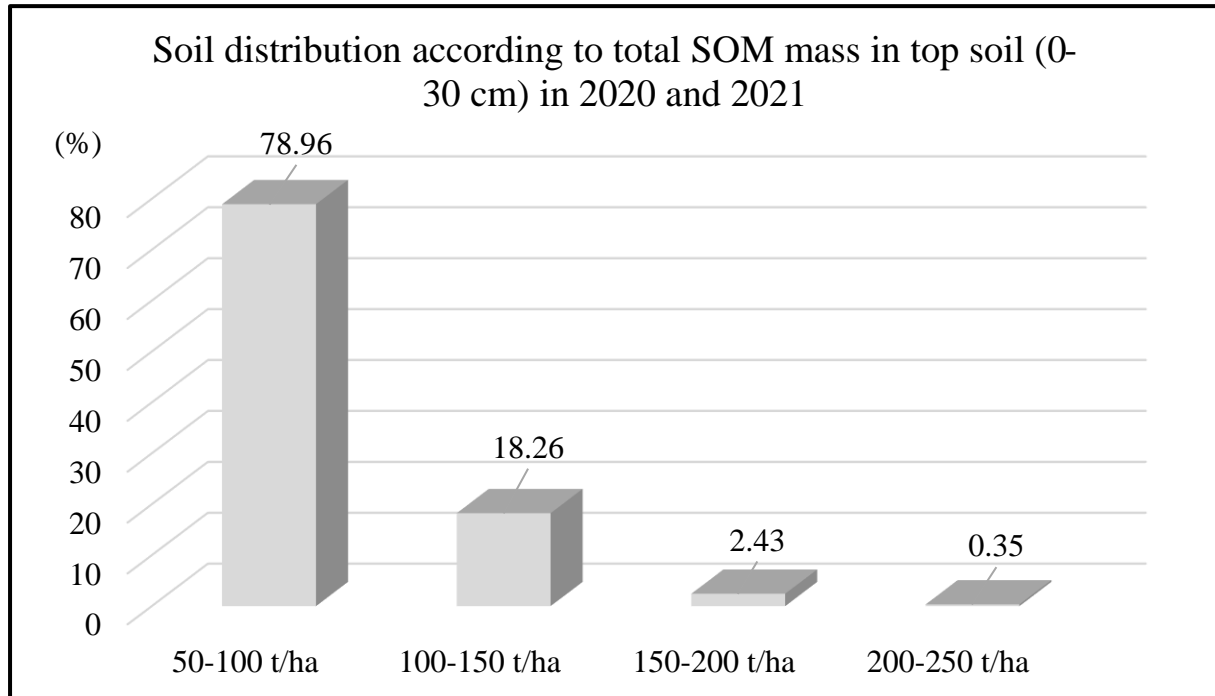
3.2. Changes in total SOM content and relevant amounts of N

The total mass of humus (SOM) at the beginning of the experiment (2005 and 2006) in the top soil layer (0-30 cm) of the analyzed arable plots where a decrease in humus content was later determined (75% of analysed arable land), was an average of 104.83 t/ha with a range of 55.35-246.60 t/ha. Assuming that humus contains 5% N, this means that at the beginning (2005 and 2006) in these soils there was an average of 5,307 kg/ha of N contained in SOM. The total content of SOM in the top soil layer in the largest number of samples (52.8%) was 50-100 t/ha, then 100-150 t/ha in 40% of the samples, while only 7% of the soil contained >150 t/ha of humus (Graph 2).



Graph 2: The soil distribution according to SOM mass in top soil layer (2005 and 2006)

After 15 years, the average amount of SOM in the top soil layer of the same soils was 85.89 t/ha (18.06 % less) with a slightly lower range (37.35-85-89 t/ha) than in 2005 and 2006 and with the soil distribution significantly shifted towards lower SOM amounts (Graph 3). The total amount of N contained in the humus was also significantly reduced to an average amount of 4,221 kg/ha.



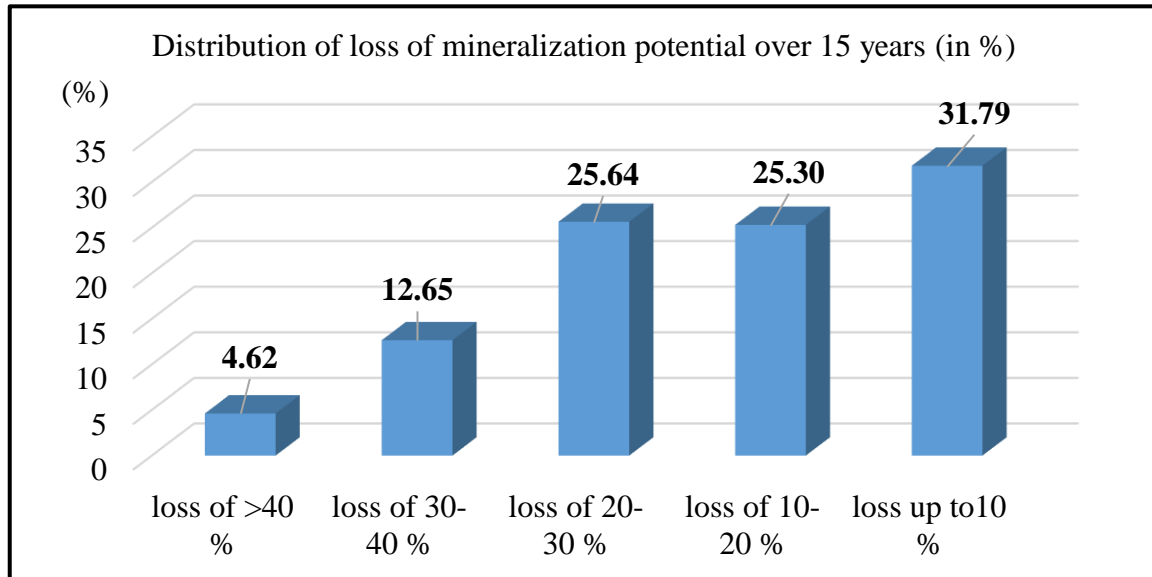
Graph 3: The soil distribution according to SOM mass in top soil layer (2020 and 2021)

Thus, the average loss of humus (SOM) in these soils during 15 years was 21,728 kg/ha. This means that the average annual loss of humus (SOM) was determined to be 1,449 kg/ha. Consequently, the determined average loss of N over 15 years was 1.086 kg/ha, and the average annual loss of N pool as part of SOM was 72.43 kg/ha. Since the total area of 585 plots on which a decrease in SOM content was determined over the 15 years is about 4,480 ha, that is the total amount of lost humus (SOM) of an important mass, as much as 97,336.36 t, i.e. 97.3×10^6 kg. Of course, also very significant is the total amount of 4,866,818 kg of N contained in SOM, which was lost from the top soil layer of 4,480 ha over 15 years, or 324,454.54 kg of N per year (what is an aliquot of the amount of N contained in 705,336 kg of urea or 1,201,684 kg of CAN).

3.3. Changes in potential humus mineralization and predicted mineral N in soils

SOM content is the most important property of the soil that affects the potential of annual nitrogen mineralization, i.e. the amount of nitrogen that will be potentially available to crops through humus mineralization. Predicted initial mineralization (2005 and 2006) on soils was 45.25 kg/ha N, with a range of 23.64 to 107.66 kg/ha. This is the average aliquot of N contained in approximately 98 kg of urea, with a range of 51-234 kg/ha of urea. The predicted amounts of N in mineralization during the average corn vegetation were only slightly lower (on average 40.72 kg/ha with a range of 21.28-96.89), while they were significantly lower for the average wheat vegetation (on average 22.62 with a range of 11.82- 53.83 kg/ha N). Predicted mineralization in the same soils after 15 years (2020 and 2021) is 36.80 kg/ha N, with a range of 14.56 to 86.03 kg/ha. The predicted amounts of N in mineralization during the average corn vegetation are in range of 13.10-96.89, while they are significantly lower than 15 years ago for

the wheat vegetation (range of 7.28- 43.02 kg/ha N). The reduction of potential annual N mineralization is on average 8.45 kg/ha of N, which, considering the initial values, is a significant loss of 18.7% of the already very low mineralization potential in just 15 years. The stated 8.45 kg/ha of N per year in the top soil layer of 4,480 ha makes a very significant 37,856 kg of N.



Graph 4: Loss of mineralization potential over 15 years in 75 % of analysed arable land

The distribution of the decrease in mineralization potential is also very significant, where a loss of > 20% of the mineralization potential was found in as many as 42.91% of the analyzed arable soils (Graph 4). Determined differences in the predicted annual nitrogen mineralization and the measured annual nitrogen losses in a period of 15 years indicate that the average actual mineralization may have been 1.60 times higher than the predicted mineralization.

3.4. Increased needs of mineral N fertilizers in corn growing

Decreased humus (SOM) content in arable soils resulted in lower mineralization and consequently, on soils of less fertility, more fertilizers is needed in the corn growing. For the analyzed soils from 2005 and 2006, when growing corn, fertilization with 135-210 kg/ha of N was needed. At the same time, even 49% of the plots needed fertilization with more than 195 kg/ha of N, and another 37% of the plots 180-195 kg/ha of N. Fertilization with 165-180 kg/ha of N was required on 10%, and only 1% of the plots required fertilization with less than 150 kg/ha of N. On soils with a decrease in SOM content during 15 years period (2020 and 2021), the need for nitrogen fertilization increased to the range of 155-215 kg/ha. The largest individual increase in the need for nitrogen fertilization was 45 kg/ha, which is 29.6% higher than the required fertilization in 2005 (160 kg/ha). But even more significant is the fact that after 15 years even 76% of the plots need fertilization with more than 195 kg/ha of N, and another 20% of the plots require 180-195, which means that 96% of the plots need a high amount of mineral forms of N what could increase nitrogen losses, reduce the nitrogen use efficiency and increase the risk of the negative impact of extreme temperatures and soil moisture, i.e. climate changes. Practically, on only 4% of plots, 150-180 kg/ha of N fertilization is sufficient, and there is no plot where less than 150 kg/ha would be sufficient in corn growing. Also, due to the lower content of humus and the greater need for nitrogen fertilization, the realization of the planned yield depends to a large extent on the seasonal distribution of precipitation, which can additionally reduce the already low nitrogen mineralization potential.

3.5. Increased needs of mineral N fertilizers in wheat growing

When growing wheat on the soils analyzed from 2005 and 2006 fertilization with 120-160 kg/ha of N was needed. A 69% of the plots needed fertilization with more than 150 kg/ha of N, and another 25% of the plots 140-150 kg/ha of N. Fertilization with 130-140 kg/ha of N was required on 5%, and only 1% of the plots required fertilization with less than 130 kg/ha of N. The need for nitrogen fertilization after 15 years increased to the range of 130-165 kg/ha. The largest individual increase in the need for nitrogen fertilization was 25 kg/ha, which is 19.2% higher than the required fertilization in 2005 (130 kg/ha). After 15 years even 99% of the plots need fertilization with more than 140 kg/ha of N, of which 72% of plots need fertilization of more than 150 kg/ha of N. So high nitrogen demand with low SOM content reduces the nitrogen use efficiency and increases the risk of the negative impact of extreme temperatures and soil moisture. Practically, on only 1.4% of plots, 130-140 kg/ha of N fertilization is sufficient, and there is no plot with N needs less than 130 kg/ha in wheat growing.

3.6. Interpretation of the value of N lost by reducing the humus content in the soil

The total amount of N contained in the humus of the top soil layer can be converted into euros using different urea prices. Table 1 shows the amounts in EUR per ha (and also for the total area of 4,480 ha) using the urea price range of 300 - 900 EUR/t to convert N into EUR. This price range is comparable to urea prices in Croatia, which in the period from 2011 to 2022 fluctuated from 467.98 (2011) to 319.33 (2018) and 903.05 (2022) EUR/t.

Price of urea (comparable for year in Croatia)	300 EUR/t (for 2018)	500 EUR/t (for 2011)	700 EUR/t	900 EUR/t (for 2022)
Total (or lost) N per ha (or on 4,480 ha)				
Total N 2005-2006 in EUR/ha	3,461.24	5,768.57	8,076.00	10,383.43
Total N 2020-2021 in EUR/ha	2,752.61	4,587.68	6,422.75	8,257.83
N loss in 15 years in EUR/ha	708.53	1,180.89	1,653.24	2,125.60
N loss per year in EUR/ha	47.24	78.73	110.22	141.71
N loss on 4,480 ha in 15 years (in EUR)	3,174,011.85	5,290,019.74	7,406,027.64	9,522,035.54
N loss on 4,480 ha per year (in EUR)	211,600.79	352,667.98	493,735.18	634,802.37

Table 1: The value of nitrogen lost by decreasing humus content

In 2005 and 2006, the total N that was in the top soil layer in the humus, in comparison with urea prices, was worth 3,461.24 to 10,383.43 EUR/ha. The big differences in values are the result of changes in the price of urea (the same happened with other mineral fertilizers with nitrogen), which in 2022 was 2.83 times higher than in 2018. However, there was also significant decrease in the total amount of SOM, and thus decreasing N in the analyzed soils after 15 years. So, in 15 years, a total of 4,866.82 t of N was lost on 4,480 ha, i.e. 1,086 kg/ha. If we convert these values into euros, a total of 708.53 to 2,125.60 EUR/ha was lost in the period of 15 years, depending on the price of urea (Table 1). This means that from the top soil of 4,480 ha, and compared to the lowest price of urea (300 EUR/t), the value of several million euros (3,174,011.85 EUR) has been lost, and at the highest price the amount rises above 9.5 million euros. The annual loss of SOM on 4,480 ha means an annual loss of N in the value of 211,600 to 634,802 euros (Table 1), at a urea price of 300-900 EUR/t (0.65-1.96 EUR/ kg N). This is equivalent to a direct loss of N in the amount 4,723 to 14,170 EUR on one hundred hectares.

The above values prove how important it is to stop the degradation of the humus content in soils, even if only the direct reduction of the N content is taken into account and these values are expressed using the lowest prices of mineral fertilizers.

4. CONCLUSION

The decrease in SOM content in three quarters of analyzed arable soils in Croatia is an indicator of a very serious degradation of soil fertility. An average of 21.7 t/ha of SOM was lost (9.9% of initial SOM content) in these soils over a period of 15 years (1.45 t/ha per year), which represents a significant loss of nitrogen pool of 1.086 kg/ha, i.e. an annual loss of 72.43 kg/ha. The decrease in humus content results in a decrease of the mineralization potential by an average of 18.7%, but in 43% of the soils the mineralization potential is reduced by more than 20%. The determined reduction of the N pool indicates that over 15 years more than 1% of the initial amount of nitrogen has been mineralized per year, and therefore models that predict mineralization of more than 1.5% of nitrogen in the conditions of continental Croatia should be used. The result of humus degradation is also reflected in the fact that more than 195 kg/ha of N is needed for corn fertilization on more than three quarters of the analyzed soils, and 15 years ago this was needed on half of the soils. The losses of the nitrogen pool and the consequent higher need for fertilization show how important it is to stop the degradation of the humus content in soils, even if only the direct reduction of the N content is taken into account.

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LITERATURE:

1. Bašić, F., Bogunović, M., Božić, M., Husnjak, S., Jurić, I., Kisić, I., Mesić, M., Mirošević, N., Romić, D., Žugec, I. (2007). *Regionalization of Croatian agriculture*, Agric. Consp. Sci. 72 (1): 27–38.
2. Halter, J., Hefer, H., Andrišić, M., Rašić, D., Zegnal, I. (2021): *Implementation of agro-technical measures in the Republic of Croatia in 2019*. Book of Abstract. 56th Croatian & 16th International Symposium on Agriculture. Rozman, V., Antunović, Z. (ed). Faculty of Agriculture, Josip Juraj Strossmayer University in Osijek. Osijek. 2021: 16-17.
3. Hefer, H., Andrišić, M., Zegnal, I., Mikulić, D., Rašić, D., Lončarić, Z. (2023): *Agrochemical indicators of soil fertility in the Republic of Croatia in 2021*. Book of Abstracts. 58th Croatian & 18th International Symposium on Agriculture. Sarović-Stanko, K., Širić, I. (ed). University of Zagreb Faculty of Agriculture, Zagreb. 2023: 17.
4. ISO 11464: 1994: *Soil Quality. Pretreatment of Samples for Physico-Chemical Analyses*. International Organization for Standardization, Geneva, 1994.
5. ISO 10390: 1994: *Soil Quality. Determination of pH*. International Organization for Standardization, Geneva, 1994.
6. ISO 14235: 1998: *Soil Quality. Determination of Organic Carbon by Sulfochromic Oxidation*. International Organization for Standardization, Geneva, 1998.
7. ISO 11277: 1998: *Soil Quality. Determination of Particle Size Distribution in Mineral Soil Material. Method by Sieving and Sedimentation*. International Organization for Standardization, Geneva, 1998.
8. Lončarić, Z., Hefer, H., Andrišić, M., Perić, K., Nemet, F., Kerovec, D., Rastija, D. (2022). *Impact of organo-mineral fertilization and manures on nutrient balance in crop production*. Sv. Martin na Muri: 14th Congress of the Croatian Society of Soil Science "Soil Degradation – Challenge in Agricultural Production"

9. Lončarić, Z., Karalić, K. (2015). *Mineral fertilizers and fertilization of field crops: Fertilization of field crops*. Faculty of Agriculture, Josip Juraj Strossmayer University in Osijek. Osijek. 105.
10. Lončarić, Z., Rastija, D. Popović, B., Karalić, K., Ivezić, V., Zebec, V. (2014): *Sampling of Soil and Plant for Agrochemical and Pedological Analysis*. Faculty of Agriculture, Josip Juraj Strossmayer University of Osijek, Osijek, 2014.
11. Lončarić, Z., Vukadinović, V., Bertić, B., Kovačević, V. (2006): *The simulation model of winter wheat organic matter production*. International Conference Climate Change: Impacts and Responses in Central and Eastern European Countries. Conference Proceedings. Lang, I., Farago, T., Ivanyi, Z. (ed.). Budapest: Hungarian Academy of Sciences, Budapest, 2006: 115-121
12. Nikolin, I. (2022): *Modelling agronomic evaluating of organic fertilizer*. Master thesis. Faculty of Agrobiotechnical Sciences Osijek. Josip Juraj Strossmayer University of Osijek, Osijek, 2022.
13. Nkoa, R. (2014). *Agricultural benefits and environmental risks of soil fertilization with anaerobic digestates: a review*. *Agronomy for Sustainable Development*, 34(2), 473-492.
14. Wershaw, R. (1993). *Model for humus in soils and sediments*. *Environmental Science & Technology*, 27(5), 814-816.

SUSTAINABILITY DIAGNOSIS AND PLANNING: AN ESSAY FOR THE PORTUGUESE AGRICULTURAL SECTOR

Ana Marta-Costa

*University of Trás-os-Montes e Alto Douro (UTAD) and Centre for Transdisciplinary Development Studies (CETRAD), Portugal
amarta@utad.pt*

ABSTRACT

Sustainability is the current paradigm that guides to the planning of economic activities by the modern world. This concept has introduced new concerns in companies, institutions and in society in general, which lead to the search for methodological instruments capable of promoting actions that are economically more efficient, respectful of the environment and taking into account social equity. The decision making process must, therefore, obey to new parameters that allow a balance between the economic, environmental and social dimensions, considered as the tripod of sustainability. However, the context of the application of sustainability is too broad and a holistic approach is needed to achieve its goals. This work, dedicated to the agricultural context and based on the data available in the last six years of the Portuguese farm accountancy data network (FADN), intends to develop the diagnosis of agricultural sustainability in Portugal, based on a procedure for the identification, calculation and normalisation of sustainability indicators. The results show which regions in Portugal promote the most sustainable agricultural and livestock activities and, within each regional context, which activities best enhance regional sustainability. It is also evident that the best value obtained in one dimension of sustainability is not always accompanied by the best values obtained in the remaining dimensions, there being some conflict between the economic, environmental and social evaluation areas. With this findings, it is also intended to generate an optimisation model that, in view of the environmental and socio-economic constraints, enables the generation of solutions for a more sustainable planning of agricultural and livestock activities at national level. The models conceived in this work show the ability to be replicated for other geographical and economic activity contexts, with some adjustments, and give rise to their complementarity with the use of optimization methodologies focused on the current paradigms of sustainability. We conclude that the sustainability indicators, when applied in a broader context, constitute an important instrument to support the decision and the conduction of public policies aimed at the sustainability of the activities practiced and their territories.

Keywords: *Diagnosis, economic, environmental and social dimensions, farming activities, planning, regions, sustainability indicators*

1. INTRODUCTION

The discussion on the concept of sustainability has become a topic of current interest, both from a theoretical and technical point of view, in the environmental, economic, social, and also in political fields, establishing itself as the paradigm that guides the planning of the territory and economic activities. In order to contribute to the evolution and application of the concept, significant insights are needed to promote changes in the existing models, and it is necessary to design conceptual frameworks and practical tools that enable the transformation of theoretical idealisations into concrete actions. Sustainability is thus an important instrument to support decision-making. In the case of the agricultural sector, its activities have a strong impact on environmental, social and economic parameters, sometimes positive and other times negative, and it is also a sector that suffers directly from globally generated constraints.

There is, therefore, an emerging need to make it less impactful environmentally, more efficient economically and promoter of social equity. Using the official data published by Portuguese FADN (2016-2021), this work aims to assess the sustainability of the various farming activities developed in Portugal and according to the regions where they are carried out. Given the obtained results, which will serve as input for the next phase, it is also intended to generate an optimization model that, given the environmental and socio-economic constraints, allows the generation of solutions for a more sustainable planning of agricultural activities at national level. The findings will also allow the support of agricultural public policies that lead to more sustainable agricultural activities, in balance with the food and raw material needs of the population.

2. BACKGROUND

The agri-food sector faces multidimensional challenges, associated with the increasing scarcity of natural resources needed for its activities (FAO, 2014), but also new social and economic pressures due to population growth and more demanding publics facing a globally competitive environment (Iocola et al., 2018; Ramos, 2019; Santos et al., 2019; Vasileiou and Morris, 2006; Velten et al., 2015). Sustainability attempts to balance the three dimensions of development (environmental, economic and social, Elkington, 1994), which define the quality of human life in its broadest sense, and is an important and complex issue to incorporate in the agri-food sector (Bryceson and Ross, 2020; Meynard et al., 2017; Schader et al., 2014; Vasileiou and Morris, 2006). The adoption of a sustainable approach is also recognised as a competitive and resilience factor for the sector, alongside the dynamics of variables that contribute to reshaping it (Flores, 2018; Keichinger and Thiollet-Scholtus, 2017). The growing challenges posed by climate change and the evolution of other environmental parameters, the increase in the prices of production factors and instability in the supply of labour, the relationships with the end-product market and food safety concerns make the need to implement sustainable practices even more evident (Christ and Burritt, 2013; Gilinsky et al., 2016; Keichinger and Thiollet-Scholtus, 2017; Thiollet-Scholtus and Bockstaller, 2015). Sustainability assessment methodologies are considered a key tool to support the transition to sustainability (Ramos, 2019). They allow to strategically follow production processes to increase efficiency and/or optimize environmental performance (Costa et al., 2020; Merli et al., 2018). Efficient use in the use of inputs is also crucial to reduce costs and dependence on government subsidies and free resources for investments in expansion and maintenance (Shirley and Ménard, 2002), with effects on the local community, society, consumers, workers and value chain actors (Luzzani et al., 2020). Usually, for the sustainability assessment, the environmental dimension is measured by the indicators related to the product quality, soil and organic matter, waste, wise use of resources, quantity of agrochemicals and water management. The production, productivity, income, value added and employment, among others, express the economic perspective. Finally, related to the social dimension, there are selected the educational level, equity, training, cooperation and associative participation (Rezaei-Moghaddam and Karami, 2008; Gaviglio et al., 2017; Marta-Costa et al., 2022). However, most of the sustainability programs and studies are essentially linked on the environmental pillar of sustainability. Based on a review of 133 articles related with the terms “sustainable”, “sustainability” and “land use”, Gibbes et al. (2020) conclude that almost half of them are focused on one dimension (environmental), one-fifth in two dimensions, and the lasting third in all three dimensions of sustainability. Mainly in the last years, there is an increasing effort for adopting complex indicators of sustainability that cross all three dimensions, thereby minimizing the limitations of using a reductionist approach, and simultaneously, emphasising the interdependence of the three pillars. Due to the great variability and interdependency of the several attributes and indicators of sustainability, the sustainability assessment needs to be made very cautiousness and always considering the

several criteria structured in the three mentioned dimensions (De Olde et al., 2016). But not only are the dimensions of sustainability important, the measurable ways selected to make them operational plays a relevant role for an effective and robust sustainability assessment. Their choice must ensure globally applicability, realism, cost-effectiveness, comparability and comprehension (Hayati, 2017). The heterogeneity of the methodologies used are evident due to the complexity and lack of consensus around the sustainability concept and also due to the multifunctionality of the agriculture. The scales to adopt, the indicators selection, the linkages and the integration of indicators, and the application of the results in the systems are the main problems cited by Marta-Costa and Silva (2013), Binder and Wiek (2007) to assess the sustainability on the farming systems. In this context, the complementarity of sustainability assessment studies with decision support optimization models has been used in several works (Cao et al., 2023; Guo et al., 2022; Marta-Costa, 2010; Moghaddam and Karami, 2008; and Rezaei- Xavier et al., 2017; 2018) and may allow the achievement of more adequate solutions to the problems that are faced for the sustainability of the agri-food sector. As pointed by Cao et al. (2023), the farming systems problems are intrinsically connected, whose solutions require a holistic approach to investigate into the interactions among all those factors and devise appropriate technological, management and policy interventions. In this scope, indicators and parameters of environmental and economic scope have been used, combined with the technical characteristics of the systems (Cao et al., 2023; Deo et al., 2022; Guo et al., 2022). However, although optimization has been identified as crucial, Guo et al. (2022) states that its implementation remains unclear. Namely, as reported by Deo et al. (2022), many models focus on a fixed set of crops and agro-ecological conditions (referring to the model of Popp et al., 2003) and others consider only one crop per season, which does not reflect the real-life scenario (e.g. Roy et al., 2009). Also according to Deo et al. (2022) it is necessary to create a realistic framework, and a robust and versatile tool that can incorporate all conditions of the systems in the decision making process.

3. METHODS AND SOURCES

From the available data of the Portuguese FADN (2016-2021), sustainability indicators were evenly identified (Table 1) for the three economic, social and environmental dimensions, following the premises of Elkington (1994).

Sustainability dimension	Indicators	Formula	Units
Environmental	Pollution by fertilizers	Fertilizers and correctives/ UAA	€/Ha
	Pollution by phytopharmaceuticals	Phytopharmaceuticals /UAA	€/Ha
	Energy and water consumption	Electricity, fuels and water/UAA	€/Ha
	Soil traction	Fuel and lubricants/UAA	€/Ha
	Environmental effects	Environmental subsidies/UAA	€/Ha
Economic	Technical Efficiency	Agricultural production/intermediate inputs	-
	Activity Profitability	Business and Family income/UAA	€/Ha
	Competitiveness	Investment/UAA	€/Ha
	Labour productivity	Gross Value Added/ Labour	€/AWU
	Autonomy	External costs /Real costs	-
Social	Land ownership and transferability	Own-account UAA/Total UAA	%
	Professionalisation of the activity	Paid labour/Total labour	%
	Contribution to society	Taxes and fees/UAA	€/Ha
	Level of remuneration	Wages paid/Wage-earner labour	€/AWU
	Dependence on subsidies	Subsidies to the activity /Gross Product	-

Table 1: Sustainability indicators identified for the Portuguese farming systems using available FADN (2016-2021)

(Legend: UAA - Utilised agricultural area; AWU - annual work unit.)

(Source: Author's elaboration.)

The indicators were calculated at the farm scale, taking into account the average values obtained for the period between 2016 and 2021 and after their deflation according to INE data (2023), being 2021 the reference year. They were subsequently normalised in a non-dimensional value between 0-100, against the best value obtained for each indicator, which correspond to the index 100. This procedure follows the economic efficiency techniques in the context of performance evaluation (Santos et al., 2020) and is in line with the studies of González-Esquivel et al. (2020) and Marta et al. (2022). The value of each dimension resulted from the arithmetic mean of its indicators and the global sustainability index resulted from the mean of its dimensions. A similar procedure was developed in the previous work of Marta-Costa et al. (2022). Based on the global sustainability indexes found in this first step, the optimization model was built with the single objective of improving the sustainable performance of Portuguese agricultural production systems (Equation 1). Those indexes were considered as inputs for the development of the objective function of the model, that combines equally weighted sustainability indexes (line 1 of Equation 1). The constraints were defined according to the available data from the Portuguese FADN (2016-2021), namely affording to the production factors of Utilized Agricultural Area (UAA), labor and stocking density used of each region (line 2 of Equation 1). Restrictions that ensure the minimum production of each agricultural product according to the average levels found in the FADN data (2016-2021) were also added (line 3 of Equation 1). The last group of constraints are the non-negativity constraints (line 4 of equation 1).

$$1) \text{Max } Z = \sum_i \sum_j c_{ij} x_{ij} \quad (\text{Equation 1})$$

Subject to

$$2) \sum_i \sum_m a_{ijm} x_{ij} \leq b_m; j = 1, \dots, 7$$

$$3) \sum_j \sum_n a_{ijn} x_{ij} \geq b_n; i = 1, \dots, 14$$

$$4) x_{ij} \geq 0$$

where c_{ij} represents the sustainability indexes and x_{ij} the farming systems, en hectares, developed in each NUT II from Portugal, with $i = 1 \dots 17$ (arable crops, rice, extensive horticulture and other extensive crops, intensive horticulture, quality wines, other wines, fresh fruits, dried fruits, olive trees, dairy cattle, beef cattle, sheep and goats, pigs, poultry, mixed cropping, mixed livestock, and mixed crops and livestock, respetively) and $j = 1 \dots 7$ (North, Center, Lisbon and Tagus Valley, Alentejo, Algarve, Madeira, Azores, repectively). The a_{ijm} and b_m represent the existing needs and availabilities of the production factors used, respectively, while the coefficients a_{ijn} and b_n represent the yields obtained from each crop and livestock activity and the minimum to be achieved, which corresponds to the average yield obtained over the previous six years according the FADN (2016-2021) data.

4. RESULTS

Figure 1(a) shows the global sustainability indexes obtained for the activities considered in each Portuguese region. The results show which regions in Portugal promote the most sustainable agricultural and livestock activities and, within each regional context, which activities best enhance regional sustainability. Figure 1 shows that in the North and Alentejo, the most sustainable activity is olive growing ($x_{91}=32\%$; $x_{94}=31\%$); in the Centre it is poultry ($x_{142}=36\%$); intensive horticulture ($x_{43}=23\%$) are the most sustainable in the Lisbon and Tagus Valley region, as well as in the Algarve, Madeira and Azores ($x_{45}=47\%$; $x_{46}=41\%$; $x_{47}=23\%$, respectively).

However, it is also worth mentioning, with very similar values, the dried fruit, in the North ($x_{81}=32\%$); the fresh fruit, in the Centre ($x_{72}=25\%$), Lisbon and Tagus Valley ($x_{73}=25\%$), Algarve ($x_{75}=40\%$) and Madeira ($x_{76}=36\%$); sheep and goat ($x_{124}=25\%$) and quality wines ($x_{54}=24\%$) in Alentejo and the beef cattle in Azores ($x_{117}=21\%$). Figure 1(b) shows the main results of the optimization model that defines the activities to be produced in order to maximize the global sustainability of the systems.

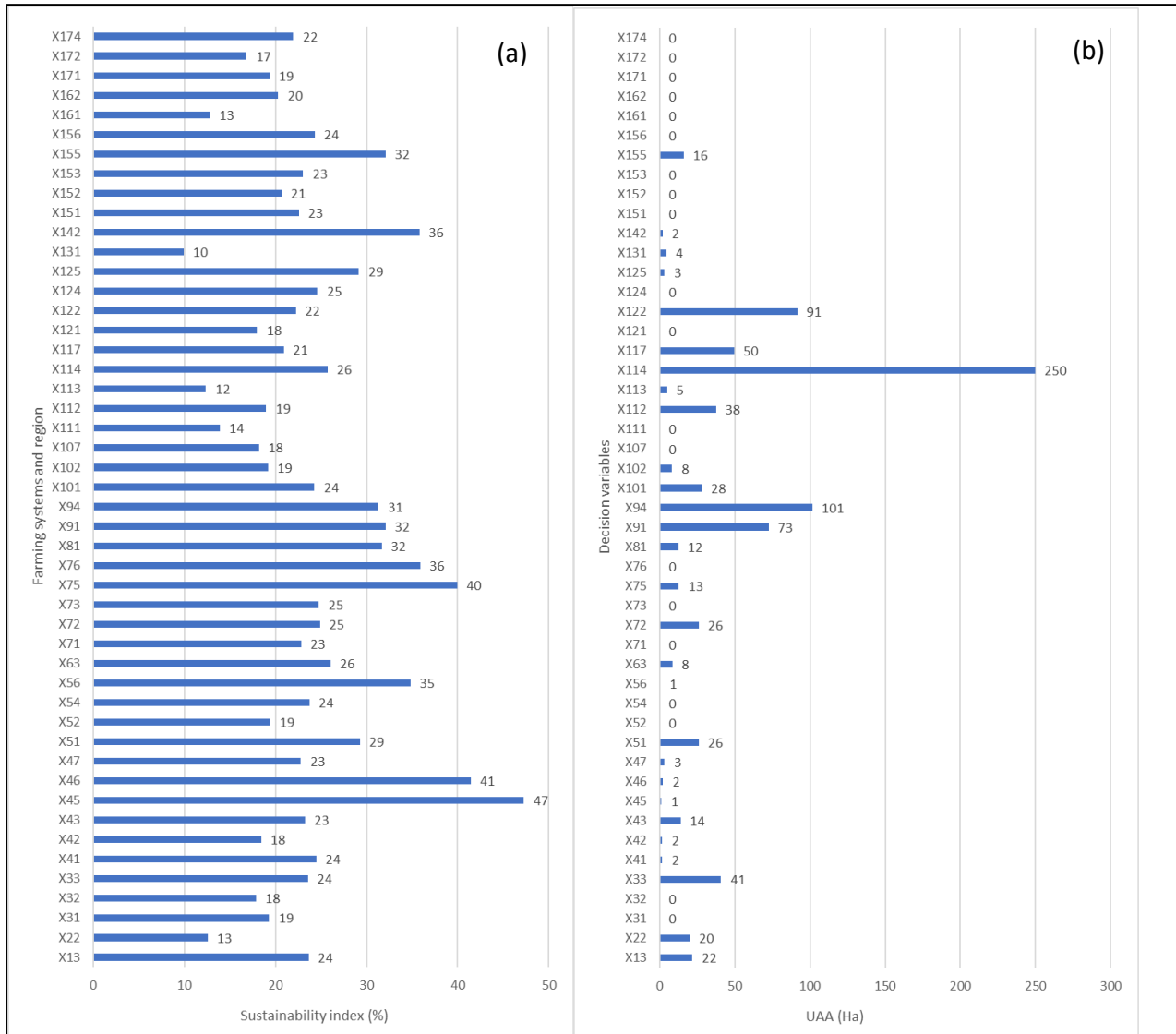


Figure 1: (a) Sustainability indexes and (b) Output of the optimization model (Source: Author's elaboration.)

Taking into account the imposed constraints, namely the availability of land and labour in each region, matching the animal stocking densities with those practiced in each region in order to maintain the characteristics of the systems for all variables placed, and considering a minimum production level per product typology equal to that identified in the FADN data (2016-2021), the model selected twenty-eight activities, given the universe of 48 decision variables. For the North, it selected intensive horticulture (x_{41}), quality wines (x_{51}), dried fruits (x_{81}), dairy cattle (x_{101}) and pigs (x_{131}), with the clear dominance of olive growing (x_{91}), which had been considered the most sustainable activity for the region (Figure 1a). In the Centre, rice (x_{22}), intensive horticulture (x_{42}), fresh fruits (x_{72}), dairy cattle (x_{102}), beef cattle (x_{112}), sheep and goats (x_{122}) and poultry (x_{142}) were the selected farming activities.

For the Lisbon and Tagus Valley region, there remain all the farming activities that were singly identified, such as arable crops (x_{13}), extensive horticulture (x_{33}) and intensive (x_{43}), other wines (x_{63}), and beef cattle (x_{113}). In the Alentejo, its most sustainable activity - olive growing (x_{94}) is selected, and beef cattle (x_{114}) come to the fore in this region. Intensive horticulture (x_{45}), fresh fruits, including citrus fruits (x_{75}), sheep and goats (x_{125}) and polyculture (x_{155}) are the selected activities for the Algarve. Intensive horticulture (x_{45}), despite having shown itself to be the most sustainable in this southern region of Portugal, is overlooked by the other activities, possibly due to compliance with the minimum limits imposed with the choice of the same activity in other regions of the country, and given the constraints imposed in terms of the factors of production available in the region. In Madeira, intensive horticulture (x_{46}) and quality wines (x_{56}) are selected, and in the Azores, intensive horticulture (x_{47}) and beef cattle (x_{117}) are also selected, activities with greater sustainability indexes in the respective regions.

5. CONCLUSION

The procedures of this work highlight the possibility of monitoring the sustainability of the various farming activities in Portugal, using the information that is made available by FADN (2016-2021). However, it should be noted the need for a more fine-grained and regular control of this data, since, in the periods under observation, it is noted the absence of records for some activities (for example, data available for arable crops only for the region of Lisbon and Tagus Valley), and there are also years of interruption of data (for example, data available on the olive grove have several years of interruption), which could lead to some weaknesses in the outputs obtained. Despite the limitations verified, which we tried to address by using a set of observation years (2016-2021), which also allows the achievement of an output based on real dynamics, the results of the sustainability assessment allow us to identify the most sustainable activities and where their practice is in fact more sustainable. In this sense, given the information used, intensive horticulture and fresh fruit production carried out in the Algarve and Madeira, as well as nuts and olive growing carried out in the North are among the most sustainable agricultural activities, all with indexes above 70%. However, the observation that is carried out per sustainability dimension does not always correspond to the selection of activities that achieve the best global sustainability value, which may be due to the conflict between the three assessment areas considered (environmental, economic and social). In this work, based on the global sustainability indexes, and taking into account a set of conditions related to the needs and availability of production factors, as well as the need to obtain food and various raw materials, a model was built to optimise the sustainability of the sector in Portugal. The solution obtained shows the prioritisation of some agricultural activities, such as beef cattle, sheep and goat farming, extensive horticulture and quality wines. In other words, these activities constitute, in the observed scenario, the solution that allows for a greater commitment to sustainability, according to the country's constraints. At this stage of development, the model represents some limitations and simplifications. Nevertheless, it is a useful tool that can be used to guide new public policies toward a more sustainable farming systems. In the future, further details will be added to the model to enable more accurate predictions, and thus serve as a reliable tool for developing strategies for planning farming systems and its geographical distribution. The models conceived in this work also show the ability to be replicated for other geographical and economic activity contexts, with some adjustments, and give rise to the complementarity of indicators and indexes with the use of optimization methodologies focused on the current paradigms of sustainability.

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LITERATURE:

1. Binder, C. and Wiek, A. (2007). The role of transdisciplinary processes in sustainability assessment of agricultural systems, In Häni, F., Pintér, L. and Ferren, H., *Proceedings and Outputs of the First Symposium of the International Forum on Assessing Sustainability in Agriculture (INFASA)*. Bern (Switzerland), pp. 33-48.
2. Bryceson, K.P., & Ross, A. (2020). Agrifood Chains as Complex Systems and the Role of Informality in Their Sustainability in Small Scale Societies. *Sustainability*, N. 12, 6535.
3. Cao, Z., Zhu, T., and Cai, X. (2023). Hydro-agro-economic optimization for irrigated farming in an arid region: The Hetao Irrigation District, Inner Mongolia. *Agricultural Water Management*, N. 277, 108095.
4. Christ, K.L. and Burritt, R.L. (2013). Critical Environmental Concerns in Wine Production: An Integrative Review. *Journal of Cleaner Production*, N. 53, 232-42.
5. Costa, J.M., Oliveira, M., Egipto, R., Cid, F., Fragoso, R., Lopes, C.M., and Duarte, E. (2020). Water and wastewater management for sustainable viticulture and oenology in south Portugal – a review. *Ciência Técnica Vitícola*, N. 35, Vol. 1, 1-15.
6. Deo, A., Karmakar, S., and Arora, A. (2022). *Journal of Environmental Management*, N. 323, 116135.
7. De Olde, E.M., Oudshoorn, F.W., Sørensen, C.A.G., Bokkers, E.A.M. and De Boer, I.J.M. (2016). Assessing sustainability at farm-level: Lessons learned from a comparison of tools in practice. *Ecological Indicators*, N. 66, 391-404.
8. Elkington, J. (1994). Towards the sustainable corporation: Win-win-win business strategies for sustainable development. *California Management Review*, 36(2), 90-100.
9. FADN (2016-2021). Resultados médios por exploração. Retrieved 09.03.2023 from <https://www.gpp.pt/index.php/rica/rede-de-informacao-de-contabilidades-agricolas-rica>.
10. FAO (2014). *Developing Sustainable Food Value Chains: Guiding Principles*. FAO: Rome, Italy.
11. Flores, S.S. (2018). What is sustainability in the wine world? A cross-country analysis of wine sustainability frameworks. *Journal of Cleaner Production*, N. 172: 2301-2312.
12. Gaviglio, A., Bertocchi, M. and Demartini, E. (2017). A tool for the sustainability assessment of farms: selection, adaptation and use of indicators for an Italian case study. *Resources*, N. 4, Vol. 6, 60.
13. Gibbes, C., Hopkins, A.L., Díaz, A.I. and Jimenez-Osornio, J. (2020). Defining and measuring sustainability: a systematic review of studies in rural Latin America and the Caribbean. *Environment, Development and Sustainability*, N. 22, Vol 1, 447-468.
14. Gilinsky, A., Newton, S.K. and Vega, R.F. (2016). Sustainability in the Global Wine Industry: Concepts and Cases. *Agriculture and Agricultural Science Procedia*, N. 8, 37-49.
15. Guo, X.-X., Li, K.-L., Liu, Y.-Z., Zhuang, M.-H., and Wang, C. (2022). Toward the economic-environmental sustainability of smallholder farming systems through judicious management strategies and optimized planting structures. *Renewable and Sustainable Energy Reviews*, N. 165, 112619.
16. Hayati, D. (2017). *A Literature review on frameworks and methods for measuring and monitoring sustainable agriculture*. Technical Report N. 22. Rome: Global Strategy Technical Report.
17. INE (2023). Atualização de valores com base no Índice de Preço no Consumidor, entre anos. Disponível a 09.03.2023 de <https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ipc>
18. Iocola, I., Campanelli, G., Diacono, M., Leteo, F., Montemurro, F., Persiani, A., & Canali, S. (2018). Sustainability Assessment of Organic Vegetable. Production Using a Qualitative Multi-Attribute Model. *Sustainability*, N. 10, 3820.

19. Keichinger, O., and Thiollet-Scholtus, M. (2017). SOECO: indicateurs socio-économiques pour la viticulture et les systèmes de culture innovants. *BIO Web of Conferences*, N. 9, 04012.
20. Luzzani, G., Lamastra, L., Valentino, F., and Capri E. (2020). Development and implementation of a qualitative framework for the sustainable management of wine companies. *Science of the Total Environment*, N. 759, 143462.
21. Marta-Costa, A.A. (2010). Sustainability study for the rearing of bovine livestock in mountainous zones. *New Medit*, N. IX, Vol 1, 4-12.
22. Marta-Costa, A.A. and Silva, E. (2013). Approaches for sustainable farming systems assessment, In Marta-Costa, A.A. and Silva, E., *Methods and Procedures for Building Sustainable Farming Systems*. Netherlands: Springer, pp. 21-29.
23. Marta-Costa, A., Trigo, A., Costa, J.M., and Fragoso, R. (2022). Standards and indicators to assess sustainability: the relevance of metrics and inventories. In J.M. Costa, S. Catarino, J.M. Escalona, & P. Comuzzo (Eds.), *Improving Sustainable Viticulture and Winemaking Practices*, Chapter 20 (pp. 391-414). London, UK: Elsevier Academic Press. Elsevier Editions.
24. Merli, R., Preziosi, M. and Acampora, A. (2018). Sustainability experiences in the wine sector: toward the development of an international indicators system. *Journal of Cleaner Production*, N. 172, 3791-3805.
25. Meynard, J.M., Jeuffroy, M.H., Le Bail, M., Lefèvre, A., Magrini, M.B., and Michon, C. (2017). Designing coupled innovations for the sustainability transition of agrifood Systems. *Agricultural Systems*, N.157, 330-339.
26. Popp, J., Wailes, E., Young, K., Smartt, J., and Intarapapong, W. (2003). Use of on-farm reservoirs in rice production: results from the MARORA model. *J. Agric. Appl. Econ.*, N. 35, 371–379.
27. Ramos, T.B. (2019). Sustainability Assessment : Exploring the Frontiers and Paradigms of Indicator Approaches. *Sustainability*, N. 11(824).
28. Rezaei-Moghaddam, K. and Karami, E. (2008). A multiple criteria evaluation of sustainable agricultural development models using AHP. *Environment, Development and Sustainability*, N. 4, Vol. 10, 407-426.
29. Roy, D., Panda, S.N., Panigrahi, B. (2009). Water balance simulation model for optimal sizing of on-farm reservoir in rainfed farming system. *Comput. Electron. Agric.*, N. 65, 114-124.
30. Santos, M., Galindro, A., Santos, C., Marta-Costa, A., and Martinho, V. (2019). Sustainability evolution of North and Alentejo vineyard regions. *Revista Portuguesa de Estudos Regionais*, N. 50, 49-63.
31. Santos, M., Rodríguez, X.A., and Marta-Costa, A. (2020). Efficiency Analysis of Viticulture Systems in the Portuguese Douro Region. *International Journal of Wine Business Research*, N. 32, Vol. 4, 573-591.
32. Schader, C.; Grenz, J.; Meier, M.S.; Stolze, M. (2014). Scope and precision of sustainability assessment approaches to food systems. *Ecology and Society*, N. 19, Vol. 3, 42.
33. Shirley, M., and Ménard, C. (2002). Cities awash: a synthesis of the country cases. In M. Shirley (Ed.), *Thirsting for efficiency: the economics and politics of urban water system reform* (pp. 1-42).Oxford: Elsevier Science.
34. Thiollet-Scholtus, M., & Bockstaller, C. (2015). Using indicators to assess the environmental impacts of wine growing activity: The INDIGO ® method. *European Journal of Agronomy*, N. 62, 13-25.
35. Vasileiou, K. and Morris, J. (2006). The Sustainability of the Supply Chain for Fresh Potatoes in Britain. *Supply Chain Management: An International Journal*, N. 11, 317-327.

36. Velten, S., Leventon, J., Jager, N., and Newig, J. (2015). What Is Sustainable Agriculture? A Systematic Review. *Sustainability*, 7, 7833-7865.
37. Xavier, A, Freitas, M., Fragoso, R. and Rosário, M. (2017). Uma Abordagem Baseada na Programação Por Metas Para a Gestão de Sistemas Agroflorestais Com Múltiplos Stakeholders. *Revista Portuguesa de Estudos Regionais*, 46, 57-70.
38. Xavier, A, Freitas, M.B.C., Fragoso, R. and Rosário, M.S. (2018). A regional composite indicator for analysing agricultural sustainability in Portugal: A goal programming approach. *Ecological Indicators*, 89, 84-100.

A SYSTEMATIC LITERATURE REVIEW OF KNOWLEDGE MANAGEMENT APPLIED TO TECHNOLOGY-BASED STARTUPS: STATE-OF-THE-ART AND TRENDS

Marco Antonio Damiao de Mello
Universidade Federal Fluminense, Brazil
Madmello71@gmail.com

Stella Regina Reis da Costa
GOVCOPP, ESTGA, Universit of Aveiro
Universidade Federal Fluminense, Brazil
stella@ufrj.br

David Nunes Resende
GOVCOPP, ESTGA, Universit of Aveiro, Portugal
david@ua.pt

ABSTRACT

Many of the technologies, products and services currently used by society were conceived by startups that have changed the way people and companies relate to each other. However, the advance, success and survival of a startup usually depend on the quality of its business model, on the knowledge generated and/or acquired that becomes part of the intellectual capital of the company, but that is often threatened and/or lost due to the difficulty, or inadequate management of this knowledge. The objective of this article is to carry out a systematic review of publications on knowledge management applied to technology-based startups to obtain a clear vision of the current state of the art that has already been produced about the subject and to point out the global trend to guide future research works. In this research, carried out in the format of a systematic review conducted in the Scopus (Elsevier) database, we initially sought to answer the following research question: What is the relevance of Knowledge Management in technology-based startups for the development of innovative products? To better select the literatures, a qualitative taxonomy model was constructed to evaluate the 1,179 publications obtained in the initial search process, resulting in 121 works reviewed by the author. The study includes a systematic review and cross-referencing of key words used by the authors of the literatures to assemble a cluster of correlations and demonstrate the strength of attraction between them. The evidence obtained through the research method used, pointed out the continuous growth in several countries of published works on Knowledge Management as a key indicator for Startup performance and the innovation process based on the concept of Open Innovation, with China being the country that published the most works between the period 2019 to 2022 followed by India, Indonesia, Malaysia and the United States among fifty-five other countries. The literatures reviewed indicate the relevance and complementarity of knowledge management for small and medium-sized enterprises (startups) with regard to the subject innovation, as well as it is possible to observe the technologies of Industry 4.0 relating to the generation of business value and adaptive methods (agility). The findings listed in this study can serve entrepreneurs of small and medium-sized enterprises (startups) to improve and/or implement knowledge management as a tool for the innovation process.

Keywords: *Digitalization, Innovation, Knowledge Sharing, Open Innovation, Small and Medium Enterprises*

1. INTRODUCTION

The economy growth of countries is being driven by innovative companies, such as the Startups. Assimilating the link between knowledge and the performance of the innovation process is of paramount importance and a matter of business survival (TASSABEHJI; MISHRA; DOMINGUEZ-PÉRY, 2019). Startups are pioneers in the creative sector due to their innovative and adaptive culture of lean structure (Squads) where, people are their main asset that generate and share knowledge (ALVAREZ et al., 2020). In this context, the technology-based startups are included, whose products and services transform the way companies and people relates to each other and, therefore, they depend on the generation and absorption of knowledge to foster the innovation process. However, startups have a high failure rate, nine out of ten fail to prosper and evolve to the final stage. The success and survival of a startup usually depends on the quality of its business model and the ability to innovate, resulting from continuous learning, and adaptability to a dynamic context that evolves ever faster (SARWONO et al., 2019). The objective of this article is to seek a view on the state of the art that has already been produced about the subject, until 2022, and to point out the worldwide trend on the subject to guide future research work.

2. METHODOLOGY

The study addresses the mapping of how knowledge management occurs in technology-based startups. And to better understand the research that has already been globally conducted about the topic, a systematic review of the literatures was carried out, which allows the understanding on a given topic without biases, was initially performed in the Scopus base (Elsevier) between the years of 2019 until 2022, in which February 10, 2022 was the end date. The steps described below details the review process conducted:

- Step 1 - Selection of Research Sources
Based on the outlined objective, a search for papers encompassing the topics of Knowledge Economy, Knowledge Management, Innovation, Startups and Small and Medium-sized companies was started in the bibliographic database (GRAY, 2012).
- Step 2 - Selection of Databases
The systemic survey of the works took place by accessing the Scopus database (Elsevier) through the internet, on the website <https://www-periodicos-capes-gov-br.ezl.periodicos.capes.gov.br/>.
- Step 3 - Determining Keywords for the searches
In the search process, executed in the Scopus database (Elsevier), the keywords described in Table 1 were used. The table also presents the dimension and definition of scope of the search using them.

Dimension	Keywords/filter
Interest	- Knowledge Management, Knowledge Economy, Innovation.
Public	- SME, ASO, Spin-Off, <i>Startups</i> .
Restriction	- (PUBYEAR)=2019, 2020, 2021,2022 - (DOCTYPE) = 'AR' - (SUBJAREA) = 'COMP'

*Table 1: Dimension and keywords filter
(Source: Own elaboration based on (HIGGINS & GREEN, 2011))*

- Step 4 - Search by keyword
After defining the keywords, the Boolean OR and AND connectors were added to form the search string, as described in Table 2 – Search Results in the Scopus database.

In Step 5 – Definition of additional filters, carried out concurrently with Step 4, the string created using the Advanced Research field of the platform was then executed. The search in the Scopus base (Elsevier) initially took place in two moments, the first on February 5, 2022 and then on February 6, 2022.

Below, in Table 2, the results of searches in the Scopus database (Elsevier) in the periods mentioned above, are presented.

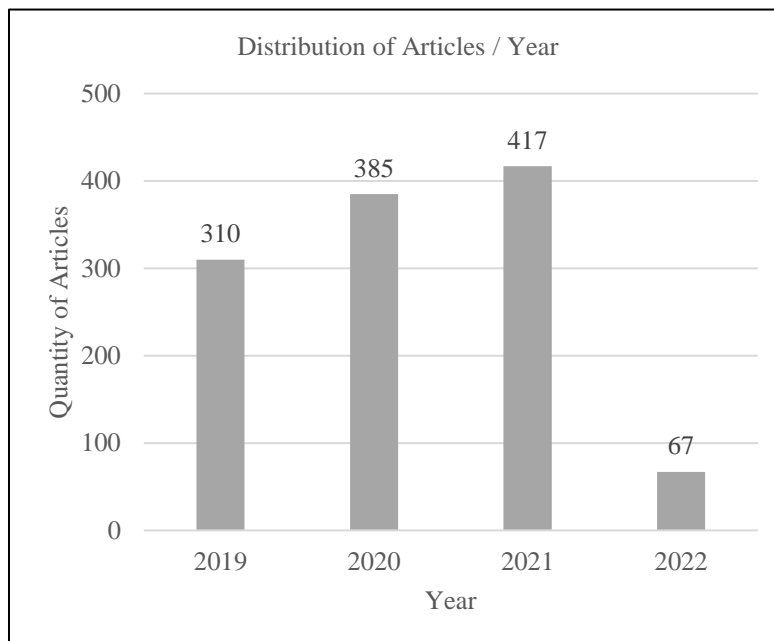
Keywords	Restriction	Papers	Search date
("Knowledge Economy" OR "Management" OR "Innovation") AND (startups OR sme OR aso OR spinoffs)	AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (SUBJAREA , "COMP")) AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019))	5.998	February 5, 2022
("Knowledge Management" OR innovation) AND (startups OR sme)		3.853	February 6, 2022
("Knowledge Management") AND (startups OR sme)		1.179	February 10, 2022

Table 2: Search Results in the Scopus database (Elsevier)

(Source: Own elaboration based on the systematic review (FERENHOF; FERNANDES, 2016))

3. RESULTS AND DISCUSSION

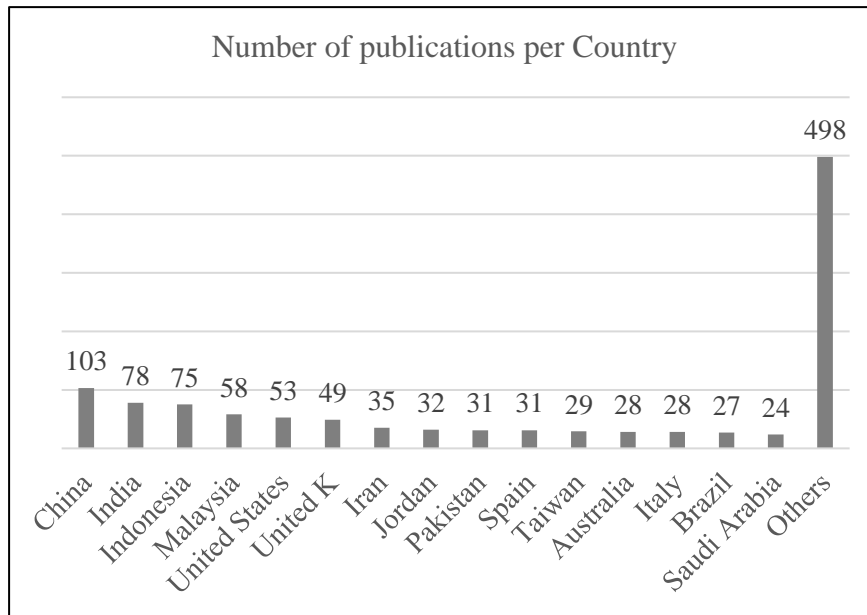
Next, it is possible to find in Graph 1 - Distribution of Articles per Year, the representation of articles published along the years within the search scope. Especially in 2021, there has been an increase in the number of works published on the subject - 2022 covers until the month of February.



Graphic 1: Distribution of Articles per Year

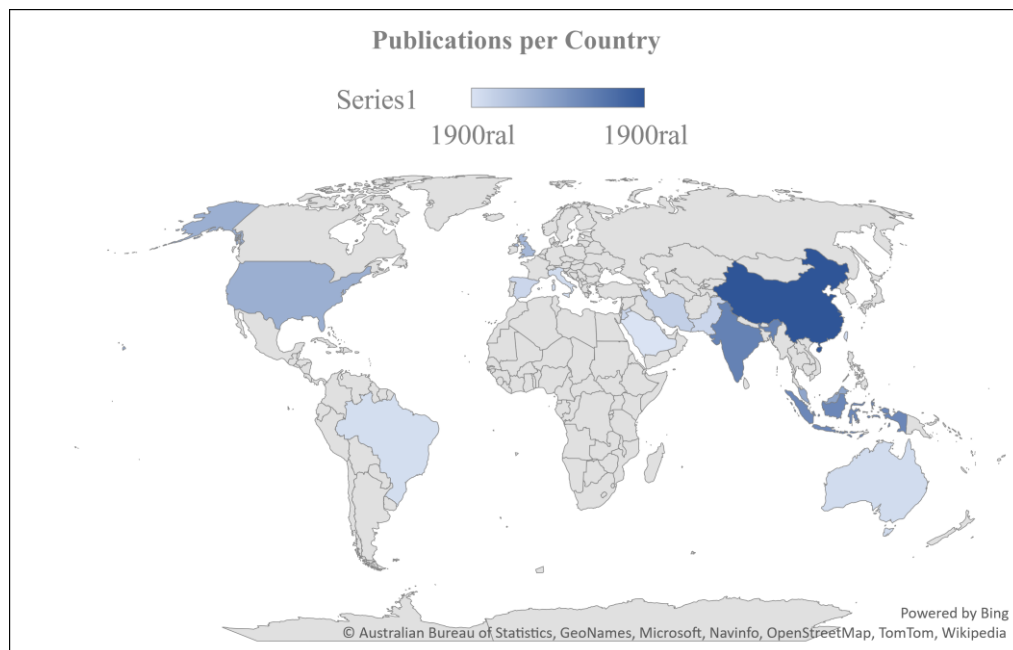
(Source: Own elaboration based on the articles search (2022))

In Graphic 2, it is possible to find the fifteen countries that have published the most articles on the researched theme.



*Graphic 2: Number of publications per Country
(Source: Own elaboration based on the articles search (2022))*

From the World Map perspective, Figure 1 shows the fifteen countries that have had the most publications on the subject.



*Figure 1: World Map of fifteen countries with highest number of publications
(Source: Own elaboration based on the articles search (2022))*

The worldwide distribution of 1,179 works presented suggests the high interest of different countries in the researched theme, especially those that have shown greater economic growth in recent years.

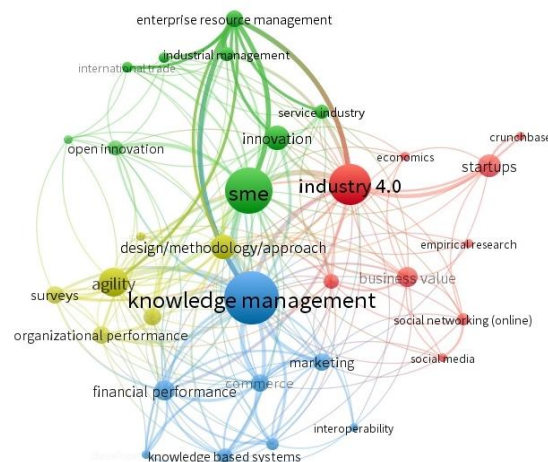
4. A CRITICAL ASSESSMENT OF LITERATURE REVIEW CORRELATED TO THE RESEARCH OBJECTIVES

It is possible to find in Chart 1, the keywords most used by the authors.

Keywords	Occurrence
knowledge management	22
Sme	18
industry 4.0	15
Agility	9
design/methodology/approach	7
Innovation	7
Startups	7
business value	6
financial performance	6
Commerce	5
Competition	5
Marketing	5
organizational performance	5
Surveys	5
decision making	4
enterprise resource management	4
knowledge based systems	4
open innovation	4
industrial management	3
Managers	3
service industry	3
social networking (online)	3
Total	150

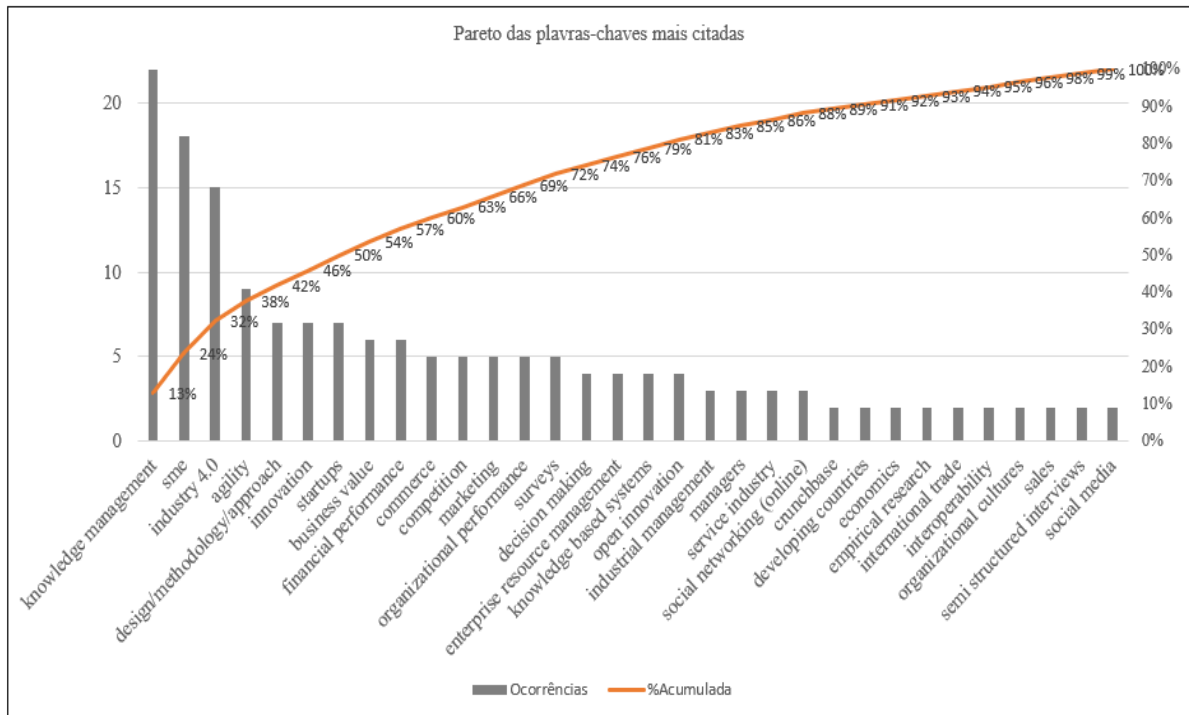
*Chart 1: Keywords most utilized by the authors
(Source: Own elaboration based on the articles search (2022))*

Based on the keywords mentioned by the authors in the articles, their co-occurrence was analyzed using the VOSviewer software - version 1.6.16 - in order to identify a quotation pattern in the selected articles, where four (4) clusters were found, as shown in Figure 3. To better understand the correlations between the keywords, the VOSviewer software created clusters of keywords that were then connected according to the strength between their correlations. The clusters defined were knowledge management, sme, industry 4.0, and agility; and were formed by affinity or proximity.



*Figure 2: Clusters of the Keywords utilized by the authors
(Source: Own elaboration based on the clusters mapped by the VOSviewer)*

Based on the literature review it was possible to map the clusters that brought together the main topics of knowledge management and the relationships with innovation and startups. After applying the Pareto chart, the relevance and complementarity of knowledge management for small and medium-sized enterprises (sme) and startups was verified regarding the matter of innovation, as it is possible to observe industry 4.0 relating to the generation of business value and adaptive methods (agility).



Graphic 3: Keywords most mentioned
(Source: Own elaboration based on the keywords)

Among the journals that had more publications, Production Planning and Control stands out with five published articles.



Figure 3: Journals with more publications within the research
(Source: Own elaboration based on the journals mapped by the VOSviewer)

5. CONCLUSION

The guiding question of this study, "What is the relevance of Knowledge Management in technology-based startups for the development of innovative products?", was addressed by identifying the high number of publications on the subject in various countries, as indicated by the graphs generated from the study. The second objective was to identify which and how other areas are related to Knowledge Management, emphasizing the cluster of Industry 4.0 which associated technologies, such as cloud computing and Big-Data, are already being utilized to support Knowledge Management. According to the results achieved, there is a tendency for an increase in publications about Knowledge Management practices in startups, to increase their efficiency and the innovation process. For future work, other researchers may conduct several case studies to explore the strategies that startups use to overcome high costs in the adoption of tools (and practices) for Knowledge Management.

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LITERATURE:

1. ALVAREZ, J. et al. Proposta de política de ciência, tecnologia e inovação baseada na gestão do conhecimento para um cluster de pequenas empresas de energia solar. *Revista Ibérica de Sistemas e Tecnologias de Informação*, n. E37, p. 65–77, 2020.
2. BAI, S.; ZHAO, Y. Startup Investment Decision Support: Application of Venture Capital Scorecards Using Machine Learning Approaches. *Systems*, v. 9, n. 3, p. 55, 22 jul. 2021.
3. CASEIRO, N., & COELHO, A. (2018). Inteligência de negócios e competitividade: o papel mediador da orientação empreendedora. *Competitiveness Review*, 28(2), 213-226. <http://dx.doi.org/10.1108/CR-09-2016-0054>
4. CAUCHICK, Paulo, et al. *Elaboração de artigos acadêmicos: estrutura, métodos e técnicas*. Elsevier Brasil, 2017.
5. FERENHOF, H. A.; FERNANDES, R. F. Desmistificando a revisão de literatura como base para redação científica: método SFM DEMYSTIFYING THE LITERATURE REVIEW AS BASIS FOR SCIENTIFIC WRITING: SFM METHOD. *Revista ACB*, v. 21, n. 3, p. 550–563, 2016.
6. GANGULY, A. et al. Firms' Reputation for Innovation: Role of Marketing Capability, Innovation Capability, and Knowledge Sharing. *Journal of Information & Knowledge Management*, v. 19, n. 02, p. 2050004, 14 jun. 2020.
7. GIL, A.C. (2002) *Como elaborar projetos de pesquisa*. 4a ed. São Paulo: Atlas S/A.
8. GRAY, David. E. *Pesquisa no mundo real*. Porto Alegre: Penso, 2012.
9. HASHIMY, L.; TREIBLMAIER, H.; JAIN, G. Distributed ledger technology as a catalyst for open innovation adoption among small and medium-sized enterprises. *The Journal of High Technology Management Research*, v. 32, n. 1, p. 100405, maio 2021.
10. HERMAWATI, A.; GUNAWAN, E. The implementation of dynamic capabilities for small and medium-sized enterprises in creating innovation. *VINE Journal of Information and Knowledge Management Systems*, v. 51, n. 1, p. 92–108, 13 fev. 2021.
11. HIGGINS, J. P. T.; GREEN, S. (editors). *Cochrane Handbook of Systematic Reviews of Intervention*. Version 5.1.0. London: The Cochrane Collaboration.
12. HIL, A. M. et al. Cryptonight mining algorithm with yac consensus for social media marketing using blockchain. *Computers, Materials and Continua*, v. 71, n. 2, p. 3921–3936, 2022.

13. HUANG, Z. XIONG; SAVITA, K. S.; ZHONG-JIE, J. The Business Intelligence impact on the financial performance of start-ups. *Information Processing and Management*, v. 59, n. 1, p. 102761, 2022.
14. JORDÃO, R. V. D.; NOVAS, J.; GUPTA, V. The role of knowledge-based networks in the intellectual capital and organizational performance of small and medium-sized enterprises. *Kybernetes*, v. 49, n. 1, p. 116–140, 21 jan. 2020.
15. LIU, Y. et al. Cloud-based big data analytics for customer insight-driven design innovation in SMEs. *International Journal of Information Management*, v. 51, p. 102034, abr. 2020.
16. MARCONI, Mariana de Andrade; LAKATOS, Eva Maria. *Metodologia do trabalho científico*. 7 ed. São Paulo: Atlas, 2008.
17. RACHAPAETTAYAKOM, P. et al. The need for financial knowledge acquisition tools and technology by small business entrepreneurs. *Journal of Innovation and Entrepreneurship*, v. 9, n. 1, p. 25, 14 dez. 2020.
18. RAMDANI, B.; RAJA, S.; KAYUMOVA, M. Digital innovation in SMEs: a systematic review, synthesis and research agenda. *Information Technology for Development*, v. 28, n. 1, p. 56–80, 2022.
19. ROSS, G. et al. CapitalVX: A machine learning model for startup selection and exit prediction. *The Journal of Finance and Data Science*, v. 7, p. 94–114, nov. 2021.
20. SAIDE, S.; SHENG, M. L. Toward Business Process Innovation in the Big Data Era: A Mediating Role of Big Data Knowledge Management. *Big Data*, v. 8, n. 6, p. 464–477, 1 dez. 2020.
21. SALEEM, H. et al. Big data use and its outcomes in supply chain context: the roles of information sharing and technological innovation. *Journal of Enterprise Information Management*, v. 34, n. 4, p. 1121–1143, 15 jul. 2021.
22. SARWONO, R. et al. IT governance of the business incubator service: Startup readiness level. *ICIC Express Letters*, v. 13, n. 9, p. 841–849, 2019.
23. TASSABEHJI, R.; MISHRA, J. L.; DOMINGUEZ-PÉRY, C. Knowledge sharing for innovation performance improvement in micro/SMEs: an insight from the creative sector. *Production Planning & Control*, v. 30, n. 10–12, p. 935–950, 10 set. 2019.
24. RUNYAN, RC Pequenas empresas diante da crise: identificando barreiras para a recuperação de um desastre natural. *J. Gestão de Crise de Contingências*. 2006, 14, 12–26.

INTERNATIONAL MARKET SELECTION: FROM RATIONAL TO MIMETIC

Raquel Meneses

*School of Economics and Management of the University of Porto,
INESC TEC, Portugal
raquelm@fep.up.pt*

ABSTRACT

When companies internationalise, choosing where to internationalise is a critical decision on which the success of the entire process depends. Most books present a prescriptive approach to international market selection, defining a systematic approach to data collection and analysis as the most correct. However, in the real world, made up mostly of SMEs, this very time-consuming and costly process is not feasible. Companies often select the international market in a much more expedient way. This conceptual paper presents these more descriptive approaches to reality: the gradualist model, the network approach and the mimetic vision. This last view is perhaps the least mentioned in the international business literature; however, it is the one that justifies the large waves of internationalisation to the same country, by a large group of companies, in a given period.

Keywords: *International Market Selection, Prescriptive Approach, Uppsala Model, Network model, mimetism*

1. INTRODUCTION

According to the popular aphorism, "When people are free to do whatever they want, they usually imitate others". This is evident today, where there is a great need to identify with the group, and everyone follows the influences propagated through social networks by micro, media, or mega influencers. Analysing what others do and how it works gives us a great sense of security, even if, in reality, the starting point is very different. Companies do not make decisions; those who make decisions are the men or women who run them. So it is unsurprising that a similar phenomenon is established in companies, even when discussing critical and risky decisions. Nowadays, in many cases, internationalisation is not an optional issue; it is something that all companies will have to face sooner or later. In this process, companies have to answer three fundamental questions: When? How? and Where? The answer to the first two is absolutely dependent on the response to the last one¹. The timing depends on the maturity of each market, so, depending on the chosen market, it may be more interesting to have a pioneer internationalisation or to be a follower. The How can only be defined in a close relationship with the where, whether we are talking about the entry modes (not all of which are available and appropriate for the various markets); or whether we are talking about the marketing mix, which to a greater or lesser degree always has to be adapted to the target market. Therefore, the selection of the international market is fundamental to the success of internationalisation. The international business literature, in a more normative approach, suggests different systematic ways of selecting the appropriate market; however, if we take a more positivist approach, describing the reality, we can see that in most situations, especially when it comes to small and medium enterprises, the process is very different. Companies, like humans, tend to listen to others and see what others do and, from there, make their decisions. This paper proposes a broader view of the phenomenon, dividing the modes of selection of international markets into prescriptive and descriptive.

¹ Musso and Francioni (2014) have further analysed this issue of precedence or simultaneity.

2. LITERATURE REVIEW

2.1. Prescriptive Modes of International Market Selection

Prescriptive approaches imply a structured and systematised process based on predefined criteria, which is time-consuming and costly. The selection of markets to internationalise results from a rational, highly reflexive process that goes through several stages. Andersen and Buvik (2002) define six steps:

- 1) problem definition, that is, the selection of the international market should be analysed as a matter independent of any other decision (such as, for example, selection of the entry mode1);
- 2) identification of the choice criteria from which the various alternatives will be evaluated;
- 3) weighting of the criteria, being aware that the relative weights of the various criteria can and should be different;
- 4) formulation of various alternatives based on two possible strategies for action:
 - a) extensive search, generating a complete list of all alternatives (countries, markets);
 - b) optimal search, generating alternatives until the cost of the search exceeds the value of the added information;
- 5) evaluation of each alternative in each criterion, considering its long-term impact;
- 6) calculation of the optimal solution, which can be done using various models:
 - a) compensatory models where each criterion is assigned a different weight so that the presence of another can compensate for the absence of one criterion;
 - b) non-compensatory models, which can be further divided into:
 - disjunctive models - a minimum level of a specific criterion or criteria is set, and only those countries that meet that value in that criterion or those criteria are considered;
 - ii. conjunctive models - in which countries are classified into acceptable and unacceptable clusters.

Compensatory models are more demanding as they require "complete information about the alternatives; non-compensatory models allow decisions to be made based on partial information" (Andersen and Buvik, 2002, p. 349). The well-known DSM model (Decision Support Model), developed by Cuyvers et al. (1995), is an excellent example of a non-compensatory model for selecting the market to export, in which there is a screening process with four filters, in which the first three will eliminate candidate potential that does not represent real opportunities. DSM involves comparing all products/countries, an extremely time-consuming and costly task only possible for companies with a sizeable economic capacity.

Figure following on the next page

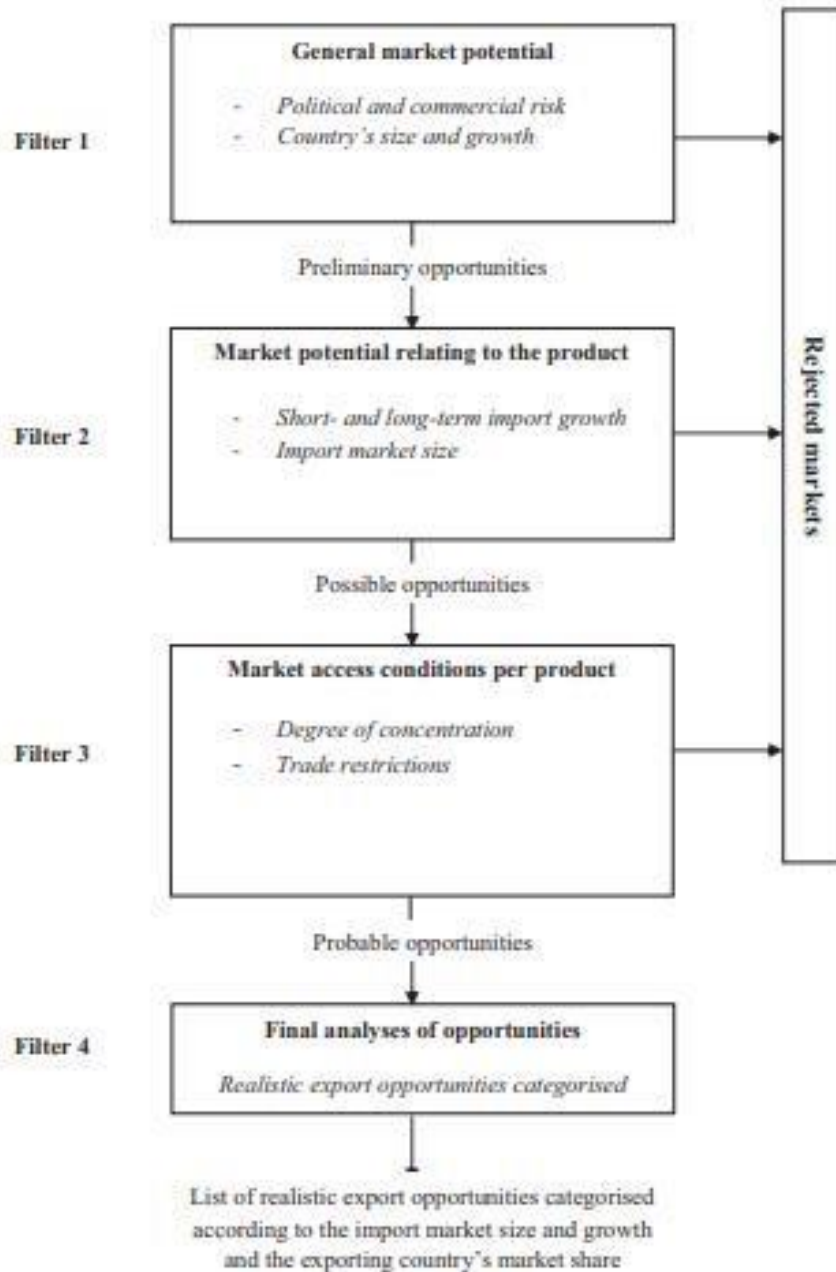


Figure 1 – Decision Support Model
(Source: Cuyvers et al, 2017, 8)

Usually, this process does not consider all existing countries but only a feasible set of countries (Vanegas-López et al., 2020). Cavusgil (1985) proposes to start by screening the countries based on political, economic, and cultural factors, then by assessing the competitive context, ending with an assessment of the company's sales potential of the market under study. Subsequently, Cavusgil (1997) presents an index (OMOI - Overall Market Opportunity Index) specially designed for emerging markets, composed of the following indicators: market size, market growth rate, market intensity, market consumption capacity, commercial infrastructure, economic freedom, and market receptiveness. This index involves many variables and a lot of data, which is not always easy to obtain or reliable, even more so when it comes to emerging markets.

Ozturk et al. (2015) developed an approach that is not exactly for selecting the international market but rather to analyse the opportunity offered by each market (FMOA) and decide whether or not to enter that market. This approach considers three dimensions: country responsiveness, potential growth, and aggregate market measures. It is important to note that each dimension used for the evaluation corresponds to the joint analysis of several variables over several years and a prediction of their future development. Although apparently simple, this is a very complex process. The advantage is that it can focus on studying just one market at a time, reducing the complexity of the process, and making it relatively less time-consuming and costly. However, it does not tell you whether this market is better than others; it only tells you whether it is good. The advantage of these approaches is to decrease the risk of spending too much time analysing uninteresting markets. Regardless of whether it is a market screening or opportunity assessment approach, these systematic approaches always involve the collection of many data, not always easily accessible, with complex treatments being costly and time-consuming processes that are not within reach of most companies. As Papadopoulos and Martín (2011) point out, the rationality of decisions is immediately compromised by the cognitive limitations of the decision-maker, by time constraints, by costs in obtaining information, and by imperfections in decision-making models. The authors also point out that if in developed countries there is an ample supply of data, "in the vast majority of markets, which include emerging and developing countries, information is almost completely unavailable and even basic data, such as education or income levels are unavailable, dated, or unreliable" (Papadopoulos and Martín, 2011, p. 135). More than ten years later, these statements still make perfect sense. Another problem is that these approaches usually do not consider the differences between regions of the same country when it is known that "in almost all countries regions are not homogeneous in economic, political or social terms" (Meneses and Brito, 2007, p. 322). Moreover, as Marchi et al. (2014) state, the companies' strategic issues and internal factors are not considered. This may lead to a mismatch between the selected country and the companies' objectives and capabilities. Moreover, initially, it was believed that a systematic selection of international markets was linked to better performance; now, the question arises whether there is genuinely a cause/effect relationship or just a correlation since the companies that can develop these procedures are already more prominent and have more means. On the other hand, "more recent literature explaining internationalisation and international performance in the context of SMEs has typically relied on networks and business relationships as the main drivers" (Martín et al., 2022, p. 2).

2.2. Descriptive Modes of International Market Selection

2.2.1. Uppsala Model

In the 1970s, Johanson and Wiedersheim-Paul studied four Swedish companies (Volvo, Sandvik AB, Atlas Copco, and Facit). They found that internationalisation is "gradual, rather than large and spectacular foreign investments" (Johanson and Wiedersheim-Paul, 1975, p. 305). Based on these principles, the Uppsala model in its initial form (Johanson and Vahlne, 1977) follows the Penrosian perspective of the company, seeing it as an organism in development, in which internationalisation consists of and results from a learning process. Therefore, the company's growth is progressive, and internationalisation develops sequentially. (Johanson and Vahlne, 1977). This leads internationalisation to develop in two dimensions: "increasing involvement of the company in each foreign country, and the successive establishment of operations in new countries" (Johanson and Vahlne, 1977, p. 23). Thus, the first dimension refers to the development within each market. Before any company ventures abroad, it builds a domestic base, and the first form of internationalisation is always achieved with low commitment, for example, via exports.

As it negotiates in this market, the company acquires knowledge that allows it to understand this market better, leading it to increase its level of commitment to it. The second dimension refers to the international selection of markets, also done sequentially, according to psychic distance. "Companies begin internationalisation by going to those markets that they can understand more easily, where they perceive opportunities, and with lower perceived market uncertainty" (Johanson and Vahlne, 1990, p. 13). Note that "as distance increases, the more problematic information flows become. Only through experiential learning can firms overcome psychic distance, but this learning takes time, so they need time to go from close markets to gradually more psychically distant markets" (Brito and Meneses, 2007, p. 3). Thus, companies begin by internationalising to markets closer to them psychically. As they internationalise, they acquire more knowledge about the country they are in, so the next step will be to internationalise to "the neighbour of the neighbour" and so on. With the accumulation of experience in less distant markets (that is, psychically more similar), companies tend to invest in countries a little further away, taking small steps towards a safe internationalisation process. Thus, every time the company selects a new market, it does so based on the conviction of proximity to the current market and not on secure knowledge about that potential market. As is evident, the company does not employ objective or systematised evaluation processes when selecting markets and is more dependent on non-economic circumstantial factors (Törnroos, 1991; Ellis, 2000). In other words, the selection of markets is not based on a rational analysis of the market but rather on a gradual movement of psychic distance, which would lead all companies from the same country to tend to internationalise to the same destination over time.

2.2.2. Network approach

In the traditional Uppsala model, the company appeared as a solitary agent, but as Håkansson and Snehota (1989) point out, no organisation is an island. It is essential to place the firm in its context. "Each company is involved in a complex network of direct and indirect relationships that affect its development, reaching internationalisation. These networks have their own dynamics, and each company and its relations influence and cause change in the flows between them" (Moutinho, 2011, p. 45). In the network approach, firms do not act and react; firms interact (Ford et al., 2008). Thus, all their actions and performance depend on their positioning in the network; that is, all their actions and performance depend on their networks of contacts and the network of contacts of their contacts. Naturally, as companies develop their activities, their network of contacts will increase and may even cross borders, making them international and creating "bridges to foreign markets" (Coviello and Munro, 1997, p. 365). It should be noted that for this to happen, their contacts do not necessarily have to be external; it is enough that the contacts of their contacts are external for the bridge to be established, which allows, from the outset, the transmission of information and knowledge. When several companies are interconnected internationally in an industry, that industry is said to be internationalised, and any company that enters that network will find it easier to internationalise. Entering an external network "is not a matter of establishing a position in a static network, it is a matter of synchronising with a new dynamic of change" (Johanson and Johanson, 2021, p. 1629), which will leverage the international development of the firm. Thus, firms can select markets according to the knowledge of opportunities that come to them this way or evaluate markets using that information. In this way, and contrary to what was predicted by the Uppsala model, experience would not be the primary source of information; firms could use "second-hand knowledge" (Costa e Silva et al., 2012), and the process would move from just intraorganizational to inter-organizational (Johanson and Vahlne, 1990). In this way, knowledge of opportunities results from this interaction, and also has the advantage that private information is only available to network members (Vahlne and Johanson, 2017).

Networks can include company networks (formal networks) formed by customers, suppliers, financial institutions and government institutions for example, but also include informal networks formed by friends, family and former colleagues, for example (Ge and Wang, 2013). Both formal (organisational) and informal (personal) networks can have a substantial impact on internationalisation, including the selection of markets (Coviello and Munro, 1997).

2.2.3. *Mimetic Vision*

As the networks model shows, companies and managers do not live in a single world, isolated from everything else. Companies and managers act and interact with other companies and with other managers, seeing what others do, their successes and failures. In 1955, Hoffer² reported that "when people are free to do as they please, they generally imitate others" (Silva et al., 2018). The same is true for companies. The tendency towards mimicry is evident in many circumstances, specifically regarding entry modes and international market selection (Lu, 2002). By being exposed to good success stories and hearing their stories, managers (especially of new and/or small firms) feel inspired and motivated to do the same (Prashantham and Birkinshaw, 2015). Companies tend to imitate the actions carried out with apparent success by a large number of companies (follow the herd), assuming that their success is also guaranteed, or carried out by a large successful company (follow the leader), assuming that when it makes its choices, it does so in a reflected and thoughtful way, based on studies and knowledge. There are two distinct situations in which follow the leader behaviour can be distinguished: the scenario in which signals and actions are visible and the one in which only actions are visible (Bikhchandani et al., 1998). In the first scenario, as companies make their decisions, the information that underlies these decisions is observed by other companies that can learn from them. In the limit, some companies may even make decisions contrary to the internal knowledge held, but according to this information, thus forming an information cascade. Firms may also act according to this practical information because they do not hold any other information internally and believe that by imitating the leader, they are guaranteed success (Lu, 2002). Thus, these small firms, without the ability to acquire information, see target market selection legitimised. In the second scenario, firms imitate the pioneers, even though they cannot access the knowledge that led to the decisions. There is no knowledge capture in this case, and decision-making is blind. There is also a belief that the pioneers' decision-making must have been based on a rational process based on information and knowledge. It is natural that this may have happened initially. However, not knowing the processes by which it was based, it is impossible to understand its suitability for the moment and the focal company. In the case of oligopolistic structures, mimicry can be linked to a competitive strategy; companies enter markets where their rivals are present to neutralise rivalry and not based on specific knowledge about the markets in question (Correia and Meneses, 2021). Firms also tend to imitate the actions taken by many similar firms (herding behaviour). This is a self-feeding effect because as firms imitate the choices of many firms, the number of firms that carry out that action increases, becoming even more visible. When the imitators of the imitators (laggards) mimic the actions (in this case, they select the same markets), they are already very distant from the initial conditions that led the pioneer companies to make this choice, indeed, based on appropriate information and considering their characteristics and objectives. "often, the behaviour is limited only to observing the actions and simply imitating them" (Silva et al., 2018, p. 587), without any thought process, or knowledge transfer and absorption. If in the case where companies have access to the information that was the basis for the initial selection or are the first imitators, mimicry may even be an expedient way to select the appropriate markets with lower costs and faster, in the case of latecomers there will hardly be a match between the selected country and the company.

² Eric Hoffer, North American writer, reference to the book "The passionate state of mind", New York: Harper and Brothers

3. CONCLUSION

In much of the International Business (IB) literature, it is assumed that a systematic, rational decision is used to select the more adequate market. However, firms need a lot of resources, money, and time to use these methods. Getting and analysing a massive amount of data and establishing criteria to screen them is a very complex process only possible for sizeable firms. Thus, firms need a more expedited way of moving forward; they go to the closer markets or use other firms as a reference. Information about opportunities and market conditions flows on the network, and firms could use that information, absorb it, and transform it into useful knowledge to decide where to go. At the same time, firms could see what other firms are doing, namely where they are going and where they are getting success. So, firms imitate successful firms internationalising for the same markets. This mimetic process is a risky approach. Sometimes, the first companies to go to a specific market are large companies that work as influencers. Smaller companies believe that this initial choice was rational, that large companies have the necessary and sufficient resources to make good decisions and that their success is due to these same decisions. This mimetic process forms a wave and a strong tendency for companies to enter a particular market. This could be a simple and effective market selection method in many cases. However, as the wave thickens, the companies joining the wave are less like the initial influencer, the market change, and the fit between the not exist. For laggard companies, this process can even be hazardous and painful. Even when firms set off to foreign markets without much knowledge, they can enter a self-reinforcing virtuous circle if this internationalisation is successful. In this way, they increase their specific knowledge of the destination market. About internationalisation, and by expanding their network of contacts, they gain more knowledge about those who have valuable knowledge.

LITERATURE:

1. Andersen, O., and Buvik, A. (2002). Firms' internationalization and alternative approaches to the international customer/market selection. *International Business Review*, 11(3), 347-363.
2. Bikhchandani, S., Hirshleifer, D., and Welch, I. (1998). Learning from the behavior of others: Conformity, fads, and informational cascades. *Journal of Economic Perspectives*, 12(3), pp. 151-170.
3. Brito, C., and Meneses, R. (2007). A Network based Approach for the Understanding of International New Ventures Market Selection. Proceedings of the 3rd International Conference on Economics and Management of Networks, Rotterdam, The Netherlands.
4. Cavusgil, S. T. (1985). Guidelines for export market research. *Business Horizons*, 28(6), pp. 27-33.
5. Cavusgil, S. T. (1997). Measuring the potential of emerging markets: An indexing approach. *Business Horizons*, 40(1), pp. 87-92.
6. Correia, M-R., and Meneses, R. (2021). From Systematic to Mimetic Behavior in the International Market Selection. In C. Martins and P. Rodrigues (Eds.), *Competitive Drivers for Improving Future Business Performance* (pp. 131-152). IGI Global.
7. Costa e Silva, S., Pacheco, E., Meneses, R., and Brito, C. (2012). The Importance of Second-Hand Knowledge in the Revised Uppsala Model: Can European Textiles Producers Export to China?. *Journal of Global Marketing*, 25(3), pp. 141-160.
8. Coviello, N., and Munro, H. (1997). Network relationships and the internationalisation process of small software firms. *International Business Review*, 6(4), pp. 361-386.
9. Cuyvers, L., De Pelsmacker, P., Rayp, G., and Roozen, I. T. (1995). A decision support model for the planning and assessment of export promotion activities by government export promotion institutions-the Belgian case. *International Journal of Research in Marketing*, 12(2), pp. 173-186.

10. Cuyvers, L., Steenkamp, E., Viviers, W., Rossouw, R., and Cameron, M. (2017). Identifying Thailand's high-potential export opportunities in ASEAN+ 3 countries. *Journal of International Trade Law and Policy*, 16(1), pp. 2-33.
11. Ellis, P (2000). Social Ties and Foreign Market Entry. *Journal of International Business Studies*, 31(3), pp. 443-69.
12. Ford, D., Gadde, L.-E., Håkansson, H., Snehota, I., and Waluszewski, A. (2008). Analysing business interaction. *24th IMP Conference*, Uppsala, Sweden.
13. Ge, G. L., and Wang, H. Q. (2013). The impact of network relationships on internationalization process: An empirical study of Chinese private enterprises. *Asia Pacific Journal of Management*, 30(4), 1169-1189.
14. Håkansson, H., and Snehota, I. (1989). No business is an island: The network concept of business strategy. *Scandinavian Journal of Management*, 5(3), pp. 187-200.
15. Johanson, J., and Johanson, M. (2021). Speed and synchronization in foreign market network entry: A note on the revisited Uppsala model. *Journal of International Business Studies*, 52(8), pp. 1628-1645.
16. Johanson, J. and Vahlne, J. E. (1977). The internationalization process of the firms—a model of knowledge development and increasing foreign market commitments”, *Journal of International Business Studies*, 8, pp. 23-32.
17. Johanson, J., and Vahlne, J. E. (1990). The mechanism of internationalisation. *International Marketing Review*, 7(4), pp. 11-24.
18. Johanson, J., and Wiedersheim-Paul, F. (1975). The internationalization of the firm: Four Swedish cases. *Journal of Management Studies*, 12(3), pp. 305-322.
19. Lu, J. W. (2002). Intra-and inter-organizational imitative behavior: Institutional influences on Japanese firms' entry mode choice. *Journal of International Business Studies*, 33(1), pp. 19-37.
20. Marchi, G., Vignola, M., Facchinetti, G., and Mastroleo, G. (2014). International market selection for small firms: A fuzzy-based decision process. *European Journal of Marketing*, 48 (11/12), pp. 2198-2212.
21. Meneses, R., and Brito, C. (2007). Market Selection by International New Ventures: A Multitheoretical Approach. *Entrepreneuriat: Nouveaux défis, nouveaux comportements*, Paris, France.
22. Martín, O. M., Chetty, S., and Bai, W. (2022). Foreign market entry knowledge and international performance: The mediating role of international market selection and network capability. *Journal of World Business*, 57(2), 101266.
23. Musso, F., and Francioni, B. (2014). International strategy for SMEs: Criteria for foreign markets and entry modes selection. *Journal of Small Business and Enterprise Development*. 21 (2), 301312.
24. Moutinho, R. F. d. A. C. d. M. S. B. (2011). Estrutura e Dinâmica das International New Ventures Não Tecnológicas, Phd Thesis, University of Porto, Portugal.
25. Papadopoulos, N., and Martín, O. M. (2011). International market selection and segmentation: perspectives and challenges. *International Marketing Review*, 28 (2), pp. 132-149.
26. Prashantham, S., and Birkinshaw, J. (2015). Choose your friends carefully: Home-country ties and new venture internationalization. *Management International Review*, 55(2), pp. 207-234.
27. Ozturk, A., Joiner, E., and Cavusgil, S. T. (2015). Delineating foreign market potential: A tool for international market selection. *Thunderbird International Business Review*, 57(2), 119141.

28. Törnroos, J-A (1991), Relations Between the Concept of Distance and International Industrial Marketing, in S. Paliwoda (ed), *New Perspectives in International Marketing*, Routledge, London.
29. Vanegas-López, J. G., Baena-Rojas, J. J., López-Cadavid, D. A., and Mathew, M. (2020).
30. International market selection: an application of hybrid multi-criteria decision-making technique in the textile sector. *Review of International Business and Strategy*, 31 (1), pp. 127-150.
31. Vahlne, J.-E., and Johanson, J. (2017). From internationalization to evolution: The Uppsala model at 40 years. *Journal of International Business Studies*, 48(9), pp. 1087-1102.

FOOD NEOPHOBIA AND INTERCULTURAL SENSITIVITY

Ana Moutinho

*Faculty Of Psychology And Educational Sciences Of The University Of Porto, Portugal
Up202006514@up.pt*

Raquel Meneses

*School of Economics and Management of the University of Porto, INES TEC, Portugal
raquelm@fep.up.pt*

ABSTRACT

This paper examines the relationship between food neophobia, intercultural sensitivity, and living abroad in the context of the current increase in the globalisation of businesses, specifically the restaurant industry. The paper utilised a self-administered questionnaire distributed through Instagram to obtain a diverse sample of 208 participants. The questionnaire comprised three main sections related to intercultural sensitivity, food neophobia, and sociodemographic context. The study used a structural equation model (SEM) to test the relationships among the variables. The results indicate that allergies play a significant role in humans' relationship with food and that living in another country correlates with intercultural interaction engagement and negatively influences food neophobia. Trust seems to be stimulated by the economic level the subject is at, leading people to act appropriately when in contact with individuals from other cultures. The findings suggest that understanding the community's relationship with other cultures is crucial before entering a new market with an ethnic food restaurant.

Keywords: *food neophobia, international business, intercultural sensitivity, international exposure, ethnic food*

1. INTRODUCTION

Economic globalisation has brought the globalisation of businesses in many different sectors, and the restaurant industry is no exception. So today, ethnic food with various origins is ubiquitous, and it is no longer necessary to travel to different countries to try dishes from various sources. Nevertheless, there is still some resistance to trying new foods. If we consider Ajzen's (1991) theory of planned behaviour, every behaviour has an attitude as an antecedent. Thus, the consumption behaviour of ethnic food from another country is preceded by the attitude towards new food. When this attitude is negative, it is called food neophobia. Consumers' acceptance of new foods depends on food neophobia, so understanding it is essential. Several studies have focused on demographic characteristics such as gender or age, and studies are often requested considering sociocultural issues. This paper aims to study the effect of international exposure and economic status mediated by intercultural sensitivity. To this end, a questionnaire was developed, and 208 valid responses were obtained. We used a Structural Equation Model to analyse the relations. Different cultural factors impact food neophobia; however, the influence of demographic characteristics is not supported. Before entering a new market with an ethnic food restaurant, it is crucial to understand the community's relationship with other cultures and how much they are engaged and enjoy being with others.

2. THEORETICAL FRAMEWORK

Neophobia is a characteristic present in several omnivorous animals functioning as a defence system that prevents them from, for example, eating poisonous foods (Schulze and Watson, 1995) or having allergic reactions (Breneman, 1984).

In humans, it presents itself as a psychological factor that affects their eating of unfamiliar (Pliner and Hobden, 1992) or ethnic food (Hartmann et al., 2015). This behaviour is characterised by fear and aversion to the new (Pliner and Hobden, 1992; Siddiqui, 2022). Although food is usually a source of pleasure (Kringelback et al., 2015) or even a source of interest (Kivela and Crofts, 2006), when an individual exhibits high levels of neophobia, a new dining experience is interpreted as unpleasant. Commerce and catering can be prejudiced when in contact with ethnic foods and new foods; individuals do not feel confident to try what is presented to them. (Sünnetçioğlu, 2020). When visiting another country, one may seek both surprise and comfort; in the second situation, novel foods pose a risk to tourists seeking familiarity (Lepp and Gibson, 2003). Several studies have tried to understand how tourism relates to neophobia, studying, for example, local food consumption with neophobia (Caber, 2018). However, the same question arises internally whenever ethnic restaurants open in a country; in this situation, it is essential to understand how the community will react. Several studies mention the importance of certain demographic variables, such as gender and formal education (Caber, 2018), but the results do not always point in the same direction. Some studies mention a more significant curiosity to learn about new ethnic foods from women (Caber, 2018), thus revealing less neophobia. These results are consistent with Tuorila et al. (2001), among others who reported a higher neophobia in men. Despite this, other studies concluded that the differences were not significant (Nordin et al., 2004). Therefore, this relationship should be further studied and hypothesised:

- H1 – Gender influences food neophobia.

Many studies have used university students, children, and children and their parents; most studies in this area focus on childhood (Rioux, 2020). A large representative sample of populations from countries has not been the norm, so it is crucial to study the effect of age on food neophobia, so the following hypothesis is put forward:

- H2 – Age influences food neophobia.

Formal education appears to be related to the effect of exposure. Thus, if exposure decreases neophobia, formal education is expected to be negatively related to it (Meiselman et al., 2010). The results were consistent with this hypothesis, showing a decrease in the level of neophobia with the increase in formal education (Tuorila et al., 2001), so the following hypothesis is put forward:

- H3 – Formal education negatively influences food neophobia.

There is much consensus in the literature regarding the economic situation-neophobia connection. Caber (2018) stated that there was a negative relationship between neophobia and high income; the same had already been confirmed by Meiselman (2010), who confirmed that perhaps related to greater exposure to different cultures (Flight, 2003), high incomes resulted in less neophobia. Thus, in this study, this question is also included, and the following hypothesis is put forward:

- H4 – Economic situation negatively influences food neophobia.

Exposure to novelty appears to be a critical factor because it directly increases the level of familiarisation (Pliner and Hobden, 1992), leading to something not being interpreted as unknown, thus decreasing its anxiogenic levels. In this way, greater exposure to different types of food will lead to less fear of what is new; that is, it will decrease neophobia towards that cuisine (Pliner and Hobden, 1992) and less distrust of other new foods.

For example, people who have lived in various countries are exposed to different ways of being and will have to be disposed of different kinds of food. This greater exposure will lead them to a lower degree of neophobia, so hypothesis 5 is put forward:

- H5 – Exposure to other cultures negatively influences food neophobia.

Cultural sensitivity requires being sensitive and respectful towards other cultures, which is related to understanding the dynamics of this culture. People, who can understand the dynamics of other cultures, could evaluate cultural behavioural models of individuals and how they act, connect, live, communicate, ... A high intercultural sensitivity will be reflected when in contact with different cultures, not only in how people communicate but also in what people choose to eat (Sünnetçioğlu, 2020). The cultural issue had already been studied, relating openness to other cultures and neophobia. However, it is crucial to consider not only the ability to explain ourselves to others but also the ability to accept the others (Chen, 1997). Chen (1997) defined intercultural sensitivity as the ability to positively interpret contact with different cultures by perceiving its benefits. Considering the scale of intercultural sensitivity (Chen, 2000) includes 5 subscales that assess 5 different dimensions of sensitivity, including Interaction Engagement, which is concerned with the feelings created during intercultural communication; Respect for Cultural Differences, which focuses on how participants familiarise themselves with or tolerate the culture and ideas of their counterparts; Interaction Confidence, which addresses how participants act with confidence in an intercultural setting; and Interaction Enjoyment, which addresses participants' positive or negative feedback during cultural interactions (Moradi and Ghabanchi, 2019). So, intercultural sensitivity can be conceptualised as "an individual's ability to develop a positive emotion towards understanding and appreciating cultural differences that promote an appropriate and effective behaviour in intercultural communication." (Chen, 1997, p. 5). Mascarello et al. (2019) developed a study focused on openness to different cultures, considering this dimension important since this variable influences the "acceptance of new foods and influences consumers' choices in their daily lives" (Mascarello et al, 2019). However, as told, reducing the cultural issue only to openness can be pretty reductive, proposed the following hypotheses:

- H6 – Intercultural sensitivity negatively influences food neophobia.
- H6.1 – Interaction engagement negatively influences food neophobia.
- H6.2 – Interaction enjoyment negatively influences food neophobia.
- H6.3 – Respect for cultural differences negatively influences food neophobia.
- H6.4 – Interaction confidence negatively influences food neophobia.
- H6.5 – Interaction attentiveness negatively influences food neophobia.

It is to be expected that cultural exposure leads to greater intercultural sensitivity because the shock and the notion of what is different fade away. Similarly, more formal education brings more information and a greater ability to understand and deal with others, so the following hypotheses are put forward:

- H7 - Exposure to other cultures positively affects cultural sensitivity (engagement, enjoyment, confidence, respect, and attention).
- H8 - Formal education positively affects cultural sensitivity (engagement, enjoyment, confidence, respect, and attention).

Considering that food neophobia itself has at its most instinctive origin the will to avoid poisonous or allergenic foods, and also that people with allergies have a contingency situation and are not as free as others to try what is new, the following hypothesis is posed:

- H9 - The existence of food allergies has a positive impact on food neophobia.

Thus, the literature review results in the framework shown in Figure 1.

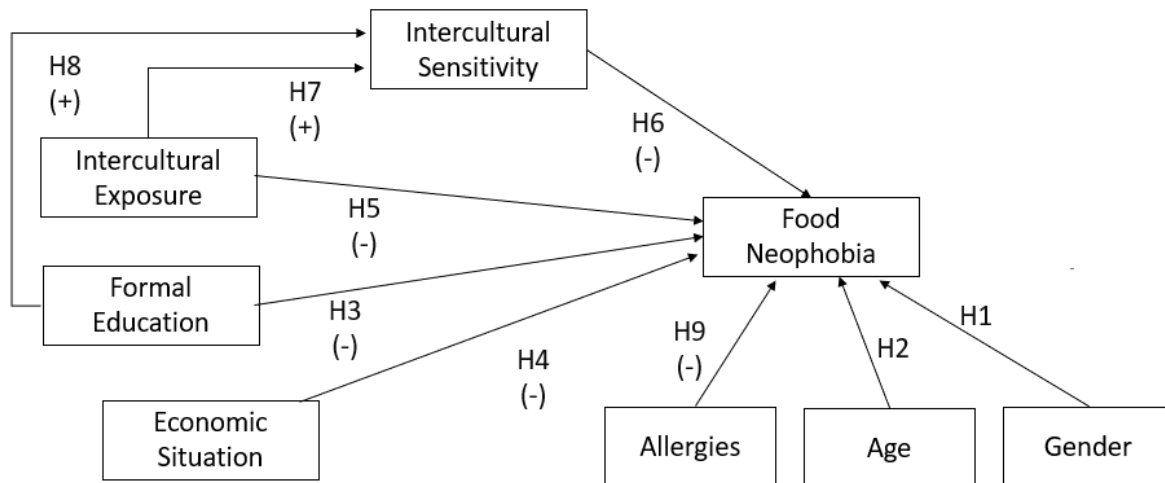


Figure 1: Food Neophobia Antecedents

There are two main variables: intercultural sensitivity and food neophobia. The relation between them is the core of this study. Many studies point to diverse relations as gender or age, but they claim that it is vital to study socio-cultural factors.

3. METHODOLOGY

To obtain answers, we developed a self-administered questionnaire distributed through Instagram. There were no restrictions, and everybody could answer it. Our goal is to get a sample as diverse as possible. The questionnaire has 3 main sections: one related to intercultural sensitivity, one to food neophobia, and one to sociodemographic context. To evaluate intercultural sensitivity, we use the ISS - Intercultural sensitivity scale developed by Chen et al. (2000), which integrates five factors (interaction engagement, respect for cultural differences, interaction confidence, interaction enjoyment, and interaction attentiveness). The 24-item scale was based on 5-Likert scale, and the choices were: 5=strongly agree, 4=agree, 3=uncertain, 2=disagree, and 1=strongly disagree.

Table following on the next page

Factor	Question	Polarity
Interaction engagement		
	1. I have a feeling of enjoyment towards differences between my culturally-distinct	(+)
	11. I tend to wait before forming an impression of culturally-distinct counterparts.	(+)
	13. I am open-minded to people from different cultures.	(+)
	21. I often give positive responses to my culturally-different counterpart during our interaction.	(+)
	22. I avoid those situations where I will have to deal with culturally-distinct persons.	(-)
	23. I often show my culturally-distinct counterpart my understanding through verbal or nonverbal cues.	(+)
	24. I have a feeling of enjoyment towards differences between my culturally-distinct counterpart and me.	(+)
Respect for cultural differences		
	2. I think people from other cultures are narrow-minded.	(-)
	7. I don't like to be with people from different cultures.	(-)
	8. I respect the values of people from different cultures.	(+)
	16. I respect the ways people from different cultures behave.	(+)
	18. I would not accept the opinions of people from different cultures.	(-)
	20. I think my culture is better than other cultures.	(-)
Interaction confidence		
	3. I am pretty sure of myself in interacting with people from different cultures.	(+)
	4. I find it very hard to talk in front of people from different cultures.	(+)
	5. I always know what to say when interacting with people from different cultures.	(+)
	6. I can be as sociable as I want to be when interacting with people from different Cultures.	(+)
	10. I feel confident when interacting with people from different cultures.	(+)
Interaction enjoyment		
	9. I get upset easily when interacting with people from different cultures.	(-)
	12. I often get discouraged when I am with people from different cultures.	(-)
	15. I often feel useless when interacting with people from different cultures.	(-)
Interaction attentiveness		
	14. I am very observant when interacting with people from different cultures.	(+)
	17. I try to obtain as much information as I can when interacting with people from different cultures.	(+)
	19. I am sensitive to my culturally-distinct counterpart's subtle meanings during our interaction.	(+)

Table 1: Intercultural Sensitivity Scale

Neophobia is the rejection of everything new to a person; when we are talking about food, food neophobia relates to denying others' food, namely ethnic food. We used the Food Neophobia Scale developed by Pliner and Hobden (1992) to evaluate food neophobia. The 10-item scale was based on a 5-Likert scale, and the choices were: 5=strongly agree, 4=agree, 3=uncertain, 2=disagree, and 1=strongly disagree.

Question	Polarity
1. I am constantly sampling new and different foods	(-)
2. I don't trust new foods	(+)
3. If I don't know what a food is, I won't try it.	(+)
4. I like foods from different cultures	(-)
5. Ethnic food looks too weird to eat	(+)
6. At dinner parties, I will try new foods	(-)
7. I am afraid to eat things I have never had before	(+)
8. I am very particular about the foods I eat	(+)
9. I will eat almost anything	(-)
10. I like to try new ethnic restaurants	(-)

Table 2: Food Neophobia Scale

To evaluate the economic situation, we used the scale of financial sufficiency developed by Mittal and Griskevicius (2016), which has three items. The 3-item scale was based on 5-Likert scale, and the choices were: 5=strongly agree, 4=agree, 3=uncertain, 2=disagree, and 1=strongly disagree.

Question	Polarity
1. I have enough money to buy things I want.	(+)
2. I don't need to worry too much about paying my bills.	(+)
3. I feel relatively wealthy these days.	(+)

Table 3: Financial Sufficiency Scale

To evaluate the cultural exposure, we use a dichotomic variable: Have you lived in another country for more than six months? We use a dichotomic variable to evaluate formal education: Have you attended higher education? To evaluate the existence of allergies, we use a dichotomic variable: Do you have any allergies?

4. RESULTS

In the end, we obtained 208 responses. Regarding sociodemographic characteristics, the sample is very diverse in age, with an average of 29.50 years, a minimum of 13 and a maximum of 65, including diverse generations; in gender, including 138 people who identify themselves as female, 67 as male, and 3 not binary; regarding formal education 178 has university frequency and 30 not. The sample has diverse intercultural experiences, too; 42 have already lived in another country for more than 6 months, and only 5 persons have never visited another country. We used the structural equation model (SEM) to test the model. In SEM, there is an inner model and an outer model. The outer models refer to diverse scales used to evaluate the latent variables. The inner model refers to diverse relations studied.

Outer model

	Neophobia	Engagement	Attention	Joyment	Respect	Confidence	wealth
Cronbach's alpha	0,805	0,718	0,671	0,639	0,693	0,794	0,817
Composite reliability (rho_c)	0,857	0,822	0,858	0,801	0,811	0,86	0,888
The average variance extracted (AVE)	0,506	0,541	0,751	0,578	0,521	0,557	0,726

Table 4: Reliability and Validity

	Engagement	Attention	Enjoyment	Respect	Confidence
Engagement					
Attention	0,656				
Enjoyment	0,672	0,158			
Respect	0,841	0,28	0,698		
Confidence	0,591	0,3	0,722	0,287	

Table 5: Discriminant Convergence

The first step was the outer model validation. Using SmartPLs, a confirmatory factor analysis was developed, ensuring the significance level of each construct was below 0.05 (Pinto, 2016). According to Hulland, to ensure internal consistency, loadings must be greater than 0.7. However, following Henseler et al. (2009), we kept items with loadings between 0.5 and 0.7 whenever their deletion did not improve the composite reliability. The rhoC - Composite reliability rhoC and Cronbach's alpha measurements were considered to ensure consistency and internal reliability (Hair Jr et al., 2021). To assess the convergent validity, we used the AVE. For this parameter to be acceptable, its value must be greater than 0.5, which reflects that the construct explains 50% or more of the variance of the indicators that constitute this construct (Hair Jr et al., 2021). On the other hand, Discriminant validity measures the degree to which a construct is empirically distinct from other constructs in the model (Hair Jr et al., 2021); here, the Fornell-Lacker criterion was used. Tables 4 and 5 present the values for the criteria used. Inner Model. The results (Table 6) demonstrate the significant influence that allergies play in human's relationship with food. Hypothesis 9 is confirmed since when allergies are present, there is a high level of neophobia; the genesis of neophobia itself can explain these results: it appeared as a protective strategy against allergic reactions (Breneman, 1984). The theory links exposure to food neophobia; living in another country means experiencing its culture through, for example, its traditional foods (Sünnetçioğlu, 2020); our results support this idea and validate H5. After analysing the results, an indirect relationship between this dichotomous variable neophobia was identified through interaction engagement. Chang (2000) defined this factor as the feelings that bloom during an intercultural interaction, so one would expect a correlation between living in another country and engaging in interactions with someone from another culture since this is the basis of change, which negatively influences food neophobia. The results of studies linking travel to neophobia demonstrate that such contacts can decrease fear of new foods (Caber, 2018): the same was supported by our results that, instead of linking exposure to tourism, connected exposure to living abroad results in a negative correlation with neophobia directly and indirectly. It is also possible to observe a relationship between living away from home and trust in other cultures, again, this result seems self-explanatory and is not related to food neophobia. Although a strong link between intercultural sensitivity and neophobia was expected since much of interculturality is related to gastronomical experiences (Sünnetçioğlu, 2020), we only obtained an inverse correlation between two factors: engagement and enjoyment. As mentioned, engagement is based on positive feelings, and food can provide that, so we can see that the desire to try new foods is linked to that positively. Along the same line, enjoyment points to the positive balance of interaction with individuals from different cultures (Moradi and Ghabanchi, 2019). This positive experience can serve as a previous exposure that motivates curiosity and facilitates the ingestion of new foods, decreasing the anxiety for the insertion since there has already been a positive experience with diverse cultures. It is also possible to observe a relationship between living away from home and trust in other cultures, again, this result seems self-explanatory and is not related to food neophobia. Although a strong link between intercultural sensitivity and neophobia was expected since much of interculturality is related to gastronomical experiences (Sünnetçioğlu, 2020), we only obtained an inverse correlation between two factors: engagement and enjoyment.

As mentioned, engagement is based on positive feelings, and food can provide that, so we can see that the desire to try new foods is linked to that positively. Along the same line, enjoyment points to the positive balance of interaction with individuals from different cultures (Moradi and Ghabanchi, 2019). This positive experience can serve as a previous exposure that motivates curiosity and facilitates the ingestion of new foods, decreasing the anxiety for the insertion since there has already been a positive experience with diverse cultures. Despite not impacting neophobia, it is also necessary to highlight the relationship between trust and wealth with interaction confidence. Trust seems to be stimulated by the economic level the subject is at, leading people to act appropriately when in contact with individuals from other cultures.

	Original s	Sample m	Standard t	T statistic	P values
Allergies -> Food_Neo	0.46	0.46	0.181	2.542	0.011
Attention -> Food_Neo	-0.103	-0.111	0.081	1.274	0.203
Education -> Attention	-0.233	-0.215	0.235	0.993	0.321
Education -> Food_Neo	-0.04	-0.034	0.184	0.217	0.828
Education -> Engagement	0.05	0.055	0.224	0.222	0.824
Education -> Enjoyment	-0.003	0.001	0.203	0.017	0.987
Education -> Confidence	-0.313	-0.315	0.176	1.776	0.076
Education -> Respect	0.084	0.099	0.234	0.36	0.719
Engagement -> Food_Neo	-0.268	-0.254	0.096	2.788	0.005
Enjoyment -> Food_Neo	-0.17	-0.176	0.081	2.105	0.035
Confidence -> Food_Neo	-0.002	-0.006	0.08	0.023	0.982
age -> Food_Neo	0.001	0.005	0.064	0.021	0.983
gender -> Food_Neo	0.026	0.026	0.136	0.19	0.849
live -> Attention	0.208	0.214	0.186	1.123	0.262
live -> Food_Neo	-0.32	-0.321	0.147	2.179	0.029
live -> Engagement	0.411	0.419	0.189	2.17	0.03
live -> Enjoyment	0.201	0.2	0.18	1.119	0.263
live -> Confidence	0.637	0.647	0.158	4.033	0
live -> Respect	0.066	0.085	0.226	0.29	0.771
Respect -> Food_Neo	-0.002	-0.019	0.077	0.027	0.978
wealth -> Attention	0.038	0.035	0.087	0.436	0.663
wealth -> Food_Neo	-0.04	-0.034	0.083	0.483	0.629
wealth -> Engagement	0.01	0.012	0.076	0.127	0.899
wealth -> Enjoyment	0.102	0.108	0.088	1.153	0.249
wealth -> Confidence	0.151	0.155	0.077	1.962	0.05
wealth -> respect	0.036	0.04	0.092	0.397	0.692

Table 6: Structural Model Results

5. CONCLUSION

In conclusion, this study investigated the relationship between food neophobia, intercultural sensitivity, and international exposure. The results of this study provide evidence for the important role that intercultural sensitivity plays in reducing food neophobia. Specifically, living in another country and being exposed to diverse cultures can increase individuals' engagement with other cultures, which can, in turn, reduce food neophobia. Additionally, the findings suggest that economic status can impact trust and facilitate intercultural interactions,

which may be particularly relevant for businesses seeking to enter a new market. However, demographic characteristics such as age and gender were not found to impact food neophobia. The theoretical implications of this study highlight the importance of considering intercultural sensitivity when exploring food neophobia. The findings suggest that interventions to reduce food neophobia should promote intercultural sensitivity and exposure to diverse cultures. This may be particularly relevant for individuals with food allergies, who were found to have higher levels of neophobia. Additionally, the study highlights the need to consider the role of economic status in facilitating intercultural interactions and reducing food neophobia. Overall, this study has important practical implications for businesses in the restaurant industry seeking to enter a new market or tackle new target groups. One of the recommendations is for restaurants to consider cultural factors that impact consumers' food preferences and attitudes. This can be achieved by designing menus that cater to customers with allergies or dietary restrictions and providing information about the cultural origin of certain dishes to increase customers' intercultural awareness and sensitivity. Additionally, restaurants can promote positive intercultural experiences by organising cultural events or collaborating with other businesses that promote diversity and inclusivity. Policymakers and educators can use the study's findings to develop programs that promote intercultural sensitivity and reduce food neophobia. By considering these factors, stakeholders can develop strategies to promote the acceptance of new foods and facilitate intercultural interactions. Regardless, it is also essential to remember that the study might have limitations. The sampling bias could be because the questionnaire was distributed through Instagram, which might have limited the sample to only those who use the social media platform. This could make the sample not representative of the general population and limit the study's generalizability. The other potential limitation could be self-report bias, which arises due to the questionnaire being self-administered. Participants may not provide accurate responses due to social desirability bias or personal biases. For instance, participants may not report their food neophobia accurately if they perceive it as a negative trait. It would be interesting to conduct complementary studies to triangulate the findings and validate the self-reported data and build questionnaire distributed through different platforms or channels, such as email lists, online forums, or community organisations that tackle different societal groups. These complementary studies would enhance the research and confirm our findings.

LITERATURE:

1. Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), pp.179–211.
2. Breneman, J.C (1984). *Basic of food allergy*. New York. Raven Press.
3. Caber, M.;Yilmaz, G.; Kiliçarslan, D.; and Öztürk, A. (2018). The effects of tour guide performance and food involvement on food neophobia and local food consumption intention. *International Journal of Contemporary Hospitality Management*, 30(3), pp.1472-1491.
4. Chen, G. M. (1997). A review of the concept of intercultural sensitivity. *ERIC -Biennial Convention of the Pacific and Asian Communication Association*, Honolulu, HI, January.
5. Chen, G. M., and Starosta, W. J. (2000). Developing and validating the Intercultural Sensitivity Scale. *Annual Meeting of the National COmmunication Association*, 86th, Seattle, November 8-12.
6. Flight, I.; Leppard, P.; Cox, D.N. (2003) Food neophobia and associations with cultural diversity and socio-economic status amongst rural and urban Australian adolescents. *Appetite* 2003, 41, pp. 51–59.
7. Hair Jr, J. F. et al (2021). *Partial least squares structural equation modeling (PLS-SEM) using R: A workbook*. Springer Nature.

8. Hartmann, C.; Shi, J.; Giusto, A. and Siegrist, M. (2015). The psychology of eating insects: A cross-cultural comparison between Germany and China. *Food Quality and Preference*, 44, pp. 148–156.
9. Henseler, J.; Ringle, C. M.; and Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In *New challenges to international marketing*. Emerald Group Publishing Limited.
10. Hulland, J. (1999). Use of Partial Least Squares (PLS) in strategic management research: a review of recent studies, *Strategic Management Journal*, 20, pp.195-204
11. Kivela, J. and Crofts, J. C. (2006). Tourism and gastronomy: Gastronomy’s influence on how tourists experience a destination. *Journal of Hospitality and Tourism Research*, 30 (3), pp. 354-377
12. Kringelbach, M. L. (2015). The pleasure of food: underlying brain mechanisms of eating and other pleasures. *Flavour*, 4(1), pp.1-12.
13. Lepp, A. and Gibson, H. (2003). Tourist roles, perceived risk and international tourism. *Annals of Tourism Research*, 30 (3), pp. 606–624.
14. Mascarello, G.; Pinto, A.; Rizzoli, V.; Tiozzo, B.; Crovato, S. and Ravarotto, L. (2020). Ethnic food consumption in Italy: The role of food neophobia and openness to different cultures. *Foods*, 9(2), pp. 112.
15. Meiselman, H. L.; King, S. C. and Gillette, M. (2010). The demographics of neophobia in a large commercial US sample. *Food Quality and Preference*, 21(7), pp. 893-897.
16. Mittal, C., and Griskevicius, V. (2014). Sense of control under uncertainty depends on people’s childhood environment: A life history theory approach. *Journal Of Personality And Social Psychology*, 107(4), pp. 621.
17. Moradi, E., and Ghabanchi, Z. (2019). Intercultural sensitivity. *Journal of Ethnic and Cultural Studies*, 6(3), pp. 134-146.
18. Nordin, S.; Broman, D. A.; Garvill, J.; and Nyroos, M. (2004). Gender differences in factors affecting rejection of food in healthy young Swedish adults. *Appetite*, 43(3), pp. 295-301.
19. Pliner, P., and Hobden, K. (1992). Development of a scale to measure the trait of food neophobia in humans. *Appetite*, 19, pp. 105–120.
20. Rioux, C. (2020). Food neophobia in childhood. *Handbook of eating and drinking: Interdisciplinary perspectives*, pp. 413-432.
21. Schulze, G. and Watson, N.V. (1995) Flavor neophobia in selected rodent species. In: R. Wong, (Eds.) *Biological Perspectives on Motivated Activities*. Ablex Publishing Corporation, Norwood, New Jersey, USA.
22. Siddiqui, S. A. et al (2022). Avoiding food neophobia and increasing consumer acceptance of new food trends—a decade of research. *Sustainability*, 14(16), 10391.
23. Sünnetçioğlu, A.; ÇAKICI, A. C.; and Erdem, S. H. (2020). The Effect of Travel Lifestyle, Cultural Sensitivity and Food Neophobia on Local Food Preference1, *Journal of Tourism and Gastronomy Studies*, 8(2), pp. 746-761.
24. Tuorila, H.; Lahteenmaki, L.; Pohjalainen, L. and Lotti, L. (2001). “Food neophobia among the Finns and related responses to familiar and unfamiliar foods”. *Food Quality and Preference*. 12, pp.29-37.

"DID I BUY THIS PERFUME BECAUSE OF THE CELEBRITY OR THE BRAND? OR BOTH?" UNDERSTANDING THE DIFFERENCE BETWEEN THE IMPACT OF CELEBRITY'S IMAGE AND BRAND'S IMAGE IN PERFUME ADVERTISEMENTS

Tural Aliyev

*Szechenyi Istvan University, Hungary
aliyev.tural@sze.hu*

ABSTRACT

Perfume advertising accounts for a sizable amount of ad pages and expenditure, which is reported to be in the billions of dollars. When employed effectively, celebrities can help brands enhance their effectiveness since people want to see their favorite stars in advertisements. People like to relate to human stories and feel emotions, which translate into a more beautiful narrative in unique locations with compelling characters in advertising. We know that positive emotions help brands connect better with their audiences, and brands that can make that emotional connection benefit from long-term brand growth. This paper investigates whether, in perfume ads, the celebrity's image or the brand's existing reputation has more impact on the customer's buying decision-making. Studies show that perfume, comparable to numerous other products and services, is not purchased for its functional benefits but is rather an intimate purchase with highly individualized preferences. Marketers face a unique issue when selling perfume because they cannot sell their product purely on its qualities. Perfume marketers, on the other hand, speak to people's fantasies. Therefore, by understanding the impact of the celebrity and the brand name in the perfume advertisement, marketing companies can connect to the target audience much more effectively, resulting in higher overall revenue.

Keywords: *Brand and celebrity image, customer decision-making, perfume advertisements*

1. INTRODUCTION

The perfume industry is a large and diverse industry that involves the creation, production, and marketing of fragrances and scents. It is driven by consumer demand, includes both luxury and mass-market brands, and covers a wide range of products such as perfumes, colognes, body sprays, and more. Perfume advertising is a highly competitive industry that has been utilizing various marketing strategies to appeal to consumers. Today, the perfume industry is a major global business that generates billions of dollars in revenue each year and is heavily influenced by trends in fashion, culture, and marketing. The industry is also known for its creativity and innovation, with perfume houses constantly pushing the boundaries of fragrance creation and using new ingredients and techniques to produce unique and distinctive scents. According to Lim et al. (2015), perfume is an experience product, and presenting it for online sales is difficult since the true sense involved, i.e., olfaction, is missing from the Internet platform, thus pushing the buyers to go to the store and try the smell before buying or making them accept the risk of not being satisfied with it by buying online. Perfume has a significant impact on human behavior, emotions, and mood. Studies have shown that scent can affect people's perception, cognition, and behavior. For instance, a study conducted by Herz and von Clef (2001) found that different scents can affect people's perception of others. They found that people who were exposed to a pleasant scent rated others as more attractive and friendly than those who were exposed to an unpleasant scent. Another study by Gueguen (2008) found that wearing perfume can increase people's confidence and self-esteem.

2. LITERATURE REVIEW: USE OF CELEBRITIES IN PERFUME ADVERTISEMENTS

The Internet limits online buyers' ability to employ their senses of smell and taste. Indeed, studies such as those by Levin, Levin, and Heath (2003) have emphasized the significance of personally inspecting some products before purchasing. According to Zhang and colleagues (2018), particularly problematic are online purchases of perfume and shoes, which necessitate customers' physical involvement of the olfactory and tactile senses. A celebrity endorser, according to Friedman and Friedman (1979), is someone who is known by the public for his or her accomplishments in areas outside of that of the product class advertised. Marketers have understood the value of including celebrities in their campaigns. Celebrities appear in their advertising and provide product endorsements. Marketers believe that a well-known and well-liked celebrity will positively influence consumers' feelings and buying intentions. In his article, Shaughnessy (1995) mentioned that the usage of celebrities produces above-average brand recognition, but only around half of the celebrities have a favorable effect on consumers' purchasing intentions toward the product. Celebrities are making their imprint in a variety of consumer markets, particularly the scent market, whether in music, movies, drama, or sports (Hung et al., 2011). Different perfume houses are searching for and wanting to embrace novel marketing communication strategies to stay in the game of this ever-increasing sales competition, with celebrity endorsement being the most prevalent and popular. They register their scent's trademark under a celebrity's name in order to compete with both luxury-branded and expensive celebrity-endorsed perfumes (Prasad, 2013). One of the reasons that celebrities are used in perfume commercials is that they may help to promote and strengthen the brand's image as well. Celebrities are frequently viewed as aspirational characters, and their affiliation with a specific perfume can contribute to the creation of a sense of elegance and exclusivity. Furthermore, celebrities are well-known and have a big following, so their endorsement of a product can result in higher brand visibility and sales. Furthermore, perfume advertising is frequently designed to elicit an emotional response from the spectator, and the use of a well-known celebrity might aid in this purpose. Individuals have strong emotional attachments to their favorite celebrities, which might lead to a good association with the promoted scent. Therefore, according to Biswas, Biswas, and Das (2006), one of the reasons why corporations hire celebrities as endorsers is to create more credible commercials while also developing more successful advertisement communication. Effects on consumers' opinions and attention, and hence purchase intentions, are consistently regarded as factors that celebrities are thought to exert once employed by a firm (McCormick, 2016). Djafarova and Rushworth (2017) believe that endorsements by celebrities promoting such products can help unknown products become well-known. Indeed, they claim that such endorsements add value to both the product or service and the brand name. McCormick (2016) also argues that because endorsers and customers become acquainted before they act as spokespersons, it is critical that the endorsers be viewed as positive people, both as an ordinary person and as an endorser. "Match up," described as the "fit between product and celebrity," is an important theme to consider before selecting endorsers (Tantisenepong et al. 2012). As a result, it is assumed that the attributes possessed by the endorsers are more likely to be passed on to the product they are selling, while customers see the match between the endorser and the endorsed product (Thwaites, Lowe, Monkhouse, & Barnes, 2012). In his study, Ohanian (1990) considers the appeal, trustworthiness, and understanding of endorsers about the product they recommend as sources of credibility that consumers perceive. In keeping with the previously listed qualities, recognition, likeability, and friendliness have been found to increase the effectiveness of endorsers (Miciak & Shanklin, 1994). Fleck, Korchia, and Le Roy (2012) argue that celebrities have become crucial aspects of ads for particular products such as perfumes and cosmetics. For example, they promote the endorsement of Dior by famed soccer player Zinedine Zidane.

They conclude that, given the constant product launches in the cosmetics and perfume industries, it is critical to familiarize customers not only by explaining product benefits but also by engaging celebrities to support such products. According to Janssens and De Pelsmacker (2009), there are three elements that influence customers' scent preference and choice. Initially, there are situational or personal aspects to consider, such as the consumer's eye or hair color, gender, age, season, or occasion. Second, there is an emotional aspect, such as past experiences with certain odors. Third, there is the consumer's personality, which is influenced by genetics and socialization processes. They also believe that certain perfumes can be linked to specific people's social classes. They go on to say that the "ideal personality" may impact consumers' scent choices, which the authors believe can be reflected in celebrity endorsers.

3. IMPACT OF CELEBRITY'S IMAGE ON CONSUMERS.

Advertisements can now be found on social media platforms such as Facebook, Twitter, Instagram, and YouTube, in addition to traditional advertising outlets such as print and television. Customers can "like" a product on Facebook, follow a celebrity on Twitter or Instagram, and listen to podcasts or watch videos on YouTube, and many of these platforms rely on advertising for financial support. Celebrities today tweet about things they use or places they visit, upload images of themselves in their daily lives, and communicate with fans by retweeting a post or link sent to them. Celebrities may now contact and interact with their followers more quickly than ever before thanks to social media networks. Many celebrities utilize social media to exert control over their public image. Many millennials idolize celebrities, and adoration of celebrities is a normal element of identity formation, according to numerous scholars. According to Boon and Lomore (2001), young consumers have been observed copying components of their identity development from celebrities they adore. Many shoppers will follow in the footsteps of celebrities who color their hair bright pink or create apparel trends. This process of self-construction has the potential to make a superstar an example and inspiration to others who admire them (Peter & Olson, 1990). There are various causes for the rapid growth of celebrity culture. For example, the growth of mass media has made celebrity news one of the most often discussed issues. Celebrities have been "reconstituted as contemporary life's overexposed persons" (Marshall, 1997). The same thing is happening with other forms of media. Such news garners a lot of attention and boosts consumption across all social classes. The development of the celebrity industry has never been so rapid. However, there are no indications that it has hit its limit. Media firms, as well as the film and music industries, have grown in power. The evolution of the media machine facilitates the process of establishing a celebrity. Many shows make use of the human need to be famous. Through such shows, celebrities are created in the entertainment business. But another reason for the extensive advertising of popular actors, musicians, and athletes is public demand. Marshall (1997) argues that celebrity is a highly public sort of dialogue concerning the boundaries of what is public, private, and, eventually, intimate. The level of exposure—the ability of our devices to record and transmit photos, messages, and sounds—and an online society with new exposure standards have aided in expanding our comfort with public intimacy. Influential people endorse a broad spectrum of products used around the world, including sports clothes, IT technology, alcoholic beverages, and many others. Most people are aware that celebrities get handsomely compensated for brief advertisements that do not take much effort. As a result, working-class populations that must repay their loans and frequently work in hazardous conditions feel envious. The famous have a tremendous influence on practically every area of ordinary people's lives, including political beliefs, fashion trends, interests, actions, and attitudes (Levy, 2015). Children and teenagers, on the other hand, are the most affected. The media influences their emerging worldviews, forming new aims and ideals. Many students are willing to forego their education in schools, colleges, and other institutions to

appear on billboards and become famous. They don't feel they'll be able to succeed in other industries. This can be considered the negative impact of the celebrity on the people, even though they may or may not do it purposefully. Although celebrities have some harmful impacts on society's culture, they also have good ones. Individuals are positively influenced by public figures who advocate ethical principles and take responsible actions (Gornstein, 2014). Several celebrities advocate for social justice and make substantial contributions when natural disasters occur. If children are not consumed with misconceptions and false beliefs, the celebrity market can be beneficial. Popular people can be excellent role models for good behavior and attitudes. Many of them, for example, support humanitarian efforts, participate in conversations about social issues, generate funds for individuals in need, donate to medical organizations, and promote philanthropy. Furthermore, celebrities who lead honorable lifestyles serve as great role models for the entire population. They stress the significance of traditional principles such as honest interactions and personal integrity. Furthermore, celebrities can entertain and amuse their audience through their work in movies, music, and other types of entertainment. This can assist people in relaxing, de-stressing, and enjoying life. In addition, some celebrities act as great role models for young people, exhibiting the value of hard work, devotion, and ethical behavior. This can assist in forming the next generation's values and views. Overall, the influence of celebrities on people is varied and multifaceted. They might provide inspiration and amusement, but they can also encourage false beauty standards, undesirable behaviors, and a separation from reality. It is vital for individuals to be skeptical of the messages that celebrities promote and to consider the impact that they have on their lives. By doing so, we can seek to limit celebrities' negative effects while also maximizing their ability to do good in the world.

4. BRAND IMAGE AND ITS EFFECT ON CONSUMERS

Brand image has a significant impact on customer purchasing behavior. If the brand image is positive, so will the customer's behavior toward the brand. When a customer is pleased with a brand, he or she becomes loyal to it. It is urged that businesses take their societal responsibility seriously and deliver a quality product that is worthy of their brand image. But what is brand image, and how is it developed? Consumer perception of a brand is referred to as brand image (Martinez & Chernatony, 2004). It is formed by a number of elements, including product familiarity, perceived quality, brand attitude, and fit between the parent and extension brands (Muge & Korkut, 2010). It is an important component of brand equity, and its growth is influenced by marketing mix efforts and corporate image (Kim & Hyun, 2011). Yet, brand extension has the potential to dilute a brand's product image, particularly when there is a mismatch between the parent and extension brands or when the parent brand's perceived image and quality are greater (Muge & Korkut, 2010). According to research, user-generated social media brand communication improves both brand loyalty and perceived brand quality. Furthermore, social media communication can have an impact on brand image, which can be investigated using structural equation modeling. Companies must exercise caution while expanding into new product categories in order to safeguard their brand image, because the stronger the image of a brand, the more dilution happens. It is worth noting that there are considerable variances in brand image creation among the industries studied (Schivinski & Dabrowski, 2015). Although there are no specific takeaways regarding what brand image is or how it is developed, Martinez and Chernatony's (2014) study defines brand image as a combination of seven constructs, which include general brand image, product brand image, quality, familiarity, fit, attitude, and demographic characteristics. The effect of brand image on consumer behavior has been thoroughly studied, and the findings emphasize the importance of a good brand image. A good brand image can positively affect consumer behavior, which can have a major impact on the bottom line of the firm. Brand equity, which includes the value customers place on a brand, influences consumer behavioral intentions, and this effect can be

mediated and modified by customer satisfaction and demographic data (Rambocas et al., 2018). Because all three image elements were found to be significant in determining the net influence of image attributes on sales, changes in brand image attributes can explain fluctuations in sales numbers. Customer self-perception and perception of brand image have a substantial influence on their marketplace behavior, and social media marketing initiatives have been shown to positively influence brand image (Ataman & Ülengin, 2018). Brand image has a substantial impact on consumer behavior toward a brand and is one of the two key aspects of brand equity, with social media marketing positively impacting both dimensions. Positive brand image can lead to higher brand preference, price premium, and loyalty through social media marketing initiatives (Godey et al., 2016). Additionally, customer satisfaction mediates the relationship between brand equity and customer behavioral intentions, with customer age, education, and gender acting as moderators. Customer behavioral intents to repeat purchases, be ready to pay a price premium, switch, and generate positive word of mouth are all related to brand equity (Rambocas et al., 2018). The brand also influences customer decision-making processes, with the purchase of branded products and preference for brand origin being dependent on consumer age (Chovanová et al., 2015). Corporate image has a direct impact on client loyalty, and it is a more important route to customer loyalty for complicated services than customer satisfaction (Wallin & Lidestad, 1998). Finally, consumer-based brand equity has a direct influence on consumer behavior, and social media marketing efforts have a favorable impact on it, which is critical for developing brand loyalty, brand preference, and the ability to charge a premium price for products in the context of SMMEs (Godey et al., 2016). A brand is more prominent than ever in an individual's self-image. Consequently, the degree to which consumers believe the brand reflects themselves determines the strength of consumer-brand attachment (Park et al. 2010). Self-concept can be divided into two types: "real self" and "ideal self." An individual's actual self reflects his or her current perceived reality (i.e., who I am now). The ideal self, on the other hand, refers to an individual's aspirational self, which exhibits a vision of objectives and ambitions associated with his or her future self (i.e., who I want to be) (Gough et al. 1978). How does the brand's image influence consumer behavior? Creating a strong brand image is critical for businesses seeking to attract and retain customers. A brand's image can be influenced by a variety of elements, including psychological, social, and personal factors that influence brand perception (Tekin et al., 2016). Advertising campaigns with a continuous theme can help a brand's image develop. Direct consumer experience is very important in authenticating brand image. For a good brand image, a straightforward and effective message is required (Manhas & Tukamushaba, 2015). Additionally, one of the competitive needs is building up the brand image of firms. Brand distinctiveness, brand loyalty, and brand awareness or associations are all important factors in developing a strong brand image (Mohd et al., 2007). Authenticity and consistency are critical in developing a strong brand image and making an emotional connection with the audience (Manhas & Tukamushaba, 2015). According to Bravo and colleagues (2012), creating a strong corporate image will also make you more appealing to customers. Therefore, mitigating the impact of unfavorable non-firm information might contribute to a good brand image. Promoting the positive image of the brand's native nation helps improve the brand's overall image. A positive country image can also be leveraged in brand name strategy (Mohd et al., 2007). Ultimately, building a good brand image requires time and work, but it can lead to long-term success and consumer loyalty (Manhas & Tukamushaba, 2015).

5. IMPACT OF BRAND IMAGE AND CELEBRITY'S IMAGE IN PERFUME ADVERTISEMENTS

What is the difference between celebrity image and brand image in perfume advertisements? To market their goods, perfume advertisers rely on both celebrity and brand images. Celebrity endorsements are a widely known marketing approach, but they are not the only one.

According to research, even if no specific product information is provided in the advertisements, customers are more likely to recall the featured brand the next time they purchase a perfume (Choi & Rifon, 2012). This means that brand image is important in shaping the consumer's view of the product. In reality, consumer perception of a brand is an important component of brand equity, and all advertising dollars should not be spent entirely on advertisements featuring celebrities (Mukherjee, 2009). Most perfume commercials, on the other hand, include both celebrity and brand cues, with celebrity endorsers frequently appearing in vehicle and perfume promotions (Aaker & Biel, 2013). Consumers identify the image of the celebrity with the perfume, demonstrating that the celebrity image has an important impact on the consumer's view of the product (Solomon et al., 1992; Tantisenepong et al., 2012). Human brands (celebrities) with strong image appeal can also improve the efficiency of perfume marketing (Seo et al., 2012). Researchers examined coded images and indications within print advertisements to evaluate customer expectations from print ads, indicating that fragrance commercials receive a lot of attention (Toncar & Fetscherin, 2012). To summarize, while celebrity image is crucial in perfume commercials, brand image is just as significant in leaving a lasting impression on the consumer's mind. How do consumers perceive celebrity image vs. brand image in perfume advertisements? The use of celebrities in advertisements is based on signaling theory, which states that some product categories, such as automobiles and perfumes, have symbolic value and are more easily connected with a celebrity or other spokesperson (Aaker & Biel, 2013a). According to a study done to better understand customer reactions to celebrity-endorsed perfumes, individuals establish a self-connection with the brand based on their assessment of the celebrity's image (Tantisenepong, 2012). This perception is critical in building brand equity, which is a component of brand perception. Spry and colleagues (2011) argue that people regard a brand as credible if they believe it possesses a specific ability or value. Younger consumers, for example, may associate a distinct smell with good value for money, resulting in an improved brand reputation. Meanwhile, shopping mall patrons consider human brand pictures to be one of the most effective advertising methods, particularly for products lacking a human brand (Seo et al., 2012). As a result, advertisers can utilize human brands with great image appeal to promote their products. Finally, consumers' perceptions of brand image are critical in shaping purchasing behavior (Srivastava, 2011). Building a strong brand image is critical for perfume brands to differentiate themselves from competitors and influence consumer behavior (Sanny et al., 2020). What is the impact of celebrity image vs. brand image on consumer behavior and purchasing decisions? According to research, celebrity endorsement can impact customer purchasing behavior; however, the efficiency of such endorsement differs depending on criteria such as product type and brand image congruence (Aaker & Biel, 2013; Choi & Rifon, 2012). According to a poll, people believe brand image to be an important component of brand equity, indicating that it influences consumer behavior and purchase decisions (Aaker & Biel, 2013). Yet, factors such as product category and perceived value-for-money association have an impact on brand image (Srivastava, 2011). Brand image consistency is also crucial for businesses since it allows for economies of scale in advertising and aids in the creation of a credible brand image (Spry et al., 2011). Social media influencers can also affect customer behavior and purchasing decisions because their followers are influenced by the things they use and promote (Sharma 2016). Finally, both celebrity and brand images influence customer behavior and purchase decisions, and businesses must carefully analyze their marketing approach to have a favorable impact on consumers.

6. CONCLUSION

Perfume advertisements often feature either a celebrity or a brand image to promote their products. While both strategies aim to influence consumer behavior and increase sales, the impact of a celebrity's image and a brand's image can differ significantly.

The main difference between the impact of a celebrity's image and a brand's image in perfume ads is that the celebrity's image is used to create an emotional connection with the consumer, while the brand's image is used to create a perception of quality, luxury, or exclusivity. Moreover, the use of a celebrity's image in a perfume ad can often result in more immediate sales as consumers are more likely to be influenced by the emotional connection created by the celebrity's image. On the other hand, the brand's image can create a long-term perception of quality and exclusivity, which can result in more loyal customers over time. Ultimately, the choice between using a celebrity's image or a brand's image in a perfume ad will depend on the marketing objectives of the brand as well as the target audience for the perfume.

LITERATURE:

1. Aaker, D. A., & Biel, A. L. (2013). *Brand Equity & Advertising*. Psychology Press eBooks. <https://doi.org/10.4324/9781315799537>
2. Aaker, D. A., & Biel, A. L. (2013a). Advertising, Perceived Quality, and Brand Image. *Brand Equity & Advertising*, 153–172. <https://doi.org/10.4324/9781315799537-18>
3. Ataman, B. and Ülengin, B. (2003), "A note on the effect of brand image on sales", *Journal of Product & Brand Management*, Vol. 12 No. 4, pp. 237-250. <https://doi.org/10.1108/10610420310485041>
4. Biswas, D., Biswas, A., & Das, N. (2006). The Differential Effects of Celebrity and Expert Endorsements on Consumer Risk Perceptions. The Role of Consumer Knowledge, Perceived Congruency, and Product Technology Orientation. *Journal of Advertising*, 35(2), 17-31.
5. Boon, S. D., & Lomore, C. D. (2001). Admirer-celebrity relationships among young adults.. *Human Communication Research*, 27(3), 432–465. <https://doi.org/10.1111/j.1468-2958.2001.tb00788.x>
6. Bravo, R., Montaner, T. and Pina, J.M. (2012), "Corporate brand image of financial institutions: a consumer approach", *Journal of Product & Brand Management*, Vol. 21 No. 4, pp. 232-245. <https://doi.org/10.1108/10610421211246649>
7. Choi, S. M., & Rifon, N. J. (2012). It Is a Match: The Impact of Congruence between Celebrity Image and Consumer Ideal Self on Endorsement Effectiveness. *Psychology & Marketing*, 29(9), 639–650. <https://doi.org/10.1002/mar.20550>
8. Chovanová, H. H., Korshunov, A., & Babčanová, D. (2015). Impact of Brand on Consumer Behavior. *Procedia. Economics and Finance*, 34, 615–621. [https://doi.org/10.1016/s2212-5671\(15\)01676-7](https://doi.org/10.1016/s2212-5671(15)01676-7)
9. Djafarova, E., & Rushworth, C. (2017). Exploring the credibility of online celebrities' Instagram profiles in influencing the purchase decisions of young female users. *Computers in Human Behavior*, 68(March), 1-7.
10. Fleck, N., Korchia, M., & Le Roy, I. (2012). Celebrities in Advertising: Looking for Congruence or Likability? *Psychology and Marketing*, 29(9), 651–662.
11. Friedman, H. H., & Friedman, L. (1979). Endorser effectiveness by product type. *Journal of Advertising Research*, 19(5), 63–71.
12. Godey, B., Manthiou, A., Pederzoli, D., Rokka, J., Aiello, G., Donvito, R., & Singh, R. (2016). Social media marketing efforts of luxury brands: Influence on brand equity and consumer behavior. *Journal of Business Research*, 69(12), 5833–5841. <https://doi.org/10.1016/j.jbusres.2016.04.181>
13. Gornstein, L. (2014). *Celebrity Playbook*. Skyhorse Publishing.
14. Gough, H. G., Lazzari, R., & Fioravanti, M. 1978 Self versus ideal self: A comparison of five adjective check list indices. *Journal of Consulting and Clinical Psychology*, 46, 1085-1091.

15. Guéguen, N. (2008). Brief report: The effects of women's cosmetics on men's approach: An evaluation in a bar. *North American Journal of Psychology*, 10(1), 221–228.
16. Herz, R. S., & von Clef, J. (2001). The influence of verbal labeling on the perception of odors: Evidence for olfactory illusions? *Perception*, 30(3), 381–391. <https://doi.org/10.1068/p3179>
17. Hung, K., Huling Chen, A., Peng, N., Hackley, C., Amy Tiwsakul, R., & Chou, C. (2011). Antecedents of luxury brand purchase intention. *Journal of Product & Brand Management*, 20(6), 457–471. <https://doi.org/10.1108/10610421111166603>
18. Janssens, W., & De Pelsmacker, P. (2009). Smells like me - personality and perfume choice. *International Journal of Market Research*, 51(4), 1-13.
19. Kim, J., & Hyun, Y. T. (2011). A model to investigate the influence of marketing-mix efforts and corporate image on brand equity in the IT software sector. *Industrial Marketing Management*, 40(3), 424–438. <https://doi.org/10.1016/j.indmarman.2010.06.024>
20. Levin, Aron & Levin, Irwin & Weller, Joshua. (2005). A multi-attribute analysis of preferences for online and offline shopping: Differences across products, consumers, and shopping stages. *Journal of Electronic Commerce Research*. 6.
21. Levy, M. S. (2015b). *Celebrity and Entertainment Obsession: Understanding Our Addiction*. Rowman & Littlefield.
22. Lim, J.-S., Al-Aali, A., & Heinrichs, J. H. (2015). Impact of satisfaction with e-retailers' touch points on purchase behavior: the moderating effect of search and experience product type. *Marketing Letters*, 26(2), 225–235.
23. Manhas, P. S., & Tukamushaba, E. K. (2015). Understanding service experience and its impact on brand image in hospitality sector. *International Journal of Hospitality Management*, 45, 77–87. <https://doi.org/10.1016/j.ijhm.2014.11.010>
24. Marshall, P. D. (1997). Celebrity and power: fame in contemporary culture. *Choice Reviews Online*, 35(01), 35–0178. <https://doi.org/10.5860/choice.35-0178>
25. Martínez, E. and de Chernatony, L. (2004), "The effect of brand extension strategies upon brand image", *Journal of Consumer Marketing*, Vol. 21 No. 1, pp. 39-50. <https://doi.org/10.1108/07363760410513950>
26. McCormick, K. (2016). Celebrity endorsements: Influence of a product-endorser match on Millennials attitudes and purchase intentions. *Journal of Retailing and Consumer Services*, 32, 39-45.
27. Miciak, A. R., & Shanklin, W. L. (1994). Choosing celebrity endorsers. *Journal of Marketing Management*, 3(3), 50-60.
28. Mohd Yasin, N., Nasser Noor, M. and Mohamad, O. (2007), "Does image of country-of-origin matter to brand equity?", *Journal of Product & Brand Management*, Vol. 16 No. 1, pp. 38-48. <https://doi.org/10.1108/10610420710731142>
29. Müge Arslan, F. and Korkut Altuna, O. (2010), "The effect of brand extensions on product brand image", *Journal of Product & Brand Management*, Vol. 19 No. 3, pp. 170-180. <https://doi.org/10.1108/10610421011046157>
30. Mukherjee, D. (2009). Impact of Celebrity Endorsements on Brand Image. *Social Science Research Network*. <https://doi.org/10.2139/ssrn.1444814>
31. Ohanian, R. (1990). Construction and Validation of a Scale to Measure Celebrity Endorsers' Perceived Expertise, Trustworthiness, and Attractiveness. *Journal of Advertising*, 19(3), 39-52.
32. Peter, J. P., & Olson, J. C. (1990). *Consumer Behavior and Marketing Strategy*. McGraw-Hill/Irwin Series in Marketing.
33. Prasad, C. B. R. (2013). Brand endorsement by celebrities impacts towards customer satisfaction. *African Journal of Business Management*, 7(35), 3630–3635. <https://doi.org/10.5897/ajbm11.2571>

34. Rambocas, M., Kirpalani, V.M. and Simms, E. (2018), "Brand equity and customer behavioral intentions: a mediated moderated model", *International Journal of Bank Marketing*, Vol. 36 No. 1, pp. 19-40. <https://doi.org/10.1108/IJBM-09-2016-0139>
35. Sanny, L., Arina, A. N., Maulidya, R., & Pertiwi, R. P. (2020). Purchase intention on Indonesia male's skin care by social media marketing effect towards brand image and brand trust. *Management Science Letters*, 2139–2146. <https://doi.org/10.5267/j.msl.2020.3.023>
36. Schivinski, B. and Dabrowski, D. (2015), "The impact of brand communication on brand equity through Facebook", *Journal of Research in Interactive Marketing*, Vol. 9 No. 1, pp. 31-53. <https://doi.org/10.1108/JRIM-02-2014-0007>
37. Seo, Y.W., Chae, S.W., Lee, K.C. (2012). The Impact of Human Brand Image Appeal on Visual Attention and Purchase Intentions at an E-commerce Website. In: Pan, JS., Chen, SM., Nguyen, N.T. (eds) *Intelligent Information and Database Systems. ACIIDS 2012. Lecture Notes in Computer Science()*, vol 7198. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-28493-9_1
38. Sharma, R. (2016). Effect of Celebrity Endorsements on Dimensions of Customer-based Brand Equity: Empirical Evidence from Indian Luxury Market. *Journal of Creative Communications*, 11(3), 264–281. <https://doi.org/10.1177/0973258616667185>
39. Shaughnessy, O. J. (1995). *Competitive marketing: A strategic approach* (3rd ed.). Academic Edition of Unwin Hyman
40. Solomon, M. J., Ashmore, R. D., & Longo, L. (1992). The Beauty Match-Up Hypothesis: Congruence between Types of Beauty and Product Images in Advertising. *Journal of Advertising*, 21(4), 23–34. <https://doi.org/10.1080/00913367.1992.10673383>
41. Spry, A., Pappu, R. and Bettina Cornwell, T. (2011), "Celebrity endorsement, brand credibility and brand equity", *European Journal of Marketing*, Vol. 45 No. 6, pp. 882-909. <https://doi.org/10.1108/03090561111119958>
42. Srivastava, R.K. (2011), "Understanding brand identity confusion", *Marketing Intelligence & Planning*, Vol. 29 No. 4, pp. 340-352. <https://doi.org/10.1108/02634501111138527>
43. Tantisenepong, N., Gorton, M. and White, J. (2012), "Evaluating responses to celebrity endorsements using projective techniques", *Qualitative Market Research*, Vol. 15 No. 1, pp. 57-69. <https://doi.org/10.1108/13522751211191991>
44. Tekin, G. , Yiltay, S. & Ayaz, E. (2016). The Effect of Brand Image on Consumer Behaviour: Case Study of Louiss Vuitton-Moet Hennessy . *International Journal of Academic Values Studies* , (2) , 1-24 . Retrieved from <https://dergipark.org.tr/en/pub/ijavs/issue/28381/301727>
45. Thwaites, D., Lowe, B., Monkhouse, L. L., & Barnes, B. R. (2012). The Impact of Negative Publicity on Celebrity Ad Endorsements. *Psychology and Marketing*, 29(9), 663-673
46. Toncar, M., & Fetscherin, M. (2012). A study of visual puffery in fragrance advertising. *European Journal of Marketing*, 46(1/2), 52–72. <https://doi.org/10.1108/03090561211189239>
47. Wallin Andreassen, T. and Lindestad, B. (1998), "Customer loyalty and complex services: The impact of corporate image on quality, customer satisfaction and loyalty for customers with varying degrees of service expertise", *International Journal of Service Industry Management*, Vol. 9 No. 1, pp. 7-23. <https://doi.org/10.1108/09564239810199923>
48. Zhang, T., Ge, L., Gou, Q., & Chen, L. (2018). Consumer showrooming, the sunk cost effect and online-offline competition. *Journal of Electronic Commerce Research*, 19(1), 55–74

SOLUTIONS FOR PREVENTING TAX EVASION IN GHANA

Emmanuel Kumi-Dumor

*Instituto Politécnico de Bragança (IPB), Bragança, Portugal
kumidumor@gmail.com*

Paula Odete Fernandes

*Unidade de Investigação em Gestão Aplicada (UNIAG),
Instituto Politécnico de Bragança (IPB), Bragança, Portugal
pof@ipb.pt*

Jose Lopes

*Centro de Investigação em Contabilidade e Fiscalidade (CICF),
Instituto Politécnico de Bragança (IPB), Bragança, Portugal
jlopes@ipb.pt*

ABSTRACT

The incidence of tax evasion/avoidance has become one of the major challenges affecting revenue generation in many countries especially in developing and emerging economies like Ghana. In a previous study we analyzed the causes and effects of tax evasion in the Sekondi-Takoradi Metropolitan Assembly of the Western Region of The Republic of Ghana. This study aims to discuss the findings regarding the solutions to prevent the tax evasion. Therefore, the main objective is to analyze the solutions, according to the point of view of small business owners. The data was collected using a structured questionnaire. The final sample size is based on 97 taxable persons and businesses. According to our findings, the retail sector is more prone to tax evasion; females have a different behavior from males. Regarding solutions to avoid tax evasion the “Government spending should be development oriented to encourage taxpayers” and “the information on taxes should be available to the public” are relevant; Education in taxation also plays an important role (according to the respondents). At first glance, the reduction of the tax rates is not the most important solution mentioned by the respondents; however, depends on the education profile.

Keywords: *Ghana, tax evasion, tax rate, income, education*

1. INTRODUCTION

The Global Financial Integrity (GFI) estimated that African countries lost US\$854 billion in cumulative capital flight by way of tax evasion and avoidance between 1970 – 2008 (Germany Federal Ministry for Economic Cooperation and Development (2010). Ghana economy is also strongly affected by tax evasion. Therefore, following our previous study to analyse the causes and the effects of tax evasion in the point of view of small businesses’ owners, the aim of this study (second part) is to analyse the solutions for preventing tax evasion in Sekondi-Takoradi Metropolitan Assembly of the Western Region of The Republic of Ghana. Based on the tax evasion literature we have identified factors that might help to avoid tax evasion. In terms of methodology, we prepared a questionnaire to obtain the data needed; next using appropriate statistics methods we achieved the results. The discussion allowed us to reach the conclusions about the solutions to mitigate Ghana tax evasion issues (Sekondi-Takoradi Metropolitan Assembly of the Western Region). This work is structured as follows: after this introduction we present a brief literature review. Next, we explain the methodology used in the study, particularly, the sample and the methods used. Finally, after the results discussion, we present the main findings.

2. BRIEF LITERATURE REVIEW

Considering the consequences of tax evasion there is the urgent need to adopt strategies and practices that help to mitigate the effects. According to Shome (2005), tax administration has the mandate to maximize revenue from taxation whilst minimizing tax evasion. These constitute the main challenge of the tax administration and therefore cannot be over-emphasized. The issue at stake is not just about maximization or minimization but rather, that of optimization. He goes on further to make the point that effective tax administration is one of the best solutions any government can implement to mitigate the tax evasion menace. Oberholzer (2007) also gave the following categories of solutions by way of tax administration governments can take to help solve the menace: (i) Measures which define and criminalize tax evasion such as anti-avoidance legislation; (ii) Those which punish evasion; (iii) Those which forgive tax evaders and allow them to re-enter the formal economy (e.g. Tax Settlements and Amnesties); and (iv) Measures which appeal to or seek to create group norm of compliant behavior such as Naming and Shaming. Lewis in (1982) proposes two policy initiatives as tested solutions to the tax evasion problems which are: (i) Pushing for an improvement in taxpayers' attitudes and perceptions vis-à-vis the government and tax administrators; and (ii) Enhancing the deterrence capabilities of tax administrators. Lewis believes the issue is not about the fear of punishment but rather compliance to rules prompted by conscience or self-intuition. Shome (2005) again argued that threats and effective audit practices, scrutiny, investigations, penalties, and punishment for errant taxpayers ought to be put in place as a solution to combat the menace of tax evasion. He also summed up laudable approaches in keeping tax evasion in check as part of the solutions. He admonishes as follows: (i) the tax administration should be well structured and resourced to enable them to incorporate genuine threats of penalties and ensure due process; (ii) Tax administrators should not sit aloof in designing a good tax policy that follows a simple tax structure and commensurable to the tax laws; (iii) The tax administration should endeavor to digitize as many administrative processes as possible to check the face-to-face encounters between tax officials and taxpayers. In his research topic "What Is Wrong With Tax Evasion?" Green (2009) also espoused various probable solutions to fix the problem of tax evasion as follows: (i) Making the Tax Code more equitable in vertical and horizontal perspective; and clearly distinguishing between 'choate' and 'inchoate' violations; (ii) Streamlining the Tax Code, distinguishing clearly between lawful and unlawful behavior (not over-looking the imposing difficulties especially in the context of large businesses tax commitment); and giving clearer outlines on what establish criminal violations and civil violations of the Code; (iii) Redefining the characteristics of '*mens rea*' (criminal intent; the thoughts and intentions behind a wrongful act including knowledge that the act is illegal); and enhancing enforcement whilst ensuring uniformity at the level of enforcement; (iv) Eschewing political rhetoric, drumming home the importance of tax revenue in the public; and modifying the spending priorities of government. Vogel (1974) identifies education and information with impact on the process of forming opinions, it is argued that understanding the behavior of taxpayers and the origin of such unambiguous behavior is one of the keys to solutions to tax evasion. Hoe (2010) also argued that, to enhance tax efficiency as a solution to combating tax evasion, tax administrators must adhere to the following:

- Simplification: the administration of taxes should not be so complicated to assess and collect. This will ensure a lower cost to the administration and the taxpayer.
- Shorter Audits: Once a tax return is filed, the tax audit should begin soon enough time possible. With this the taxpayer is able to respond to needed information in ample time.
- Transparency: All rules of engagement about tax payments should be made public, be effectively communicated to the taxpayer and also be assessable. This gives the taxpayer the full knowledge of the tax paying system.

- **Training:** As tax administration evolves, tax officials should stay abreast with the recurrent changes in the course of their duties.
- **Cost of Compliance:** More often, the requirements for tax compliance are just the properly recorded books; therefore, the taxpayers should be well-informed on the best approaches to keeping good books of record.
- **Confidentiality:** To encourage the taxpayers to provide tax information at will without the fear of being leaked, tax administrators should offer the highest confidentiality to taxpayers' information in their custody.
- **Impartial Appeal Process:** Any disparities among tax administrators and taxpayers should go through an impartial appeal process and a report be formally communicated without over- looking the confidentiality of the individuals affected.

From the foregoing, an argument can further be advanced that cultivating a deeper understanding of the technicalities behind the tax laws and regulations; and the tax benefits to the economy are conditions precedent to affirmative attitudes about the tax system and a fiscal behavior which is capable enough to put tax evasion as a social canker in check. Other studies have been done in the field of finding workable solutions is the best way to curb the menace of tax evasion and tax avoidance and such solutions have largely advocated for administering friendly, equitable and affordable tax rates as well as accessible tax systems at all times and most especially in countries with weak identification system.

3. DATA AND METHODS

As previously mentioned, the main general objective of the study is to analyze the solutions to avoid tax evasion in Sekondi-Takoradi Metropolitan Assembly of the Western Region of The Republic of Ghana, according to the respondents.

3.1. Data collection analysis

The final sample size of ninety-seven (97) respondents from the Sekondi-Takoradi Metropolitan Assembly of the Western Region of The Republic of Ghana. The study adopted a self-completed questionnaire (using Likert scale) as the main tool for collecting primary data. The self-completed questionnaires were administered by hand to selected respondents and later collected. The study employed descriptive statistics and tests as a means of analysing data and the results are presented in charts and tables in the subsequent pages.

3.2. Objectives and hypothesis

The next table provides information about the objectives and the hypothesis.

Table following on the next page

Label	Objectives or Research Hypotheses	Technique
<i>O₁</i>	<i>Identify the age bands with more propensity to tax evasion</i>	<i>Mean and Standard deviation. Frequency tables.</i>
<i>O₂</i>	<i>Identify the marital status with more propensity to tax evasion</i>	<i>Mean and Standard deviation. Frequency tables.</i>
<i>O₃</i>	<i>Identify the type of business with more propensity to tax evasion</i>	<i>Mean and Standard deviation. Frequency tables.</i>
<i>O₄</i>	<i>Identify the years in business with more propensity to tax evasion</i>	<i>Mean and Standard deviation. Frequency tables.</i>
<i>H₁</i>	<i>There is an association between variables gender and tax evasion</i>	<i>Chi-Square test</i>
<i>H₂</i>	<i>There is an association between variables education and tax evasion</i>	<i>Chi-Square test</i>
<i>H₃</i>	<i>There is an association between number of employees and tax evasion</i>	<i>Chi-Square test</i>
H₄	There are differences by <i>gender</i> regarding solutions to avoid tax evasion	Student t-test
H₅	There are differences between the <i>age bands</i> regarding solutions to avoid tax evasion	kruskal-Wallis
H₆	There are differences between the <i>education</i> regarding solutions to avoid tax evasion	kruskal-Wallis
H₇	There are differences between the <i>marital status</i> regarding solutions to avoid tax evasion	kruskal-Wallis
H₈	There are differences between the <i>type of businesses</i> regarding solutions to avoid tax evasion	kruskal-Wallis
H₉	There are differences between <i>years in business</i> regarding solutions to avoid tax evasion	Student t-test
H₁₀	There are differences between <i>number of employees</i> regarding solutions to avoid tax evasion	kruskal-Wallis

Table 1: Objectives and Hypotheses

4. RESULTS AND DISCUSSION

4.1. Taxpayers profile

Concerning the taxpayer's profile, as stated in the previous authors' study "causes and effects of tax evasion" the information is as follows (Kumi-Dumor, Fernandes & Lopes, 2022):

- The total number of respondents is 97; two-third of the respondents are males and one-third are females. In terms of age bands, 44,30% of the respondents have in between 31 and 35 years old. Regarding the education level, 42,3% hold a secondary/technical degree, 20,6% have a tertiary degree; 23,7% declare other education background. There are 13,4% with no education background.
- In what concerns to *marital status*, the majority is married – 62,9%, 24,7% are single and 10,3% are divorced. To ascertain the types of business the respondents engaged in the following was adduced. 2.1% are in manufacturing, 17.5% in services. 16.5% are into distribution whilst 58.8%, are in the retailing of goods. Conclusion can be made that more than half of the population surveyed are into retailing.
- *Gender and age*
Four out of the 97 respondents were below the age of 25 years made up of 50% male and female apiece. Eleven respondents fell between the ages of 26 – 30 years. 81,8% and 18,2% were male and female respectively. 62,8% male and 37,2% female of 11 respondents out of the total 97 were between the ages of 31 – 35 years. In the 36 – 40 years age range, 25 respondents out of 97 were 68,0% male and 32,0% female. Fourteen (14) out of the 97 respondents made up of 64,3% male and 35,7% female were above 41 years.
- *Business and education*. Forty-One out of the 97 respondents made up of 4,9% in manufacturing, 14,6% in service, 9,8% in distribution, 68,3% in retailing and 2,4% in the other business categories had Secondary/Technical education. The Tertiary education saw twenty respondents made up of 15,0% apiece in service and distribution and 70,0% in

retailing. For No Education category of respondents 23,1% were into service, 7,7% into distribution, and 69,2% into retailing. Twenty-three respondents out of the 97 made up of 21,7%, 34,8%, 26,1% and 17,4% in the business of service, distribution, retailing and other, respectively had some other forms of education.

4.2. Descriptive Statistics Analysis

4.2.1. Profile and tax evasion (Kumi-Dumor, Fernandes & Lopes, 2022)

According to the respondents we present some pertinent issues in relation to profile characteristics and tax evasion in the past - question 16A “have you evaded tax before”. Globally 30% of the people declared that had evaded tax before, 42% declared that never evade tax before and 28% are not sure.

- Gender vs. tax evasion. Regarding gender (66% males; 34% females) and question 16A (have you ever evade tax before), the percentage of males (29,7%) and females (30,3%) that declared had evaded tax before is similar. Therefore, at first sight the behavior seems to be analogous. On the other hand, 50% of men declared never evade tax before, contrary to females (27,3%). The “not sure” answer was higher for females (42,4%) against 20,3% of males.
- Age vs. tax evasion. The age band declaring had “evaded tax before” with higher percentage is 26-30 years. The lower percentage is band age 31-35 (45,5%) and below 25 (25%).
- Education vs. tax evasion. Concerning education and tax evasion in past, respondents with higher education levels are those that declare more evasion before: “had evaded tax before” 45% -Tertiary, 29, 3%. While respondents with no education and other show a percentage of 23,1% and 21,7%, respectively.
- Marital status vs. tax evasion. Divorced respondents are those that declared had “evaded tax before” - 40%. Single and married show a percentage of 33% and 27,9%, respectively.
- Type of business vs tax evasion. The distribution sector of shows the higher percentage of “evade tax before” - 37.5%, retailing sector 30,3%.
- Years in Business vs. tax evasion. The majority declares that did not tax evasion in the past (42,3%) against to 29,9% of those that answered yes. Regarding “yes answers”, those that are in the business in the band of 1-5 years show the higher percentage (58,6%); “year in business” above 6 years also show a percentage of 37,9%; only the “beginners” (“years in business” lower than 1 year) seems to declare an “yes” answer with lower percentage – 3,4%.

4.2.2. Solutions to avoid tax evasion

The descriptive statistics regarding the solutions show that the respondents do not disagree or strongly disagree with the suggested solutions (see next table).

Table 2: Objectives and Hypotheses

Statement	Strongly Agree	Agree	Neither Agree/Disagree	Disagree	Strongly Disagree	Mean	Standard Deviation
	1	2	3	4	5		
1. Tax rates should be reduced to enable everybody to pay.	67	15	15	-	-	1,46	0,751
	69,1	15,5	15,5	-	-		
2. Enforcement of penalties for tax default should be made clearer and public.	56	30	11	-	-	1,54	0,693
	57,7	30,9	11,3	-	-		
3. Priority should be placed on tax education.	74	15	8	-	-	1,32	0,622
	76,3	15,5	8,2	-	-		
4. Government spending should be development oriented to encourage tax payers.	87	2	8	-	-	1,19	0,565
	89,7	2,1	8,2	-	-		
5. Information on taxes should be made available to the public.	78	9	10	-	-	1,30	0,648
	80,4	9,3	10,3	-	-		
6. The tax administration structure should be computerized to eliminate corruption.	64	13	19	-	-	1,53	0,807
	66,0	13,4	19,6	-	-		
Global Mean						1,39	0,681

Table 2: Descriptive statistics for solutions to avoid tax evasion

The solution that shows a lower mean (i.e., strongly agree) is related with the government behavior “Government spending should be development oriented to encourage taxpayers” and in second position comes “the information on taxes should be available to the public”. Education in taxation is also an important issue for the respondents. The reduction of the tax rates is not the most important solution mentioned by the respondents.

4.3. Results

Considering the objectives and the hypotheses* previously stated, the evidence obtained is as follows:

Label	Objectives or Research Hypotheses	Conclusion
O ₁	Identify the <i>age bands</i> with more propensity for <i>tax evasion</i>	Age band with more tax evasion: 31-35 (34,5%); 36-40 (27,6%)
O ₂	Identify the <i>marital status</i> with more propensity for <i>tax evasion</i>	From 29 respondents that declared committed tax evasion, 58,6% are married
O ₃	Identify the <i>type of business</i> with more propensity for <i>tax evasion</i>	The activity sector with more propensity for tax evasion is the retail sector: 65,5%
O ₄	Identify the <i>band years in business</i> with more propensity for <i>tax evasion</i>	The businesses with more propensity to tax evasion are business established within 1 to 5 years (58,6%)
	p-value	Conclusion
H ₁	There is an association between variables <i>gender</i> and <i>tax evasion</i>	$\rho=0,039$ Corroborated
H ₂	There is an association between variables <i>education</i> and <i>tax evasion</i>	$\rho=0,135$ Not corroborated
H ₃	There is an association between <i>number of employees</i> and <i>tax evasion</i>	$\rho=0,693$ Not corroborated
H ₄	There are differences by <i>gender</i> regarding <i>solutions</i> to tax evasion	$\rho=0,481$ Not corroborated
H ₅	There are differences between the <i>age bands</i> regarding <i>solutions</i> to tax evasion	$\rho=0,409$ Not corroborated;
H ₆	There are differences between the <i>education</i> regarding <i>solutions</i> of tax evasion	$\rho=0,962$ Not corroborated
H ₇	There are differences between the <i>marital status</i> regarding <i>solutions</i> to tax evasion	$\rho=0,755$ Not Corroborated
H ₈	There are differences between the <i>type of businesses</i> regarding <i>solutions</i> to tax evasion	$\rho=0,724$ Not corroborated
H ₉	There are differences between <i>years in business</i> regarding <i>solutions</i> to tax evasion	$\rho=0,073$ Corroborated
H ₁₀	There are differences between <i>number of employees</i> regarding <i>solutions</i> to tax evasion	$\rho=0,773$ Not Corroborated

Table 3: Evidence obtained

(*Globally results for solutions (i.e. group); Individual results (by question) are presented below in the discussion comments.)

Therefore, the evidence obtained is as follows:

- **O1.** According to the results the age bands with more propensity are 31-35 (34,5%) and 36-40 (27,6%).
- **O2.** The marital status with more propensity for tax evasion are married people (58,6%).
- **O3.** the type of business with more propensity for tax evasion are retailers (65,5%).
- **O4.** The band years in business with more propensity for tax evasion are 1-5 (58,6%).
- **H1.** Since the *p-value* is lower than our chosen significance level ($\alpha = 0,05$), we conclude that there is an association between “gender” and “tax evasion” ($p=0,039$).
- **H2.** Since the *p-value* is greater than our chosen significance level ($\alpha = 0,05$), we do not reject the null hypothesis; we conclude that there is not enough evidence to suggest an association between “education” and tax evasion ($p=0,135$).
- **H3.** Considering $\alpha = 0,05$, we do not reject the null hypothesis; we conclude that there is not enough evidence to suggest an association between the size measured by the “number of employees” and tax evasion and ($p=0,693$).
- **H4.** There are no association by “gender” regarding “solutions” to avoid tax evasion ($p=0,481$), globally and individually (we concluded that there is not enough evidence to suggest an association).
- **H5.** Due to the violation of the normality assumption, the non-parametric test Kruskal-Wallis was used. We do not reject the null hypothesis; globally, we conclude that there is no association between “age” and the “solutions” for tax evasion ($p=0,409$).
- **H6.** Concerning the “education” background, globally, we conclude that there is no association between “education” and “solutions” ($p=0,962$). Individually, we conclude that there is an association between “education” and “solutions” in the following cases:
 - (viii) 1C “taxes should be reduced to enable everybody to pay” ($p=0,061$)
 - (ix) 5C “Information on taxes should be made available to the public” ($p=0,051$)
- **H7.** Concerning the “marital status”, we conclude that there is no association between “marital status” and “solutions”, individually and globally.
- **H8.** Regarding “type of business”, we conclude that there is not a significant association between “type of business” and “solutions”, individually and globally.
- **H9.** Regarding “years in business”, globally, we conclude that there is association with solutions to avoid tax evasion. No association individually.
- **H10.** Regarding “number of employees”, we conclude that there is no association with solutions to avoid tax evasion, globally and individually.

5. CONCLUSION

Taking into consideration the aim of this study (and his exploratory character), and considering the respondent’s opinion, we found evidence concerning the solutions to prevent tax evasion/avoidance in the Sekondi-Takoradi Metropolitan Assembly of the Western Region of The Republic of Ghana. Previously, we found that age, marital status, the type of business and the years in business might have impact on tax evasion. People within 31 to 40 years and married people are those that engage more in tax evasion. The retail sector and businesses from 1 to 5 years old are those that show more propensity to tax evasion. The gender factor shows differences in the tax evasion behavior (between males and females). Therefore, there are differences between males and females regarding tax evasion. More females denied that committed tax evasion or are not sure about their behavior. Education and the size of the company measured by the “number of employees”, seem not have impact on tax evasion in terms of behavior (i.e., no differences). Regarding the solutions to avoid tax evasion, globally there are differences in “years in business”, only. No association was found between the age and solutions, education and solutions, marital status and solutions, type of business and

solutions and size of the company and solutions. However, individually, concerning the “education” factor there is an association with solutions to avoid tax evasion: “taxes should be reduced to enable everybody to pay” and “information on taxes should be made available to the public” are relevant.

LITERATURE:

1. Germany Federal Ministry for Economic Cooperation and Development Addressing Tax Evasion and Avoidance in Developing Countries. *International Tax Compact*. 2010.
2. Green, S 2009, ‘What is Wrong with Tax Evasion?’ *Houston Business & Tax LawJournal*, Vol 9, pp. 221-233
3. Hoe, K. (2010). The Role of Excise As A Sin Tax. Available at: <http://thestar.com.my>. (accessed on 12/03/2019).
4. Kumi-Dumor, E., Fernandes, P.; & Lopes, J. (2022). Causes and effects of tax evasion in Ghana. In 78th International Scientific Conference on Economic and Social Development. Aveiro
5. Lewis, A. (1982), *The Psychology of Taxation*, Basic Books, New York.
6. Shome, P. (2005). Tax Systems and Tax Reforms in South and East Asia: The Control of Tax Evasion and the Role of Tax Administration.
7. Vogel, J. (1974). Taxation and Public Opinion in Sweden: An Interpretation of Recent Survey Data, *National Tax Journal*, vol. 27, pp. 499-513.

ACCOUNTING AND BUSINESS INTELLIGENCE: THE STATE OF THE ART AND RESEARCH OPPORTUNITIES

Albertina Monteiro

*Porto Accounting and Business School, Polytechnic of Porto, CEOS.PP, Portugal
amonteiro@iscap.ipp.pt*

Amelia Silva

*Porto Accounting and Business School, Polytechnic of Porto, CEOS.PP, Portugal
acfs@iscap.ipp.pt*

Pedro Fonseca

*Porto Accounting and Business School, Polytechnic of Porto, Portugal
2200155@iscap.ipp.pt*

Catarina Cepeda

*Porto Accounting and Business School, Polytechnic of Porto, Portugal
UTAD, University of Trás-os-Montes and Alto Douro, Vila Real, Portugal
clmc@iscap.ipp.pt*

Sandra Raquel Pinto Alves

*CEOS.PP; ESTG, Polytechnic Institute of Leiria, Portugal
raquel.alves@ipleiria.pt*

ABSTRACT

This article aims to report the state of the art regarding the topic of Accounting and Business Intelligence. It reviews the twelve years of indexed publications in the web of science. All documents are deeply analyzed to summarize and evaluate the writings on the topic, namely the major themes and relationships among topics. Moreover, using bibliometric techniques, the leading authors, institutions, journals and countries are identified. It also applies citation network analysis. Finally, the research opportunities are identified. This paper offers support and guidance for new researchers on the topic.

Keywords: *accounting and business intelligence, artificial intelligence, big data, accounting information systems*

1. INTRODUCTION

The history of any science is studied to ensure the continuity of its development, so that it is possible to know the feature of that development so that discoveries are not done twice (Mukhametzyanov et al., 2017). Accounting is as old as the civilization history and is linked to the first human manifestations of social needs and the interpretation of events that occurred with the material intention (Amorim, 1968). During ancient times, data processing started with primitive and evolved into more effective processes (Kee, 1993). Accounting profession has also evolved with human evolution and seeks to keep up with the business globalization and technology innovation (Gulin et al., 2019). Currently, the profession's challenges involve the rapid adaptation to technological changes (Gulin et al., 2019). In fact, technological improvements affect the task computerization on accounting practices resulting challenges to accounting, supporting innovation based on digital technologies. According to Baldwin et al. (2006), the research on accounting and auditing and the need to apply business intelligence technologies are among the most relevant topics for the future of the profession. The technology-intensive industries creation in the second half of 20th century affirmed

industrialization significance. Through technological evolution, companies began to depend heavily on new ideas, whose origin is closely associated with science and technology. As technology advances, organizations tend to adapt, making it imperative to modify the entire organizational chain. One of the main foundations for development and advancement on management knowledge field is business intelligence. Business intelligence is defined as “*technologies, applications and practices for the collection, integration, analysis, and presentation of business information across the enterprises and organizations*” (Zohuri and Moghaddam, 2020, p. 2). Business intelligence began with the development of specific systems to solve problems related to measuring a company efficiency and performance, as well as to facilitate decision-making process (Melchert et al., 2004). In this context, Zohuri and Moghaddam (2020) highlights that “*the purpose of Business Intelligence is to support better business decision making*”. Mirzaey et al.(2017, p. 3523) state that “*information based on business intelligence with capabilities such as learning, prediction, classification, and extension can be considered as a solution may be considered as a support tool of management accounting*”. By the way, Rikhardsson and Yigitbasioglu (2018) state that accounting research is focused on business intelligence technologies and techniques and in the success of tasks related to financial reporting preparation and analyses. Accounting process is supported by applications developed to process large volumes of data (Mirzaey et al., 2017). Given that, an information system can be defined as any combination between people, hardware, software, communication networks, databases, policies, and procedures that store, retrieve, transform, and disseminate information in an organization (O'Brien and Marakas, 2011). To business intelligence development, the companies need to improve their information systems that are vital components for companies to be successful, which can be integrated into various areas, such as in areas of accounting, finance, operations management, marketing, human resources management, in other words, in any administrative area. With all this, we find that the emergence of new technologies, in addition to affecting the entire structure of companies, has also dramatically transformed the entire accounting process (Yoon, 2020). In the past, most accounting processes were performed manually or with limited use of the computer for accounting only (Yoon, 2020). Thus, as information and communication technologies have developed, technologies such as artificial intelligence, Cloud, and Big Data are widely and actively used in accounting processes (accounting information systems) (Yoon, 2020). This is referred to as Business intelligence on accounting in this study. According to Nespeca and Chiucchi (2018, p 283), “*the use of Business Intelligence and Business Analytics to support decision making is widespread in the world of praxis and its relevance to accounting, especially Management Accounting*” has been drawn in the non-academic literature (Nespeca & Chiucchi, 2018). However, current research regarding the topic Accounting and Business Intelligence has grown but there is still much to be unraveled. Considering the above, this study aims to report the state of the art regarding the research topic Accounting and Business Intelligence. Specifically, this study aims to answer the following questions:

- Q1: How many works were published on accounting and business intelligence and how has been their evolution?
- Q2: Which journals, authors, countries/regions, and organizations have more publications specifically focused on accounting and business intelligence?
- Q3: What are the most used keywords?
- Q4: What are the main research subtopics?

A bibliometric analysis of literature is conducted considering the publications specifically focused on research area. This analysis technique allows us to analyze: (1) the scientific production by quantifying the published articles per year, journal, author, country, subtopic and keywords and (2) the influence the scientific production by identifying the most cited articles,

journal, authors, organizations and country/regions (Cepêda et al., 2022). In addition, we analyze all documents to understand its trends, identifying subtopics, and seeking to analyze the gaps of business intelligence in accounting. Considering that all technological evolution affects companies (internally and externally), this study will have Contingency Theory as its theoretical basis (Hayes, 1997). The research results will bring to the agenda a current description of accounting and business intelligence research by providing a framework that can guide accounting researchers and practitioners as their practices progress. This paper is organized as follows Following this introduction the methodology used in the literature review is explained. The third section describes the main findings, and the last section contains some concluding remarks and describe the limitations of study, while also offering some insights for future research.

2. METHODOLOGY

Following previous studies (e.g., Sáez-Martín et al., 2017 Monteiro et al., 2021; Monteiro & Cepêda, 2021; Rikhardsson and Yigitbasioglu, 2018; Secinaro, et al., 2021), we conducted comprehensive research to collect publications specifically focused on accounting and business intelligence. Papers were selected from WoS database. We start by doing the research using the follow criteria in WoS database: Accounting as Field and Business Intelligence as Topic. To reflect the emergence of Industry 4.0, we considered all publications from 2008. This first search resulted in 771 publications. Then, the used keywords in WoS database to identify publications in research area were “Accounting”; “Accountability”; “Accountant”; “Information Systems”; “Big Data”; “Cloud Computing”; “Blockchain”; “Business Intelligence”. From the search, 378 publications were generated. Later, we tried to identify the publications that have the word Account* (to reflect the many possible variations of the word accounting) in topic. With this process, the sample was reduced to 101 articles. However, only publications in English and Portuguese were considered (97 articles). After checking, 27 publications were excluded because they were not related to the research theme, and one was editorial material. The final sample is composed of 69 articles (40 articles, 24 proceedings paper and 5 review). This study is based on a quantitative approach which takes as reference bibliometric indicators of scientific production indexed on WoS database. In analysing publications and their associated citations, we use bibliometric analysis, this analysis applies statistical techniques to examine bibliographic data (Kumar et al., 2020). In this regard, bibliometric studies use as main indicators articles, authors, journals or sources, institutions, countries/regions and keywords (Lafont et al., 2020). To carry out data analysis, we use VOSviewer. VOSviewer is a software that pays attention to graphical representation of bibliometric maps in an easy-to-interpret way (van Eck & Waltman, 2010).

3. RESULTS

3.1 Publications per year and their evolution

In this research, we found that the first document published in Wos was in 2009, by Maryska, titled "Model for measuring and analysing costs in business informatics" (proceedings paper). From 2009 to date, there is an increasing trend line of publications in the area. The year with more publications was 2022 with 16, which shows that accounting and business intelligence is a recent theme, and it is expected to have more publications in 2023. Figure 1 shows scientific production on accounting and business intelligence per year.

Figure following on the next page

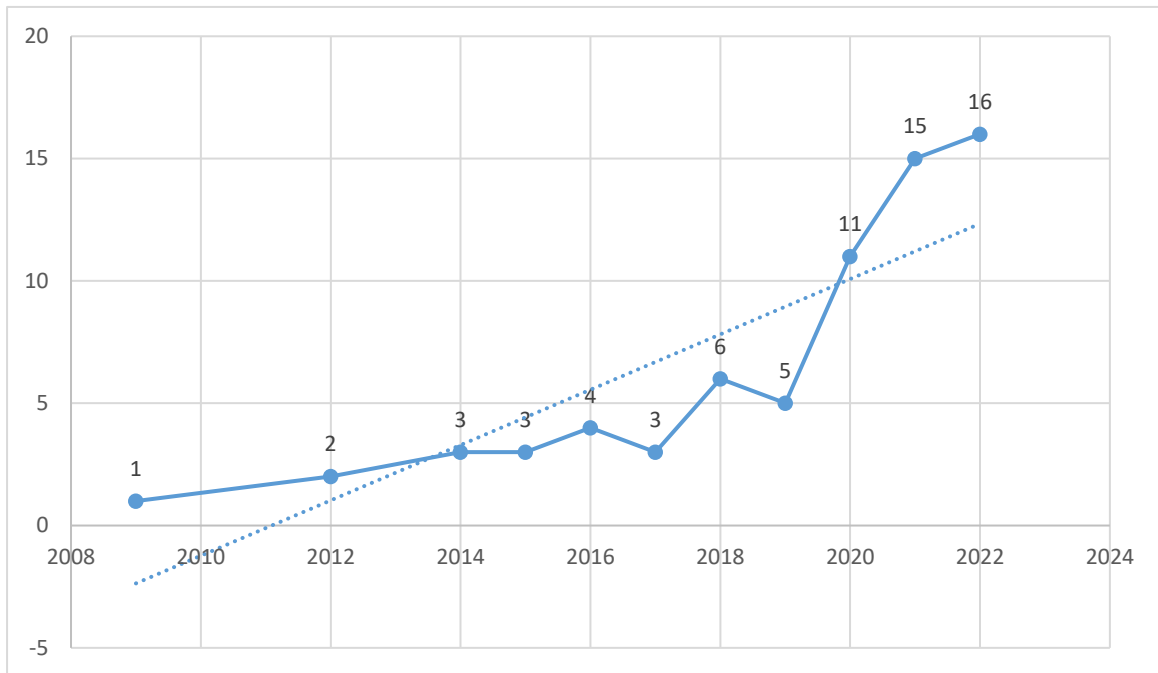


Figure 1: Scientific production on digital accounting per year
(Source: Data collected from WoS database)

3.2. Publications per journals, authors, countries/regions and organizations

The two journals with the most publications are Accounting Auditing & Accountability Journal and Electronics with three articles published, followed by International Journal of Accounting Information Systems, Journal of Accounting and Organizational Change, Mathematics, Meditari Accountancy Research and Sustainability with two publications each. All other 62 journals have only 1 publication about accounting and business intelligence. Table 1 presents total scientific production (TP) per journal (with 2 or more publications), as well as total citations (TC) and impact factor.

Journal	TP	TC	Impact Factor - 2021
Accounting Auditing & Accountability Journal	3	41	4.893 - SSCI
Electronics	3	6	2.690 - SCIE
International Journal of Accounting Information Systems	2	204	5.111-SSCI
Journal of Accounting and Organizational Change	2	4	ESCI
Mathematics	2	10	2.592 SCIE
Meditari Accountancy Research	2	7	ESCI
Sustainability	2	23	3.889 - SSCI

Table 1: Scientific production per journal
(Source: Data collected from WoS database)

People's Republic of China and Romania are the countries/regions with the most published studies accounting and business intelligence (7 publications each), followed by USA with 6, Italy with 5, Czech Republic, England and Portugal with 4. All other countries/regions have 3 or 1 publications, as shown in figure 2.

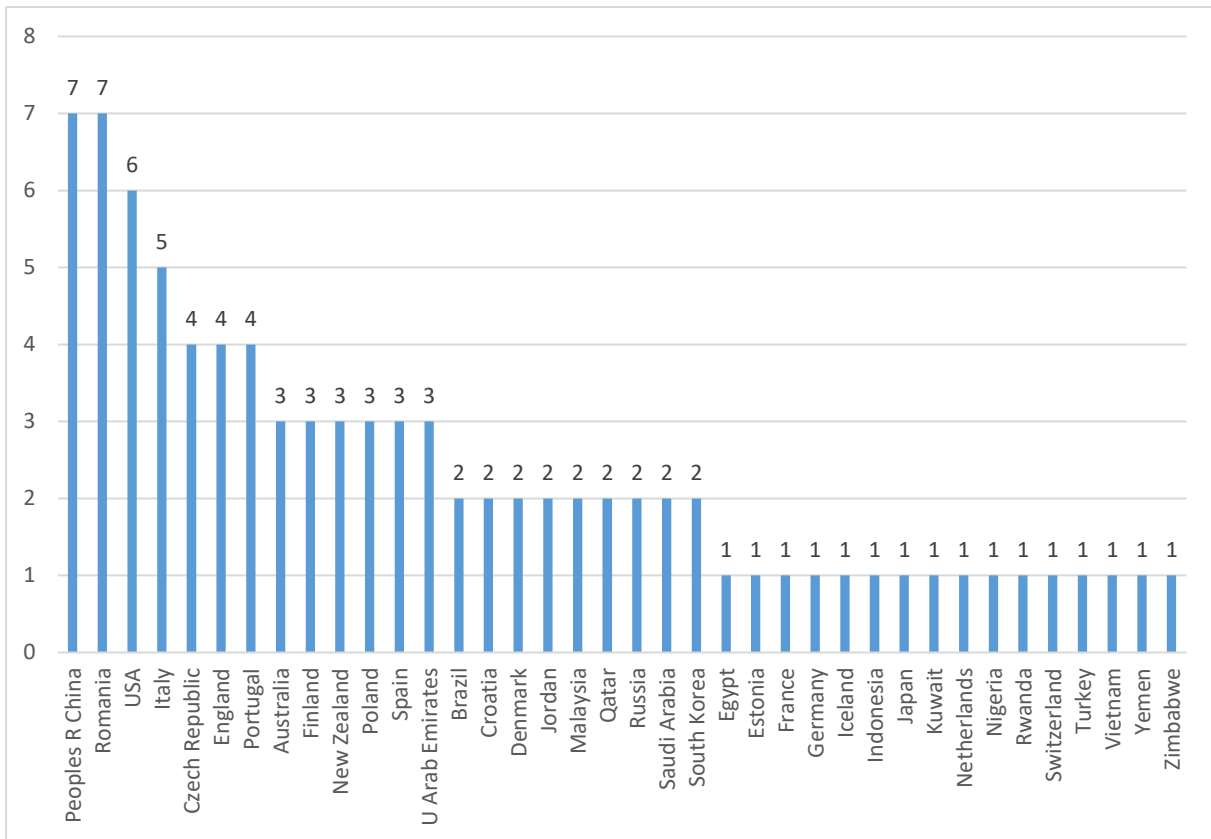


Figure 2: Publications per country/region
(Source: Data collected from WoS database)

Regarding the scientific production per author, in a total of 149 authors, we verificate that only 10 authors have more than one paper. The author with more publications is Varzaru (3 publications), followed by Appelbaum, Belfo, Inghirami, Januszewski, Perez Estebanez, Ranta, Trigo, Yoon and Zager, with 2 publications. All other authors published only 1 work on accounting and business intelligent. Table 2 presents scientific production per authors.

Author	TP
Varzaru, AA	3
Appelbaum, D	2
Belfo, F	2
Inghirami, Ie	2
Januszewski, A	2
Perez Estebanez, R	2
Ranta, M	2
Trigo, A	2
Yoon, S	2
Zager, K	2

Table 2: Scientific production per authors
(Source: Data collected from WoS database)

The authors more cited is Appelbaum, with 132 citations, followed by authors Kogan, Vasarhelyi, Yan, with 123 citations each, Rikhardsson and Yigitbasioglu, com 81 citations each, Allen, Botes, Dela Rue and Low, with 32 citations each. Remaining authors have 30 or fewer citations. Table 3 shows citations by authors.

Author	TP	TC
Appelbaum, D	2	132
Kogan, A	1	123
Vasarhelyi, M	1	123
Yan, Z	1	123
Rikhardsson, P	1	81
Yigitbasioglu, O	1	81
Allen, J	1	32
Botes, V	1	32
Dela Rue, D	1	32
Low, M	1	32
Kharbat, FF	1	30
Qasim, A	1	30

Table 3: Citations per authors
(Source: Data collected from WoS database)

In addition, we verify that 42 articles were published by multi-authors and 27 by single authors, according to figure 3.

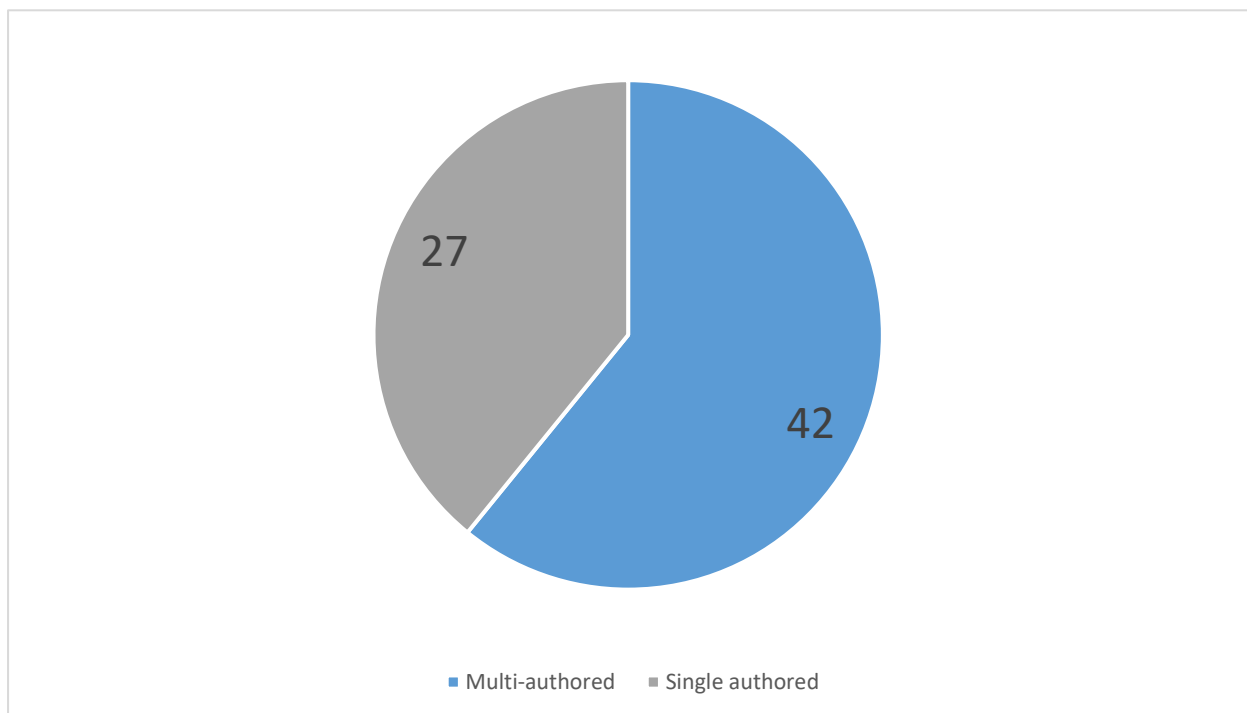


Figure 3: Number of single/multi authored publications
Source(s): Data collected from WoS database

In total, we identified 96 organizations. Table 4 shows the organizations with two or more publications. Highlight for University Craiova and University Waikato with 3 publications, which are followed by Alexandru Ioan Cuza University, Polytechnic Institute of Coimbra, Qatar University, Queensland University Technol, Rutgers State University, University Complutense Madrid, University Econ, University Milano Bicocca, University Minho, University Vaasa and University Zagreb, with 2 publications. The other organizations have only 1 article on this research area. The organization more cited is Rutgers State University (132 citations).

Organization	TP	TC
University Craiova	3	6
University Waikato	3	45
Alexandru Ioan Cuza University	2	0
Polytech Inst Coimbra	2	28
Qatar University	2	6
Queensland University Technol	2	97
Rutgers State University	2	132
University Complutense Madrid	2	28
University Econ	2	11
University Milano Bicocca	2	2
University Minhho	2	28
University Vaasa	2	9
University Zagreb	2	0

Table 4: Organizations per publications
Source(s): Data collected from WoS database

Table 5 shows the TOP10 of publications most cited. Rikhardsson and Yigitbasioglu’s work stands out with 163 citations. This paper was published on International Journal of Accounting Information Systems in 2018 and it is focused on Business intelligence and analytics in management accounting research. Authors refer that many organizations are “*implementing business intelligence & analytics (BI&A) technologies to support reporting and decision-making*” and highlight that it is an interesting area for accounting and accounting information systems research, as there is little research on this link (p. 37). Second publication most cited belong to Nielsen. Your paper, published in 2022 on Journal of Accounting & Organizational Change, has 156 citations. The author stand out, based on literature, “*that if the management accountants want to keep up with the demand of their qualifications, they must take action now and begin to discuss how big data and other concepts from artificial intelligence and machine learning can benefit management accounting and the management accountant in specific ways*” (p. 811). Remaining publications have 133 or fewer citations.

Rank	Authors	Title	Year	TC
1	Rikhardsson, P; Yigitbasioglu, O	Business intelligence & analytics in management accounting research: Status and future focus	2018	163
2	Nielsen, S	Management accounting and the concepts of exploratory data analysis and unsupervised machine learning: a literature study and future directions	2022	156
3	Al-Matari, AS; Amiruddin, R; Aziz, KA; Al-Sharafi, MA	The Impact of Dynamic Accounting Information System on Organizational Resilience: The Mediating Role of Business Processes Capabilities	2022	133
4	Secinaro, S; Dal Mas, F; Brescia, V; Calandra, D	Blockchain in the accounting, auditing and accountability fields: a bibliometric and coding analysis	2021	133
5	De Villiers, R	Seven principles to ensure future-ready accounting graduates - a model for future research and practice	2021	133
6	Abad-Segura, E; Gonzalez-Zamar, MD	Research Analysis on Emerging Technologies in Corporate Accounting	2020	128
7	Bellucci, M; Bianchi, DC; Manetti, G	Blockchain in accounting practice and research: systematic literature review	2022	112
8	Oyewo, B; Ajibolade, S; Obazee, A	The influence of stakeholders on management accounting practice	2019	110
9	Ranta, M; Ylinen, M; Jarvenpaa, M	Machine Learning in Management Accounting Research: Literature Review and Pathways for the Future	2022	109
10	Garanina, T; Ranta, M; Dumay, J	Blockchain in accounting research: current trends and emerging topics	2022	109

Table 5: TOP10 of Publications more influential
Source(s): Data collected from WoS database

3.3. Q3: keywords more used

Figure 4 shows the frequency of the keywords based on the co-occurrence analysis. The most used keyword was "business intelligence" (19 occurrences) followed by "artificial intelligence" (16 occurrences) and "accounting" (15 occurrences). These words coincide with older publications. Most used words in the most recent articles were "innovation", "automation" and "accounting information systems", these words characterizing new research trends as shown in figure 4. These topics are justified considering that global digital revolution has irrevocably transformed societies and consequently companies (Al-Htaybat et al., 2018). Accounting business intelligence evolution are strongly dependent in internal and external factors such the big data explosion (Bhimani and Willcocks, 2014) that involves an intersection of accounting practices and new technologies (Al-Htaybat et al., 2019; Locke et al., 2018).

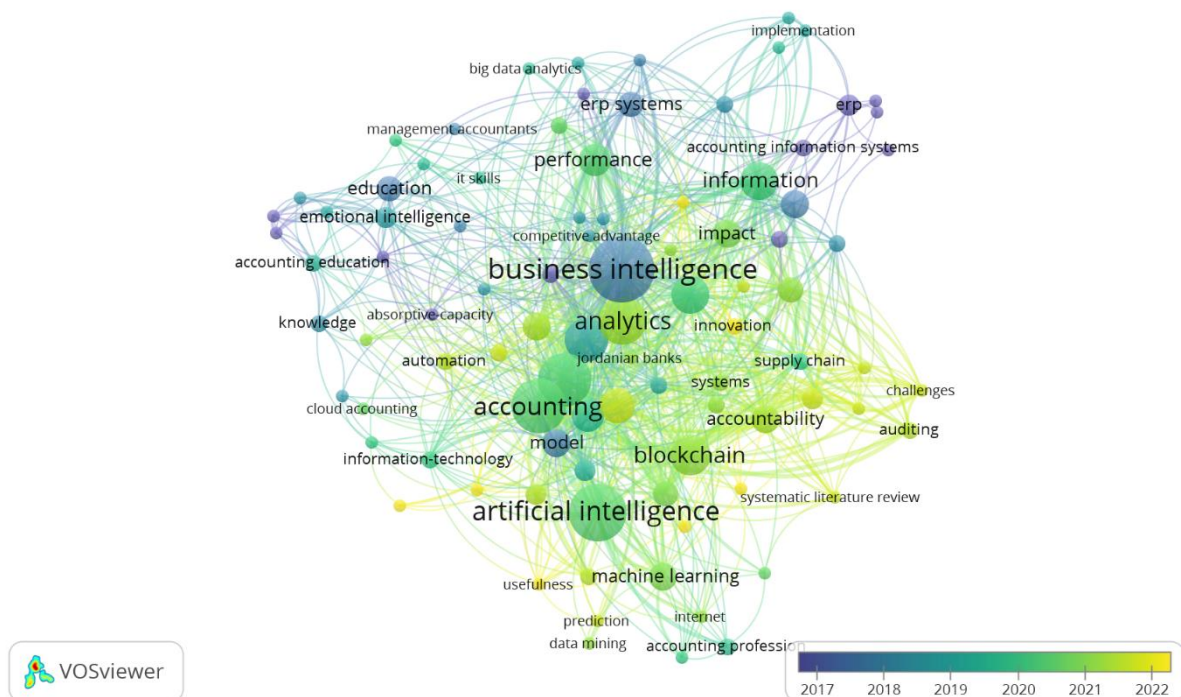


Figure 4: Keywords

(Source: Data collected from Wos database using VOSviewer)

3.4. Q4: Research subtopics

In this study, we identified three research subtopics in accounting and business intelligence. The clusters are displayed in figure 5 by colors, and in figure 6 by years.

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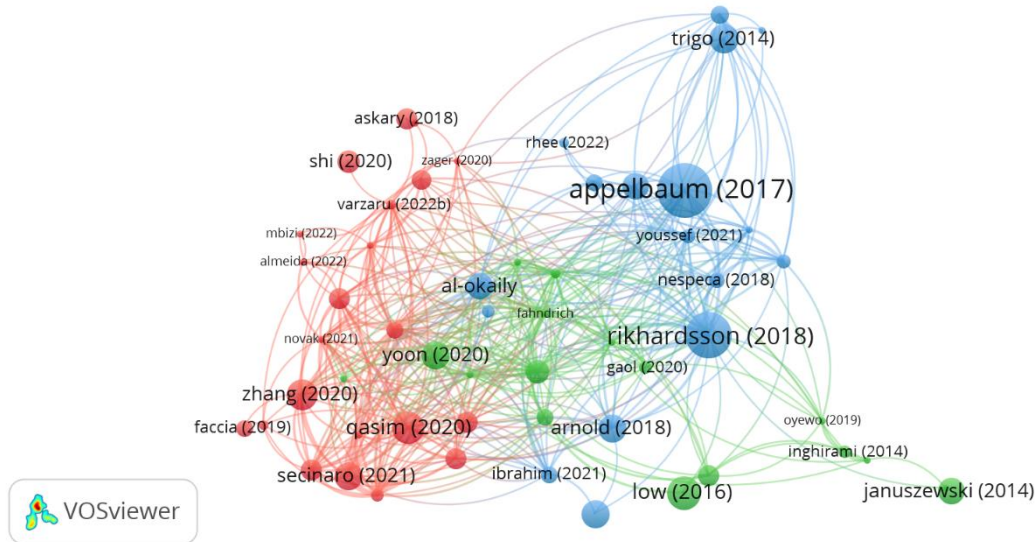


Figure 5: Bibliographic coupling
(Source: Data collected from WoS database)

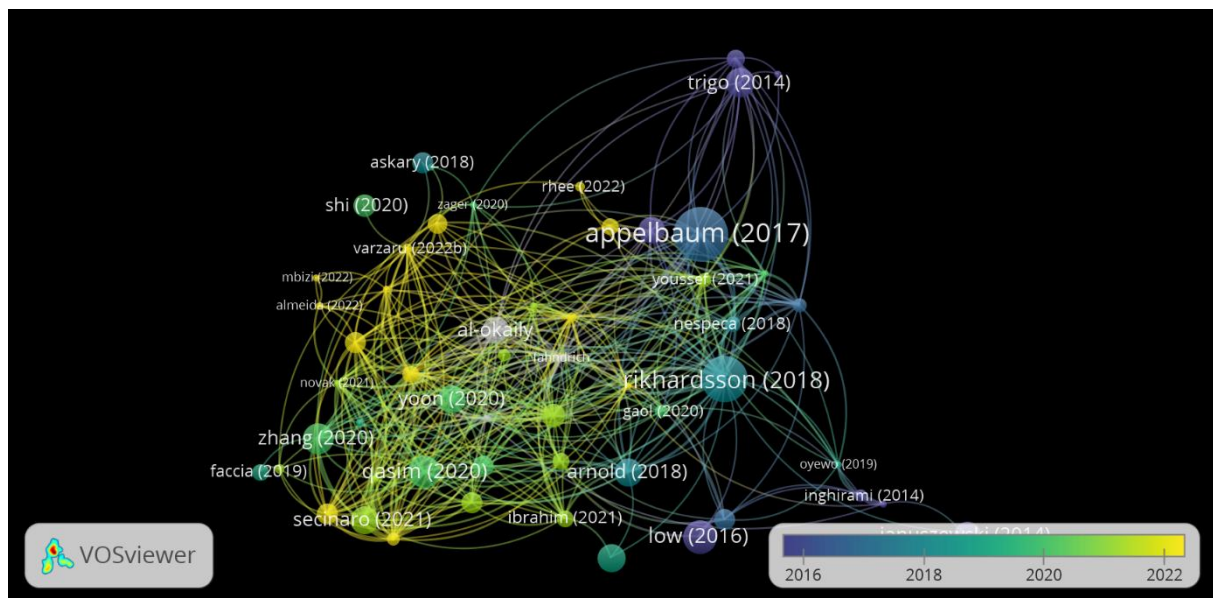


Figure 6: Bibliographic coupling by year
(Source: Data collected from WoS database)

3.5. Analysis of the first cluster (Red)

The first cluster (Red) contains 31 articles and is consequently the cluster with the most recent articles (2020-2022). This cluster addresses the topic "Blockchain and Accounting Profession and Education". In this topic, we highlight the article by Zhang, XiongXie, Fan and Gu (2020), which addresses the recent technological developments that have introduced dramatic changes in the accounting profession. The study explores the evolution of the accounting profession following these recent technological developments and assesses the impact of future developments (Zhang et al., 2020). Furthermore, it takes into consideration the dramatic changes and developments of artificial intelligence applications in accounting addressing the requirements that job applicants will have (accounting graduates) providing a discussion on what higher institutions and their accounting graduates can do to adopt such changes (Zhang et al., 2020).

Also on this topic, the study by Secinaro et al., (2021) did a bibliometric analysis on the topic of blockchain in the fields of accounting, auditing and accountability. This study shed light on the definition and characteristics of blockchain, business models, processes involved, connection with other technologies, and relationships with accounting theories (Secinaro et al., 2021). Furthermore, the results confirm that technology as an external force can create an intersection between various research areas: accounting, auditing, accountability, business, management, computer science, and engineering (Secinaro et al., 2021). Still on this topic, Qasim and Kharbat (2020) also warn about the implications of blockchain on the accounting profession. While on the one hand, accounting academics have reported an increasing attention in the accounting profession to the employment of various technologies, on the other hand, they only highlight the exploitation of these technologies in the profession and future research areas, while missing the need to modernize the accounting curriculum to meet the technological needs of the industry (Qasim & Kharbat, 2020). Thus, the authors call for radical changes in the accounting curriculum to achieve a balance between existing accounting knowledge and information technology skills relevant to the profession.

3.6. Analysis of the second cluster (Green)

The second cluster (green) contains 22 articles and is composed of recent articles (2018-2022), which are related to "Accounting Information Systems". In this topic cluster, we highlight the study of Yoon (2020), which identifies new accounting technologies in Cloud, Artificial Intelligence, Big Data, and Blockchain, and introduces the case of Korean companies applying new technologies to their accounting process. The study also provides guidance for applying technologies to accounting practices for firms and researchers. Although Yoon (2020) warns that new technologies offer many opportunities, the associated risks and threats should be further explored and analyzed. Korhonen et al. (2021), on the other hand, attempted to better understand the automation of management accounting by exploring the programmability of management accounting work. Thus, it was their goal to understand how digitization plays out at the level of individual actors in accounting practice, using a dataset from an interventionist case study of a machine manufacturer. Surprisingly, the authors found that during this development process, calculation tasks remained more suitable for humans than machines, even though they were initially thought to be programmable. With this, they claim that practitioners can interpret experts' non-programmable work tasks as programmable and seek to automate them. Only the identification of factual possibilities for automating accounting work can lead to improved efficiency in terms of automation (Korhonen et al., 2021). Fährndrich (2022), on the other hand, reviewed the impact of digitalization on management control. The author found that several studies highlight the continuous development of the management accounting function under the impact of digitalization, including the extension of management accounting tasks, the adaptation of existing instruments and the creation of new instruments, positive and negative behavioral aspects of the digitalization of management accounting, and the establishment of new advanced management accounting models for the organization.

3.7. Analysis of the third cluster (Blue)

Finally, the last cluster the blue one is composed of 16 articles (2009- 2021). This cluster reports on "Business Intelligence on Accounting". Here we highlight the study by Rikhardsson and Yigitbasioglu (2018) which addresses business intelligence and big data analytics in the areas of management accounting. This article reviews the literature, points to several research gaps, and proposes a framework for studying the relationship between implementing business intelligence and analytics technologies and management accounting. Also in this regard, Appelbaum et al. (2017) analyzed the impact of business analytics and enterprise systems on managerial accounting.

However, the research shows that the nature and scope of management accounting has barely changed and that management accountants primarily employ descriptive analysis, some predictive analysis, and minimal prescriptive analysis. That said, Appelbaum et al. (2017) proposed a Management Accounting Data Analysis (MADA) framework based on balanced scorecard theory in a business intelligence context. This framework provides management accountants with the ability to use comprehensive business analytics to perform performance measurement and provide information related to decision making (Appelbaum et al., 2017). With MADA, three types of business analytics (descriptive, predictive, and prescriptive) are implemented across four business performance measurement perspectives (financial, customer, internal process, and learning and growth) in an enterprise system environment (Appelbaum et al., 2017). Finally, the study by Nespeca and Chiucchi (2018) also talks about the impact of Business Intelligence Systems on Management Accounting Systems in Consultant's Perspective. Nespeca and Chiucchi (2018) found that the implementation of Business intelligence can affect the expertise of Management Accountants and can cause not only incremental changes in existing Management Accounting techniques, but also more relevant ones by supporting the introduction of new and advanced MA techniques. As can be seen in figures 5 and 6, the subtopics identified by the VOSviewer software are strongly correlated, which means that some publications could also fall under another subtopic. Finally, Table 6, shown below, provides a list of clusters by publications and authors.

Cluster	Authors	Title	Year
1	Abad-Segura, E; Gonzalez-Zamar, MD	Research Analysis on Emerging Technologies in Corporate Accounting	2020
1	Almeida, AC; Carvalho, C	The adequacy of academic curricula for digital transformation in the accounting education	2022
1	Askary, S; Abu-Ghazaleh, N; Tahat, YA	Artificial Intelligence and Reliability of Accounting Information	2018
1	Atik, A; Kelten, GS	Blockchain Technology and Its Potential Effects on Accounting: A Systematic Literature Review	2021
1	Bellucci, M; Bianchi, DC; Manetti, G	Blockchain in accounting practice and research: systematic literature review	2022
1	Coman, DM; Ionescu, CA; Duica, A; Coman, MD; Uzlau, MC; Stanescu, SG; State, V	Digitization of Accounting: The Premise of the Paradigm Shift of Role of the Professional Accountant	2022
1	Faccia, A; Al Naqbi, MYK; Lootah, SA	Integrated Cloud Financial Accounting Cycle: How Artificial Intelligence, Blockchain, and XBRL will Change the Accounting, Fiscal and Auditing Practices	2019
1	Garanina, T; Ranta, M; Dumay, J	Blockchain in accounting research: current trends and emerging topics	2022
1	Gavrilova, V; Gurvits-Suits, NA	Contemporary Innovation Challenges - Future of Adoption Artificial Intelligence: Case of Estonia	2020
1	Goncalves, MJA; da Silva, ACF; Ferreira, CG	The Future of Accounting: How Will Digital Transformation Impact the Sector?	2022
1	Haddad, H	The Effect of Artificial Intelligence on the AIS Excellence in Jordanian Banks	2021
1	Iuliana, G; Ioana, B; Irina, M	Economic Intelligence	2012
1	Le Guyader, LP	Artificial intelligence in accounting: GAAP's FAS133	2020
1	Maryska, M	Model For Measuring and Analysing Costs in Business Informatics	2009
1	Mbizi, R; Sifile, O; Gasheja, F; Twesige, D; Gwangava, E; Makurumidize, S; Matowanyika, K; Chinofunga, S; Sunday, K	Accountants in Africa and the evolving fourth industrial revolution (4IR): Towards a competency framework	2022
1	Medennikov, V	Management Transformation with a Single Digital Platform as Exemplified by Accounting	2021
1	Novak, A; Zager, K; Barisic, I	Perspectives of the Information Technology Use in Accounting - Implications of the Covid-19 Pandemic	2021
1	Ping, W	Data mining and XBRL integration in management accounting information based on artificial intelligence	2021

1	Qasim, A; Kharbat, FF	Blockchain Technology, Business Data Analytics, and Artificial Intelligence: Use in the Accounting Profession and Ideas for Inclusion into the Accounting Curriculum	2020
1	Rezaee, Z; Wang, J	Relevance of big data to forensic accounting practice and education	2019
1	Secinaro, S; Dal Mas, F; Brescia, V; Calandra, D	Blockchain in the accounting, auditing and accountability fields: a bibliometric and coding analysis	2021
1	Sheshukova, T; Mukhina, E	Environmental Accounting in Digital Economy	2019
1	Shi, YL	The Impact of Artificial Intelligence on the Accounting Industry	2020
1	Sun, LX	Elementary Exploration on the Embedded Intelligent Accounting Information System	2016
1	Tofan, OD	Digital Trends in Audit	2020
1	Varzaru, AA	An Empirical Framework for Assessment of the Effects of Digital Technologies on Sustainability Accounting and Reporting in the European Union	2022
1	Varzaru, AA	Assessing the Impact of AI Solutions' Ethical Issues on Performance in Managerial Accounting	2022
1	Varzaru, AA	Assessing Artificial Intelligence Technology Acceptance in Managerial Accounting	2022
1	Zager, K; Decman, N; Rep, A	The Impact of Artificial Intelligence on The Accounting Process	2020
1	Zhang, XF	Application of data mining and machine learning in management accounting information system	2021
1	Zhang, YY; Xiong, F; Xie, Y; Fan, X; Gu, HF	The Impact of Artificial Intelligence and Blockchain on the Accounting Profession	2020
2	Alyoubi, BA	Impacts of Knowledge Sharing in Saudi Accounting Firms using Fuzzy AHP	2021
2	Appelbaum, D; Showalter, DS; Sun, T; Vasarhelyi, MA	A Framework for Auditor Data Literacy: A Normative Position	2021
2	Botes, VL; Sharma, U	A gap in management accounting education: fact or fiction	2017
2	Chalastra, M	Identification of Good Education Practices in The Field of Management Accounting - Presentation of Results of Empirical Research Conducted in Companies In Poland	2015
2	De Villiers, R	Seven principles to ensure future-ready accounting graduates - a model for future research and practice	2021
2	Fahndrich, J	A literature review on the impact of digitalisation on management control	2022
2	Friedrich, MPA; da Silva, MZ; Venturini, JC; Schuster, WE	Epistemological thinking about accounting in the era of artificial intelligence	2022
2	Huy, PQ; Phuc, VK	Accounting Information Systems in Public Sector towards Blockchain Technology Application: The Role of Accountants' Emotional Intelligence in the Digital Age	2021
2	Inghirami, IE	Reshaping Strategic Management Accounting Systems	2014
2	Inghirami, IE; Scribani, G	Towards Strategic Management Accounting: The Nespoli Group Case	2016
2	Ionescu, I	The newest key to unlock the erp systems accounting intelligence	2012
2	Januszewski, A	It skills developing as an important part of managers and management accountants education	2018
2	Januszewski, A; Spiewak, J	It for controlling and management accounting courses	2014
2	Knihova, L	Virtual reality in financial reporting: are accountants an endangered species?	2019
2	Korhonen, T; Selos, E; Laine, T; Suomala, P	Exploring the programmability of management accounting work for increasing automation: an interventionist case study	2021
2	Li, HM	Research on the Application of Accounting Information System Intelligence on Business Enterprises	2018
2	Low, M; Botes, V; Dela Rue, D; Allen, J	Accounting Employers' Expectations - The Ideal Accounting Graduates	2016
2	Momo, FD; Melati, C; Janissek-Muniz, R; Behr, A	Relationships between accounting and intelligence: research paths	2021
2	Nielsen, S	Management accounting and the concepts of exploratory data analysis and unsupervised machine learning: a literature study and future directions	2022
2	Oyewo, B; Ajibolade, S; Obazee, A	The influence of stakeholders on management accounting practice	2019

2	Ranta, M; Ylinen, M; Jarvenpaa, M	Machine Learning in Management Accounting Research: Literature Review and Pathways for the Future	2022
2	Yoon, S	A Study on the Transformation of Accounting Based on New Technologies: Evidence from Korea	2020
3	Al-Matari, AS; Amiruddin, R; Aziz, KA; Al-Sharafi, MA	The Impact of Dynamic Accounting Information System on Organizational Resilience: The Mediating Role of Business Processes Capabilities	2022
3	Al-Okaily, M; Alghazzawi, R; Alkhwaldi, AF; Al-Okaily, A	The effect of digital accounting systems on the decision-making quality in the banking industry sector: a mediated-moderated model	2022
3	Ammar, S	Enterprise systems, business process management and UK-management accounting practices Cross-sectional case studies	2017
3	Appelbaum, D; Kogan, A; Vasarhelyi, M; Yan, ZK	Impact of business analytics and enterprise systems on managerial accounting	2017
3	Arnold, V	The changing technological environment and the future of behavioural research in accounting	2018
3	Belfo, F; Trigo, A; Estebanez, RP	Impact of ICT Innovative Momentum on Real-Time Accounting	2015
3	Gaol, FL; Abdillah, L; Matsuo, T	Adoption of Business Intelligence to Support Cost Accounting Based Financial Systems - Case Study of XYZ Company	2020
3	Ibrahim, AEA; Elamer, AA; Ezat, NA	The convergence of big data and accounting: innovative research opportunities	2021
3	Nespeca, A; Chiucchi, MS	The Impact of Business Intelligence Systems on Management Accounting Systems: The Consultant's Perspective	2018
3	Prasad, A; Green, P	Organizational Competencies and Dynamic Accounting Information System Capability: Impact on AIS Processes and Firm Performance	2015
3	Rhee, Y; Yoon, S; Park, H	Exploring Knowledge Trajectories of Accounting Information Systems Using Business Method Patents and Knowledge Persistence-Based Main Path Analysis	2022
3	Rikhardsson, P; Yigitbasioglu, O	Business intelligence & analytics in management accounting research: Status and future focus	2018
3	Soljakova, L	Impact of business intelligence tools on the quality of management accounting	2020
3	Svobodova, L	Managerial Accounting and Utilization of Software	2016
3	Trigo, A; Belfo, F; Estebanez, RP	Accounting Information Systems: The Challenge of the Real-Time Reporting	2014
3	Youssef, MA; Mahama, H	Does business intelligence mediate the relationship between ERP and management accounting practices?	2021

Table 6: Publications per clusters by publications and authors

4. CONCLUSION

In this study, a bibliometric analysis of literatures specifically focused on accounting and business intelligence, in journals indexed in the WoS database, from 2008, was carried out. This analysis technique enabled the evaluation of the scientific production, the temporal evolution, the most influential authors, journals, countries/regions and organizations, the most used keywords and the main research topics, and thus respond to the four research questions formulated for this study. Based on 69 articles published in WoS from 2009 to 2022, results show that the first work was published by Maryska, in 2009. However, the year with more publications was 2022, with 16 publications. Given the trend line, it is expected that the number of publications will increase considerably in the coming years, as this is an emerging research area. The countries, journals, and organizations with more publications in this topic is united People's Republic of China and Romania, Accounting Auditing & Accountability Journal and Electronics, University Craiova and University Waikato and the author is Varzaru. The works most cited were published by Rikhardsson and Yigitbasioglu (2018) and Nielsen (2022) in the International Journal of Accounting Information Systems and Journal of Accounting & Organizational Change, respectively. Most keywords used in research in accounting and business intelligence were focused on "business intelligence", followed by "artificial intelligence" and "accounting". These words coincide with older publications. Most used words in the most recent articles were "innovation", "automation" and "accounting information

systems", these words characterizing new research trends. Finally, we identified three research topics, the first is "Blockchain and Accounting Profession and Education", the second "Accounting Information Systems" and the last "Business Intelligence on Accounting". We found that there is much to be done on these topics, and that although the literature mostly covers the application of business intelligence in management accounting, much remains to be researched in financial and non-financial accounting. In fact, literature warns about the dangers and threats that information technology can contain, particularly with the implementation of artificial intelligence in business, making business smarter but also riskier. These risks can be reduced if professionals and academics are prepared for this new digital era. The exposed supports the contingency theory fundamentals because the accounting and business intelligence arise from external pressures brought about by technology evolution. In terms of contributions, firstly, this research provides robust evidence on scientific production growth in this very recent area. Secondly, this study offers the area new research trends and most studied topics, paving the way for possible studies of other topics. On the other hand, it considers contingency theory, accepting that everything is relative because environment conditions cause transformations within organizations. In future studies, we suggest the community of scholars interested in accounting and business intelligence to consider various perspectives specific to digital accounting field to holistically map accounting and business intelligence. Similarly apply this study in other databases like Scopus, google scholar and compare with our results.

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LITERATURE:

1. Abad-Segura, E., & González-Zamar, M. D. (2020). Research analysis on emerging technologies in corporate accounting. *Mathematics*, 8(9), 1589.
2. Al-Matari, A. S., Amiruddin, R., Aziz, K. A., & Al-Sharafi, M. A. (2022). The impact of dynamic accounting information system on organizational resilience: the mediating role of business processes capabilities. *Sustainability*, 14(9), 4967.
3. Al-Htaybat, K., Hutaibat, K., & von Alberti-Alhtaybat, L. (2019). Global brain-reflective accounting practices. *Journal of Intellectual Capital*, 6(6), 733-762.
4. Al-Htaybat, K., von Alberti-Alhtaybat, L., & Alhatabat, Z. (2018). Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4), 333-357.
5. Amorim, J. L. (1968). *Digressão Através do Vetusto Mundo da Contabilidade*. Porto: Livraria Avis.
6. Appelbaum, D., Kogan, A., Vasarhelyi, M., & Yan, Z. (2017). Impact of business analytics and enterprise systems on managerial accounting. *International Journal of Accounting Information Systems*, 25, 29-44.
7. Baldwin, A. A., Brown, C. E., Trinkle, B. S. (2006). Opportunities for artificial Intelligence development in the accounting domain: the case for auditing. *Intelligent Systems in Accounting, Finance & Management: International Journal*, 14(3), 77-86.
8. Bellucci, M., Cesa Bianchi, D., & Manetti, G. (2022). Blockchain in accounting practice and research: systematic literature review. *Meditari Accountancy Research*, 30(7), 121-146.
9. Bhimani, A., & Willcocks, L. (2014). Digitisation, 'Big Data' and the transformation of accounting information. *Accounting and Business Research*, 44(4), 469-490.
10. Cepêda, C., Monteiro, A. P., Silva, R., & Ferreira-da-Silva, A. (2022). Accounting history: a bibliometric literature review. *Revista de Contabilidade e Controladoria*, 14(2).

11. De Villiers, R. (2021). Seven principles to ensure future-ready accounting graduates—a model for future research and practice. *Meditari Accountancy Research*, 29(6), 1354-1380.
12. Fährndrich, J. (2022). A literature review on the impact of digitalisation on management control. *Journal of Management Control*, 1-57.
13. Garanina, T., Ranta, M., & Dumay, J. (2022). Blockchain in accounting research: current trends and emerging topics. *Accounting, Auditing & Accountability Journal*, 35(7), 1507-1533.
14. Gulin, D., Hladika, M., & Valenta, I. (2019). Digitalization and the Challenges for the Accounting Profession. *ENTRENOVA-ENTerprise REsearch InNOVAtion*, 5(1), 428-437.
15. Hayes, D. C. (1977). The contingency theory of managerial accounting. *Accounting review*, 52(1), 22-39.
16. Kee, R. (1993). Data processing technology and accounting: A historical perspective. *Accounting Historians Journal*, 20(2), 187-216.
17. Korhonen, T., Selos, E., Laine, T., & Suomala, P. (2021). Exploring the programmability of management accounting work for increasing automation: an interventionist case study. *Accounting, Auditing & Accountability Journal*, 34(2), 253-280.
18. Kumar, S., Marrone, M., Liu, Q., & Pandey, N. (2020). Twenty years of the International Journal of Accounting Information Systems: A bibliometric analysis. *International Journal of Accounting Information Systems*, 39, 100488.
19. Lafont, Juan & Ruiz, Felipe & Gil-Gómez, Hermenegildo & Oltra-Badenes, Raul. (2020). Value creation in listed companies: A bibliometric approach. *Journal of Business Research*, 115(C), 428-434.
20. Lam M. 2004. Neural network techniques for financial performance prediction: integrating fundamental and technical analysis. *Decision Support Systems*, 37(4): 567–581
21. Locke, J., Rowbottom, N., & Troshani, I. (2018). Sites of translation in digital reporting. *Accounting, Auditing & Accountability Journal*. 31(7), 2006–2030.
22. Qasim, A., & Kharbat, F. F. (2020). Blockchain technology, business data analytics, and artificial intelligence: Use in the accounting profession and ideas for inclusion into the accounting curriculum. *Journal of emerging technologies in accounting*, 17(1), 107-117.
23. Maryska, M. (2009). Model for measuring and analysing costs in business informatics. In *8th Wuhan International Conference on E-Business*.
24. Melchert, F., Winter, R., Klesse, M. (2004). Aligning process automation and business intelligence to support corporate performance management. Proceedings of the Tenth Americas Conference on Information Systems, New York, New York, August 2004.
25. Mirzaey, M., Jamshidi, M. B., Hojatpour, Y. (2017). Applications of artificial neural networks in information system of management accounting. *International Journal of Mechatronics, Electrical and Computer Technology*, 7(25), 3523-3530.
26. Monteiro, A. P., Aibar-Guzmán, B., Garrido-Ruso, M., & Aibar-Guzmán, C. (2021). Employee-related disclosure: A bibliometric review. *Sustainability*, 13(10), 5342.
27. Monteiro, A., & Cepêda, C. (2021). Accounting information systems: scientific production and trends in research. *Systems*, 9(3), 67.
28. Moudud-UI-Huq, S. (2014). The Role of Artificial Intelligence in the Development of Accounting Systems: A Review. *IUP Journal of Accounting Research & Audit Practices*, 13(2), 7-19.
29. Mukhametzhanov, R. Z., Nugae, F. S., & Muhametzhanova, L. Z. (2017). History of Accounting Development. *Journal of History Culture and Art Research*, 6(4), 1227-1236. doi:<http://dx.doi.org/10.7596/taksad.v6i4.1163>

30. Nespeca, A., & Chiucchi, M. S. (2018). The impact of business intelligence systems on management accounting systems: The consultant's perspective. In *Network, Smart and Open: Three Keywords for Information Systems Innovation* (pp. 283-297). Cham: Springer International Publishing.
31. Nielsen, S. (2022). Management accounting and the concepts of exploratory data analysis and unsupervised machine learning: a literature study and future directions. *Journal of Accounting & Organizational Change*, 18(5), 811-852.
32. O'Brien, J. A., & Marakas, G. M. (2011). *Management information systems* (Vol. 9). McGraw-Hill/Irwin.
33. Oyewo, B., Ajibolade, S., & Obazee, A. (2019). The influence of stakeholders on management accounting practice. *Journal of Sustainable Finance & Investment*, 9(4), 295-324.
34. Rikhardsson, P., & Yigitbasioglu, O. (2018). Business intelligence & analytics in management accounting research: Status and future focus. *International Journal of Accounting Information Systems*, 29, 37-58.
35. Sáez-Martín, Alejandro & López-Hernández, Antonio & Caba-Perez, Carmen. (2017). Access to public information: a scientometric study of legal versus voluntary transparency in the public sector. *Scientometrics*. 113. 10.1007/s11192-017-2541-5.
36. Secinaro, S., Dal Mas, F., Brescia, V., & Calandra, D. (2021). Blockchain in the accounting, auditing and accountability fields: a bibliometric and coding analysis. *Accounting, Auditing & Accountability Journal*, 35(9), 168-203.
37. Ranta, M., Ylinen, M., & Järvenpää, M. (2022). Machine learning in management accounting research: Literature review and pathways for the future. *European Accounting Review*, 1-30.
38. Yoon, S. (2020). A study on the transformation of accounting based on new technologies: Evidence from Korea. *Sustainability*, 12(20), 8669.
39. Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84(2), 523-538.
40. Zhang, Y., Xiong, F., Xie, Y., Fan, X., & Gu, H. (2020). The impact of artificial intelligence and blockchain on the accounting profession. *Ieee Access*, 8, 110461-110477
41. Zohuri, B., & Moghaddam, M. (2020). From business intelligence to artificial intelligence. *Journal of Material Sciences & Manufacturing Research*, 1(1), 1-10.

THE IMPACT OF DIGITAL TRANSFORMATION ON ACCOUNTING WORK PROCESSES

Amelia Ferreira da Silva

*CEOS.PP, Polytechnic of Porto, Portugal
acfs@iscap.ipp.pt*

Maria Jose Angelico Goncalves

*CEOS.PP, Polytechnic of Porto, Portugal
mjose@iscap.ipp.pt*

Humberto Nuno Rito Ribeiro

*GOVCOPP; ESTGA, University of Aveiro, Portugal
hnr@ua.pt*

Joao Pedro Teixeira Duarte

*Porto Accounting and Business School, Portugal
2200155@iscap.ipp.pt*

ABSTRACT

We are living in times of dramatic transformations. Technology is embedded in our daily lives and organizations are constantly looking for more efficient and flexible technological solutions. Accounting is not an exception. Many organizations are implementing automation technologies to perform better accounting work processes. Since it interferes with the core competencies of professional accountants, it is relevant to understand how they look at the digitalization of accounting. This paper aims to capture the perception of certified accountants regarding the impact of digital transformation on accounting work processes. Data was collected from 225 accountants. The questionnaire was applied during August and September 2022. The results showed that automatic document classification and posting; digital archiving, and communication with the client, are the work processes for which emergent technology has a more perceived impact on accounting. This paper findings are helpful for technology consultants and accounting professional bodies, while promoting the adoption of technology in accounting.

Keywords: *Digital Transformation (DT), Artificial Intelligence (AI), Accounting and Finance, Accounting Processes*

1. INTRODUCTION

In recent years we have witnessed an increase in technological development and consequently a growth in emerging technologies. This digital transformation is revolutionizing society, organizations, and professions, including accountancy. The accounting profession is a traditional profession and the accounting rules and principles have been established and have been the same for many years. However, the globalization of business, stricter regulations, and numerous technological solutions and innovations do not ignore the accounting profession. The development of technology and digitalization allow for updates and changes in this profession. Modern computer systems lead to reduced workload and the repetitive actions that used to exist are now easier and performed faster (Gulin et al., 2019). Accounting work processes will change sooner or later. The automation of these processes will lead to accountants being able to focus on more specific tasks where they can add more value to their clients. The tasks they will perform in the future will consist of using sophisticated information systems and Artificial Intelligence to analyze, report and develop the recorded data (Kruskopf et al.,2020).

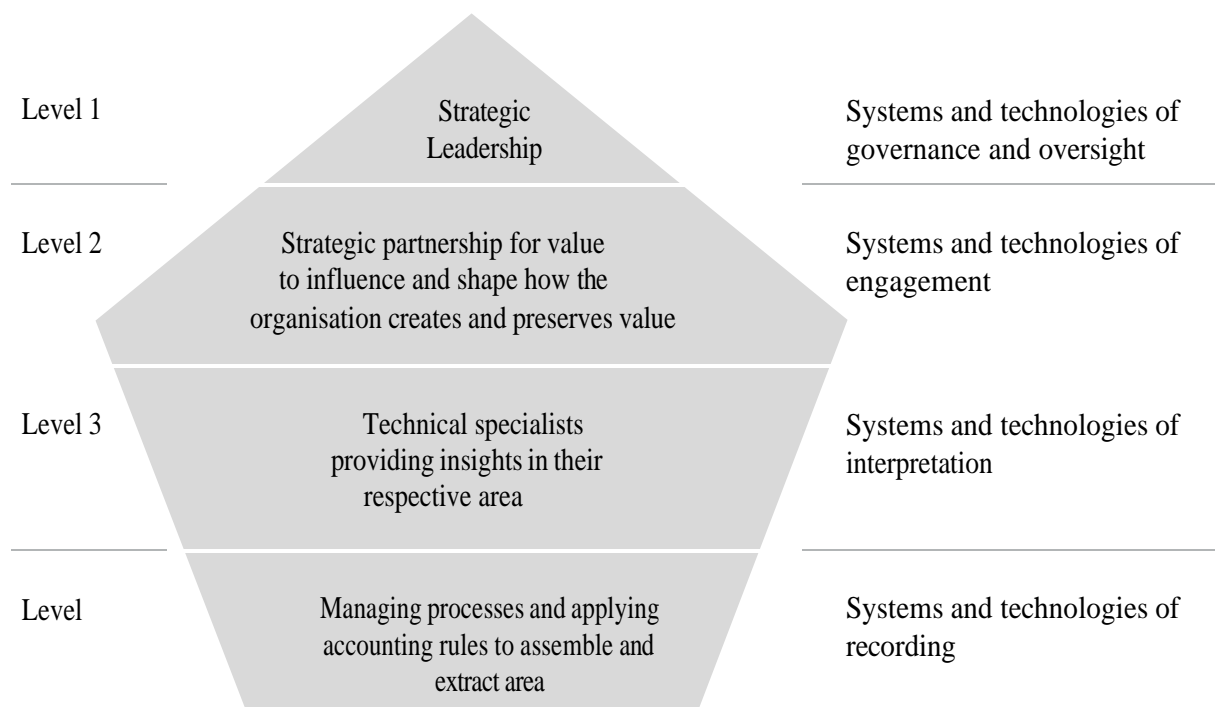
This study aims to capture Portuguese Certified Accountants' perceptions of the impact of digital transformation on accounting work processes. More specifically, to understand how accountants position themselves concerning the digital transformation that is taking place in the accounting industry and to identify which processes they have felt the impact of digital transformation the most. After this introduction, section 2 presents a literature review on the digitization of accounting work processes. Section 3 describes the methodology adopted, while section 4 presents and discusses the results of the study. Finally, section 5 refers to the final considerations, where the limitations of the study, future suggestions and the contribution of this article are included.

2. DIGITALIZATION OF ACCOUNTING WORK PROCESSES

Digital transformation (DT) is a relatively new concept that has gained great popularity in recent years among researchers. The first definition appears in a book by Fors and Stolterman, where they describe DT as the changes that digital technology entails or influences in all aspects of human life (Stolterman & Fors, 2004), both in society and in business (Mergel et al., 2019; Mahraz et al., 2019). Indeed, digitalization is a transformational change that occurs at the intersection of technology, work, people, and organization (Mushore & Kyobe, 2019). According to Tekic & Koroteev (2019), some companies see DT to optimize processes and reduce costs, while others see it as an opportunity to create value by offering products and services that never existed before; some companies see DT as a change in the profile of the people they employ, while others see it as a need to find and serve new customers. All these perspectives can be valid and correct. The different definitions of DT can be divided into three distinct elements: (1) Technological - DT is based on the use of new digital technologies such as social media, analytical data or embedded devices; (2) Organizational - DT requires a change of organizational processes or the creation of new business models; (3) Social - DT is a phenomenon that is influencing all aspects of human life, for example by improving the customer experience (Reis et al., 2018). This digital revolution is positively developing digital and standardized work environments. Some workplaces are being virtualized or remotely controlled, which requires new communication skills and knowledge of virtual worlds (Lei & Jing, 2016). For Sivarajah et al. (2020), the digitization of many aspects of business and organizational activities have subsequently led to the emergence of large data sets, which through big data and analytical tools can create insights that help improve business performance and provide a competitive advantage. Modern computer systems lead to reduced workload and the repetitive actions that used to exist are now easier and performed faster (Gulin et al., 2019). In this sense, the digital revolution may lead to the disappearance of many jobs, but at the same time, it will allow new opportunities for recent graduates and for workers who are willing to develop new skills. Indeed, as stated by Breque et al. (2021:5), a transformed industry will have a transformative impact on society as well. This is foremost true for industry workers, who may see their role changed or even threatened". According to *The future of jobs report 2020 from the World Economic Forum (WEF)*, by 2025, the capabilities of machines and algorithms will be more widely used than ever before, and the time of work done by the Machine will equal the time of work done by Man. For example, in the accounting field they will benefit immensely when they use digitalization to organize, process and evaluate financial data, which will improve productivity and save both cost and time. However, at the same time, DT can also be understood as a threat to the accounting profession. For instance, World Economic Forum. (2020) listed "Accounting, Bookkeeping and Payroll Clerks" and "Accountants and Auditors" appear as the third and fourth top 20 job roles in decreasing demand across industries. Frey and Osborne (2013), emphasize that some processes in the accounting area can be taken over by robotics and therefore part of the accounting profession will disappear. In this same study, the authors estimated that 47% of jobs in the US may be replaced by automation in the next two

decades. Greenman (2017), states that according to a study done by Oxford University in 2015, accountants are 95% likely to lose their jobs when machines take over the role of data analysis and processing. This study also found that as technology advances, some jobs will eventually disappear, and others will emerge. In line with this view, Greenman (2017) argues that the repetitive tasks of posting and sorting accounting documents are more likely to be replaced by automated technology than the higher-value tasks that involve professional judgment. However, the study CGMA (2019) presents a more positive perspective on the impact of DT in the accounting profession. This research reveals that “the human-machine hybrid situation requires new skills and competencies, in addition to maintaining existing ones” CGMA (2019). Having Digital skills at the center, accounting professionals must develop simultaneously (i) technical skills; (ii) business skills; (iii) people skills; (iv) leadership skills, and to be able to apply them within a business context. Finally, the CGMA 2019 competency framework claims that “all of these things must be underpinned by ethics, integrity and professionalism” CGMA (2019:32). According to this research, the time that automation frees up, in combination with new technologies, is augmenting accounting professionals’ capabilities, because it allows them to use the freed-up time to perform new tasks within jobs, tasks that add real value to organizations. For Gulin et al. (2019), a positive prediction of process automation is that machines and robotic automation will increase the value of services. Basic services can and will be delivered even more efficiently, allowing accountants more time to discuss their client's current situations and future needs. In the study by Rîndaşu (2017), it is noted that professional bodies and organizations emphasize that the future roles of accounting professionals will be somewhere between the frontier of accounting and information technology expertise to continue to create value in the digital age. One of the main conclusions of this study is that the academic environment plays an important role in improving the level of understanding and ability to work with emerging technologies because it makes future professionals more familiar with these technologies during the accounting and finance learning process. Due to these new technologies, the accountant's job will change, which may also mean a change of the name designation, as suggested by Kruskopf et al. (2020): Blockchain Accountant; Analytics Guru; Historical Accounting Analyst; Healthcare Accountant; Cloud Accounting specialist; Systems Integrator; Cybercrime Accountant; Fintech City planner accountant; Strategic Accounting Analyst; Fintech Accountant; Data Security Accountant. Kruskopf et al. (2020) show the potential competencies needed now and in the future. To begin with, basic accounting knowledge will always be necessary, so the competencies mentioned in the table are those that are required in addition to what accountants should already know previously. Included in the technical skills are analysis, understanding of software and its capabilities, data security knowledge, and more. In this type of skill, the focus is on learning to interact with programs, AI, robotics, and the processes of digitizing daily tasks. As already mentioned, many of these tasks will become hybrid, that is, there will have to be professionals who know how to interact with machines. As for social skills, these are generally more difficult to learn in an academic context, as they require patience, understanding, and adaptability. These skills are gaining momentum and becoming increasingly valuable because they bridge the desired gap between machines and people. Suleiman et al. (2020), predict that accounting courses will soon also include subjects related to programming and the use of AI for routine accounting tasks. These changes will not only ensure the survival of accounting professionals but will also increase their productivity and enhance their skills. According to Sherif and Mohsin (2021), students taking accounting courses should be prepared to know data analytics, know about data security and cyber-security, and be prepared for developments in the transition to digitalization. The accounting profession is one of the professions that must keep abreast of changes in the world that is in a process of rapid digitization. Thus, it is important that future accountants, the students, are equipped with the latest technology by studying in the field of accounting.

According to Kruskopf et al. (2020), the emerging technologies that most directly interfere with the nature of the accountant's work now and soon are Robotic Process Automation, AI, Blockchain, and cybersecurity. While many of these new technologies are still in their infancy, they are already creating value for clients and enabling accountants to take on more global clients without as many constraints as previously. The study by Rîndaşu (2017) concludes that accountants are becoming familiar with emerging technologies, although they are not completely mastering them. Nevertheless, their level of knowledge proved to be sufficient to identify the main benefits and challenges. Nevertheless, they still need to develop new skills and enhance their knowledge to acquire efficient work tasks. Since cybersecurity was the main challenge, the study participants demonstrated an above-average theoretical level of awareness in correctly identifying the main problems. The study by Richins et al. (2017) advances the argument that accountants possess the ability to think strategically and leverage their knowledge about companies'/clients' businesses to increase the value provided by big data, and they conclude by mentioning that this knowledge is complementary and supplementary to technologies, invaluable for maximizing the value of companies. From the above literature review, it seems quite clear that the core skills and competencies of accountants are changing as a consequence of the Industry 4.0 era. The research of CGMA (2019) went a step forward and developed a model of the finance function in the digital world. In its pentagonal structure, there are four levels of impact and interaction of technology and finance function within organizations, as shown in figure 1.



*Figure 1: The shape of the finance function in the digital world
(Source: CGMA (2019:23))*

The following Table 1 reflects CGMA (2019:24) findings and the detail for each level. It explores the changing roles, tasks and focus within the finance function levels and also considers how the digital world impacts finance professionals' use of technologies. In the last line, the table maps where the CIMA Professional Qualification and the CGMA Competency Framework cut across these levels (2019:24).

Attribute	Data extraction (Level 4)	Insight generation (Level 3)	Value partnering (Level 2)	Finance leadership (Level 1)
Type of system	Recording	Interpretation (or sense-making)	Engagement (or interaction)	Governance and oversight
Outcome	Hindsight	Insight	Foresight	Oversight
Gartner model	Descriptive	Diagnostic	Diagnostic; predictive; prescriptive	Predictive; prescriptive and cognitive
Technology	OCR; RPA; early stages of BI system	AI; NLP; middle stages of BI system	AI; visualisation; final stages of BI system	AI; prediction tools; all stages of BI system
Role of accounting	Gathering information for narrating; and narrating how organisation creates and preserves value	Narrating in greater detail; beginning to shape how organisations create and preserve value	Shaping how value is created (through interaction); enabling how value is created	Enabling value creation by ensuring oversight, governance, and by allocation and provision of resources
Focus	Quality and integrity of data; training machines to do a better job; efficiency	Compliance (interpreting rules); quality of analysis; telling machines what to do; effectiveness	Quality of decision-making; judgement; trade-offs and learning	Quality of strategic decision-making; risk management; capital and resource optimisation
Main competencies	Technical accounting	Technical accounting; business skills	Business skills; people skills	Business skills; people skills and leadership skills
CIMA Professional Qualification/CGMA	Operational level	Management level	Strategic Level CPD/CPE	CPD/CPE

OCR – Optical Character Recognition, RPA – Robotic Process Automation, NLP – Natural Language Processing,
 BI – Business Intelligence, AI – Artificial Intelligence, CPD – Continuing Professional Development, CPE – Continuing Professional Education

*Table 1: The attributes of each level within the pentagonal structure
 (Source: CGMA (2019:24))*

The framework proposed by CGMA (2019) offers us a very practical and useful tool to evaluate the stage of digital transformation of the accounting profession in any community. In trying to assess that, we developed an empirical study to capture the perception of Portuguese-certified accounts about their level within the pentagonal structure regarding the sophistication technologies they use and its impact on accounting work processes.

3. EMPIRICAL STUDY

A questionnaire was launched, targeting certified accountants. The questionnaire was prepared on Google Forms and was shared with the OCC, who made it available on their website and Facebook, with APECA who provided it to their members, and through a network of personal

and professional contacts via email and Facebook. The questionnaire was available between August 19 and September 5. For the present study, questions from three sections are used:

- 1) Profile of the respondent: academic qualifications, the area of training, and the number of years of experience as a Certified Accountant
- 2) Perception about your level of digitalization: How do you position yourself concerning the digital transformation that is happening in the accounting industry?
- 3) Perception of the impact of TD on work processes: Which work processes have you felt the impact of digital transformation the most?

The questionnaire was adapted from Snaplogic (2022). To confirm the level of applicability of the questionnaire, a pre-test was carried out considering the objectives set for its execution. The objectives of a pre-test were to check whether the respondents understood the questions, to verify whether the closed questions included all available options, and to correct ambiguities and misunderstandings of the questionnaire, to evaluate in terms of vocabulary, question order, and meanings. The conclusions are drawn from the applied pre-test allowed for the adjustment of questions and the reformulation of other questions for further simplification. The sample selected was by convenience; this type of sample is not representative of the population and is therefore used only because it is useful for capturing general ideas as well as identifying critical aspects to be analyzed.

4. DISCUSSION OF RESULTS

A total number of 225 participants were included in this study, 124 (54.6%) males, with a minimum age of 20 years old, mostly graduated (n=172, 75.8%), with the area of education accounting/ fiscality (n=165, 72.7%) and with at least 11 years of experience (n=181; 80.4%) (Table 2).

	n	%
Gender		
Female	103	45.4%
Male	124	54.6%
Age		
20-30	18	7.9%
31-40	30	13.2%
41-50	62	27.3%
51-60	61	26.9%
≥ 60	56	24.7%
Education		
Lower than secondary school	2	0.9%
Complete secondary school	28	12.3%
Graduation	172	75.8%
Master/ PhD	25	11.0%
Area of education		
Management	40	17.6%
Accounting/ Fiscality	165	72.7%
Economy	21	9.3%
Law	1	0.4%
Years of experience as a certified accountant		
1-10	44	19.4%
11-20	40	17.6%
21-30	69	30.4%
≥ 30	74	32.6%

Table 2: Socio-demographic characteristics

Participants' opinion concerning the digital transformation that is taking place in the accounting sector was mostly of following trends about the digital transformation schedule (n=144. 63.4%). Few participants haven't started which digital transformation process and are not planning to do (n=11, 4.8%), 35 (15.4%) fell behind on the digital transformation schedule, 23 (10.1%) haven't started which digital transformation process but have plans to do it and 14 (6.2%) are at the forefront of trends when it comes to the digital transformation schedule (Table 3).

	n	%
I follow trends in the digital transformation schedule	14	63.4
	4	%
I'm behind on the digital transformation schedule	35	15.4
		%
I haven't even started which digital transformation process, but I'm planning to do so	23	10.1
		%
I am at the forefront of trends when it comes to the digital transformation schedule	14	6.2%
I haven't even started which digital transformation process, nor am I planning to	11	4.8%

Table 3: Position concerning the digital transformation that is taking place in the accounting sector

The accountants' opinion of the processes where they felt the most impact from digital transformation was mostly automatic document classification and digital posting (n=112, 49.8%), digital archive (n=103, 45.8%), and communication with the clients (n=81, 36.0%) (Table 4).

	n	%
Automatic document classification and posting	112	49.8%
Digital Archive	103	45.8%
Communication with client	81	36.0%
Document reading	55	24.4%
Report	37	16.3%
I did not feel the impact in any process	23	10.2%

Table 4: Which processes have felt the impact of digital transformation the most

In trying to establish the link with the attributes of each level within the pentagonal structure of CGMA (2019), we classified

- Automatic document classification and posting (49,8%); Digital archive (45,8%); and Document reading (24,4%), as level 4
- Communication with the clients (36%), and Report (16%), as level 3.

Our classification was based on the technological tools that support these accounting processes. It is quite interesting to note that none of the participants mentioned the attributes of level 1 and level 2 within the pentagonal structure. This means that the Portuguese Certified Accountants do not feel comfortable with the role of “Shaping how value is created (through interaction); enabling how value is created” (level 2), and “Enabling value creation by ensuring oversight, governance, and by allocation and provision of resources” (level 1). Only 10% of the participants did recognize any impact on the work process.

This means that most of the respondents acknowledge the role of accounting as being:

- Level 4: Gathering information for narrating; and narrating how the organization creates and preserves value:
“Here, individuals and teams apply accounting rules, policies and standards to the collecting, cleaning and connection of data. They are essentially operating systems and technologies of recording. The information and extracted data they provide become the foundations of the work of finance professionals.” CGMA (2019:25)
- Level 3: Narrating in greater detail; beginning to shape how organizations create and preserve value:
“These are technical specialists who provide insight derived from the information that has been handed over to them in their specialist areas. They analyse the information to create insights which they communicate through periodic reports. Essentially, they operate systems of sense-making and interpretation in order to provide insight. Their insights create the building blocks of the organisation’s value-creation story.” CGMA (2019:25)

In line with literature, our findings show that the main impact of digital transformation is the automation of routine activities and workflow reduction (Greenman, 2017; Mosteanu, & Faccia, 2020), freeing up time for more value-added tasks (Bromwicha & Scapens, 2016; Hoffman, 2017).

5. CONCLUSION

The digital transformation underway in organizations influences accounting processes and the role of the accountant. In this article, we briefly reflect on the changes that information technology and automation are inducing in the accounting work processes. Supported by scientific literature and documents from professional bodies, we try to identify the main trends for the accounting profession regarding its role in society and organizations and the necessary competencies to accomplish it. To capture the perception of certified accountants regarding the impact of digital transformation on accounting work processes. Participants' opinion concerning the digital transformation that is taking place in the accounting sector was mostly of following trends about the digital transformation schedule (63.4%). The results showed that digital archives, digital records, and communication with the client are the work processes for which emergent technology has a more perceptible impact in accounting. From this, we can conclude that most of the Portuguese Certified Accountants who participated in this study recognize the role of accounting as level 4 (gathering information for narrating; and narrating how the organization creates and preserves value) and level 3 (narrating in greater detail; beginning to shape how organizations create and preserve value). Finally, our results show that the main impact of digital transformation is the automation of routine activities, workflow reduction, and freeing up time for more value-added tasks. Regarding the limitation of the study, the sample is not representative of the population and may restrict the generalization of the results. In future research, we suggest identifying how universities are planning to change their accounting course curricula to adapt to emerging technologies and digital transformation in the sector. This study is helpful for technology consultants and accounting professional bodies in promoting the adoption of technology in accounting.

LITERATURE:

1. Breque, M., De Nul, L., & Petridis, A. (2021). Industry 5.0. Towards a Sustainable, Human-Centric and Resilient European Industry. Available online: <https://op.europa.eu/en/publication-detail/-/publication/468a892a-5097-11eb-b59f-01aa75ed71a1> (accessed on 15 January 2022).

2. Bromwicha, M.; Scapens, R.W. (2016). Management Accounting Research: 25 years on. *Manag. Account. Res.*, 31, 1–9.
3. CGMA (2019). Reinventing finance for a digital world. Chartered Global Management Accountant (CGMA®), USA.
4. Frey, C. B., & Osborne, M. A. (2013). The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, 114, 254–280. <https://doi.org/10.1016/j.techfore.2016.08.019>
5. Greenman, C. (2017). Exploring the impact of artificial intelligence on the accounting profession. *Journal of Research in Business, Economics and Management*, 8(3), 1451.
6. Gulin, D., Hladika, M., & Valenta, I. (2019). Digitalization and the Challenges for the Accounting Profession. *ENTRENOVA-ENTERprise REsearch InNOVation*, 5(1), 428-437.
7. Hoffman, C. Accounting and Auditing in the Digital Age. 2017. Available online: <http://xbrlsite.azurewebsites.net/2017/Library/AccountingAndAuditingInTheDigitalAge.pdf> (accessed on 12 June 2021).
8. Kruskopf, S., Lobbas, C., Meinander, H., Söderling, K., Martikainen, M., & Lehner, O. (2020). Digital accounting and the human factor: theory and practice. *ACRN Journal of Finance and Risk Perspectives*.
9. Lei, Z., & Jing, Y. (2016). Study on Human Resource Reform in the Digital Transformation. *Proceedings of the 2016 Joint International Information Technology, Mechanical and Electronic Engineering*. 2016 Joint International Information Technology, Mechanical and Electronic Engineering Conference, Xi'an, China. <https://doi.org/10.2991/jimec-16.2016.84>
10. Mahraz, M. I., Benabbou, L., & Berrado, A. (2019, July). A Systematic literature review of Digital Transformation. In *International Conference on Industrial Engineering and Operations Management*. *Anais... Toronto: IEOM Society International* (pp. 917-931)
11. Mergel, I., Edelmann, N., & Haug, N. (2019). Defining digital transformation: Results from expert interviews. *Government information quarterly*, 36(4), 101385
12. Mosteanu, N.; Faccia, A. Digital Systems and New Challenges of Financial Management—FinTech, XBRL, Blockchain and Cryptocurrencies. *Qual. Access Success* 2020, 21, 159–166.
13. Mushore, R., & Kyobe, M. (2019, October). Optimizing the business value of digital transformation by aligning technology with strategy, work practices and stakeholder interests. In *2019 IEEE 10th Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON)* (pp. 0403-0408). IEEE.
14. Reis, J., Amorim, M., Melão, N., & Matos, P. (2018). Digital Transformation: A Literature Review and Guidelines for Future Research. Em Á. Rocha, H. Adeli, L. P. Reis, & S. Costanzo (Eds.), *Trends and Advances in Information Systems and Technologies* (Vol. 745, pp. 411–421). Springer International Publishing. https://doi.org/10.1007/978-3-319-77703-0_41
15. Richins, G., Stapleton, A., Stratopoulos, T. C., & Wong, C. (2017). Big data analytics: opportunity or threat for the accounting profession?. *Journal of Information Systems*, 31(3), 63-79.
16. Rîndașu, S. M. (2017). Emerging information technologies in accounting and related security risks—what is the impact on the Romanian accounting profession. *Journal of Accounting and Management Information Systems*, 16(4), 581-609.
17. Sherif, K., & Mohsin, H. (2021). The effect of emergent technologies on accountants ethical blindness. *The International Journal of Digital Accounting Research*, 21(27), 61-94.
18. Sivarajah, U., Irani, Z., Gupta, S., & Mahroof, K. (2020). Role of big data and social media analytics for business to business sustainability: A participatory web context. *Industrial Marketing Management*, 86, 163-179.

19. Snaplogic (2022). Digital Transformation Survey. *Snaplogic Web Site*. Accessed August 15, 2022, at <https://www.snaplogic.com/resources/research/digital-transformation-survey>.
20. Stolterman, E., & Fors, A. C. (2004). Information Technology and the Good Life. Em B. Kaplan, D. P. Truex, D. Wastell, A. T. Wood-Harper, & J. I. DeGross (Eds.), *Information Systems Research* (Vol. 143, pp. 687–692). Springer US. https://doi.org/10.1007/1-4020-8095-6_45
21. Suleiman, Amneh, Borgi, H., Phung, Muhammad, & Ali. (2020). How Artificial Intelligence Changes the Future of Accounting Industry. *International Journal of Economics and Business Administration*, VIII(Issue 3), 478–488. <https://doi.org/10.35808/ijeba/538>
22. Tekic, Z., & Koroteev, D. (2019). From disruptively digital to proudly analog: A holistic typology of digital transformation strategies. *Business Horizons*, 62(6), 683-693.

PERSONAL PERCEPTIONS ABOUT THE AFFECT OF RSDS HEURISTIC ON MENTAL ACCOUNTING

Anabela Martins Silva

*School of Economics and Management, University of Minho, Portugal
anabela@eeg.uminho.pt*

Ione Cruz

*Department of Applied Social Sciences, State University of Feira de Santana, Brazil
ione.cruz@uefs.br*

Amelia Ferreira da Silva

*CEOS.PP, Porto Accounting and Business School, Polytechnic of Porto, Portugal
acfs@iscap.ipp.pt*

Humberto Nuno Rito Ribeiro

*GOVCOPP; ESTGA, University of Aveiro, Portugal
hnr@ua.pt*

ABSTRACT

Financial education, grounded on technical economic and financial knowledge, has been criticized largely because of their limited impact on behavior. Underlying this debate, stands the confrontation between the traditional economic approach, based on the "homo economicus" concept, and the behavioral economics approach, centered on the idea that individuals' decisions are influenced by factors outside rational processes. Framed within the behavioral approach, the theory of mental accounting recognizes the effect of environment issues on individual economic decisions, and supports that the decision process can be redesigned, by persuasion enhancing. This research seeks to assess the impact of RSDS, i.e. Receiving, Saving, Donating and Spending model, built on the theory of mental accounting. This paper examined issues concerning the individual mental accounting of twenty-five public servants, participating in an intervention project carried out in a Brazilian University. By following a qualitative approach, this paper obtained results that suggest that there was a change in the participants' mental accounting mindset, as they started to adopt new behaviors that positively influenced their financial decisions and attitudes. The limitations of this work are mainly associated with the sample size, the biases introduced by the data collection instruments, and the difficulty in controlling other variables that may interfere with the participants' behavior. This paper contributes to the literature in the topic of personal finance management, as well as to the improvement of the RSDS model itself. Moreover, its results may be of great interest to policy-makers and households with financial problems.

Keywords: *Mental Accounting, Financial Education Intervention, Financial Literacy, RSDS, Receiving, Saving, Donating and Spending Model*

1. INTRODUCTION

The financial stress experienced by families has become a public issue, even in developed countries (Hastings, Madrian, & Skimmyhorn, 2013). Literature is not clear about the effect of financial literacy on financial behavior (Hastings, et al, 2013; Fernandes, Lynch, & Netemeyer, 2014). The lack of financial literacy can lead to poor financial decisions, including taking on high-interest debt, overspending, and failing to save for the future. These poor financial decisions can lead to financial imbalance, making it difficult for individuals to break the cycle of poverty (Askar, Ouattara, & Zhang, 2020).

That's the reason "policymakers in both developed and developing countries are increasingly recognizing the importance of financial literacy and of investing resources in financial education programs" (Xu, L., & Zia, B. (2012:2). These programs can play an essential role in reducing poverty by empowering individuals to make informed decisions about their finances. Financial education gives people the skills and competences required to deal with their finances effectively. Such education may involve themes such as credit management, saving, budgeting, create a small business, and investing. By exploring these concepts, individuals can improve their finance decisions, avoid costly mistakes (Atkinson, A., & Messy, F. A. (2012). According (Fernandes, Lynch, & Netemeyer, 2014:1872) "the widely shared intuition that financial education should improve consumer decisions has led governments, businesses, and nongovernmental organizations worldwide to create interventions to improve financial literacy". However, financial education models based on the transmission of technical economic and financial knowledge have been criticized mainly because of their limited impact on individual behavior. Underpinning this debate is the confrontation between the traditional economic approach, based on the "homo economicus" concept, and the behavioral economics approach, based on the idea that individuals' decisions are influenced by a variety of factors outside rational processes. Framed within the behavioral approach, the theory of mental accounting recognizes the effect that the environment has on individual economic decisions and supports that the decision process can be redesigned, by creating nudge. Mental accounting is a psychological concept developed by Thaler (1980, 1999). It is a critique of expected utility theory, recognizing the tendency of individuals to irrational behavior, such as overspending in one category while neglecting another, or making decisions based on the perceived value of money in a particular account rather than the overall financial situation. Mental Accounting theory argues that people often make irrational decisions due to cognitive biases and heuristics. The essence of the theory of mental accounting lies in the explanation of behavioral patterns that violate the principle of fungibility (Thaler, 2008). However, Thaler and Sunstein (2008) argue that and that these biases can be addressed by nudges, which are small changes in the environment, or the way information is presented to individuals. Choice architecture is the proposition of alternatives that mirrors a good understanding of human behavior, with the goal of encouraging humans to make the best choice, also known as the "good architecture" (Thaler & Sunstein, 2008). The "good" choice architecture is the one that helps people improve their ability to map and select choices that are in their best interests, without limiting their freedom of choice. Based on the theory of mental accounting, this research seeks to assess the impact of RSDS (Receiving, Saving, Donating and Spending) model in individual mental accounting. The paper follows a qualitative approach and uses a sample of twenty-five public servants participating in an intervention project carried out in a Brazilian University. After this introduction, session two describes the RSDS heuristic as a financial education tool, followed by the methodology. In fourth session, the results are presented and discussed.

2. THE RSDS HEURISTIC AS A FINANCIAL EDUCATION TOOL

The RSDS heuristic is a financial education tool that aims to assist individuals in decisions involving Receiving, Saving, Donating and Spending activities, hence the acronym RSDS. The idea is inspired by Machiavelli's Wheel of Fortune, from the eighteenth century, considering it as an image that for centuries has served to define the movement between good luck and bad luck (Tiburi, 2007). Inspired by the Wheel of Fortune, Cruz (2007) began to research financial activities that could form the heuristics and the rules that could improve individual financial decisions according to the "spin" of the wheel. Believing that it is always necessary to give a "little push" to do better, the RSDS is proposed as a "Nudge" in mental accounting. The proposition is simple, that the individuals exercise self-control, through an architecture of choice that encourages them establish priorities receipts, savings, donations, and spending, in

order to reorganize their mental accounting. The challenge is for people to learn to turn the wheel in their own favor and to do this, you must mentally order the way you will manage your finances. The way of thinking should be clarified with this new knowledge of financial education that will be the basis of financial management, potentially obtaining better results that will be evidenced in the accounting statements and measured through the financial analysis of the results, adapted based on a simple and effective understanding. In this case, the RSDS wheel proposes a system in which the individual can quickly decide on his situation as a whole, in relation to his income, donations, savings and expenditure:

- **Rule of Receiving** - Receive and give thanks first. The indebtedness is a notorious fact in several world realities and with the incentive of the marketing industry, it tends to increase, because we often buy what we do not need at the expense of what we are using and not paying, which tends to be common too many to postpone monthly bills. Analyzing in the light of the wheel of mental accounting there is an inversion because people spend before receiving and do not feel grateful for what they have always wanting more and more. So, to benefit from this principle, individuals must reflect and act in a way that they can receive before spending. What it can and should do and how it will benefit, such as avoiding payments on credit and prioritize cash payments, among others.
- **Savings Rule** - Save for your dreams to come true. The central idea of this principle, is that it should be a budget priority, people should "pay" themselves first, stipulating a monthly amount to save. Experts on the subject set the parameter that the ideal is a minimum of 10% of income, but in this case in the first place, the important thing here is to establish the habit of saving. To apply this principle and establish the habit of saving, people should be encouraged to save to make dreams come true, because saving is often associated with something negative, like saving if you lose your job or get sick, thus discouraging people to save, because unconsciously they fear that something bad will happen. So for this principle to be consolidated in the lives of individuals and families they should have different mental strategies (Muramatsu, 2015) and be primarily associated with positive facts.
- **Donation Rule**: Donate time and/or money. The third rule of the RSDS mental shortcut, concerns donation and proposes that individuals donate a portion of their time and/or money. In this way they will exercise charitable donating, which is the act of donating money, goods or time to the unfortunate, either directly or through an organization or other worthy cause (Marquis, Cristopher; Tilcsik, 2016). The objective of encouraging Donating as a pillar for family financial sustainability, stems from many research studies where it has been proven that people who donate are happier as evidenced in detail in the article entitled: *Donate More, Be Happier! Evidence from the Netherlands* (Ugur, 2018).
- **Spending Rule**: Spend consciously and avoid debt - aims to raise awareness that spending should be pleasurable, yes, but that as a rule it should be done consciously, in a balanced way and that it really comes to fulfill its intended purpose, which is to somehow increase well-being, meet a need and/or bring more convenience. At the same time, care must be taken to avoid indebtedness, being strong to overcome the unrestrained appeals of a consumer society, in which the whole time stimulates buying without thinking, payment in installments and easy loans, leading the individual to contract debts that every day take him further away from himself and what he dreamed of conquering. The essence of this principle is that individuals seek to buy in cash and if they do not have immediate resources, they must wait until they have them. The rule requires that the person should spend within the budget, still seeking to have reserves for savings and donations.

3. METHODOLOGY

To conduct this study, on August 9, 2018, the first contact was made with the Human Resources Management of State University of Feira de Santana – UEFS, in Brazil, to see how to proceed for the course. On May 13, 2019, the first class of the IEF - Financial Education Initiative for Servers of the *Family Accounting* Extension Project was announced via email to the servers along with the registration form. The course started with 25 participants, and it was divided into three workshops of three hours each. During the course, a *Whatsapp* group was created to strengthen communication among the group members, with the aim of exchanging information on the topic of financial education. On July 25 the sector returned to us via email with the attendance lists filled out by the participants and the evaluation of reaction to the course, carried out by the Dean of Management and Personnel Development, in which the participants make a self-assessment, evaluate the course, the instructors, the course organization, and can make comments. On a scale of 1 to 4, considering 1 as the minimum value and 4 as the maximum or excellent, we were evaluated with the maximum grade, 4. This questionnaire is answered confidentially and we only receive the results 15 days after the end of the course, because it first goes through the Pro-Rector of Management and Personnel Development. The workshops were given by teachers participating in the extension project "Family Accounting". In this action we counted on 3 teachers and 3 volunteer students from the project, in addition to the accountancy students who participated in the pilot project. The result was obtained by applying the same questionnaire at the beginning and at the end of the intervention. Twenty-five participants were evaluated, since the others were discarded for not participating in the whole process. We believe that the fact that they had already filled out this evaluation was a preponderant factor in the number of answers we obtain the second round of the survey questionnaire. We had this difficulty in obtaining the final data. The moment of registration was the first data collection, because through registration form we got the names of the participants, the sector where they were working, and who their immediate boss was, since this information was important to ask for their authorization to participate in the event. The impact generated by this financial education action was proven through the indicators presented below, in Table 1.

Financial Activities	Indicator
Receiving	% of servers that improved their financial planning % of servers that are satisfied with their life
Savings	% of servers that increased their savings
Donating	% of servers that increased Donating
Spending	% of servers that started to do the budget % of servers that decreased their debts % of servers that started using the RSDS mental shortcut

*Table 1: Indicators of impact of the financial education intervention
(Source: Elaborated by the authors)*

The impact indicators of the financial education action for servers were defined in line with the advocated principles of the mental accounting wheel, involving indicators of behavioral changes in receiving, saving, Donating, spending, and debt decisions and the indicators used by AEF in other financial education programs for adults (AEF - Associação de Educação Financeira do Brasil, 2018).

4. DISCUSSION OF RESULTS

Regarding the principle of receiving and the satisfaction with life, i.e., gratitude for everything, reflected positively the effect of the intervention. This question has the objective of verifying the satisfaction of the servers in relation to their own life, because, despite having an average income above the national average before the intervention, 36% reported not being satisfied. By the end of the experiment, more than half, corresponding to 52% of the respondents revealed to be satisfied, representing an increase of 16% in the satisfaction level, as shown below, in Figure 1.

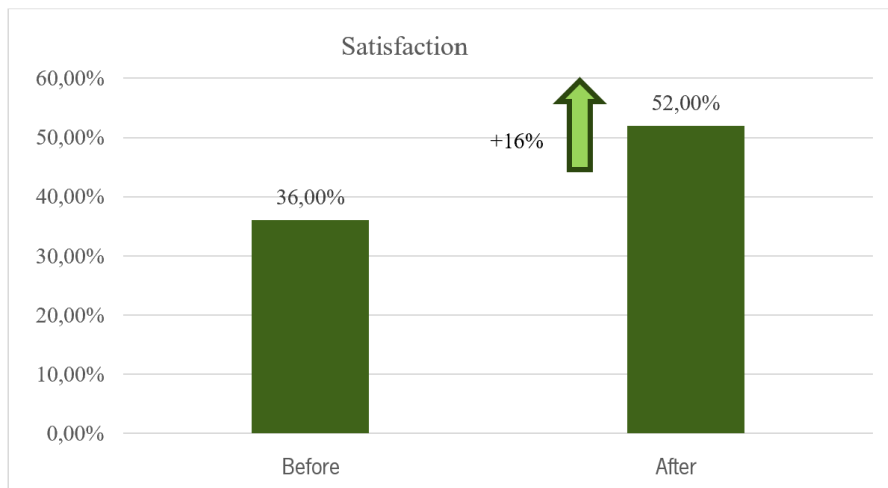


Figure 1: Satisfaction

(Source: Elaborated by the authors, based on survey data)

When we analyze the percentage of savings in the last 12 months, we have an average of 56%, which did not change after the intervention. Probably there was no change, because many reported having payroll loans and, according to the oral report of some participants, they would have no way to save, because if there was any surplus they would prefer to pay off the loans because the interest rates were higher than the income from savings, as it may be observed in Figure 2.

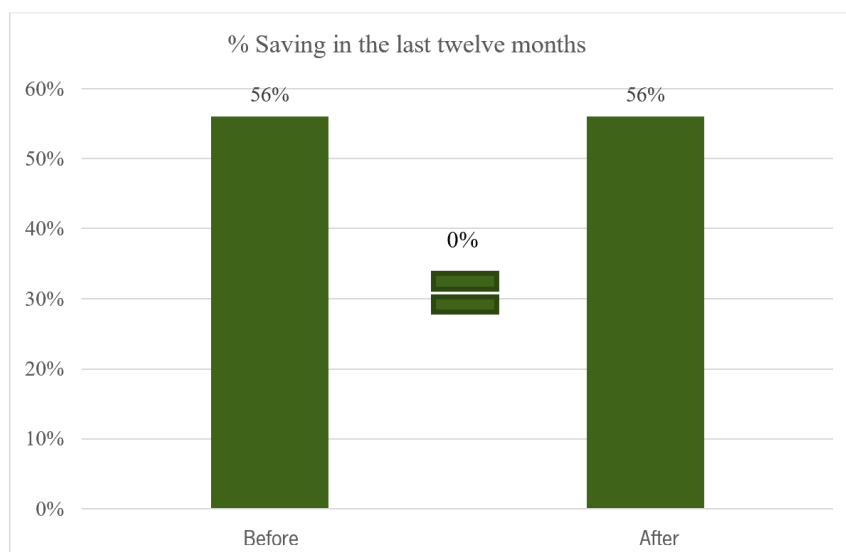
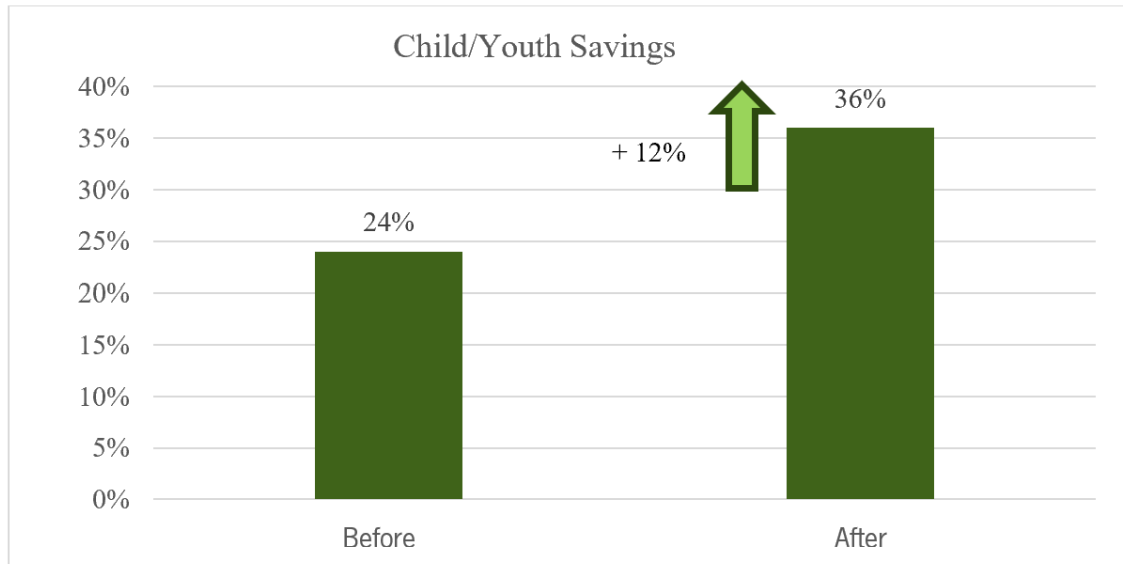


Figure 2: Percentage of those who saved

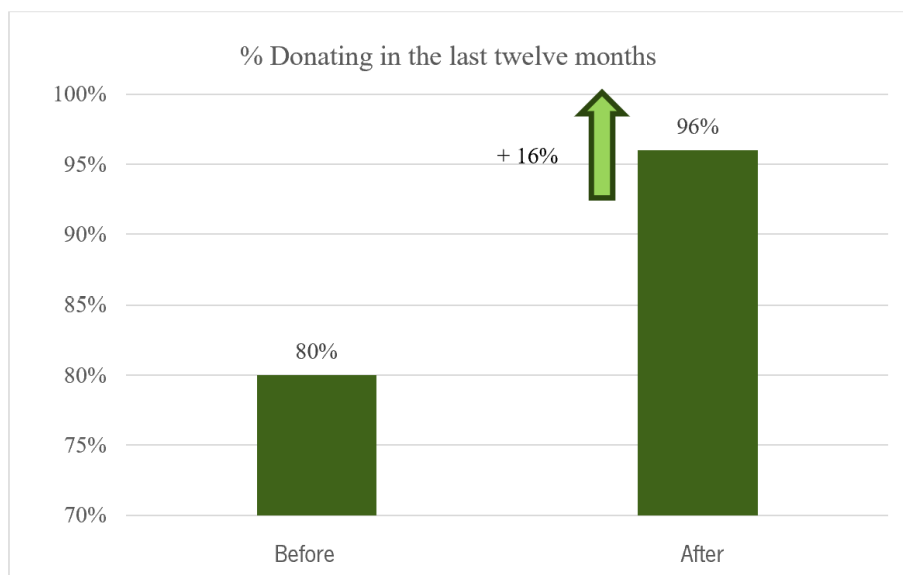
(Source: Elaborated by the authors, based on survey data)

In general, there was an incentive for children and young people to save, because when asked if there were people under 18 who owned a piggy bank or something similar, before the intervention 24% answer “yes”, and after the intervention this number increased by 12%, corresponding to 36%, the average percentage of respondents (Figure 3).



*Figure 3: Stimulus for children and young people to save
(Source: Elaborated by the authors, based on survey data)*

The attitude of Donating was considered as an important pillar both for financial harmony and for building a more caring world. Before the intervention 80% had already donated something, and after the intervention 96% declared they donated in some way, be it through time and/or money, as it can be observed in Figure 4.



*Figure 4: Percent of those who donate
(Source: Elaborated by the authors, based on survey data)*

The donation pillar was stimulated through the enrollment in the government's fiscal program, called "Nota Fiscal Premiada".

During the experiment, we stimulated participants to exercise the spirit of solidarity and to exercise not only financial education but also fiscal education. The participants adhered to the idea and the number of people enrolled in the program increased by 36%. The spirit of solidarity prevailed among the participants, starting a campaign on social networks, motivating other people to do the same (Figure 5).

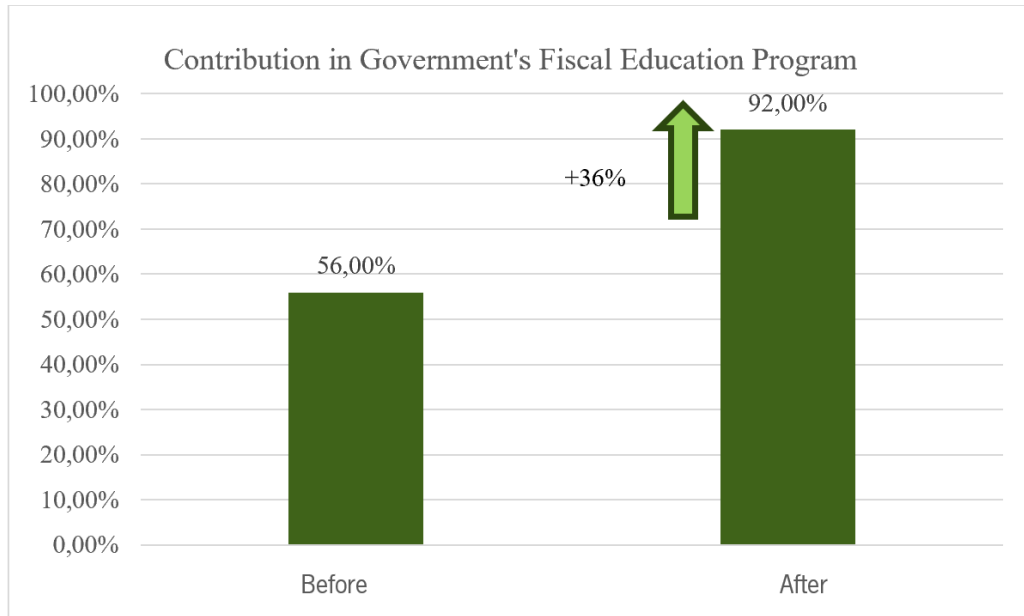


Figure 5: Incentive to Donation and Fiscal Education
(Source: Elaborated by the authors, based on survey data)

The employees were stimulated to outline their dreams and goals, through the instrument called "Treasure Map" (Cruz, 2007). From there they were guided to the elaboration of the budget. During the intervention, all of them were encouraged to do it, even if in a simple way, considering it as an important tool to control income and expenses. By the end of the training, 100% of the participants started to elaborate the family budget (Figure 6).

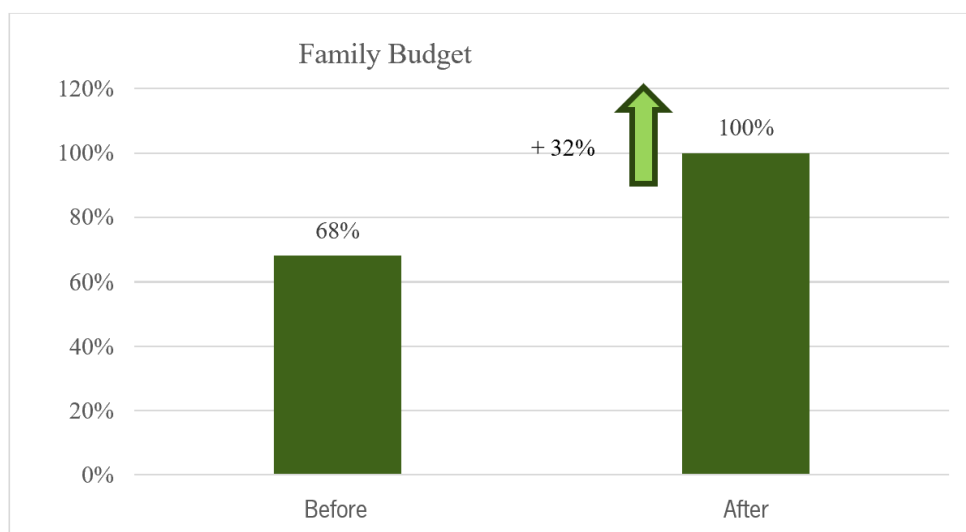
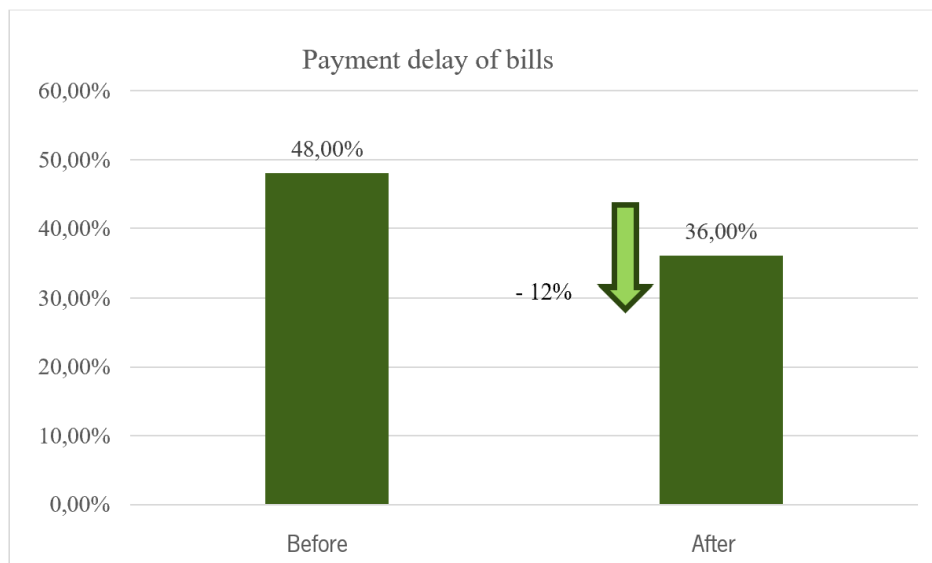


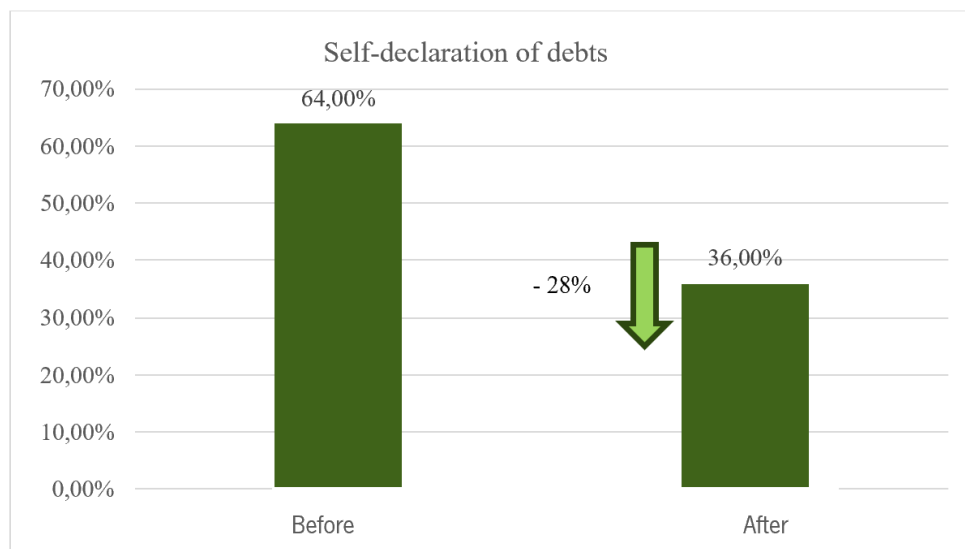
Figure 6: Realization of the family budget
(Source: Elaborated by the authors, based on survey data)

The intervention had a positive effect in the payment delay of bills. The respondents who had overdue bills decrease from 48%, before the intervention, to 12% after the intervention, which may also be reflecting budgeting (Figure 7).



*Figure 4: Delay in the payment of public servants' bills
(Source: Elaborated by the authors, based on survey data)*

The debts also decreased considerably, because when asked if they currently had many debts, before the intervention 64% reported answer “yes”, and after the intervention this number dropped to 36%, representing a decrease of 28% (Figure 8).



*Figure 5: Servers' self-declaration of debts
(Source: Elaborated by the authors, based on survey data)*

To measure the knowledge gained by the participants, the average of the Index of financial education of the participants was calculated, under the RSDS perspective. The results suggest that participants perceived positively the intervention based on RSDS heuristic, as it can be observed below, in Figure 9.

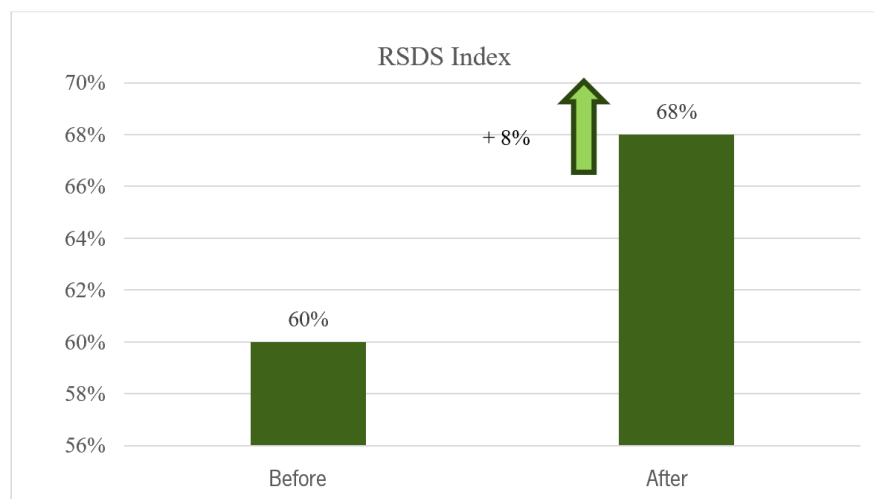


Figure 6: Financial Education Index – RSDS
(Source: Elaborated by the authors, based on survey data)

The average results, shown in Figure 9, were obtained from questions prepared about the content taught in the workshops, especially involving behaviors in the activities of Receiving, Saving, Donating, and Spending. The results indicated an increase of 8%, in relation to the results obtained before the intervention. The average RSDS index of the participants was 60% before the intervention, considering a scale of up to 100 points, and after the intervention was 68%.

5. CONCLUSIONS

The research presented in this paper allowed to obtain results that suggest that there was a change in the participants' mental accounting mindset, as they started to adopt new behaviors that positively influenced their financial decisions and attitudes. Furthermore, one can argue that this paper contributes to the literature in the topic of personal finance management, as well as to the improvement of the RSDS model itself. Moreover, the results presented here may be of great interest to policy-makers and households with financial problems. However, since this is a case study, we cannot necessarily generalize the results. Indeed, this paper examined issues concerning the individual mental accounting of twenty-five public servants, which represent a very small sample size. Accordingly, one can point out that the limitations of this work are mainly associated with the sample size, the biases introduced by the data collection instruments, and the difficulty in controlling other variables that may interfere with the participants' behavior. Despite such limitations, one can always argue that, although RSDS heuristic suggest changings in financial behavior similar to other financial education programs, including creating a budget, reducing unnecessary expenses, increasing income through additional work or seeking higher-paying job opportunities, and seeking financial counseling or assistance, it may be relevant to suggest a longitudinal case-control study for future research, in other to identify the specificities of the RSDS models that make real difference.

LITERATURE:

1. AEF - Associação de Educação Financeira do Brasil. (2018). Avaliação Experimental de Impacto Social do Programa de Educação Financeira para Adultos de Baixa Renda. Retrieved August 6, 2018, from http://www.vidaedinheiro.gov.br/wp-content/uploads/2018/01/Produto-5-Relatório-Final_v2.pdf
2. Askar, M. W., B. Ouattara, and Y.-F. Zhang. 2020. Financial Literacy and Poverty Reduction: The Case of Indonesia. ADBI Working Paper 1097. Tokyo: Asian Development

- Bank Institute. Available:<https://www.adb.org/publications/financial-literacy-poverty-reduction-caseindonesia>
3. Atkinson, A., & Messy, F. A. (2012). Measuring financial literacy: Results of the OECD/International Network on Financial Education (INFE) pilot study.
 4. Cruz, I. (2007). *O poder dos seus sonhos: projeto de vida e finanças pessoais*. São Paulo: Scortecci.
 5. Fernandes, D., Lynch Jr, J. G., & Netemeyer, R. G. (2014). Financial literacy, financial education, and downstream financial behaviors. *Management science*, 60(8), 1861-1883.
 6. Loomis, J. M. (2018). Rescaling and reframing poverty: Financial coaching and the pedagogical spaces of financial inclusion in Boston, Massachusetts. *Geoforum*, 95, 143-152.
 7. Marquis, Cristopher; Tilcsik, A. (2016). Institutional Equivalence : How Industry and Community Peers Influence Corporate Philanthropy. *Organization Science*, (October 2019).
 8. Muramatsu, R. (2015). Lições da economia comportamental do desenvolvimento e pobreza. In *Guia de Economia Comportamental e Experimental* (pp. 156–164). São Paulo: www.economicacomportamental.org.
 9. Thaler, R. H. (1980). Toward a positive theory of consumer choice. *Journal of Economic Behavior & Organization*.
 10. Thaler, R. H. (1999). Mental Accounting Matters. *Behavioral Decision Making*, 206, 183–206.
 11. Thaler, R. H. (2008). Mental Accounting and Consumer Choice. *Marketing Science*, 27(3), 15–25. <https://doi.org/10.1287/mksc.4.3.199>
 12. Thaler, R. H., & Sunstein, C. R. (2008). *Nudge* (1a.). Alfragide: Academia do Livro.
 13. Tiburi, M. (2007). A vida poderia ser diferente. *Revista Vida Simples*, Ano 5, n., 52–53.
 14. Ugur, Z. B. (2018). Donate More, Be Happier! Evidence from the Netherlands. *Applied Research in Quality of Life*, 13(1), 157–177. <https://doi.org/10.1007/s11482-017-9512-0>
 15. Xu, L., & Zia, B. (2012). Financial literacy around the world: an overview of the evidence with practical suggestions for the way forward. *World Bank Policy Research Working Paper*, (6107).

THE IMPORTANCE OF BUSINESS INTELLIGENCE TOOLS IN THE DIGITAL TRANSITION ERA: THE PRINTRIA CASE

Elio Novo

*PRINTRIA; ESTGA; ISCA University of Aveiro, Portugal
elionovo@ua.pt*

Humberto Nuno Rito Ribeiro

*GOVCOPP; ESTGA, University of Aveiro, Portugal
hnr@ua.pt*

Ciro Alexandre Domingues Martins

*IEETA; ESTGA, University of Aveiro, Portugal
ciro.martins@ua.pt*

ABSTRACT

As a result of the digital transition, planned or imposed, it is important that companies introduce control tools that allow measuring, validating, and improving the operations performed automatically, by the various technologies involved in the processes. For SMEs the challenge is increased by the lack of available resources. The additional benefits that the introduction of these tools can bring are several and diversified, but there are also several challenges to their implementation. One of the main obstacles will be the time factor, which in this case covers several dimensions. We intend to demonstrate that in the first stage of the implementation process, the ChatGPT technology can be important in presenting these benefits and challenges to managers of SMEs as well as higher education institutions, increasing the training of future managers in business intelligence and data analysis platforms that are mostly open source and low/no code for cost reduction. We focus our attention on a small Portuguese company where the advances in the digital transition were imposed by the pandemic but now faces the challenges of uncertainty in the quality of its process data and has to make choices between the visible and invisible costs of implementing business intelligence tools.

Keywords: *Digital transition, SMEs, Business Intelligence, ChatGPT, low code/no code platforms, PRINTRIA*

1. INTRODUCTION

The impact of the Covid 19 pandemic was not transversal throughout the world, Portugal being no exception. The municipality of Ovar, located in Aveiro Region, unexpectedly and suddenly, on 18 March 2020, was rounded by barriers placed to prevent the free passage of people and goods, closing all commercial establishments, except those in the food sector, pharmacies, banks, petrol stations and other (Portugal, 2020), by the decree of a sanitary fence by the health and political authorities. This resulted in a restriction of movements that Portugal, one of the oldest countries in Europe, only in a few moments of its history has experienced. In a few hours, the entire economy of Ovar municipality had its doors closed, also affecting companies in other municipalities that could not benefit from the activity of labour from Ovar. This imposition in such a short period of time did not allow the remote work to be planned nor to safeguard the most important responsibilities of the institutions, the ability to fulfil the responsibilities with their workers, clients, and suppliers. Some companies could not resist such fierce lockdown, others were forced to make the digital transition in the space of a few days, as opposed to a properly planned gradual changeover. In this paper, we present the case of a company based in Ovar, Portugal, that fortunately managed to survive and overcome the pandemic, but which continues to face the challenges and opportunities presented by this rapid digital transition

environment. Concurrently, the authors used a business intelligence tool, the ChatGPT, in order to try to perceive its usefulness and appropriateness to PRINTRIA business. The starting point of this research is also related to the current possibilities of taking advantage of technology as it is released to the public. This has been very well pointed out by the Rector of the University of Aveiro (Ferreira, 2023). This work is part of the preparation, for one of the authors for submission of the final project to obtain a master's degree in commercial management at ESTGA-UA, with the theme, implementation of business intelligence tools in PRINTRIA and the final project to obtain a master's degree in competitiveness and business development at ISCA-UA, with the theme, strategies for diversification and adaptation of the offer of products/services at PRINTRIA.

2. THE IMPORTANCE OF INTRODUCING BUSINESS INTELLIGENCE TOOLS IN THE DIGITAL TRANSITION ERA

The use of AI (Artificial Intelligence) tools is becoming widespread across virtually all areas nowadays, assuming ChatGPT a flagship role. As a natural outcome, we are witnessing a steep increase not only in the number of news (vid. e.g. Bloomberg, 2023), but on research as well, as exemplified by the following examples of literature on: the role of ChatGPT in public health (Biswas, 2023b); the academia and education, as the role of ChatGPT in Education (Biswas, 2023a); chatting about ChatGPT: how may AI and GPT impact academia and libraries? (Lund & Wang, 2023); can Chat-GPT Replace the Role of the Teacher in the Classroom: A Fundamental Analysis (Ausat et al., 2023); or on management: AI and GPT for Management Scholars and Practitioners: Guidelines and Implications (Rana, 2023); Can ChatGPT Decipher FedSpeak ? (Hansen & Kazinnik, 2023); Can ChatGPT Forecast Stock Price Movements? Return Predictability and Large Language Models (Lopez-lira & Tang, 2023). For Business Intelligence (BI), Lousa et al., 2019 affirm that, “the concept of Business Intelligence (BI) refers to the relationship between Information Technology (IT) and business processes. It is responsible for transforming data into information and subsequently from information into knowledge. BI platforms are able to collect, organize, analyze and share data that later support important decision making”. For (Sarda et al., 2018) “Business intelligence (BI) is an umbrella term that combines architectures, tools, data- bases, analytical tools, applications, and methodologies ... the term *BI* was coined by the Gartner Group in the mid-1990s”. Reported to 1999, Williams & Williams claimed that “Business Intelligence marries business information, business analysis and fact-based structured decision making, all of which have the potential to dramatically improve knowledge worker productivity” (Williams & Williams, 2006). And three years after the introduction into PRINTRIA of some of the steps of the digital transition, can we already see any changes?

3. THE PRINTRIA CASE

In the case under review, some of the steps of the digital transition process were not carefully planned by management, but rather an inevitability imposed by the Covid-19 pandemic. The introduction of business intelligence (BI) tools in the company, is being a slower and planned process.

3.1. The company's profile

PRINTRIA - EQUIPAMENTOS e SOLUÇÕES, LDA. is a commercial and services company which started its activity on the 7th of September 2009, located in Arada-Ovar, Aveiro District, Portugal. The company operates under the sector of activity code: CAE 47781 - "Retail sale of machinery and other office material in specialized shops", with its head office at Av. 16 de Maio, lote 6, 3880-102 Ovar. It is a limited liability company with a social capital of 11,250 euros, and is currently composed by 3 partners and 11 employees.

Its main activity is that of an official dealer of the Xerox brand, promoting the sale and rental of copying and printing equipment, in a Business-to-Business (B2B) environment, associating each new installation with a service contract, which is subsequently managed periodically. Additionally, it promotes the sale of office consumables, such as paper and other stationery. Currently, the invoicing of the services it provides results from the management of approximately 1,000 technical assistance contracts, representing 60% of turnover. The remaining 40% comes from direct sales of equipment and other consumables. With the imposition of the sanitary fence, half of the company's workers remained outside the municipality of Ovar, and the premises were obligatorily closed. The need to automate the entire billing process for the services already rendered was imperative, to guarantee the necessary liquidity and honour the commitments undertaken, forcing the company to transform its administrative and financial activity in an agile manner, and allow it to maintain its activity, with the least human intervention possible, outside the imposed fences. The computer programs in use in the management of the company, dependent on human intervention in all phases of their use, were replaced and the data they contained migrated to other management programs that were less dependent on human intervention. Communication between the programs was parametrized to speed up the company's ability to issue invoicing documents and charge them to its customers. The introduction of these new programs created the need to measure and monitor their performance and to detect any errors caused by humans or by the technology itself. In fact, the communication of the different technological elements that make up the installed solutions can introduce errors that are difficult to detect and, in many cases, even inexplicable given the overall belief in the reliability of the technology. In fact, with automation, it is possible to see in the figure below - Documents and Invoicing Panel - that in 2020 the number of documents produced automatically was 10 956, with a total value of 593 152€. In the same figure, we see that the number of documents has been increasing year after year, which exacerbates the need to implement control mechanisms.

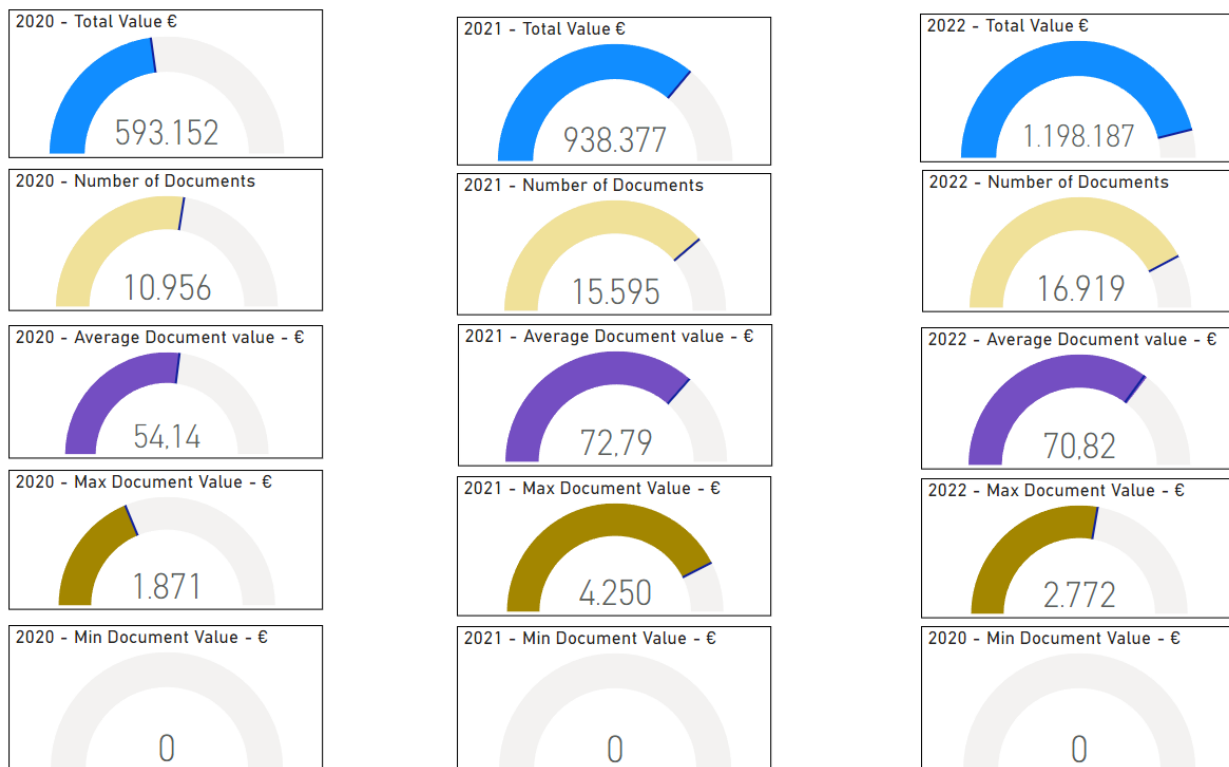


Figure 1- Documents and Invoicing Panel

It is clear that PRINTRIA and probably most start-ups and small and medium-sized enterprises (SMEs) are subject to the same motivations as large companies to implement Business Intelligence systems, accordingly and considering the growing technological dependence and, in turn, in the data (Al-Qirim et al., 2017). Because data is the lifeblood of economic development, it is the basis for many new products and services, driving productivity and resource efficiency gains across all sectors of the economy, allowing for more personalized products and services, and enabling better policy making and upgrading government services. It is an essential resource for start-ups and (SMEs) in developing products and services (European Commission, 2020). But, managing large volumes of data and transforming it into useful information, as well as detecting any anomalies in the digital transition processes, are today's levers for speeding up decision making. Business Intelligence (or BI) can be referred to as the technologies, applications and practices that are usually employed to give support to decision making in business (Yahaya et al., 2019), as well as enabling the presentation of metrics that are important for the business, BI often uses Key Performance Indicators (KPIs) to assess the present state of business and to prescribe a course of action (Ranjan, 2009), but SMEs have budgets much lower than larger companies. Process automation increases the need to introduce additional control tools, to guarantee that the tasks performed by the different programs can be carried out with quality, that is, without errors in the invoicing of services, something that may lead to costs and losses for the company, even putting its viability in question.

3.2. The use of business intelligence tools in PRINTRIA business

As referred earlier in this paper, the challenges and opportunities presented by the current digital transition environment are to be addressed, using PRINTRIA as a case study. Accordingly, the authors used a business intelligence tool, the ChatGPT, in order to try to perceive its usefulness and appropriateness, while using PRINTRIA business as an example. The rationale, and a starting point of this research, is related to the current possibilities of taking advantage of technology as it is released to the public. This question has been very well pointed out by the Rector of the University of Aveiro, in his opinion article, entitled “Artificial Intelligence, ChatGPT and Superior Education”, published in the online edition of *Jornal de Notícias*, last 28 February 2023, where he states that “the technology we doubted yesterday is the one that helps us today, in our daily lives” (Ferreira, 2023). Nevertheless, there many AI tools and, therefore, one can always question: how to find and confirm the right tools and why? Or, how important is the introduction of BI tools in SMEs? Among the several AI tools available, we choose ChatGPT, as it is being recognised as to be one of the most powerful ones available. Questioned about “How important is the introduction of business intelligence (BI) tools in SMEs?”, the ChatGPT provided the following information:

Some benefits of introducing business intelligence (BI) tools	
Informed decision-making	Access and analyze real-time data, which allows them to make informed decisions based on up-to-date and accurate information. This can help improve operational efficiency and productivity
Identifying opportunities	Identify trends and patterns that can help identify business opportunities. This can help them expand their business, identify new markets and products.
Improving efficiency	Automate manual processes and improve operational efficiency. This can help them reduce costs and increase profitability
Performance analysis	Monitor and evaluate their performance in real-time. This can help them identify areas for improvement and implement changes to improve efficiency and profitability

Improved accuracy	Collect and analyze data from multiple sources, which can lead to better data accuracy and quality. This can help improve decision making and avoid errors
Competitor monitoring	Monitor their competitors, assess their market position and identify possible threats and opportunities. This can help them stay competitive and make informed strategic decisions
Improved customer service	Collect and analyze data on customer behavior, which can lead to a better understanding of their needs and preferences. This can help them improve customer service and offer more personalized products and services
Service customization	understand the needs and preferences of customers and thus offer personalized services tailored to their specific needs. This can help them maintain customer loyalty and increase revenues
Identifying inefficiencies	Identify inefficiencies in their business processes and implement changes to improve efficiency and reduce costs. This can lead to better resource management and increased profitability
Cost reduction	Identify areas where they can reduce costs and maximize efficiency. This can lead to better cost management and increased profitability
Increased transparency	Provide their employees, suppliers, and customers with access to important and up-to-date information. This can lead to greater business transparency and increased trust among stakeholders
Trend forecasting	Predict market trends and prepare for possible changes in consumer preferences or economic conditions. This can help them make informed strategic decisions and adapt quickly to changes
Access to real-time information	Access real-time information, which can be crucial in a rapidly changing business environment. This can help them make faster, more informed decisions and respond quickly to problems and opportunities
Improved collaboration	Enable teams of employees to work together more effectively, sharing information and insights to improve decision-making and achieve business goals
Improved inventory management	Manage inventory more effectively, improving forecasting of requirements and minimizing the risk of overstock or out-of-stock products
Identifying growth opportunities	Identify growth opportunities, such as expanding into new markets or offering new products and services. This can help them diversify their revenues and increase the number of customers
Reduction of manual errors	Automate data collection and analysis, reducing reliance on error-prone manual processes. This can lead to greater data accuracy and more informed decision making
Complex data analysis	Handle large volumes of complex data, including unstructured data, to identify hidden trends and patterns. This can help them gain valuable insights into their customers, products and internal processes
Business performance analysis	Monitor and measure the performance of key businesses such as sales, marketing, finance, and customer service. This can help them identify areas for improvement and take corrective action
Decision making support	Provide valuable insights to help SMEs make informed and strategic decisions in quick time. This can help them make faster and more accurate decisions to maintain competitive advantage
Service customization	Understand the needs and preferences of customers and thus offer personalized services tailored to their specific needs. This can help them maintain customer loyalty and increase revenues
Competitor analysis	Analyze and monitor their competitors in real-time, providing insights into their market position, pricing and marketing strategies, and more. This can help them adjust their own strategies to maintain a competitive edge
Forecasting purchasing needs	Forecast future needs based on historical and current data. This can help them make informed decisions about purchasing, production and inventory management

Improving operational efficiency	Identify "bottlenecks" and inefficiencies in business processes, enabling them to make improvements to increase efficiency and reduce costs
Identifying fraud and errors	Identify and prevent financial fraud and errors by monitoring financial transactions in real time and providing alerts to suspicious activity
Product profitability analysis	Analyze the profitability of individual products, including production costs, selling prices, and profit margins. This can help them make informed decisions about which products to keep in their portfolio and which to withdraw
Business process automation	Automate manual business processes such as inventory management and invoicing to save time and resources. This can lead to greater efficiency and productivity
Improved risk management	Identify internal and external risks and threats, including fraud, errors, cyber threats and market fluctuations. This can help them take proactive steps to mitigate these risks and protect their business.

What would be the challenges that the IA tool could identify? The ChatGPT provided the following information:

Some challenges in introducing BI tools in SMEs	
Cost	BI tools can be expensive, and SMEs may find it difficult to justify the investment relative to the benefits they will receive. In addition, many BI tools require additional hardware and infrastructure to run, which can further increase the overall cost
Lack of technical expertise	SMEs may have difficulty finding or hiring professionals with advanced technical skills to implement and operate BI tools. BI tools may require employees to be trained in new skills and techniques, which can lead to disruptions in daily operations and additional training costs
Dependency on external vendors	SMEs may have to rely on external vendors to provide services and support related to BI tools, which can lead to dependency issues and lack of control over business operations
Difficulty collecting and integrating data	SMEs may have data scattered in different systems or stored in different formats, which can make it difficult to integrate this data into a single BI tool. This can lead to delays in implementation and producing accurate results
User adoption	workers may resist adopting new BI tools, especially if these tools require training or significant disruptions to daily workflow. This can limit the effectiveness of BI tools
Data security	SMEs can be easy targets for cybercriminals, and the introduction of BI tools can increase the risk of data security breaches. This can lead to loss of confidential data and damage to the company's reputation
Scalability	SMEs may struggle to find BI tools that can handle large volumes of data as the company grows. This can lead to performance issues and delays in producing reports
Difficulty identifying relevant metrics	SMEs can struggle to identify the right metrics to measure their company's performance. Without proper metrics, BI tools may not provide valuable insights to guide decision making
Difficulties in choosing the right tool	There are many BI tool options in the market, and choosing the right tool can be challenging for SMEs that have limited budgets and resources
Difficulties in demonstrating return on investment (ROI)	SMEs may face difficulties in justifying their investment in BI tools, especially if they cannot demonstrate the return on investment (ROI) to their stakeholders
Complexity	BI tools can be very complex for non-technical users, which can lead to data misinterpretation or inaccurate analysis

Lack of data reliability	If the data used in BI tools is not accurate or reliable, the analyses produced may be inaccurate or misleading. SMEs may struggle to ensure data quality and integrity
Cultural resistance	Cultural resistance: Organizational culture may resist the introduction of BI tools, especially if it means significant changes in business processes or decision-making. This can lead to resistance from workers or even leadership
Lack of stakeholder engagement	The engagement of stakeholders, including managers, executives, and other stakeholders, is important for successful adoption of BI tools, and SMEs may face challenges in getting this engagement
Integration with existing systems	SMEs may find it difficult to integrate BI tools with existing software systems, such as enterprise resource management systems (ERPs) or customer relationship management (CRM) systems. This can lead to compatibility issues and make it difficult to collect real-time data
Lack of business knowledge	If BI tool users do not have sufficient business knowledge, it can be difficult to interpret the information provided by BI tools effectively
Difficulty in setting priorities	SMEs may have difficulty prioritizing which information and data is most important to the success of the business. This can lead to unnecessary analysis or lack of focus on business objectives
Changing business requirements	As business needs change, BI tools will need to be updated and adapted to meet these new needs. This can lead to additional costs and delays in producing up-to-date reports
Data management	The introduction of BI tools can lead to a greater amount of data being generated and stored, which can lead to data management issues such as inadequate storage, insufficient backups or data loss
Additional costs	The introduction of BI tools may lead to additional costs, such as purchasing hardware and software, hiring specialized professionals, training employees and maintaining BI tools
Privacy and security issues	BI tools may contain confidential and business-critical information, so SMEs should take steps to ensure that this information is secure and protected from potential security breaches
Collaboration challenges	BI tools may not facilitate collaboration between teams and departments, which can lead to information silos and make it difficult to exchange knowledge and insights between different areas of the company
Need for change management:	The introduction of BI tools can lead to changes in the culture and the way the company operates, and these changes may require a significant change management effort to be implemented successfully
Lack of alignment with business objectives	BI tools can provide valuable information, but if that information is not aligned with the company's business objectives, it may have no practical value to the organization
Difficulty integrating data from different sources	SMEs may have data stored in different systems and formats, which can make it difficult to integrate this data into a single BI tool
Difficulty balancing automation and human intervention	BI tools can provide valuable insights, but they can also generate automated results that need to be validated and interpreted by humans. SMEs may find it difficult to balance automation with the human intervention required to gain useful insights
Difficulty in keeping tools up to date	BI tools require regular updates to function properly and are constantly evolving. SMEs may find it difficult to keep the tools updated and effective due to lack of resources or technical knowledge
Risk of information overload	BI tools can generate a large amount of information that can be difficult to manage and interpret. SMEs may find it difficult to cope with the information overload generated by BI tools and may feel overwhelmed or unable to take advantage of the information generated

4. CONCLUSION

The implementation of measures in the context of digital transition, leverage the evolution of internal processes gradually, so that repetitive tasks are performed with minimal human intervention and the associated costs reduced. In PRINTRIA's case, the changes to the processes used since its creation and which had been adapted over the years, had to be implemented within a few days and saved the company. Given the diversity of products sold and services provided, and the different software used, the implementation of business intelligence tools is the next step in the process. The factors presented by the AI tool consulted, are indeed interesting and in this specific case, corroborate the opinions of PRINTRIA's managers. After three years after the sanitary fence, are we already seeing other benefits of these imposed changes. In fact, after an initial period of improvements and fine-tuning, the introduction of tools for the automation of processes, implemented in the digital transition, revealed gains in the productivity of workers assigned to these tasks, after the pandemic period and the return of most workers to their companies. In addition to improving the well-being of these workers who have benefited from the digital transition and the end of repetitive tasks carried out in the shortest time possible, the company has managed to direct the time available to other tasks, increasing its earnings. PRINTRIA's managers, and presumably those of most SMEs, live with the daily need to reduce costs and optimize resources, to meet the challenges that pandemic, inflation and war, and other constraints, have brought to the economy. The cost of introducing BI tools, despite all the identified benefits, cannot compromise the viability of the business. The study of the tool to be implemented should consider the visible and invisible costs, so they should tend to be free tools, as well as low code/no code so that it is not necessary to resort to external companies for their implementation. Assigning the responsibility for the study, learning, implementation, and consequent monitoring of results to a member of the management, was the path chosen to achieve this next stage: introducing business intelligence tools in PRINTRIA.

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LITERATURE:

1. Al-Qirim, N., Tarhini, A., & Rouibah, K. (2017). Determinants of Big Data Adoption and Success. *Conference on Algorithms, Computing and Systems - ICACS '17*. <https://doi.org/10.1145/3127942.3127961>
2. Ausat, A. M. A., Massang, B., Efendi, M., Nofirman, N., & Riady, Y. (2023). Can Chat GPT Replace the Role of the Teacher in the Classroom: A Fundamental Analysis. *Journal on Education*, 5, 16100–16106. <https://doi.org/10.31004/joe.v5i4>
3. Biswas, S. (2023a). *Role of Chat GPT in Education*. *Annals of Biomedical Engineering*, 1-2
4. Biswas, S. (2023b). ChatGPT and the Future of Medical Writing. *Radiology*, 307(2), e223312. <https://doi.org/10.1148/radiol.223312>
5. European Commission. (2020). Communication 'A European Strategy for Data' (2020) COM/2020/66 final. *European Commission*.

6. Ferreira, P. J. (2023). Inteligência artificial, ChatGPT e Ensino Superior. *Jornal de Notícias*. <https://www.jn.pt/opiniaio/convidados/inteligencia-artificial-chatgpt-e-ensino-superior-15915356.html>
7. Hansen, A. L., & Kazinnik, S. (2023). *Can ChatGPT Decipher Fed Speak ?* 1–17.
8. Lee, J. (2023). ChatGPT Can Decode Fed Speak, Predict Stock Moves From Headlines. *Bloomberg*. <https://www.bloomberg.com/news/articles/2023-04-17/chatgpt-can-decode-fed-speak-predict-stock-moves-from-headlines#xj4y7vzkg?leadSource=uverify wall?leadSource=uverify wall>
9. Lopez-lira, A., & Tang, Y. (2023). *Can ChatGPT Forecast Stock Price Movements ? Return Predictability and Large Language Models*.
10. Lousa, A., Pedrosa, I., & Bernardino, J. (2019). Avaliação e análise de ferramentas business intelligence para visualização de dados. *Iberian Conference on Information Systems and Technologies, CISTI, 2019-June*(June 2019), 19–22.
11. Lund, B. D., & Wang, T. (2023). Chatting about ChatGPT: how may AI and GPT impact academia and libraries? *Library Hi Tech News, ahead-of-print*(ahead-of-print). <https://doi.org/10.1108/LHTN-01-2023-0009>
12. Portugal. (2020). Despacho n.º 3372-C/2020 da Presidência do Conselho de Ministros e Administração Interna. *Diário Da República, 2.ª Série, Nº54, 2*, 2020.
13. Rana, S. (2023). AI and GPT for Management Scholars and Practitioners: Guidelines and Implications. *FIIB Business Review, 12*(1), 7–9. <https://doi.org/10.1177/23197145231161408>
14. Ranjan, J. (2009). Business Intelligence: Concepts, Components, Techniques and Benefits. In *Business Intelligence: Concepts, Components, Techniques and Benefits* (Vol. 9).
15. Sarda, R., Delen, D., & Turban, E. (2018). Business intelligence, Analytics and Data Science: A Managerial Perspective. 4th Ed., *Pearson Education*, Upper Sadle River, NJ. <https://doi.org/10.4324/9781315108537-4>
16. Williams, S., & Nancy, W. (2006). *The Profit Impact of Business Intelligence*. Elsevier. San Francisco, CA.
17. Yahaya, J., Abai, N. H. Z., Deraman, A., & Jusoh, Y. Y. (2019). The implementation of business intelligence and analytics integration for organizational performance management: A case study in public sector. *International Journal of Advanced Computer Science and Applications, 10*(11), 292–299. <https://doi.org/10.14569/IJACSA.2019.0101140>

QUALITY MANAGEMENT: LITERATURE REVIEW AND A FRAMEWORK PROPOSAL

Daise Santos

*Centro Universitário Leonardo da Vinci
R. Doutor Pedrinho, 79 - - Indaial/SC, 89082-262, Brazil
daisasantos.nogueira@gmail.com*

Alexandre Zammar

*Instituto Federal de Educação, Ciência e Tecnologia de Santa Catarina - IFSC
Rua 14 de Julho, 150, Coqueiros, Florianópolis-SC, 88075-010, Brazil
alexandre.zammar@ifsc.edu.br*

Gilberto Zammar

*Federal University of Technology, Paraná (UTFPR), R. Doutor Washington Subtil Chueire,
330 - Jardim Carvalho, Ponta Grossa - PR, 84017-220, Brazil
zammar@utfpr.edu.br*

Andreia Antunes da Luz

*University Center of Maringá (Unicesumar),
R. Des. Westphalen, 60 - Oficinas, Ponta Grossa - PR, 84010-000, Brazil
andreia.luz@unicesumar.edu.br*

Adriano Mesquita Soares

*Department of Business, Faculdade Sagrada Família (FASF),
Ponta Grossa, PR 84010-760, Brazil
adrianomesquitasoares@gmail.com*

Regina Negri Pagani

*Federal University of Technology, Paraná (UTFPR), R. Doutor Washington Subtil Chueire,
330 - Jardim Carvalho, Ponta Grossa - PR, 84017-220, Brazil
reginapagani@utfpr.edu.br*

Joao Luiz Kovaleski

*Federal University of Technology, Paraná (UTFPR), R. Doutor Washington Subtil Chueire,
330 - Jardim Carvalho, Ponta Grossa - PR, 84017-220, Brazil
kovaleski@utfpr.edu.br*

ABSTRACT

Companies worldwide are being demanded as to their level of competitiveness, their production efforts with higher quality allow a robust market expansion, mainly through technological development and learning and the culture of quality. In view of this, the present work presented the following question: what are the central concepts that guide the management of the requirements of the quality system? In order to answer it, a theoretical framework was built that made possible the understanding and discussion about the theme. The concepts, principles, management, quality system requirements and certification were discussed. Also, the impacts of quality and poor quality on company results were addressed, and in the end, a framework was proposed on levels of quality management performance in order to assist managers in understanding the dynamics of the process of raising performance of companies focused on the superior quality perceived by customers, which guarantees a competitive differential and

lasting advantages in its results, considering the incorporation of quality as a productive strategy and not just as a final product resulting from chance.

Keywords: *Quality Management, Quality Management System, ISO 9001: 2015, Framework*

1. INTRODUCTION

Companies around the world are being demanded in terms of their level of competitiveness since, with the advent of globalization, there are competitors in any segment of activity. This fact requires increasingly efficient solutions in the quality of its products, services and processes. Under this aspect, it becomes more essential in companies from developing countries, which still present a situation of technological and cultural backwardness when compared to North American, European and Asian organizations, mainly the Japanese ones. Higher quality production efforts allow for robust market expansion, mainly through technological development and learning and the culture of quality. This urgency in obtaining equal conditions in the development of competitiveness through quality takes place through the implementation of management systems for production processes that are more consistent with the requirements of its customers. In this sense, national companies need to advance in this process of managing their quality systems, regardless of whether they are certified or not, because, more than certification, quality must be perceived by all its stakeholders, mainly by its customers, who can be internal or external. In face of this scenario, the present work presents the following starting question: what are the central concepts that guide the management of the quality system requirements? To answer the starting question, the general objective of the work is to know the central concepts of quality and the requirements for building a quality management system. For this, a theoretical framework will be built that makes it possible to understand and discuss the theme of quality management, keeping the general objective of the work as a reference to adapt the research steps, and in the end, a framework will be proposed about the levels of management performance of quality.

2. LITERATURE REVIEW

2.1. Quality management: concepts and principles

The concept of quality is not treated as something static or immutable, but as a concept in constant evolution. In this sense, three quality concepts are important for understanding and discussion: Quality is the necessary condition of suitability for the purpose for which it is intended (EOQC, 1972); Quality is the adequation for a special use (JURAN AND GRZYNA, 1991); Quality is the degree of adjustment of a product to the demand it intends to satisfy (JENKINS, 1971). The principles brought by the three concepts are kept in the definition adopted in the technical standard, which considers quality to be the “degree to which a set of inherent characteristics satisfies requirements” (CARPINETTI, GEROLAMO, 2016, p. 10). Fit for use is the most relevant improvement to consider, with a focus on the consumer, in tune with the process operations and basic objectives of the organization. Therefore, continuous improvement is seen as synonymous with total quality (PALADINI, 2012). The meanings of quality for Juran and DeFeo (2015) surround the results achieved by companies regarding the fact that they meet the requirements of the company's customers, impacting higher revenues and lower costs. The advantages allowed by the superior quality level suggest a greater amplitude between their revenues and their costs, directly impacting on a higher profit margin obtained by the companies that achieve this competitive advantage. It is assumed that greater added value through quality will result in consumers willing to pay more to obtain their products and, at the same time, the same superior quality will promote operations with fewer defects and rework, increasing production efficiency, which impacts on lower costs. According to Carpinetti and Gerolamo (2016), quality principles include customer focus, leadership, people engagement, process approach, improvement, evidence-based decision making and relationship

management. These principles are interconnected and interdependent to generate positive outcomes such as risk reduction, improved effectiveness and efficiency, and stakeholder satisfaction. Aquilani et. al. (2017) state that the critical success factors of Quality Management are very numerous depending on specificities such as industrial sectors, countries, dimensions, products and services, but they identified that the role and style of leadership, the commitment and function of top management assume a key role in improving the company's performance in all contexts. The management techniques applied to quality were strongly applied in the late 1970s, when North American companies felt the impact suffered by the perception by users of the superior quality of products manufactured by Japanese companies. This perceived superiority led to the adoption of the terms Japanese quality or Toyota quality, which became synonymous with superior quality and this strongly impacted American companies, some went bankrupt while others were forced to raise their performance standards in terms of quality (JURAN, DEFEO, 2015). Quality management has evolved along with the concept of quality over time. Currently, quality management is seen as a competitive strategy whose objectives are to conquer markets and reduce waste (CARPINETTI, GEROLAMO, 2016, p. 7). The integration of production routine management processes with a focus on customer satisfaction regarding the suitability of a product for its use, essential contributions from Juran and Feigenbaum resulted in quality assurance systems, which evolved into the current management systems of the quality (CARPINETTI, GEROLAMO, 2016). The success of Quality Management can be verified through two indicators: level of consumer loyalty and the ability to turn possible customers into consumers. This happens when the company satisfies and creates value, exceeds the initial expectations of its customers, resulting in greater chances of survival for the company (PALADINI, 2012).

2.2. Quality Management System

Having a quality management system becomes essential for efficiency in quality management, regardless of whether or not you have quality certification, as it is a matter of systematizing information sharing activities, whether in data collection or dissemination of information. quality policy and objectives, with a systemic approach. Not having certification does not mean that the company does not have quality in its processes or in the system itself, since not all companies need certification, but all need management and quality or they may end up perishing. The competitive environment is characterized by its dynamic, diverse and challenging essence, so that the provision of the quality management system assumes the central objective of guaranteeing the survival of the company, through the full use of the organization's potential and resources. "Management systems involve norms, methods and procedures. The norms include the organization's global policy, its operating guidelines and specific rules, applicable to the organization's resources in defined situations" (PALADINI, 2012, p. 111). The focal points of activities inherent to quality management, according to ISO 9001: which must be systematized in companies are: management responsibilities to lead the quality management process; planning objectives and action and review plans, support for quality management activities; quality management in the production operation, performance evaluation and improvement of management processes. (CARPINETTI, GEROLAMO, 2016, p. 7). The quality management activities listed by Carpinetti and Gerolamo (2016) are required at the time of certification, so they are now called quality management system requirements. Thus, the role of the manager before the quality management system consists of putting these activities into practice and managing them minimally well. Additionally, Carpinetti and Gerolamo (2016) report that a series of activities or management processes will be required for certification of the quality management system by ISO 9001:2015, which then came to be called system requirements, which are: Organizational Context, Leadership, Quality Management System Planning, Support, Operation, Performance Evaluation and Improvement.

As for the standardization of the processes, the International Organization for Standardization (ISO) is a network organization formed by experts from around the world to develop international standards for many different management processes. ISO 9001: 2015 is the main standard and aims to certify quality systems according to its requirements. According to ISO, by the year 2014 there were 1,138,155 ISO 9001 certificates in the world.

3. METHODOLOGY

This research is classified as a basic exploratory literature review research, with the objective of building a theoretical framework to carry out a qualitative analysis on the subject. A framework will be proposed with the scenario to be pursued by companies with regard to quality management, aiming to provide reliable subsidies to guide the planning of actions to be performed for the implementation and management of quality systems, discussing the great currents that appear in the specific literature on the proposed topic.

4. RESULTS AND DISCUSSIONS

4.1. Content analysis

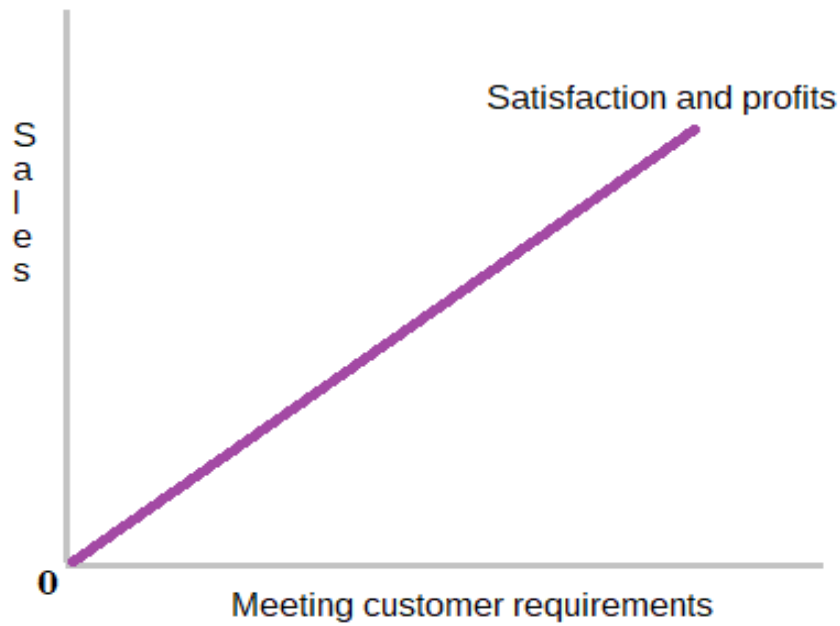
The content analysis revealed a difficulty in interpreting the concept of quality in management, due to the lack of uniform understanding by all interested parties and its subjectivity. Although quality is a concept in constant evolution, the concepts presented between 1971 and 1991 have similar statements. In this way, it was verified that it is not the concept of quality that evolves, but the perception and requirements of customers over time. The ever-changing environment and technology influence people's perceptions and requirements, which affects quality dimensions. Leading companies have had to incorporate quality into their strategies to achieve their goals, making it a means of achievement, not just a goal to be achieved. Some companies radically changed the focus given to quality, breaking paradigms and working to create a culture of quality, which permeates all processes developed by the organization. Thus, the appropriation and use of quality in all its dimensions, raised the level of performance of the entire organization, not being restricted only to issues restricted to its products and processes.

4.2. Quality Principles

Quality principles are universal, however they depend on specificities such as sectors, countries, products and services. Leadership, commitment, and the discharge function are critical success factors. Engaging people is critical to achieving efficiency and continuous improvement, reducing risks, improving effectiveness and efficiency, and satisfying stakeholders. Quality principles are interconnected and depend on each other to achieve superior results. Managers must apply Quality Management knowledge in all processes carried out, not only in the company, but above all with customers and interested parties, and also ensure that the approach is clear to customers in order to demonstrate the willingness of companies to provide them satisfaction.

4.3. Quality management

The evolution of the concept of quality evolved from a focus on inspections and elimination of defects to a concern with the entire process and treatment of root causes. It consists of management methods aimed at superior results, suitability of the product for use and satisfaction of stakeholders, especially customers, raising the company's performance standard. This generates competitive advantages, such as customer recognition and loyalty, resulting in increased sales, as shown in Figure 1.



*Figure 1: Sales x meeting customer requirements
(Source: The authors (2023))*

Thus, improving the requirements fulfillment rate increases customer satisfaction, increasing the company's sales and profits. The practice of continuous improvement in fitness for use is the most effective way to achieve superior results in quality management, as shown in Figure 2.



*Figure 2: Sales x continuous improvement.
(Source: The authors (2023))*

Continuous improvement results in greater satisfaction, sales and profits for companies, while the presence of defects impairs quality and generates negative impacts on the entire organization, mainly on customer satisfaction, sales and profits. as shown in Figure 3.



Figure 3: Defects x sales.
 (Source: own authorship (2023))

In addition to the impact caused on customer satisfaction, sales and profits, poor quality will also impact fixed and variable costs, raising their levels, as poor quality will cause rework, when it is possible to recover the defective product, and when this is not possible. If possible, the product will be discarded, which is even worse. Figures 5 and 6 show comparisons of the impacts on costs of production with poor quality and production with higher quality.

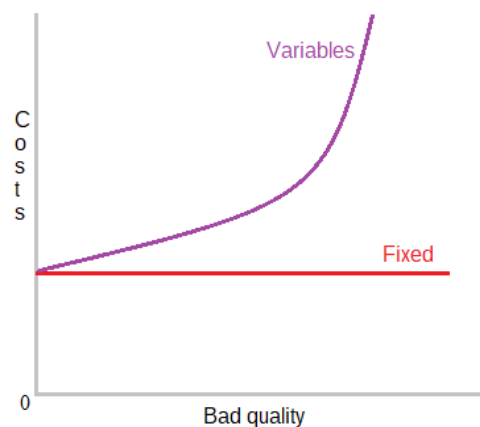


Figure 4: Costs x poor quality
 (Source: The authors (2023))

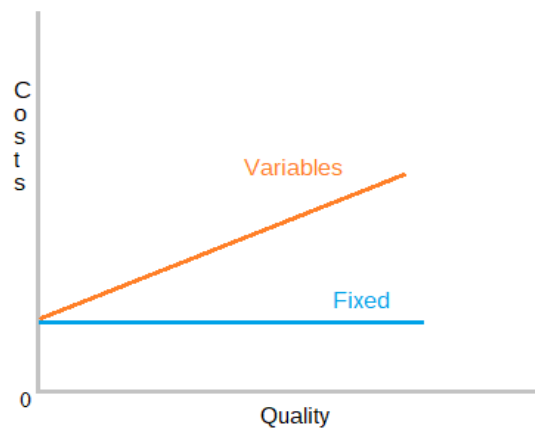


Figure 5: Costs x quality.
 (Source: The authors (2023))

According to Juran and DeFeo (2015), Table 1 demonstrates that offering features that meet customer needs results in superior quality, which allows companies to charge higher prices. In addition, the absence of process and product failures reduces operating costs, which increases profit margins, as shown in Figure 6.

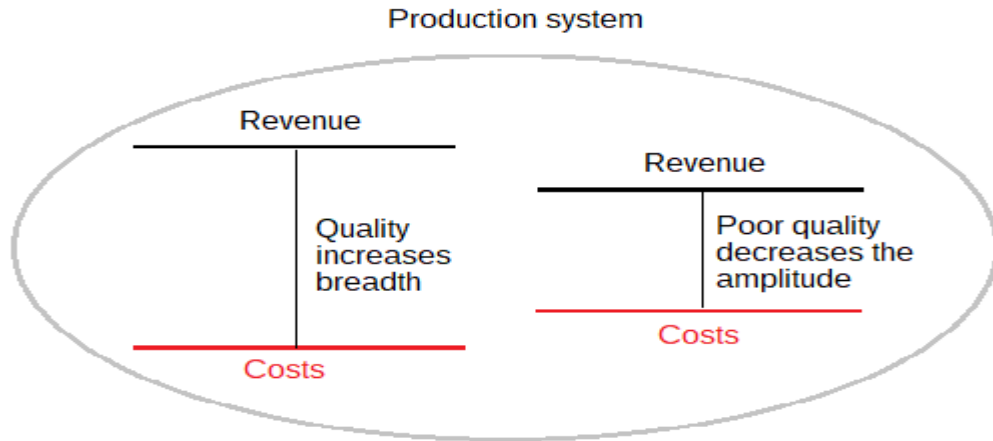


Figure 6: Range between revenue and costs.
(Source: The authors (2023))

In this sense, by increasing profit margins through quality management, the company will realize the positive impacts of production with superior quality directly reflected in its financial results. This will allow greater capacity for investments, innovations, remuneration and, ultimately, in meeting the requirements of its stakeholders.

4.4. Quality Management System

Quality management must be experienced by all people and be part of all the organization's operations. For this, it is necessary to systematize activities and ensure coherent and standardized communication of information. The documentation of quality management practices is important for certification and managers must manage the execution of the quality management system requirements to achieve the organizational objectives in relation to quality. Knowledge management is also important to implement quality management. Figure 7 shows the system requirements management process.



Figure 7: Quality in the management of system requirements.
(Source: The authors (2023))

Thus, having a quality management system is not enough to guarantee the success of a company. There must be a commitment to managing the entire system with quality, otherwise there is a risk of having a false sense of continuous improvement and customer satisfaction.

4.5. Framework proposal

Taking into account the literature review and discussion of the results carried out regarding the conceptualization and understanding of quality, its principles, management processes and systematization, it is proposed, as shown in Figure 8, a framework containing, in a synthesized form, the impacts resulting from the levels of quality performance and continuous improvement in companies.

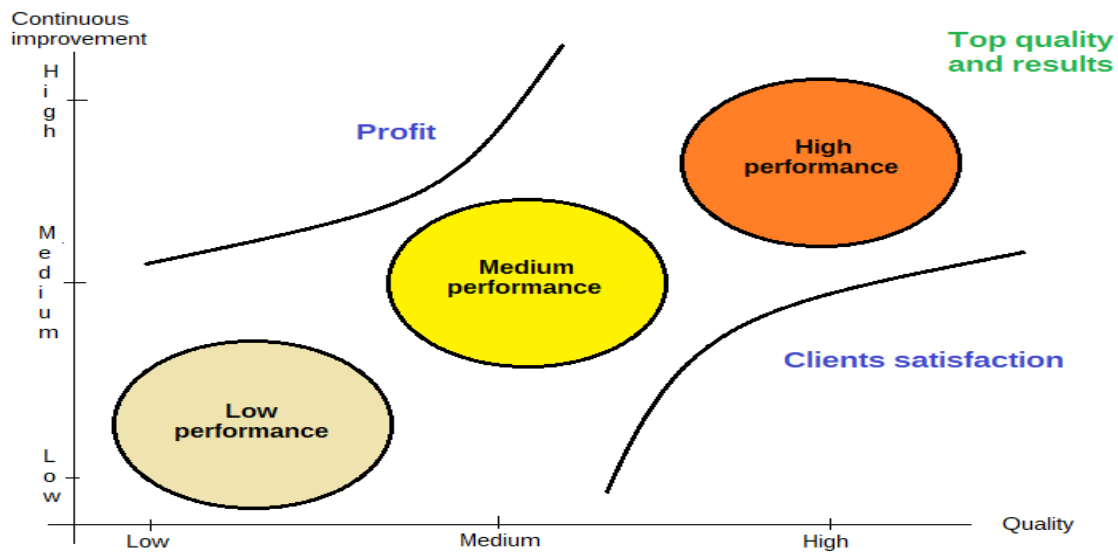


Figure 8: Framework of Quality performance levels.
(Source: The authors (2023))

The aim of this framework proposal is to help managers understand the dynamics of the process of increasing the performance of companies with a focus on the superior quality perceived by customers, which guarantees a competitive advantage and lasting advantages in their results, given the incorporation of quality as a productive strategy and not just as a final product resulting from chance.

5. CONCLUSIONS

Companies need to raise their level of competitiveness since with the advent of globalization, there are competitors in any segment of activity. Production efforts allow for superior quality, which is achieved through the implementation of management systems for production processes that are more consistent with the requirements of its customers. The present work started from the following question: what are the central concepts that guide the management of the quality system requirements? And to answer the starting question, a literature review was carried out in order to know the central concepts of quality, understand the system requirements and specificities to be considered to carry out quality management efficiently. The theoretical deepening provided sufficient subsidies to guide the planning of actions to be performed for the implementation and management of quality systems, discussing the major currents that appear in the specific literature, described by reliable sources. In this way, in view of the theoretical survey that made it possible to understand and discuss the theme of quality management, a framework was proposed about the levels of performance of quality management.

It is expected that this work will help managers in the elucidation of the central concepts of quality, which have a dynamic and abstract characteristic, which makes its full understanding difficult. Also, that this proposed framework helps in the process of raising the performance of companies with a focus on the superior quality perceived by customers, which guarantees a competitive differential and lasting advantages in their results. As a result, the knowledge achieved with this review work will support future studies on the subject, in which it is intended to use the applied methodological approach to confront the findings in this literature review with the reality of companies.

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LITERATURE:

1. AQUILANI, Barbara. SILVESTRI, Cecilia. RUGGIERI, Alessandro. GATTI, Corrado. (2017). "A systematic literature review on total quality management critical success factors and the identification of new avenues of research", The TQM Journal, Vol. 29 Issue: 1, pp.184-213, <https://doi.org/10.1108/TQM-01-2016-0003>
2. CARPINETTI, Luiz Cesar Ribeiro. GEROLAMO, Mateus Cecílio. (2016). Gestão da Qualidade ISO 9001:2015. 1. Ed. São Paulo: Atlas.
3. JURAN, Joseph M. DEFEO Joseph A. (2015). Fundamentos da Qualidade para Líderes. Ed. Bookman.
4. PALADINI, Edson Pacheco. (2012). Gestão da Qualidade: Teoria e Prática. 3. Ed. São Paulo: Atlas.
5. SANZ-CALCEDO, J. G. GONZÁLEZ, A. G. LÓPEZ, O. SALGADO, D. R. CAMBERO, I. HERRERA, J. M. (2015). Analysis on integrated management of the quality. Environment and Safety on the Industrial Projects. Procedia Engineering. 132, 140–145.
6. SILVA, Edna Lúcia. MENEZES, Estera Muszkat. (2005). Metodologia da pesquisa e elaboração de dissertação. 4. ed. Florianópolis: UFSC.

DEALING WITH VISITORS PARTICIPATION AND INTERACTION IN MUSEUM EXPERIENCES: A PERSPECTIVE FROM SERVICE QUALITY

Fatemeh Bashashi Saghezchi

*GOVCOPP & DEGEIT, University of Aveiro,
Campus Universitário de Santiago, 3810-193, Aveiro, Portugal
fatemeh@ua.pt*

Marlene Amorim

*GOVCOPP & DEGEIT, University of Aveiro,
Campus Universitário de Santiago, 3810-193, Aveiro, Portugal
mamorim@ua.pt*

Maria Joao Rosa

*GOVCOPP & DEGEIT, University of Aveiro,
Campus Universitário de Santiago, 3810-193, Aveiro, Portugal
m.joao@ua.pt*

ABSTRACT

The services delivered by museums offer rich informal learning opportunities for individuals and contribute to the development of key literacy and cultural competencies in societies. Over the years, the characteristics of visitor journeys in museums and exhibitions have evolved, and currently, many such experiences require substantial participation and interaction from the visitors. This study identifies and characterizes four different archetypes of museum services that have varying degrees of customer effort and customer-to-customer interaction (CCI). The study builds on data collected from Fábrica Centro Ciência Viva, a Science Museum that is part of a wider network of units in Portugal, and that is devoted to the public dissemination of science. The study offers an innovative perspective to address the integration of customers in service operations and discusses how time and crowd density can be addressed as key service process design variables that influence service process quality.

Keywords: *Service quality, Visitor experience, Customer participation, Customer-to-customer interaction*

1. INTRODUCTION

Service experiences frequently require the active participation of customers for achieving the expected results. In the specific case of museums, visitors can be invited to walk through exhibitions, to read and interpret information, to interact with artefacts and to participate in showcasing activities, with the purpose of enabling learning and entertainment. Likewise, in many museums and related services, the interaction between visitors, referred in the literature as customer-to-customer interaction (CCI), has also become a common feature. In Science Museums, that are focused on the dissemination of science to wide audiences, it is frequent to involve visitors in group activities requiring collaboration to solve a challenge or a given task, with illustrative purposes. For service managers the design and specification of such interactive activities creates important challenges because it carries important implications for service results, service quality and visitor satisfaction. Elements such as the level of customer effort, the degree of task complexity and the duration of the activities are critical for the performance of the visitor. Likewise, for those service experiences involving CCI, other elements such as crowd density and customer compatibility have been also highlighted in the literature.

Despite of the complexity that is involved in integrating the customer participation and CCI in service processes, there is still a lack of academic literature to support the role of service managers in this task. In this article we offer a contribution to advance the knowledge about the design of services involving customer participation and CCI building on the study of the service experiences offered by Science Museums. The study identifies and characterizes four different archetypes of museum services that have varying degrees of customer effort and CCI. And provides Illustrations for each of the archetypes that are presented, for the specific context of Science Museums. The study builds on data collected from Fábrica Centro Ciência Viva, a Science Museum that is part of a wider network of units in Portugal, and that is devoted to the public dissemination of science. The article then discusses the characteristics of the four service types towards service quality, and explores how the management of two key factors of service process design - time and crowd density – affect the quality and the results that can be derived from customer participation and CCI in Science Museum visits. The study offers an innovative perspective to address the integration of customers in service operations by advancing four archetypes to characterize services according to the intensity of participation and CCI, and exploring how time and crowd density can be addressed a key service process design variables that impact service process quality. While offering a discussion and examples for the specific case of Science Museums, the proposed archetypes and the discussion, the recommendations about time and crowd density for different service archetypes, and the implications for participation and CCI are generalizable to wider service settings.

2. CONCEPTUAL BACKGROUND

2.1. Understanding the determinants of Service Quality

Inseparability, heterogeneity, intangibility, and perishability are four essential characteristics of services that we need to consider when constructing a service quality assessment scale (Ghobadian et al., 1994; Ladhari, 2009). Because of these characteristics, assessing the quality of services is, in general, difficult and very different from assessing the quality of manufactured goods. For example, in the service industry, customers judge the direct delivery results (e.g., timely delivery) and the service process experience, e.g., empathy of the employees (Johnston & Clark, 2008; Gronroos, 1978). Parasuraman et al. (1988), in their pioneering study for developing a service quality scale, introduced their influential SERVQUAL model consisting of five dimensions (namely, tangible, reliable, responsiveness, assurance, and empathy), which essentially measures the discrepancy between what customers expect from the service and what they perceive as actual service realization. Since its introduction in 1988, this SERVQUAL model has inspired many researchers in the field to develop their own models by either modifying or adapting it to the context of a particular service setting. For example, Cronin and Taylor (1994) argued that the only determinant factor of the service quality assessment is customer perception and there is no need to measure customer expectation. Therefore, they introduced SERVPERF model, which was pretty similar to the SERVQUAL model, except for omitting the customer expectation items. Later, Dabholkar et al. (1996) proposed RSQS scale, including five dimensions, i.e., physical aspects, reliability, personal interaction, problem solving, and policy, to evaluate the service quality in retail stores that offers a mixture of goods and services. RSQS includes some general items of SERVQUAL and some other relevant items to cover the specific aspects of retail stores. For example, the physical aspect dimension consists of two parts: the appearance part, which is inspired by the tangible dimension of SERVQUAL, and the convenience part, which covers items related to the store's layout. Similarly, Vázquez et al. (2001) argued that SERVQUAL is more appropriate for measuring the quality of pure service firms than the stores that provide merchandise and services. Therefore, they developed CALSUPER scale with 28 variables and four dimensions, namely, physical aspects, reliability, personal interaction, and policies, to assess service quality in supermarket companies.

Similarly, in 2000, Frochot and Hughes developed HISTOQUAL model as a modification of SERVQUAL to assess the quality of historic houses that serve as a museum. The model maintained the three dimensions of SERVQUAL (namely, tangible, responsiveness, and empathy) and replaced the other two dimensions (assurance and reliability) with "communication" and "consumable" dimensions. Like many other services, the museum's product is offered in a physical setting that includes the site or building, ways to keep visitors engaged, queues, lighting, waiting, crowding, and techniques for calling for visitors' attention and participation, i.e., where visitors interact and engage with exhibits (Muskat et al., 2013). On the other hand, as the museum visit is a dynamic and multifaceted task, the visitors evaluate their experience in a mixture of three different scenarios of personal, social, and physical factors (Falk and Dierking, 1992) while they move direct and continually across the exhibition areas (Jeong and Lee, 2006; Muskat et al., 2013). Goulding (2000) claimed that, in order to provide a high-quality visitor experience in the museum, several factors of socio-cultural (e.g., social interaction), cognitive (e.g., involvement and engagement), psychological orientation (e.g., scene setters, routing, and mapping), as well as physical and environmental conditions (e.g., crowding, seats, noise) that need to be recognized as interdependent factors from each other. It has been documented in the literature that visitors' quality perceptions are likely to be influenced by aspects related to physical parameters as well as by situational variables (Bäckström and Johansson, 2006). Physical parameters such as crowd density and the duration of the activities are intrinsic to the visitor and influence their experiences. Situational variables include the involvement and engagement of the visitors; as the visit is a dynamic and multifaceted construct, visitors perceive the quality of the entire visit experience (Gilmore and Rentschler, 2002).

2.2. The importance of Customer Participation for service results and quality

Customer participation is defined as "the degree to which the customer is involved in producing and delivering the service" (Dabholkar 1990, p. 484). Only in the service sector, do the customers play both a "production role and a consumption role" (Bateson, 1985). Mills and Moberg (1982) described the contribution of customers to service production, such as their information and effort. According to Lovelock and Young (1979), participating customers, as "partial workers", can undertake a percentage of the working input from employees, reducing employee workload and increasing service organization's productivity. For example, when the bank customers fill in deposit forms or when they are using ATM to do banking operations, they help service provider save time and effort (Schneider and Bowen, 1985). Bitner et al. (1997) identified three levels of customer participation tasks, namely presence, information exchange, and co-production, ranging from low to high degrees of customer participation, respectively. In the first category of services, in which only the physical (or virtual) presence of the customers is required, customers essentially play a low level of participation, and the service provider takes care of all service production tasks. Some examples of these services are symphony concerts and theatre, where customers must merely attend an event to receive the entertainment service. The second level of customer participation, i.e., information exchange services, refers to those services where the customers are required to provide some (information) inputs to deliver the service process. There are many examples of services that need a moderate level of customer participation, such as providing information and effort, in order to run the service. For instance, in financial consultations, customers must provide some input such as personal information, tax history, and even receipts to create the service. Finally, in the third level of customer participation, i.e., co-production, the participating customers are responsible for the essential realization of the service (e.g., knowledge transfer and idea-generating) in order to accomplish the service objectives. It includes all sorts of education and health care, where customers must study or exercise and eat healthy for the success of the

service. It is worthwhile mentioning that, in the literature, there are several other classifications of customer participation in service setups. For example, Dong and Sivakumar (2017) classified customer participation based on who (i.e., only customers, or firm or customer) can perform the service delivery processes and what (i.e., is activity critical for service creation or not) customers contribute to the service exchange. Then, they classify customer participation into three categories: mandatory, replaceable, and voluntary. Customer participation is also driven by the customers' desire to take an active role in the service delivery process. With the advancement of technology, particularly the Internet and social media, the concept of customer participation has gained increased attention. Furthermore, customer participation can provide customers with economic and relationship value, boosting customer satisfaction and employee performance (Chan et al., 2010; Jiang et al., 2019). Nevertheless, we should not neglect the fact that the customer participation does not necessarily lead to a positive influence on a firm, particularly when a high level of customer participation is needed (e.g., for the self-service situations that require a high degree of expertise, or when the customers find themselves in new and unfamiliar situations). In these cases, there is a potential to have negative consequences on the service process, which can negatively impact the perceived service quality (Yen et al., 2004; Chan et al., 2010). Therefore, it is crucial to carefully plan the customer participation (when a high level of participation is required) and ensure that it is completely clear for the customers the type of input that they need to provide. Indeed, in today's world, many services can be tailored with a greater degree of customer participation where customers influence the received service quality by the different roles that they play as resources, as buyers, as co-producers, etc. (Dabholkar, 1990; Lengnick-Hall, 1996; Bendapudi and Leone, 2003).

2.3. Customer-to-Customer interaction

Customer-to-customer interactions refer to a wide variety of interactions that take place between two individual customers, two groups of customers, or one customer and a group of fellows while the service is being delivered (Nicholls, 2010; Amorim et al., 2014; Jiang et al., 2020). Indeed, CCI is a frequent phenomenon that arises in many service contexts such as education, transportation, retail, leisure and hospitality, hairdressing, etc. Customers can ask for inputs from other customers before, during or after a service encounter, either in person or using a technology interface (Nicholls, 2007; Harris et al., 2000). According to the literature, customer-to-customer interactions can be defined as the exchange of information, knowledge, emotions, and sentiments (feeling) that takes place between customers, which directly impacts each customer's behavior and influences their overall perceived experience (Wilson, 1976; Langeard et al., 1961; Grönroos and Ravald, 2011; Lin et al., 2020). As claimed by Gruen et al. (2007), value is commonly produced through the customer-to-customer exchange process, especially when the interactions among customers increase the perceived advantages of service offers. Moore et al. (2005) argued that since CCI is a critical component of the customer service experience, it should be included in a service provider offering. Moreover, it has been acknowledged that CCI can remarkably impact customer satisfaction (Moore et al., 2005; Wu, 2007), customer loyalty (Gruen et al., 2007), word-of-mouth, and the future patronage intention (Martin and Pranter, 1989). The literature also illustrates different categorizations of how the CCI impacts the service experience. For instance, the CCI can play either a positive or negative role and can impact the service quality either directly or indirectly. Positive CCI includes interactions such as collaboration and friendly conversations (Moore et al., 2005; Wu, 2007; Gruen et al., 2007; Jung et al., 2017), whereas negative CCI refers to dysfunctional customer behaviour, e.g., undesirable complaining behaviour or verbal and physical incidents that negatively influences the customer satisfaction (Harris and Reynolds, 2003; Daunt and Harris, 2012). On the other hand, direct CCI refers to those specific interpersonal interactions that occur between customers, and indirect CCI refers to the service environment, e.g., in an exhibition,

the other visitors who are nearby a visitor can affect his/her experience, even if they do not directly see or talk to him/her (Venkat, 2007). Finally, it is worthwhile noting that there are service settings where CCI is an intentional and necessary aspect of the service experience, e.g., scientific conferences, leisure services, science centers, etc., where interactions between customers are an intentional and important aspect of the service experience (Martin, 1997). The essential and special contribution of CCI in such services has been highlighted as “CCI-driven services” (Nichols, 2007), where participating and cooperating in activities are frequently required from the customers. This paper focuses on CCI-driven services and studies a service organization that requires distinct levels of customer participation and CCI (e.g., exhibitions, educational science activities for groups, etc.) where participating and cooperating in activities are frequently required from the customers.

3. DATA AND METHODS

This study develops a straightforward typology to characterize CCI and to allow the development of adjusted service management strategies to deal with customer contributions for service results and quality. More theoretical and empirical attention is required to understand CCI and the management of customer roles and performance in services, and for this purpose, typologies offer an important analytical perspective. Typologies are useful tools to describe organizations or processes, as they allow for the identification of characteristics that are different from a conceptual point of view, and enable a classification logic that distinguishes groups based on the importance of the similarities inside the groups and the differences among them (Doty & Glick, 1994). Typologies are useful for developing adequate managerial strategies to make the most out of the opportunities offered by customer participation and CCI. This involves defining different levels of customer participation and CCI for a given service, and the consideration of other service elements, such as the role of front-line employees and the design of the physical aspects of the service setting, the volume of participants, and the duration of service episodes and experiences. The study addressed the specific empirical context of Science Museums. After the theoretical development of the typology, the study builds on data from the service activities provided by the “Fábrica–Centro Ciência Viva de Aveiro”. Fábrica is a science center located in the city of Aveiro, Portugal, as a science dissemination unit managed by the University of Aveiro. Fábrica provides a wide range of service experiences to encourage public participation in science. Indeed, it offers a rich portfolio of service experience attributes like participation, interaction, emotional engagement, and fun to increase awareness and access to knowledge via informal learning among children and adults.

4. STUDY RESULTS AND MANAGERIAL CONTRIBUTION

Customer participation and CCI are broad concepts that are invoked to refer to interactions between customers in service delivery contexts. There is considerable research, as well as abundant evidence, about the intensity and diversity of expressions that customer participation and CCI might take place. It is clear that the nature of the tasks that customers are asked to perform in service settings and the implications of customer participation and CCI for the service experiences will vary across different types of services. For this reason, different levels of customer participation and CCI call for differentiated managerial approaches, in order to adequately incorporate, and manage customer contributions and roles in service delivery operations. This study proposes a classification of service activities along two dimensions of customer participation and CCI for the specific contexts of exhibits and museums (as exhibited in figure 1, below). Considering the X axis to represent the intensity of customer (visitor) participation and Y axis for the expression of customer-to-customer (visitor-to-visitor) interaction, leads to the identification of four archetypes for the configuration of the service experience - HH, HL, LH, LL - that are presented in Figure 1.

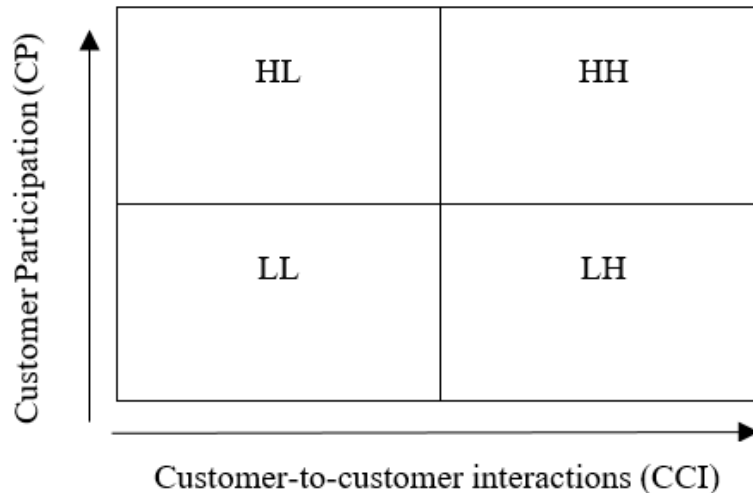


Figure 1: Matrix for positioning services – CP and CCI intensity

The axis for CCI refers to the extent a given service activity – in the specific context of the study a science museum visit – requires the interaction of visitors to achieve the desired results; and the axis for CP proxies the richness of customer participation and effort in the completion of tasks and activities during a museum visit. The intensity of participation and interactions is classified as High (H) or Low (L), allowing for the definition of the two axis and the positioning of a variety of service configurations. Addressing these dimensions into high and low categories, four distinct CP and CCI configurations for service experiences are defined (see Figure 1). The four configurations are labeled and described in Table 1.

Archetype	CP	CCI	Description
Orchestrated	H	H	The level of CP as well as the interactions between customers (CCI) are high. Each visitor can have a unique experience, customized and built on communication and rich interactions and exchanges with other visitors.
Event	H	L	The level of CP is high and customizable whereas the intensity of interactions between different customers (CCI) is lower and involves less interaction with others.
Peer Assisted	L	H	The level of required CP is low and non-modifiable or less customized. The exposure to other customers and the scope for interactions between customers (either voluntary or involuntary) is high.
Go-Through Visit	L	L	Both customer participation and the interactions between customers are low. The activity is non-modifiable, very standard for all visitors, and involved low levels of interaction between them.

Table 1: Characterization of CP and CCI archetypes

The next step in the work involved the densification of the typology by applying examples from the museum activities and services, to the axis proposed for the classification, in order to illustrate the usefulness and the applicability of the typology. In Table 2 we offer an example, with the classification and positioning of activities for the four different archetypes suggested by the typology.

CP and CCI archetypes	Orchestrated (HH)	Event (HL)	Peer Assisted (LH)	Go-Through Visit (LL)
Examples from “Fábrica” Science Museum	Holidays with Science	Science in Prose	European Researchers’ Night	Science Cafe
Activity description	Museum activities are offered for visitors during school years, during holidays and school breaks. These activities include science experiments and demonstrations, designed for participation in groups.	A science communication activity combined with literary art. Science is purified, like someone distilling literature. These are spoken words, which can arrive in storytelling or in well-written sentences, combining fiction and fantasy with scientific rigor.	Annual event prepared to display science exhibits to make university researchers closer to the public in general. The event is open to all - visitors/families – and combines exhibitions with music, theatre, dance, and magic.	Regular activity that provides an informal setting for some presentation and for discussing scientific concerns (e.g., what each one of us can do to promote more sustainable use of the ocean).

Table 2: Application of CP and CCI archetypes to the Science Museum Case

Overall more than 30 different activities were analyzed and characterized for positioning in the classification matrix. The classification work was developed with the expression obtained from the staff of the museum that rated the levels of CP and CCI involved in each activity. Examples were found to fit all the quadrants proposed and therefore validate the usefulness of the typology to distinguish between service activities and the roles of customers in the service experience.

5. CONCLUSION

Service organizations, like museums, need to acknowledge the need to manage CP and CCI, namely to clarify the roles expected from customers in the activities, given the importance of customer participation for the final results of any service. By classifying the service activities along the dimensions of CP and CCI advances can be made in the specification of service setting, procedures and roles, to make the most of the potential positive effects of CP and CCI (in terms of cost reduction and/or value creation) and to limit any possible negative consequences (conflict, inconsistency and service failures). The positioning of services in the typology matrix is not static, as organizations can devise strategies to transform a service experience from one quadrant to another, because of alterations in the interactions and roles of customers.

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LITERATURE:

1. Amorim, M., Rosa, M. J., & Santos, S. (2014), “Managing customer participation and customer interactions in service delivery: the case of museums and educational services”, *Organizacija*, 47(3), 166-175.
2. Baker, J. (1986), “The role of the environment in marketing services: The consumer perspective”, *The services challenge: Integrating for competitive advantage*, 1(1), 79-84.
3. Bendapudi, N., & Leone, R. P. (2003), “Psychological implications of customer participation in co-production”, *Journal of marketing*, 67(1), 14-28.

4. Bitner, M. J., Faranda, W. T., Hubbert, A. R., & Zeithaml, V. A. (1997), "Customer contributions and roles in service delivery", *International journal of service industry management*, 8 (3), 193-205.
5. Chan, K. W., Yim, C. K., & Lam, S. S. (2010), "Is customer participation in value creation a double-edged sword? Evidence from professional financial services across cultures", *Journal of marketing*, 74(3), 48-64.
6. Cronin Jr, J. J., & Taylor, S. A. (1994), "SERVPERF versus SERVQUAL: reconciling performance-based and perceptions-minus-expectations measurement of service quality", *Journal of marketing*, 58(1), 125-131.
7. Dabholkar, P. A. (2015), "How to improve perceived service quality by increasing customer participation", In *Proceedings of the 1990 academy of marketing science (AMS) annual conference* (pp. 483-487). Springer, Cham.
8. Dabholkar, P. A., Thorpe, D. I., & Rentz, J. O. (1996), "A measure of service quality for retail stores: scale development and validation", *Journal of the Academy of Marketing Science*, 24(1), 3-16.
9. Daunt, K. L., & Harris, L. C. (2012), "Exploring the forms of dysfunctional customer behaviour: A study of differences in servicescape and customer disaffection with service", *Journal of Marketing Management*, 28(1-2), 129-153.
10. Dierking, L. D., & Falk, J. H. (1992), "Redefining the museum experience: the interactive experience model", *Visitor Studies*, 4(1), 173-176.
11. Dong, B., & Sivakumar, K. (2017), "Customer participation in services: domain, scope, and boundaries", *Journal of the Academy of Marketing Science*, 45(6), 944-965.
12. Doty, D. H., & Glick, W. H. (1994). Typologies as a unique form of theory building: Toward improved understanding and modeling. *Academy of Management Review*, 19(2), 230-251.
13. Forrest, R. (2013), "Museum atmospherics: The role of the exhibition environment in the visitor experience", *Visitor Studies*, 16(2), 201-216.
14. Frochot, I., & Hughes, H. (2000), "HISTOQUAL: The development of a historic houses assessment scale", *Tourism Management*, 21(2), 157-167.
15. Ghobadian, A., Speller, S., & Jones, M. (1994), "Service quality: concepts and models", *International journal of Quality & reliability management*.
16. Goulding, C. (2000), "The museum environment and the visitor experience", *European Journal of Marketing*, 34 (3/4), 261-278.
17. Gronroos, C. (1978), "A Service-Oriented Approach to Marketing of Services," *European Journal of Marketing*, 12 (8), 588-601.
18. Grönroos, C., & Ravald, A. (2011), "Service business logic: implications for value creation and marketing", *Journal of Service Management*, 22(1), 5-22.
19. Gruen, T. W., Osmonbekov, T., & Czaplewski, A. J. (2007), "Customer-to-customer exchange: Its MOA antecedents and its impact on value creation and loyalty", *Journal of the Academy of Marketing Science*, 35(4), 537-549.
20. Harris, K., Baron, S., & Parker, C. (2000), "Understanding the consumer experience: It's good to talk", *Journal of Marketing Management*, 16(1-3), 111-127.
21. Harris, L. C., & Reynolds, K. L. (2003), "The consequences of dysfunctional customer behavior", *Journal of service research*, 6(2), 144-161.
22. Huang, W. H. (2008), "The impact of other-customer failure on service satisfaction", *International Journal of Service Industry Management*.
23. Jeong, J. H., & Lee, K. H. (2006), "The physical environment in museums and its effects on visitors' satisfaction", *Building and Environment*, 41(7), 963-969.

24. Jiang, T., Li, J., & Zhang, F. (2020, December), “Customer-to-customer interactions in hostels: A qualitative inquiry”, In Fifth International Conference on Economic and Business Management (FEBM 2020) (pp. 598-602). Atlantis Press.
25. Jiang, Y., Xu, L., Cui, N., Zhang, H., & Yang, Z. (2019), “How does customer participation in service influence customer satisfaction? The mediating effects of role stressors”, *International Journal of Bank Marketing*.
26. Johnston, R., & Clark, G. (2008), *Service operations management: improving service delivery*, Harlow: Prentice Hall.
27. Jung, J. H., & Yoo, J. J. (2017), “Customer-to-customer interactions on customer citizenship behavior”, *Service Business*, 11(1), 117-139.
28. Ladhari, R. (2009), “A review of twenty years of SERVQUAL research”, *International journal of quality and service sciences*, 1(2), 172-198.
29. Lengnick-Hall, C. A. (1996), “Customer contributions to quality: A different view of the customer-oriented firm”, *Academy of management review*, 21(3), 791-824.
30. Lin, H., Gursoy, D., & Zhang, M. (2020), “Impact of customer-to-customer interactions on overall service experience: A social servicescape perspective”, *International Journal of Hospitality Management*, 87, 102376.
31. Lovelock, C. H., & Young, R. F. (1979), “Look to consumers to increase productivity”, *Harvard business review*, 57(3), 168-178.
32. Martin, C. L. (1997), *Bowling's team concept*, ICS Books.
33. Martin, C. L., & Pranter, C. A. (1989), “Compatibility management: customer-to-customer relationships in service environments”, *Journal of Services Marketing*, 3 (Summer), 6-15
34. Mills, P. K., & Moberg, D. J. (1982), “Perspectives on the technology of service operations”, *Academy of Management Review*, 7(3), 467-478.
35. Moore, R., Moore, M. L., & Capella, M. (2005), “The impact of customer-to-customer interactions in a high personal contact service setting”, *Journal of Services Marketing*, 19(7): 482-91.
36. Muskat, M., Muskat, B., Zehrer, A., & Johns, R. (2013), “Generation Y: evaluating services experiences through mobile ethnography”, *Tourism Review*, 68(3), 55-71.
37. Nicholls, R. (2007), “Value creation in services: a customer-to-customer (C2C) approach”, in Starnawska, S. and Werda, W. (Eds), *In Search for Value: Selected Aspects*, University of Podlasie, Siedlce, 79-84.
38. Nicholls, R. (2010), “New directions for customer-to-customer interaction research”, *Journal of Services Marketing*, 24 (1), pp. 87-97
39. Parasuraman, A., Zeithaml, V. A., & Berry, L. (1988), “SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality”, *Journal of Retailing*, 64(1), 12-40.
40. Schneider, B., & Bowen, D. E. (1985), “Employee and customer perceptions of service in banks: Replication and extension”, *Journal of applied Psychology*, 70(3), 423.
41. Turley, L. W., & Milliman, R. E. (2000), “Atmospheric effects on shopping behavior: a review of the experimental evidence”, *Journal of business research*, 49(2), 193-211.
42. Vazquez, R., Rodríguez-Del Bosque, I. A., Díaz, A. M., & Ruiz, A. V. (2001), “Service quality in supermarket retailing: identifying critical service experiences”, *Journal of retailing and consumer services*, 8(1), 1-14.
43. Wu, C. H. J. (2007), “The impact of customer-to-customer interaction and customer homogeneity on customer satisfaction in tourism service—the service encounter prospective”, *Tourism Management*, 28(6), 1518-1528.
44. Yen, H. R., Gwinner, K. P., & Su, W. (2004), “The impact of customer participation and service expectation on Locus attributions following service failure”, *International Journal of Service Industry Management*.

UNDERSTANDING WORKFORCE SUSTAINABILITY AND THE CHALLENGES OF DIGITAL WORK

Lorena Bittencourt Bastos

*GOVCOPP & DEGEIT, University of Aveiro,
Campus Universitário de Santiago, 3810-193, Aveiro, Portugal
lorenabbastos@ua.pt*

Marlene Amorim

*GOVCOPP & DEGEIT, University of Aveiro,
Campus Universitário de Santiago, 3810-193, Aveiro, Portugal
mamorim@ua.pt*

Mario Rodrigues

*IEETA & ESTGA, University of Aveiro,
Campus Universitário de Santiago, 3810-193, Aveiro, Portugal
mjfr@ua.pt*

ABSTRACT

The increased adoption of digital technologies both in personal and work contexts has been raising growing interest in revisiting the determinants of the quality of work and the well-being of employees. This study explores the determinants of quality and sustainability of the workforce, with a specific focus on the work contexts that resort to digital technologies. The article reports the findings of a literature review that addresses quality and sustainable work in remote and digital work contexts, with the purpose of identifying the variables that affect remote workers' satisfaction and performance. The research work focused on the analysis of 82 recent publications selected from the Scopus database. The analysis led to the identification of 70 variables that were classified in the context of quality of work, under five categories: organizational factors, work-related factors, environmental and ergonomic factors, individual factors, and psychological factors. The study contributes to the advancement of our understanding of the determinants of workers' well-being, productivity, and satisfaction, and can inform the development of resource management strategies to meet the challenges of remote work.

Keywords: *quality of work, sustainable work, employee well-being, productivity*

1. INTRODUCTION

In recent years, the debates about the sustainability of work have been permeating European political agendas. Among the various determinants that explain the concerns of governments and managers with guaranteeing access to a stable workforce, demographic factors play a key role, due to the restrictions created by low birthrates, the aging of the population, migrations, etc. Moreover, there is a multiplication of regional policies together with company strategies to attract and retain talent to assure the growth and sustainability of industrial investments. Europe faces various challenges to attract and retain the right talent to its economic ecosystems. More recently, the discussions have also been addressing the need to reskill the population in order to meet the evolution of digital technologies and contexts of work. The challenges are many, and the progression varies much determined also by regional specificities. Despite that there are some transformations in the work contexts that seem to be transversal to EU territories, and for which some common approaches are relevant and useful. In particular, the changes that are being observed in the role of digital technologies in shaping the modern workspace are a concern for many.

Recently the context of the pandemic also accelerated and led to some improvised and forced modifications on the work environment, moving many from face-to-face to remote work. Such new models of work have negatively affected many workers, who alleged difficulties in reconciling their professional lives and the management of their personal time and space (Dunn 2020). For many, working in a remote context caused an increase in the worker's stress, lack of peace, and overload at work (Sorribes et al., 2021). In the pandemic context, some states have implemented measures to prevent mass unemployment and company bankruptcy. Due to the amount of time and energy that people consume in the workplace, and the boundaries between professional and personal life, it is essential for organizations to ensure that their employees have a high level of job satisfaction (Ko, 2021). In a crisis scenario, employees' priorities tend to be different as compared to scenarios of economic growth. In Spain, for example, it was noted that workers prioritized job stability more than any other aspect related to the quality of work, even the possibility of job promotion (Sorribes et al., 2021). Following the changes triggered by the pandemic moment, for many the working conditions have worsened, resulting in job insecurity, increased worker stress levels, reduced wages, extended working hours, work overload, loss of control over work, and less supervisor support (Myhill et al. 2021). The worker's level of satisfaction varies according to the conditions and particularities of the nature of the work, for example the type and value of the salary, the promotion, the relationship with co-workers, as well as the circumstances, context, and trust in the organization. Such trust tends to decrease in periods of crisis, as the company is more concerned with the financial performance of the organization than the well-being of employees (Sorribes et al., 2021, Albrecht et al. 2018).

2. CONCEPTUAL BACKGROUND

2.1. Understanding the concept of work quality and employee satisfaction

The management of human resources is a fundamental functional area in organizations, concerned with the access to adequate resources, but also for its relevant role in contributing to support the implementation of managerial practices that contribute to the well-being of workers, as a key driver of their performance and permanence in the firm (Sorribes et al., 2021). The well-being of an individual in work contexts includes several elements, such as: emotional well-being, related to job satisfaction; his health and physical well-being, directly affected by the levels of stress at work and physical health; the social well-being, an aspect more related to the trust in the organization's management and in the interrelationships between the employee and the supervisors and the domain of work happiness, related to the contexts and characteristics of the work environment. The authors Sorribes, Celma and Matínez-García (2021) identified 16 variables related to employee satisfaction, namely: work organization, promotion possibilities, evaluation of superiors, activity performed, personal development, autonomy and independence, level of participation in the company, employee motivation, working hours, flexible working hours, rest periods during work, vacations, job stability, occupational health and safety, training provided by the company and social benefits. One of the factors that can have the most negative impact on work is insecurity, due to the origin of temporary employment. The same is true for precarious working conditions, such as noise and lack of privacy. The imbalance between professional and personal life, work overload, undefined working hours, and greater work demands, contribute to an increase in work stress and the level of worker dissatisfaction (Barrena-Martinez, et al., 2018). Several studies point out that the longer the working day, the greater the worker's stress level and, on the other hand, the greater the internal communication in the company, the greater the employee's engagement, their level of satisfaction, the confidence in management, creating a light and open environment, as well as generating a feeling of "being heard". Good internal communication contributes to a reduction in work stress.

However, the lack of promotion and opportunities at work generates an increase in the worker's stress level (SORRIBES; CELMA; MARTÍNEZ-GARCIA, 2021). The level of worker's satisfaction is determined by several factors including the needs of the employees and employee well-being. Studies reveal that employees with a high quality of life at work have a high level of satisfaction and performance at work, which are associated with a lower level of turnover (Ko, 2021). This author defines the quality of life at work as being "the satisfaction of the employee with a variety of needs, through resources, activities, and results arising from participation in the workplace". The same author characterizes seven categories of human needs for the quality of life at work, namely: (i) health and safety; (ii) economic and family; (iii) social; (iv) esteem; (v) update; (vi) knowledge and (vii) aesthetic needs. The quality of work enables a positive mood for the employee, being able to transfer this feeling to his personal life. This transfer is known as the "spillover effect", generating satisfaction in other aspects of the employee's life, such as family, leisure, social, health, and financial, among others. The author defines that "a happy employee is a productive, dedicated and loyal employee" (Ko, 2021).

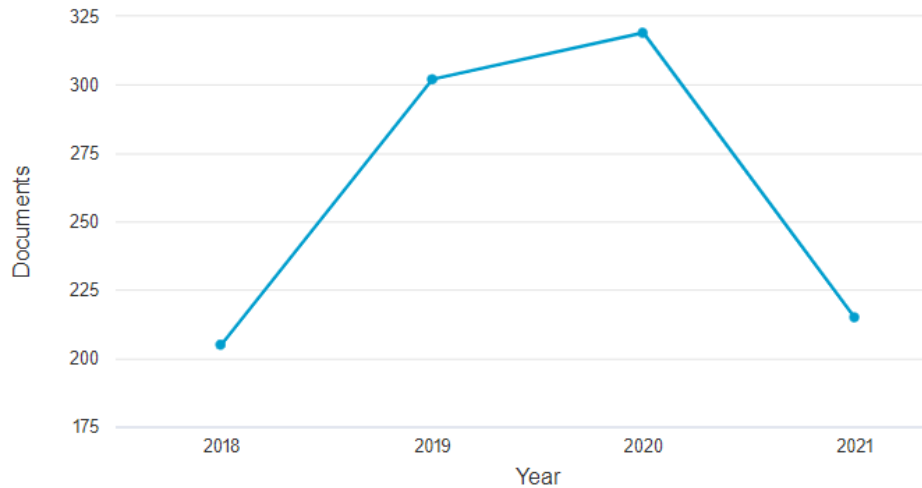
3. DATA AND METHODS

This study develops a systematic literature review focused on the determinants of quality and sustainability of work, based on the guidelines presented by Kitchenham, et al. (2009). The study involved three main steps, namely: (i) planning the review; (ii) conducting the article selection and the review and (iii) reporting the review. The systematic literature review is a rigorous methodology, capable of identifying, evaluating, and interpreting empirical studies on a particular topic, research question, or something of interest (Kitchenham et al., 2009). "Systematic reviews are based on clear questions, using systematic and explicit methods with the aim of identifying, selecting and critically evaluating relevant research" (Lima et al., 2018). The steps of the methodology for carrying out the systematic review of the literature, according to the authors Kitchenham, et al. (2009), are described in the following paragraphs.

3.1. Planning the systematic literature review

The variables that affect the quality of work, and that have a key role in the productivity and well-being of individuals, have been researched and studied for decades. However, this subject has gained high relevance due to the increasing use and modification in the work format in recent years, determined by the adoption of digital technologies, and stemmed by the pandemics in 2019-2020, that forced many to remote work contexts. As such, the purpose of this study was to conduct a review of the literature on the most recent studies on this theme. The review of the literature was guided by the underlying question: What are the variables/factors of quality of life at work that affect the productivity and sustainability of remote workers? The review addressed studies published between 2018 and 2021 and indexed in the Scopus database. The queries used the terms "quality of work", in the in abstract or title, leading to preliminary access to 1,041 journals, as shown in Graph 1.

Figure following on the next page



Graph 1: Publications using the term “quality of work” from 2018 to 2021

The objective of this study was to investigate the quality of work in the new scenario of work organization, in order to obtain a more up-to-date understanding of the well-being of remote workers and their productivity.

3.2. Conducting the systematic literature review

The analysis of the selected articles and the coding and classification of the topics addressed was initially supported by the model of sustainable work developed by Eurofound (2021) that proposed the aggregation of determinants of quality and sustainable work along seven dimensions, namely: (i) physical environment; (ii) work intensity; (iii) quality of working time; (iv) social environment; (v) abilities and description; (vi) perspective and (vii) earnings. Figure 1 illustrates these seven dimensions, along with the indicators associated to them.

Figure following on the next page



Figure 1: The seven dimensions of work quality and their indicators (adapted from Eurofound 2021)

3.3. Reporting the systematic review of the literature

The systematic literature review development process was carried out following the the PRISMA methodology was used, following the following steps for the process of delimiting the final sample of articles to analyze Identification, Screening, Eligibility and Inclusion (Page at al. 2021). The process flow of the delimitation of relevant articles is depicted in Figure 2, with the description of the exclusion criteria and the framing used to select the final 55 articles.

Figure following on the next page

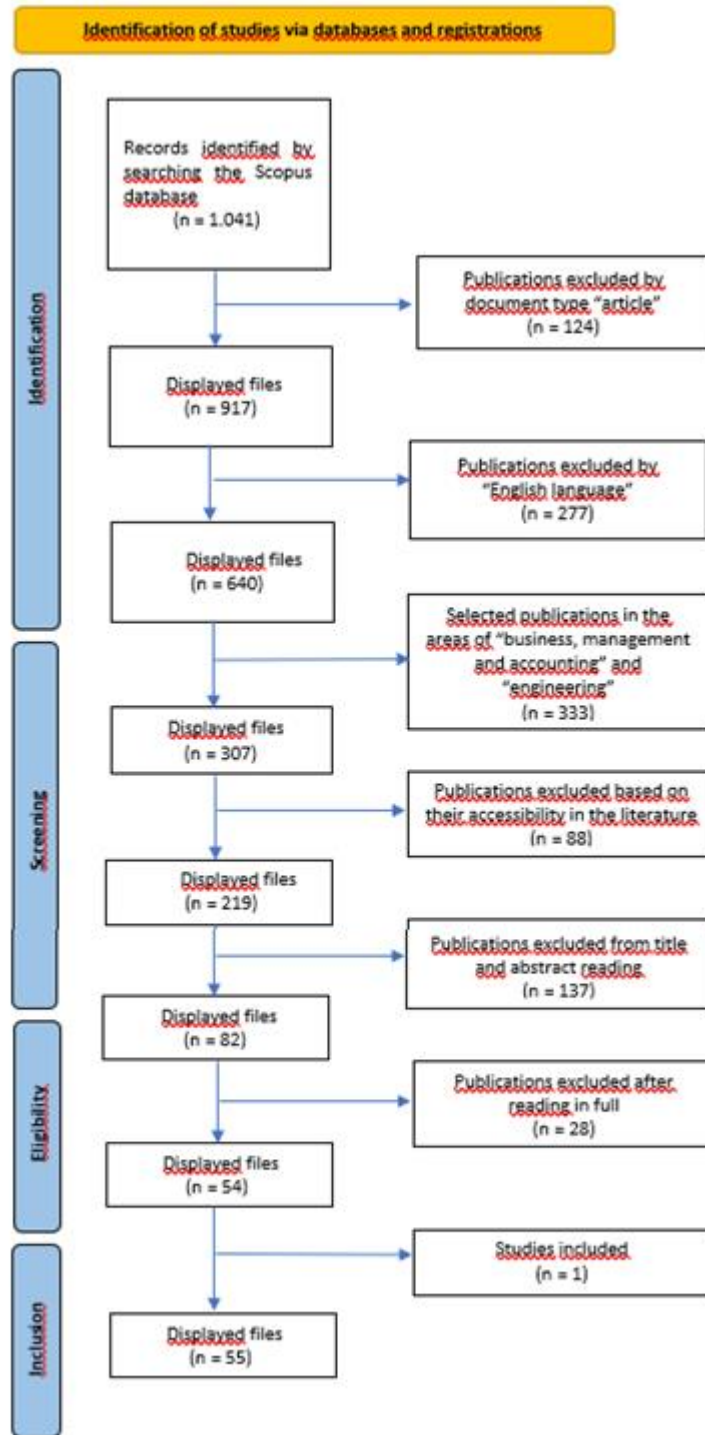


Figure 2 : Flowchart for the process of article selection, using PRISMA Method

The screening stage was subdivided into three stages: in the first stage, only manuscripts from the areas of "business, management and accounting" were selected, corresponding to 173 journals and "engineering", corresponding to 132 journals, resulting in 307 manuscripts; in the second stage, publications that do not have free access in the literature were excluded, obtaining the exclusion of 88 publications that are not available, regarding their access to the content of their publication. In which, it resulted in 219 manuscripts for the analysis of the next stage, with 130 publications in the area of "business, management and accounting", and 89 publications in the area "engineering"; in the third stage, manuscripts that did not present the subject addressed

in the present work in the title and abstract were excluded, as well as those that did not adapt to the inclusion criteria of this study, reaching an exclusion of more 137 publications, resulting in 82 publications, being 53 publications in the area of “business, management and accounting”, and 29 publications in the area of “engineering”. After carrying out the analysis and filtering corresponding to this stage, the result was 82 publications remaining for the analysis of the next stage. In the third stage, after a complete reading of the manuscripts remaining from the previous stages, publications that were not considered adequate to the eligibility evaluation criteria were excluded. In which, it resulted in 28 publications for a review and analysis of its content, in order to obtain a robust theoretical basis for the development of the present work. The assessment criteria for each article is further illustrated in Table 1.

Article assesment questions	
1	Does the article include a definition of work quality and/or sustainability?
2	Does the article identify/list factors that affect the quality and/or sustainability of work?

Table 1: Article assessment criteria

4. STUDY RESULTS AND CONTRIBUTION

The systematic review of the literature shows that the variables related to quality of life at work, retained by the researchers as a construct for the productivity of teleworkers, go beyond the dimensions proposed by Eurofound in 2021, in which the research was substantiated. A total of 70 variables were identified in the article analysis stage. These were classified into five categories, named as follows: (i) Organizational factors; (ii) Work-related factors; (iii) Environmental and ergonomic factors; (iv) Individual factors and (v) Psychological factors. Organizational factors refer to how workers perceive the organization and how it relates to its employees. This category has 20 variables. Work-related factors present elements related to the tasks performed and relative procedures and norms - 19 variables in the “work-related factors” category. Environmental and ergonomic factors refer to internal conditions (work environment) and external conditions (balance between personal and professional life), as well as factors that affect the teleworker's ergonomics in the new work environment. In this category, 11 variables are presented. The individual factors are associated with 9 variables, more related to personal conditions such as commitment at work; presence of a child at home; schedule flexibility, among others. Finally psychological factors present 11 variables related to stress, exhaustion and related. Figure 3 summarizes the main results related to the variables that affect the quality of life at work when performing remote work.

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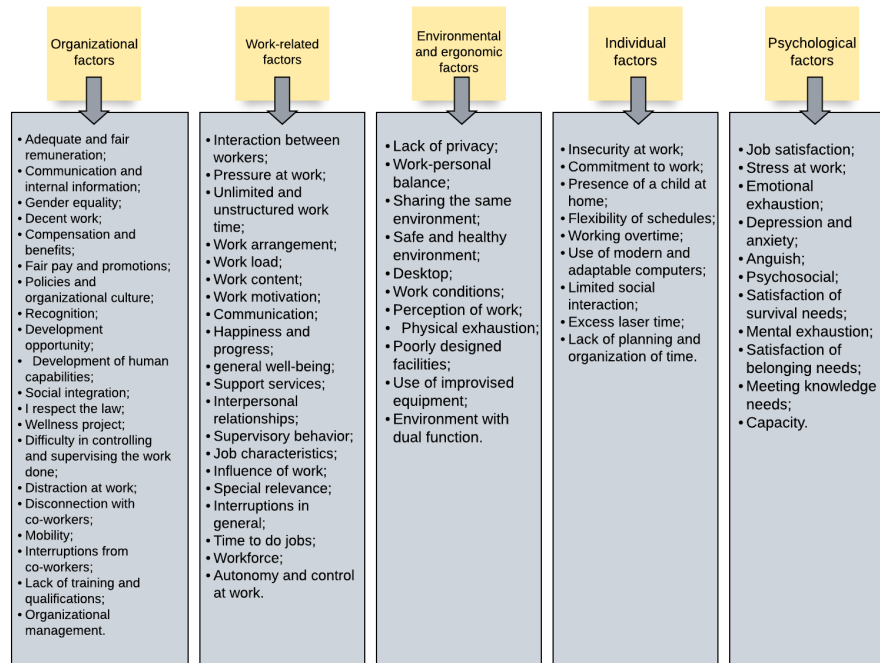


Figure 3: Variables affecting work quality and sustainability

5. CONCLUSION

In this article, we sought to show the concepts related to remote work, exposing its relevance following the pandemics but also the increased adoption of technologies in work, for which there's no turning back, With the adaptation to the "new normal", new digital technologies were introduced, thus affecting organizational performance and worker productivity. In view of what was exposed in this article, it was noted that human well-being in carrying out remote work is a relevant factor to measure worker productivity. Therefore, the human factor, involving worker satisfaction, safety, health, and comfort, is a significant contribution to the current literature on the topic addressed. The research has implications for the management of organizational human resources, contributing to the practices of HR managers, as well as to the literature, in which it provides insights regarding the effects of quality of life at work, presenting several variables responsible for teleworker productivity performance. The study suggests that employers are aware of the importance of quality of work-life and work-life balance in order to achieve organizational and personal effectiveness. It is expected that the present study will contribute to the well-being of society, helping to implement a balance between professional and personal life. The research also contributes to society, because it helps to balance personal and professional life, presenting the difficulties faced in carrying out home office work.

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LITERATURE:

1. Albrecht, S., Breidahl, E., & Marty, A. (2018). Organizational resources, organizational engagement climate, and employee engagement. *Career Development International*.
2. Barrena-Martinez, J., López-Fernández, M., & Romero-Fernandez, P. M. (2018). Drivers and barriers in socially responsible human resource management. *Sustainability*, 10(5), 1532.

3. Dunn, M. (2020). Making gigs work: digital platforms, job quality and worker motivations. *New Technology, Work and Employment*, 35(2), 232-249.
4. EUROFOUND. Working conditions and sustainable work: An analysis using the job quality framework, Challenges and prospects in the EU series. [s.l: s.n.].
5. Kitchenham, B. et al. Systematic literature reviews in software engineering – A systematic literature review. *Information and Software Technology*, v. 51, n. 1, p. 7–15, 2009.
6. Ko, M. C. An Examination of the Links Between Organizational Social Capital and Employee Well-Being: Focusing on the Mediating Role of Quality of Work Life. *Review of Public Personnel Administration*, v. 41, n. 1, p. 163–193, 2021.
7. Lima, A. C. D. de Et Al. Alterações Sensoriais Em Respiradores Orais: Revisão Sistemática Baseada No Método Prisma sensory changes in mouth breathers: systematic review based on the Prisma method. *Revista Paulista de Pediatria*, v. 27, p. 1–7, 2018.
8. Myhill, K., Richards, J., & Sang, K. (2021). Job quality, fair work and gig work: the lived experience of gig workers. *The International Journal of Human Resource Management*, 32(19), 4110-4135.
9. Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *International journal of surgery*, 88, 105906.
10. Sorribes, J.; Celma, D.; Martínez-García, E. (2021). Sustainable human resources management in crisis contexts: Interaction of socially responsible labour practices for the wellbeing of employees. *Corporate Social Responsibility and Environmental Management*, v. 28, n. 2, p. 936–952.

A STUDY ON THE FACTORS THAT HINDER THE FULFILLMENT OF SDGS FOCUSED ON THE MANAGEMENT OF URBAN SOLID WASTE

Ligia Moreira

*Universidade Federal Fluminense, Brazil
cbligia@yahoo.com.br*

Stella Regina Reis da Costa

*Universidade Federal Fluminense, Brazil
stella@ufrj.br*

Maristela Soares Lourenco

*Universidade Federal Fluminense, Brazil
maristelasl@id.uff.br*

David Nunes Resende

*Universidade de Aveiro, Portugal
GOVCOPP, ESTGA, University of Aveiro
david@ua.pt*

ABSTRACT

One of the biggest challenges of the 21st century is the need to develop a sustainable society, capable of solving the environmental, social, and psychological problems caused by the growth of the global century. Factors such as the increase in world population over the past two centuries and the interference of industrialization on a global scale have transformed the relationship between humanity and the environment. As a result, the increase in access to goods and services led to changes in consumption habits, accelerating the growth of productive structures and generating an increase in demand for natural resources in order to meet new needs, especially in the technological area. This article aims to present the perception of 20 Brazilian specialists from the academic, governmental, third sector, and private sector areas, in exploratory research, to identify which bottlenecks make it difficult to comply with the guidelines and goals of Sustainable Development, protected worldwide, followed to the management of urban solid waste, towards a Circular Economy. A questionnaire with questions elaborated based on the literature review was used. For the treatment of primary data, the content analysis method was used. The justification and relevance are given by the need to accelerate the implementation of measures, based on the following question: What obstacles hinder the implementation of a sustainable model of Urban Solid Waste Management based on the concepts of the Circular Economy? The analysis and discussion of the results point to the need for actions to motivate the population regarding the fulfilment of the sustainable development goals, in particular SDG 11 (make cities and human settlements inclusive, safe, resilient, and sustainable) and SDG 12 (ensure environmentally correct production and consumption standards), but it is a fact that the 17 SDGs are interconnected since good waste management depends on a dignified quality of life for all citizens in order to provide conditions for everyone to collaborate in the pursuit of a circular economy. With the results pointed out by the experts, it is expected to contribute to society, companies, researchers, and managers in the adoption or maintenance of urban solid waste management for the success and continuous improvement of existing processes and those in development, using the concepts of Circular Economy towards the Sustainable development.

Keywords: *Circular Economy, Sustainable Development, Waste Management, Integrated Solid Waste Management, and Waste Management Technologies*

1. INTRODUCTION

The Circular economic model not only aims to reduce the negative impacts caused by the Linear Economy according to the published studies, but also aims at a long-term systemic change that can generate economic and business opportunities, providing social and environmental benefits and, for this reason, it goes beyond simple sustainable development actions and initiatives, focusing on a more complex and broader vision, from the redesign of processes and products (from their origin), creation of new business models to the optimization of the use of resources (MARIA; BESSA; ESQUIVEL, 2019). Law 12,305 published in 2010 refers to the National Solid Waste Policy (NSWP) in Brazil defines that Solid Waste Management is the set of actions carried out, directly or indirectly, in the stages of collection, transport, transshipment, treatment and environmentally appropriate final disposal of solid waste and environmentally adequate final disposal of waste in accordance with the municipal integrated solid waste management plan or solid waste management plan. Next, it also conceptualizes Integrated Management as a set of actions aimed at finding solutions for solid waste, in order to consider the political, economic, environmental, cultural and social dimensions, with social control and under the premise of sustainable development (BRASIL, 2010). Recycling is seen as an end-of-line solution trying to limit the impacts of the linear model (extraction, production, consumption, and disposal). Consequently, waste prevention, recovery, reuse and remanufacturing have not received the attention and incentives they should according to their place in the waste management hierarchy. In addition, the difficulty in investing in waste production prevention policies is related to lifestyle changes, with what this implies for both producers and consumers (LEMONS, 2018). The Circular Economy (CE) is considered a fundamental economic model to face the challenge of sustainable development, and, for this reason, worldwide efforts are focused on transforming waste into resources that can be reintroduced into the economic system through proper management (AVILÉS -PALACIOS; RODRÍGUEZ-OLALLA, 2021; SHARMA et al., 2021). According to Batista (2019), in order to manage the disposal of solid waste in a sustainable way, it is necessary to understand the concepts of digital transformation and manufacturing 4.0 applied to the management of municipal solid waste. This article aims to present the perception of 20 Brazilian specialists from the academic, governmental, third sector and private sector areas, in exploratory research, to identify which bottlenecks make it difficult to comply with the guidelines and goals of Sustainable Development, established worldwide, aimed at the management of urban solid waste, towards a Circular Economy. The justification and relevance are given by the need to accelerate the implementation of measures, based on the following question: What barriers hinder the implementation of a sustainable model of Urban Solid Waste Management (USWM) based on Circular Economy concepts? The analysis and discussion of the results point to the need for actions to motivate the population regarding the fulfilment of the sustainable development goals, in particular SDG 11 (make cities and human settlements inclusive, safe, resilient and sustainable) and SDG 12 (ensure sustainable production and consumption patterns).

2. PRESENTATION OF THE THEORY

2.1. Sustainable development

Most authors define sustainability as the process of reaching a level of development capable of meeting the needs of the current generation, without compromising the ability to meet the needs of future generations, preserving nature's resources in a balanced way, since they are finite. This concept, even written in a simplified way, forces human beings to rethink the world economic paradigm in order to propose better ways to promote sustainable development (SOLIANI; KUMSCHLIES; SCHALCH, 2019). It is worth mentioning that the reduction, reuse, collection and recovery of recyclable materials are sustainable behaviours and people's awareness of them plays an important role in the implementation of strategies and policies in this field.

Thus, a quantitative analysis carried out on a group of students from the Polytechnic University of Timisoara (Romania) aimed to find answers to important environmental concerns and to observe the behaviour of students regarding the reuse and selective collection of waste resulting from various recyclable materials (GHERHEȘ; FĂRCAȘIU ; PARA, 2022). Faced with the current reality, Environmental Education (EE) is the tool that aims to mitigate, contain and even reverse this process of environmental degradation, which is determined by habits that are not conscious of the population as a whole, always raising awareness and transmitting information on how is the correct way to proceed in the face of these factors, the EE endeavour is characterized by warning about the damage already caused to the environment in which we live, which we are part of and depend on to survive (DE QUEIROZ, 2013; MATEUS et al., 2020; NUNES, 2021; NUNES; LUCAS, 2014; QUINTA; MONTEIRO; RIBEIRO, 2019). Thus, according to the historical approach to MSW management, there is a growing increase in the production of solid waste in societies and research shows that economic interests, most of the time, stand out in relation to the interest of environmental preservation. The waste management hierarchy is a key part of waste management policy worldwide. In the European Union, this hierarchy was enshrined in several strategic documents and was reflected in the fourth article of Directive 2008/98/EC of the European Parliament and of the Council, transposed into national law by Decree-Law n° 73/2011 of 06/17 (LEMONS, 2018; PAES; BELLEZONI, 2021).

2.2. Waste management

The National Solid Waste Policy (NSWP) provides for principles, objectives, instruments, and guidelines related to the integrated management of solid waste. In addition, the Law establishes the shared responsibility of waste generators in the Reverse Logistics of waste and post-consumer packaging and provides important tools within the national, regional, state and municipal spheres for the preparation of waste management plans and establishes goals that will help eradicate “dumps”, in addition to including collectors of recyclable materials in selective collection and reverse logistics (MAZETO; ABREU, 2014). The concept of Integrated Urban Solid Waste Management (MSW) seeks to find a balance between three dimensions of waste management: environmental effectiveness, social acceptability, and economic accessibility. They incorporate the perspectives and needs of the interested parties, the local context and the ideal combination of adequate prevention, reduction, recovery, and disposal methods available (MARSHALL; FARAHBAKHS, 2013). The Brazilian MSW policy is based on the concepts of external control which favour the adoption of the division of responsibilities in order to break down the tasks assigned to each of the key actors necessary for waste control to take place efficiently. In this way, the implementation of waste management plans involves responsibilities of public management and the private sector, operating directly by the public authorities, in a consortium between 2 or more public entities or by delegation to the private sector, the latter being the most usual (DA SILVA; FUGII; SANTOYO, 2017; PAES; BELLEZONI, 2021). It is a fact that sorting and recycling associations are fundamental for strengthening selective collection, which is why joint articulations between municipalities are necessary for a regional development process, demanding relationships that go beyond municipal territories. In this way, it is necessary for government officials to be aware of the possibilities of implementing a regional waste landfill, a regional composting plant, or even a regionalized solidary selective collection, in order to meet the technical requirements, as well as the continued management by people qualified to do so, according to their professional skills (ALONSO-ALMEIDA; RODRÍGUEZ-ANTÓN, 2020; BERTICELLI et al., 2020). In Brazil, the NSWP recognizes the activity of recyclable material collectors, including in its objectives and encouraging the creation and development of cooperatives or other types of associations with the purpose of promoting social inclusion and economic improvement for these workers,

recognizing them as key actors for USWM. For this reason, government bodies should assess the environmental impacts of different types of full-life-cycle waste disposal and establish sustainable household waste recycling systems under the guidance of academic research (SHI; ZHOU; ZHANG, 2021). It is important to emphasize that the use of different models can contribute to the process of universalizing selective collection in the area, in order to meet the demands of the population more efficiently according to the characteristics of each region. However, aiming at the universalization of selective collection in a scenario of greater empowerment of cooperatives and associations of collectors, driven by the National Solid Waste Policy, the expansion of inclusive selective collection in potential areas presents itself as a very interesting alternative, not only by optimizing the recycling of discarded materials, but also by raising awareness among the population made by the collectors, resulting in greater adherence of the population to the service provided (LYN et al., 2015). Thus, the main activity carried out by the Organizations of Collectors is to insert materials in the productive cycle, promoting a circular economy, however, due to the financial dependence on the public sector as the main economic source and the difficulties of self-management, these organizations do not reach a competitive position in the recycling market (ROMEIRO, 2021; TONG; HUYNH; KHONG, 2021).

2.3. Circular Economy

According to Korhonen (2018), the circular economy limits the flow of production to a level that nature tolerates and uses ecosystem cycles in economic cycles, respecting their natural reproduction rates. This concept originates from several schools and lines of thought which underlie discussions on Sustainable Development, one of which is Life Cycle Management. In addition, CE transforms goods that are at the end of their useful life into resources for others, minimizing waste (STAHEL, 2016). The results of the study by Tiozzi and Simon (2021) showed that Sustainability and Circular Economy have in common the objective of addressing environmental, economic, and social problems, emerging as a new support strategy for sustainable development in addition to being a tool capable of strengthen sustainable practices and help companies achieve the globally proposed sustainable development goals. The concept of circular economy is a general approach to promote green growth in developing countries that allows overcoming global ecological problems and, as a result, achieving a sustainable state of the planet and saving lives on Earth (GUREVA; DEVIATKOVA, 2020; ELGIE; SINGH; TELESFORD, 2021). Achieving environmental sustainability and the transition from a linear economy to a circular economy largely depends on effective waste management and how waste is treated as a potential future resource (EZEAH; ROBERTS, 2012; HUYSMAN et al., 2017; RANJBARI et al., 2021). Ferrari (2016) addresses the subject of international partnerships for the sustainable development of urban solid waste management in developing countries, having as object of study the Italian private initiative, responsible for the technical transfer of knowledge and experience and has the support of an international association, which plays the role of a cultural bridge to ensure the translation of innovative knowledge into local and viable solutions for Guinea-Bissau, West Africa (EZEUDU, 2019; FERRARI et al., 2016; FERRONATO, 2021). According to Batista (2019), in order to manage the disposal of solid waste in a sustainable way, it is necessary to understand the concepts of digital transformation and manufacturing 4.0 applied to the management of municipal solid waste. In this way, the automated execution of public services for the collection, transport, reduction of weight and volume of urban waste up to final disposal, can be structured based on the effectiveness of successful business models. Deka and Goswami (2018) highlight the real-time monitoring and management of the garbage collection system, thereby eliminating the need to collect semi-empty trash cans. Thus, the received data can be effective in determining the minimum number of associated vehicles or compartments to be distributed. The authors Xue et al., (2019) point

to Internet and Communication Technologies (ICTs) in waste management as a form of a new collection model: smart collection with the comparative study of smart collection, organizational model and comparative advantages about informal collection. Application as a complement to the Municipal Solid Waste collection system and as an exclusive collection for high waste value items under the extended producer responsibility framework looked promising.

3. METHODOLOGY

The strategy for data collection was to send, via Google Forms, the research questionnaire, elaborated from the theoretical foundation, based on the critical themes that were pointed out by the authors as bottlenecks that are, in a way, impacting on the progress of solid waste management actions necessary for the sustainable development of the population, especially regarding the correct disposal and selective collection of this waste. These questionnaires were applied to a group of specialists in Rio de Janeiro/Brazil, with the aim of collecting primary data on the subject in order to use specialized knowledge in the area of USWM to raise gaps that could be filled with suggestions found in the literature. or arising from the experience of those surveyed. Table 1 presents the central themes defined, as well as the critical themes raised, the questions formulated from the literature review and the related theoretical framework.

SUSTAINABLE DEVELOPMENT	
Critical Themes	Questions formulated from the literature review
<u>Sustainability</u>	1- What can be done immediately to make the environmental education programs offered more comprehensive in order to accelerate the process of popular awareness regarding the subject in dispute?
<u>Urban Solid Waste and Environmental Impacts</u>	2- How can key actors who have decision-making power in the USWM processes contribute to contain the impacts of incorrect MSW disposal?
<u>Participatory methodologies</u>	3- What is the best way to encourage the participation of private companies in the USWM with a view to transitioning to an EC?
MSW MANAGEMENT	
<u>Policies of USWM</u>	4- What contributions can USWM specialists give to government entities in order to reduce difficulties in complying with established policies?
<u>Integrated MSW management</u>	5- What is the best way to use the specialists' knowledge to expand the integrated MSW management initiatives?
<u>Selective Collection, economic development and social inclusion</u>	6- In order for materials to effectively reach the recycling chain, would it be feasible to formally include recycling cooperatives in municipal USWM processes, considering the role they play in returning Urban Solid Waste to industry?
<u>Difficulties in MSW management</u>	7- What would be the proposal to mitigate the structural problems faced for the correct treatment of waste?
<u>Sustainable models</u>	8- What steps can be taken at the public and private level to scale up investments in technologies to improve the efficiency of the USWM?
CIRCULAR ECONOMY	
<u>Transition to the CE</u>	9- What is the strategy to promote the Circular Economy theme among the key actors involved in the USWM process and accelerate the transition?
<u>Sustainable initiatives</u>	10- What would be the ways to expand cooperation between countries, states and municipalities in order to achieve the USWM global goals?

*Table 1: Assembly of the research instrument
(Source: prepared by the authors (2023))*

After formulating the questions, a representative sample of specialists who directly participate in the Waste Management chain or who have influence on decisions relating to matters related to the management of urban solid waste at the various government levels was selected, according to the content found in own literature review. Table 2 presents the list of specialists, covering the most important areas of activity for this study.

LIST OF EXPERTS FOR APPLICATION OF THE RESEARCH QUESTIONNAIRE		
Occupation area	Participant	No.
Academic	Professor of the environmental area for research participation and Researcher of the environmental area	9
Governmental	Public cleaning company representative; Representative of the Legislative Power and Representative of an environmental/sanitary control body.	4
Third sector	Recycling cooperative representative and representative of environmental protection NGOs.	5
Private initiative	Waste Management Company Representative and Recycling Industry Representative.	2
TOTAL		20

*Table 2: List of Proposed Specialists
(Source: prepared by the authors (2023))*

According to (Lakatos (2008), the pre-test allows the researcher to observe reactions and difficulties in understanding the respondent, as well as highlighting important elements in relation to the questionnaire: reliability, validity, and operability. After the application of the pre-test, a questionnaire with 6 questions was obtained, which were sent to the specialists through the google form. Finally, to treat the primary data, which were collected from the responses to the questionnaire, the Content Analysis method was used. One of the most common approaches to analyzing qualitative data is through content analysis, which essentially deals with making inferences about data (usually text), systematically and objectively identifying special characteristics among them. In the present research, the content analysis started by extracting context units anchored in the questions of each round. Then, the response registration units were extracted and, finally, the design of categories. Figure 1 illustrates the complete process for collecting primary data, from the formulation of the questionnaire, pre-test, application and return of responses.

4. ANALYSIS AND DISCUSSION OF RESULTS

As presented in the methodology, the questionnaires were sent as a tool to obtain the contribution of specialists in USWM from different areas of activity in the state of Rio de Janeiro/Brazil, collected from the forms sent by google forms. Of the 20 specialists invited to whom the questionnaires were sent, 10 completed questionnaires were returned, randomly filled out according to the availability and interest of the respondents, after telephone contacts were made and emails were sent, reaching a return rate of 50% , considered an acceptable average for the return of applied questionnaires, since studies indicate that an optimal number of respondents should not be less than 10 and, in most cases, panels have at most a few dozen experts. Thus, it can be ensured that the return rate of the instrument used in data collection supported the analysis of the results of this research, as it was based on the structured use of the knowledge and experience of a pre-selected group of participants, all specialists with broad knowledge on the subject in question and vast experience in their areas of expertise. Table 3 describes the 6 (six) unified answers, extracted from the 10 (ten) questionnaires answered by the participants, as well as the comparative discussions with the authors surveyed in the literature review.

Table following on the next page

Critical Themes	Recording units
Sustainability	
1- What can be done immediately to make the environmental education programs offered more comprehensive in order to accelerate the process of public awareness of the USWM?	1- Disseminate in the mass media the environmental education programs contained in the approved waste management plans. 2- Expand the implementation of environmental education actions/programs proposed in the approved plans and monitor the results achieved. 3- Promote training to potential information multipliers (representatives of residents' associations, condominium cleaning teams; representatives of basic education institutions; merchants with large waste generation). 4 Publicize the solutions available for the operation of waste in each location in the mass media. 5- Include the subject of environmental education in all basic education curricula.
Integrated management of urban solid waste	
2- What is the best way to use the knowledge of an expert to expand integrated MSW management initiatives?	1- Provide necessary training and autonomy for waste managers to work in multidisciplinary areas. 2- Recruit interested waste managers to apply paid instruction in environmental education projects contained in approved waste management plans. 3- Efficiently monitor the environmental education projects included in the approved waste management plans. 4- Train specialists working in recycling cooperatives, including them as instructors in environmental education programs. 5- Use the knowledge of waste managers to create interactive platforms, aiming to bring the public of all ages closer to approved environmental education programs.
Selective Collection, economic development, and social inclusion	
3- In order for materials to effectively reach the recycling chain, how could recycling cooperatives be formally included in municipal USWM processes, given the role they play in returning Urban Solid Waste to industry?	1- Effectively regularize the integration between recycling cooperatives and industry. 2- Carry out a gravimetric study of waste in places not served by selective collection programs. 3- Regulate the hiring of labour from cooperatives. 4- Regularize the fiscal and corporate status of cooperatives. 5- Prepare public notices for contracting services provided by cooperatives.
Sustainable initiatives	
4- What would be the ways to expand cooperation between countries, states and municipalities in order to achieve the USWM global goals?	1- Prepare technical cooperation notices that result in benefits and/or tax incentives for participating entities; 2- Promote events aimed at transferring technologies in waste management. 3- Promote exchanges of courses in USWM with academic institutions from the most developed countries in environmental issues; 4- Promote exchanges of good practices in conscious consumption and waste management, disseminating in the mass media. 5- Expand cooperation agreements between government entities and companies aimed at improving waste management actions.
Sustainable models	
5- What steps could be taken at the public and private level to scale up investments in technologies to improve the efficiency of the USWM?	1- Provide for tax compensation upon proof of investment in technologies for the proper disposal of waste. 2- Increase investment in computerized waste management systems. 3- Form/expand partnerships with companies for investment in educational institutions for the development of technologies in waste management. 4- Identify the right technologies for each situation. 5- Regulate the use of these technologies in waste management with appropriate sanctions in case of non-compliance. 6- Promote competition for practical and viable solutions.
Participatory methodologies	
6- What is the best way to encourage participation by private companies in the USWM with a view to transitioning to a CE?	1- Disseminate the environmental management rules set out in the MSW Management Plans; 2- Demand more vigorously the fulfilment of the environmental targets imposed on companies. 3- Expand tax benefits and incentives for companies that contribute to a circular economy. 4- Implement/expand the circularization process of the production chain of waste generating companies. 5- Establish performance indicators to measure the efficiency of waste management by companies.

Table 3: Final version of the questionnaire and main recording units pointed out by the specialists.

(Source: prepared by the authors (2023))

Based on the results presented in this research, some suggestions can be observed in the registration units that can be used by public and private managers, as well as the legal provisions and the necessary actions for waste management pointed out by the specialists who answered the questionnaire.

It should be noted that compliance with the sustainable development goals, in particular SDG 11 (make cities and human settlements inclusive, safe, resilient and sustainable) and SDG 12 (ensure sustainable production and consumption patterns) is the best way to resolve obstacles that hinder the implementation of a sustainable model of Urban Solid Waste Management based on Circular Economy concepts.

5. CONCLUSION

From the results found, the necessary content was obtained to support the 3 main subjects addressed in this research, which were: Sustainable Development, Waste Management and Circular Economy. The results contribute to academic research for the content that can be used as a basis for future studies, aiming to achieve, more quickly, the global goals of Sustainable Development. For this it is necessary, according to the specialists who participated in this research, to join efforts so that the societies that have developed the most in the scope of USWM can help the less favoured ones, both with the transfer of knowledge acquired through the experiences, as well as with the celebration of formal cooperation agreements, aiming at a greater objective that is the sustainable development towards a CE in a globalized way. The analysis and discussion of the results sought to motivate society regarding the fulfilment of the sustainable development objectives. It is a fact that the 17 SDGs are interconnected, and that good solid waste management depends on a dignified quality of life for all citizens in order to provide conditions for everyone to collaborate in the search for a CE. Therefore, it is expected that this work will contribute to society, companies, researchers and managers in the adoption or maintenance of urban solid waste management for the success and continuous improvement of existing and ongoing processes, using the concepts of Circular Economy towards the Sustainable development.

5.1. Suggestions for Future Work

For future studies, it is suggested that the results of actions proposed by this research be collected and analyzed, so that it is possible to expand USWM actions among locations not reached by existing programs and to improve current initiatives.

Here are some suggestive topics for the development of new research:

- % of men and women in recycling X employment need.
- Is the format of the residue linked to income?
- What is the % of single mothers who support their children by recycling?
- Poverty as the main driver of recycling.

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LITERATURE:

1. GUREVA, M.; S. DEVIATKOVA, Y. (2020). Formation of the Concept of a Circular Economy. *Sistemas & Gestão*, v. 15, n. 2, p. 156–169,
2. ALONSO-ALMEIDA, M. D. M.; RODRÍGUEZ-ANTÓN, J. M. (2020). The role of institutional engagement at the macro level in pushing the circular economy in Spain and its regions. *International Journal of Environmental Research and Public Health*, v. 17, n. 6.
3. AVILÉS-PALACIOS, C.; RODRÍGUEZ-OLALLA, A. (2021). The sustainability of waste management models in circular economies. *Sustainability (Switzerland)*, v. 13, n. 13.

4. BATISTA, P. M. (2019). Análise De Modelos E Práticas De Gestão De Resíduos Sólidos: O Caso Do Aproveitamento Energético Do Lixo Urbano No Brasil. Universidade Federal Fluminense Escola de Engenharia - Departamento de Engenharia de Produção - Laboratório de Tecnologia, Gestão de Negócios e Meio Ambiente - Mestrado Profissional em Sistemas de Gestão, Niteroi..
5. BERTICELLI, R. et al. (2020). Contribution of selective waste collection for municipal sustainable development. *Revista em Agronegocio e Meio Ambiente*, v. 13, n. 2, p. 781–796..
6. BRASIL, Presidência da República. (2010). Lei nº 12.305 de agosto de 2010. Institui a Política Nacional de Resíduos Sólidos (PNRS); altera a Lei nº 9.605 de 12 de fevereiro de 1998; e dá outras providências. Disponível em: <http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/112305.htm>.
7. DA SILVA, C. L.; FUGII, G. M.; SANTOYO, A. H. (2017). Proposal for an evaluation model for municipal urban solid waste management in Brazil: A study conducted in the city of Curitiba. *Urbe : Revista Brasileira de Gestão Urbana*, v. 9, n. 2, p. 276–292.
8. DEKA, K.; GOSWAMI, K. S. (2018). Monitoramento baseado em IoT e planejamento inteligente da gestão de resíduos sólidos urbanos. vol 462 ed. Cingapura.
9. DE QUEIROZ, A. P. B. (2013). Coleta seletiva em condomínios: realidades, possibilidades e desafios estudo de caso do município de Niterói, RJ. Universidade do Estado do Rio de Janeiro - Centro de Tecnologia e Ciência - Faculdade de Engenharia Rio de Janeiro.
10. ELGIE, A. R.; SINGH, S. J.; TELESFORD, J. N. (2021). You can't manage what you can't measure: The potential for circularity in Grenada's waste management system. *Resources, Conservation and Recycling*, v. 164.
11. EZEAH, C.; ROBERTS, C. L. (2012). Analysis of barriers and success factors affecting the adoption of sustainable management of municipal solid waste in Nigeria. *Journal of Environmental Management*, v. 103, p. 9–14.
12. EZEUDU, O. B.; EZEUDU, T. S. (2019). Implementation of circular economy principles in industrial solid waste management: Case studies from a developing economy (Nigeria). *Recycling*, v. 4, n. 4.
13. FERRARI, K. et al. (2016). An international partnership for the sustainable development of municipal solid waste management in Guinea-Bissau, West Africa. 21st Summer School Francesco Turco.
14. FERRONATO, N. (2021). Integrated analysis for supporting solid waste management development projects in low to middle income countries: The NAVA-CE approach. *Environmental Development*, v. 39.
15. GHERHEȘ, V.; FĂRCAȘIU, M. A.; PARA, I. (2022). Environmental Problems: An Analysis of Students' Perceptions Towards Selective Waste Collection. *Frontiers in Psychology*, v. 12,.
16. HUYSMAN, S. et al. (2017). Performance indicators for a circular economy: A case study on post-industrial plastic waste. *Resources, Conservation and Recycling*, v. 120, p. 46–54,.
17. KORHONEN, J.; HONKASALO, A.; SEPPÄLÄ, J. (2018). Circular Economy: The Concept and its Limitations. *Ecological Economics*, v. 143, p. 37–46, 1 jan..
18. LAKATOS, E. MARIA. M. DE A. M. (2008). Fundamentos de metodologia científica. v. v. 5.
19. LEMOS, P. (2018). Economia Circular como fator de resiliência e competitividade na região de Lisboa e Vale do Tejo Comissão de Coordenação e Desenvolvimento Regional de Lisboa e Vale do Tejo.

20. LYN, F. et al. (2015). MODELOS DE COLETA SELETIVA: COMPARAÇÃO ENTRE O SERVIÇO PRESTADO POR ORGANIZAÇÕES DE CATADORES DE MATERIAIS RECICLÁVEIS E EMPRESAS TERCEIRIZADAS. 48^o Congresso Nacional de Saneamento da ASSEMAE, v. 55, n. 1, p. 1–12.
21. MARIA, J.; BESSA, S.; ESQUÍVEL, J. (2019). Cidades circulares-Contributos da Economia Circular no desenvolvimento urbano sustentável. Faculdade de Ciência e Tecnologia - Universidade Nova de Lisboa.
22. MARSHALL, R. E.; FARAHBAKHS, K. (2013). Systems approaches to integrated solid waste management in developing countries. *Waste Management*, v. 33, n. 4, p. 988–1003.
23. MATEUS, D. M. R. et al. (2020). Participation of students in the project Valorbio: A case study to accelerate the implementation of sustainability principles in the curriculum. *International Journal of Sustainability in Higher Education*, v. 21, n. 2, p. 244–263.
24. MAZETO, C. C.; ABREU, E. P. DE. (2014). Implantação da coleta seletiva em um condomínio residencial em Curitiba. Universidade Tecnológica Federal do Paraná - Departamento de Química e Biologia - Curso Superior de Tecnologia em Processos Ambientais.
25. NUNES, L. I. A. (2021). Gestão Sustentável de Resíduos Urbanos sob a Perspetiva dos Cidadãos Universidade de Aveiro.
26. NUNES, M.; LUCAS, I. (2014). A CIDADE COMO ESPAÇO EDUCADOR. *Literacia Científica: Ensino, Aprendizagem e Quotidiano*, n. 2021, p. 208–214.
27. PAES, M. X.; BELLEZONI, R. A. (2021). MANUAL PRÁTICO PARA INOVAÇÃO EM GESTÃO DOS RESÍDUOS SÓLIDOS URBANOS Centro de Estudos de Infraestrutura & Soluções Ambientais (FGV/CEISA).
28. QUINTA, M.; MONTEIRO, I.; RIBEIRO, V. R. (2019). Educar para a Economia Circular – Uma Experiência Inovadora Na formação de professores. *Saber e Educar*, v. 27.
29. RANJBARI, M. et al. (2021). Two decades of research on waste management in the circular economy: Insights from bibliometric, text mining, and content analyses. *Journal of Cleaner Production*, v. 314.
30. ROMEIRO, A. R. (2021). Civilização e inovação – Porque a revolução industrial foi um fenômeno dependente de uma trajetória civilizacional dependente de uma trajetória civilizacional Instituto de Economia da Unicamp.
31. SHARMA, N. K. et al. (2021). The transition from linear economy to circular economy for sustainability among SMEs: A study on prospects, impediments, and prerequisites. *Business Strategy and the Environment*, v. 30, n. 4, p. 1803–1822.
32. SHI, K.; ZHOU, Y.; ZHANG, Z. (2021). Mapping the research trends of household waste recycling: A bibliometric analysis. *Sustainability (Switzerland)*, v. 13, n. 11.
33. SOLIANI, R. D.; KUMSCHLIES, M. C.; SCHALCH, V. (2019). The management of solid urban waste as a sustainability strategy. *Espacios*, v. 40, n. 3.
34. STAHEL, W. R. (2016). The circular economy. *Nature*, v. 531, n. 7595, p. 435–438.
35. TONG, Y. D.; HUYNH, T. D. X.; KHONG, T. D. (2021). Understanding the role of informal sector for sustainable development of municipal solid waste management system: A case study in Vietnam. *Waste Management*, v. 124, p. 118–127.
36. TIOSSI, F. M.; SIMON, A. T. (2021). Economia Circular: Suas Contribuições Para O Desenvolvimento Da Sustentabilidade. *Brazilian Journal of Development*, v. 7, n. 2, p. 11912–11927.
37. XUE, Y. et al. (2019). Can intelligent collection integrate informal sector for urban resource recycling in China? *Journal of Cleaner Production*, v. 208, p. 307–315, 20 Jan.

TERRITORIAL SETTLEMENT OF EDUCATIONAL INSTITUTIONS: MAIN LOCATIONAL FACTORS

Daniel Mendes Pires Haack

*Universidade Federal Fluminense, Brazil
danielhaack@id.uff.br*

Stella Regina Reis da Costa

*Universidade Federal Fluminense, Brazil
stella@ufrj.br*

Julio Vieira Neto

*Universidade Federal Fluminense, Brazil
julion@id.uff.br*

David Nunes Resende

*GOVCOPP, ESTGA, Universidade de Aveiro, Portugal
david@ua.pt*

ABSTRACT

This work has as its theme the influence of the most relevant locational factors in the process of territorial settlement of educational institutions. Its relevance is perceived through the conception that the locational process of structures properly accomplished is capable of mitigating diverse risks, ranging from issues related to people's comfort to, even, institutional security. As a problem, the questioning about which are the most relevant locational factors that should be considered in the process of territorial settlement of educational institutions stands out. The objective of this study is to identify the main locational factors to be considered in the process of territorial allocation of educational institutions. To this end, a qualitative approach of a basic nature and exploratory objective was used as a methodology, employing a bibliographical and documental review as a procedure. The limitation of this work was that it did not consider locational factors fragmented by geographic regions, and this refinement could be the subject of future studies. As the main result obtained by this research were identified the 9 main locational factors capable of influencing the territorial settlement process of educational institutions: accessibility condition; infrastructural conditions for implementation; relationship between demand and the concentration/offering of the service or stuff; disasters risks; comfort index; provision of basic infrastructure; security conditions; gross domestic product per capita; distance from headquarters. Among the practical implications of this work, the contribution to the deepening of existing knowledge about the locational factors that affect the territorial location of educational institutions stands out, as well as the possibility of associating the 9 main locational factors identified by this study with the decision support models in order to enable a greater degree of efficiency in the territorial dispersion process of institutions of an educational nature.

Keywords: *Territorial Settlement, Location Criteria, Locational Factors, Educational Institutions*

1. INTRODUCTION

On locational issues that correlate with the scope of educational institutions, Al-Sabbagh (2020) states that a non-ideal geographic distribution of these organizations can make it difficult for populations to access school locations, promoting an increase in school dropout and evasion rates, while an adequate spatial dispersion of educational units is capable of boosting the

improvement of the educational process itself. Suggests Sakti et al (2022) that the establishment of an educational unit in a location that has ideal conditions for the execution of the activities to be practiced by that institution also facilitates the achievement of education goals. In this sense, in order to achieve success in this process, according to Phongpipattanapan and Dasananda (2013), an analysis is necessary that does not fail to cover, among other points, issues related to the demography and spatial distribution of the local population. Complementing the idea of the importance of analyzing demographic and spatial issues for the process of allocating educational institutions, Araya et al (2012) suggest that it does not make sense to install such units in regions with low demand for the educational service to be offered, nor in locations where, even if the demand is present, there is already a robust offer for that product, in order to avoid incurring in the underutilization of the educational unit due to insufficient demand or excessive regional supply, negatively impacting the relationship between the volume of capital applied and the degree of benefit returned to populations.

2. METHODOLOGY

This study used a research with a qualitative approach and of a basic nature. In attention to the objectives, there is, in this study, a general predominance of an exploratory profile, while, procedurally, bibliographical and documental research were adopted in relation to data collection. This procedural apparatus for data collection was carried out through a systematic scan of the Scopus base – bibliometric research –, by works concentrated on 2 specific themes: i - decision support models applied to the territorial settlement of teaching institutions; ii - locational factors applied to the territorial settlement of diverse structures, added to a complementary, non-systematized search, on the same scopus base, on the subject locational factors applied to the territorial settlement of diverse structures. Associated with the reported procedures, still in order to collect data that supported the identification of the locational factors reported in this study, a survey of the locational factors arranged in the Simulation for Reorganization of the units of the Brazilian Federal Network of Professional, Scientific and Technological Education was carried out.

3. THEORETICAL FOUNDATION

In order to contribute to the settlement of educational institutions in suitable locations for the execution of their activities, a systematic review of the literature was carried out on the most relevant locational factors to be considered in the process of choosing the location of educational establishments, categorized, as shown in table 1, under the 3 fundamental pillars of sustainability.

Locational Factors	Adhering Pillars of Sustainability
Accessibility Conditions	Social and Economic
Infrastructural Conditions for Implementation	Environmental, Social and Economic
Supply/Demand Ratio of a Service or Good	Environmental, Social and Economic
Disaster Risk	Environmental, Social and Economic
Comfort Index	Social and Economic
Provision of basic Infrastructure	Environmental, Social and Economic
Security Condition	Social and Economic
Gross Domestic Product Per Capita	Environmental, Social and Economic
Distance from the Administrative Headquarters	Environmental, Social and Economic

*Table 1: Relationship between the 9 locational factors identified in this study and their adherence to the fundamental pillars of sustainability
(Source: Prepared by the authors themselves)*

3.1. Accessibility Conditions

The planning of new installations, especially public ones, must include the study of the ideal locations where such establishments will be settled, this process being a key factor for sustainable urban planning. To this end, accessibility emerges as a relevant locational factor among the most varied forms of establishments (Elsheikh, 2022). In light of authors such as Strutynska et al (2018), Al-Sabbagh (2020); Althoaliet al (2022) and Ferrari et al (2022), the availability of structured and diversified passenger transport networks and lines with high capillarity is capable of helping to guarantee highly efficient accessibility to populations. The central idea would be that the availability of these transport structures, mainly public ones, would be able to increase the ability to come and go of local and regional populations, ensuring that they do not fail to enjoy certain services and goods due to incapacity or difficulty in Locomotion. A relevant factor is also the structural and operational conditions of the sets of roads that make up the closest regions. In this sense, for example, aspects such as the dimensions and state of conservation of the roads, their general traffic conditions, the type of road, the existence or not of duplicate roads, will facilitate or hinder access to those places (Al-Sabbagh, 2020; Althoaliet al, 2022; Elsheikh, 2022). Intrinsically linked to road conditions and the capacity of the transport offer is the duration of trips. Lin and Xu (2022) understand the duration of trips, that is, the time spent in moving populations to certain locations, as well as the distance between them, as relevant obstacles to accessibility to a given region. (Althoaliet al, 2022). In continuity, it is stated by Al-Sabbagh (2020) that adequate spatial distribution favors efficient accessibility, producing shorter travel times and thus boosting results in the educational process. For the aforementioned author, highly efficient accessibility is the main factor in choosing to enroll a student among schools with similar teaching capacity, with distance and travel time between the student's home and the school unit being the preponderant elements. Therefore, it is possible to infer that accessibility is one of the main locational factors, if not the most relevant in numerous scenarios, for the establishment of the most diversified human organizations, being composed not only of aspects related to the physical distance between the user and the organization and the time of displacement between them, as well as less obvious parameters, such as the availability of a people transport system and the structural and operational conditions of the sets of roads that cross the regions of greater geographic proximity.

3.2. Infrastructural Conditions for Implementation

The selection of a land for the settlement of buildings must consider restrictions of multiple nature, encompassing geophysical, environmental and cultural aspects (Delivand et al, 2015). According to Delivand et al (2015) and Ferrari et al (2020), land with excessively steep conditions should be avoided. Their proportions should also be considered, since they are capable of intensely affecting the activities carried out there, whether in defining their usefulness or establishing their price, or even as a guarantee tool for banks to access credit, the size of the land exerts a direct influence on the most varied human activities (Abebe et al, 2022; Bulut and Celik, 2022; Li, Li and Nutapong, 2022; Maffezzoli, Ardolino and Bacchetti, 2022; Worlanyo, Alhassan and Jiangfeng, 2022; Zurek, 2022). A sub-factor to be observed, also linked to the proportions of the land, is whether the size of the site is able to support a parking capacity compatible with the number of people who will frequent the site (Althoail, 2022). Equally relevant to this process are the economic value of the land available, the costs related to works, renovations and building maintenance, the amounts to be used in the acquisition of certain equipment that are necessary for the implementation of the establishment, or even the amounts to be made available to property lease title or acquisition of the land itself (Saktiet al, 2022; Strutynska et al, 2018).

Therefore, the particularities of each region will demand a specific infrastructural framework to house educational institutions, requiring careful evaluation in this regard during the locational process.

3.3. Supply/Demand Ratio of a Service or Good

The relationship between demand and concentration of services in a given location is yet another locational factor to be evaluated in the process of choosing locations for the settlement of educational institutions. When seeking an adequate geographical distribution of establishments of the same nature in a given territory, it is of great importance to assess the relationship between the local demand for the provision of the service offered and the concentration of providers of that service already existing in those locations, in order to avoid competition between the structures and the possible occurrence of a disordered geographic coverage (Alhothali et al, 2022; Ebrahimiet al, 2022; Saktiet al, 2022). According to Ferrari et al (2022), the concept of demand point, used by this work, is connected to the idea of a place representing a certain group of people or things that require goods and services from the facilities. Armed with this understanding, it is plausible to assert that, by allocating an organization's facilities in the regions with the highest demand points, or at least in their vicinity, it is possible to minimize the travel time/distance between the demand points and the settled facilities (Alhothali et al, 2022). Ferrari et al (2022) even point out that the lower the costs and the time/distance to travel to the destination, the greater the demand will tend to be. However, demand tends to decrease as the distance – and its implications: cost and travel time – between the point of demand and the facility expands. For Saktiet al (2022), the main subfactor that feeds demand is the degree of population density existing in each region. Thus, the more densely populated a geographic region is, the greater its demand for products and services in general, including education, will tend to be. It is also indicated, however, that throughout the territorial allocation process of educational institutions, the relationship between the demand and the offer of the activities that will be developed by them in the region be considered, in order to enable balance to this dynamic (Al-Sabbagh, 2020; Saktie et al, 2022). With the purpose of promoting a regional proportionality in the relationship between the points of demand and supply, it is common to distribute educational units by coverage zone in order to meet the spatially distributed population demands, settling the establishments in such a way that they can attract stakeholders from a set of nearby locations, establishing a geographical area covered by the power of attraction, influence or action of each of the settled units (Alhothali et al, 2022). The geographic distribution by area of scope or coverage is abundantly used to determine the ideal territorial dispersion of school units, university campuses, police stations, vaccination centers, as in the cases portrayed, respectively, by the works of Al-Sabbagh (2020), Morrill and Beyers (1991), Elsheikh (2022) and Alhothali et al (2022). Therefore, the relationship between demand and supply works as a kind of marker to help in the decision of where to set up an educational institution, with scenarios where demand is higher than the service supply capacity in the region, favorable to the establishment of new facilities, while in locations with demand lower than such capacity, inadvisable to the establishment of new units (Al-Sabbagh, 2020; Saktiet al, 2022).

3.4. Disaster Risk

There are several works that raise various locational factors capable of influencing the choice of the ideal location for the settlement of the most different types of structures or organizations, however, there are almost no studies that include among these factors the risk for disasters, whether due to biological risk or multiple natural hazards (Sakti et al, 2022). According to Taet al (2022), the risk for technological disasters can also be added to the two subtypes of risks already presented, which encompass a range of events, such as, for example, catastrophes

caused by chemical products. In what Papavasileiou et al (2021) thinks, such risks bring with them not only aspects correlated to the actual occurrence of disasters, but also the feeling of psychological insecurity regarding the mere possibility of their occurrence, triggering feelings of fear, vulnerability and lack of safety, which can, in turn, negatively influence the work performance of human beings. Evidence that the incidence of disasters actively impacts human activities, including educational ones, is the result provided through a study that evaluated the dynamics of enrollment rates in secondary schools in Malaysia, in the period from 1970 to 2014, which concluded that the disasters that occurred in a given region, in general terms, negatively impacted enrollment rates in secondary schools in the locations where the disasters occurred (Kaur, Habibullah and Nagarathnam, 2018). Therefore, in a broad way, treating the risk of disasters as a whole, encompassing its three variants – biological risk, natural risk and technological risk –, it is obviously imperative to carry out a careful assessment of such hazards throughout the process of analysis for the territorial allocation of educational institutions.

3.5. Comfort Index

The concept of comfort has a close correlation with the idea of alleviating discomfort for not meeting basic human needs, as well as ensuring mental, physical and environmental well-being, emerging as influential factors for well-being, in this context, aspects such as a healthy, silent environment with adequate temperature (Freire et al, 2021; Xiao, 2022). In the light of deXiao (2022), it is suggested that there is a strong negative impact of atmospheric pollution on the governance capacity of institutions and on their human capital, reducing not only working hours, but also the productivity of employees, conceiving the hypothesis that organizations located in regions with severe air pollution tend to experience high problems in their managerial capacity. Regarding noise pollution, in developed and developing countries this type of pollution is one of the most relevant causes of reduced well-being of populations, negatively affecting their satisfaction with life (Yang, D. et al, 2022). Equally impacting the comfort index is the temperature of the environments, both indoors and outdoors. Excessively hot or cold spaces weaken people's health, deteriorating their sense of well-being and, consequently, their productive capacity (Alam, Sharma and Salve, 2022). On the subject, Abdallah (2022) postulates that thermal comfort in the premises of the buildings of educational institutions is a critical issue, since adequate temperatures for the comfort of students are necessary in order to encourage them to develop their daily study routines and interact with other members of the academic community. Therefore, in order to think of an index that is capable of measuring human comfort as close to its totality, according to Sakti (2022), one should not neglect aspects related, at least, the quality of the air to be breathed, the noise level to which it will be exposed for a prolonged period and the average temperature of the environments to be frequented.

3.6. Provision of Basic Infrastructure

According to Fisch-Romito (2021), access to infrastructure services is essential to meet basic human needs. Therefore, when selecting the territorial location in the settlement process of educational organizations, the convenience of choice should be guided by geographic and social factors, contemplating the provision of basic infrastructure present in each of the candidate regions (Strutynska et al, 2018). For Fish-Romito (2021) and Gai, Sir and Maulida (2022), the supply of electricity, water supply and availability of basic sanitation services are considered among the most basic infrastructure devices, as they meet the basic daily needs of societies. Permeated by a character of essentiality, the communication infrastructure, especially with regard to the internet and telephony, has a strong influence on economic and social aspects, being indispensable to the process of development of nations or regions, also establishing an intrinsic connection with basic infrastructural issues (Ighodaro, 2021). Equally composing the group of locational subfactors that are part of the subsidiary infrastructure, the local capacity to

provide regular access to fuels emerges, whether aiming to safeguard the locomotion capacity, through automotive fuels, or in order to enable the operation of certain commercial and industrial activities (Strutynska et al, 2018; Maurya, P., Muthukumar, P. and Anandalakshmi, R., 2022). In summary, it can be concluded that thinking about locational factors for educational institutions without taking into account the diverse issues that involve the basic infrastructure of the different regions, whether those of a more essential nature or those with subsidiary characteristics, presents itself as an overly reckless situation. , because, as stated by Fisch-Romito (2021), those are intended to meet the most elementary human needs.

3.7. Security Condition

According to Gai, Sir and Maulida (2022) security is one of the essential critical issues, which can act as a decisive factor in influencing the choice or not for a location in which to set up an establishment, since, as conceived by Hoffman and Shelby (2017), the feeling of insecurity tends to stimulate avoidance behavior. the latter, the sense of security itself, should also be considered in the design of spatial security conditions, and the analysis of security conditions should also be applied, as a priority, on a regional scale, to the detriment of an individual one (Berthold, Meyer and Dahlen, 2022). In order to address the issue of the relevance of the locational security factor, a study published by Hanchard (2020) sought to understand how data related to criminal statistics present in digital maps, such as Google Maps, influence people in their daily decision-making, resulting in the idea that the sense of security, generated by data such as crime rates present in digital maps, interfered with the experience of using spaces, having changed the way bodies feel. distributed in it, influencing different aspects of human life. In this sense, the result of the research published by Hanchard (2020), went beyond demonstrating that a sense of security is a highly important aspect for human beings, but that, in addition, the security condition is capable of interfering with man's disposition in space, influencing his decision-making, including with regard to locational issues.

3.8. Gross Domestic Product Per Capita

The allocation of developments in a region is not just a disconnected dynamic of a larger context, it is interconnected with the regional development process itself, possessing the capacity, depending on the nature of the establishments to be settled, of generating new opportunities for work, education and income to local populations. Therefore, obviously, this driving force originating from the installation of new organizations, especially educational ones, is endowed with higher social relevance in poor areas than in more affluent regions (Bojesen, Boerboom and Skov-Petersen, 2015; FERRARI et al, 2022). For this reason, Bojesen, Boerboom and Skov-Petersen (2015) and Ferrari et al (2022) suggest that searching, throughout the locational dynamics, for locations with a lower per capita GDP (gross domestic product) condition can benefit the development of those regions, providing a positive effect, for example, on job creation. However, complement Grizane and Jurgelane-Kaldava (2019), that robust organizations, such as universities, settled in a specific location influence not only their settlement region, but a multiple set of surrounding territorial entities. In this sense, the presence of educational institutions can lead to the locations of their allocation, as well as those surrounding them, an interconnected network to encourage local and regional development, which makes it obvious, of course, that the choice of such locations for allocations should also meet criteria that include demands linked to social responsibility.

3.9. Distance from the Administrative Headquarters

Corporations, according to De Beule et al (2022), seek various forms of structuring themselves and relationships with other organizations in order to optimize resources and, consequently, costs, with physical proximity emerging as a relevant factor in this process, in particular the

proximity between the parent company and its subsidiaries. Such geographic proximity is still able, for example, to provide management teams with access to a wider range of information sources, which tends to increase their monitoring capacity, in addition to reducing costs related to ensuring an adequate information flow (Firoozi, Magnan and Fortin, 2019).

4. CONCLUSION

Aspects of Geography are capable of broadly influencing the most varied spheres of human society, acting as constraints on human actions. In view of this, the selection of the geographic location for undertakings of the most diverse natures, in particular, in this case, that of educational establishments, emerges as an important critical success factor. Therefore, the development of the nine fundamental locational factors capable of influencing the territorial settlement process of teaching institutions – accessibility conditions; infrastructural conditions for implementation; supply/demand ratio of a service or good; disaster risk; comfort index; provision of basic infrastructure; security condition; gross domestic product per capita; distance from the administrative headquarters –, made possible by this work through the carrying out of an in-depth documental and bibliographical research of an exploratory nature, in addition to contributing to the deepening of the existing knowledge about locational factors that affect the process of territorial settlement of educational organizations, brings the possibility of associating the identified factors with decision support models in order to make it possible to increase efficiency in the process of territorial dispersion of institutions of an educational nature, which may prevent losses arising from an inadequate geographic distribution of educational establishments. As a limitation to this research, mention is made of the fact that public and private educational institutions are endowed with distinct particularities, which, naturally, are capable of affecting certain traits of the locational factors that influence the process of territorial settlement of educational organizations, therefore, future work on the subject is suggested, segmented by locational factors adherent to public educational institutions and locational factors more aligned to private educational units.

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LITERATURE:

1. Abdallah, A. S. H. (2022). Passive design strategies to improve student thermal comfort in Assiut University: a field study in the Faculty of Physical Education in hot season. *Sustainable Cities and Society*, 86. Doi: 10.1016/j.scs.2022.104110
2. Abebe, F. *et al.* (2022). The influences on farmers' planned and actual farm adaptation decisions: Evidence from small-scale irrigation schemes in South-Eastern Africa. *Ecological Economics*, 202, 1-22. Doi: 10.1016/j.ecolecon.2022.107594
3. Al-Sabbagh, T. A. (2020). GIS location-allocation models in improving accessibility to primary schools in Mansura city-Egypt. *Geojournal*, 87(2), 1009-1026. Doi: <https://doi.org/10.1007/s10708-020-10290-5>
4. Alam, M. S.; Sharma, M.; Salve, U. R. (2022). Assessment of thermal comfort in a hot and humid indoor built environment of a kitchen at a university canteen. *Work*, 72(1), 189-199. Doi: 10.3233/WOR-205174
5. Alhothali, A. *et al.* (2022). Location-allocation model to improve the distribution of COVID-19 vaccine centers in Jeddah city, Saudi Arabia. *International Journal of Environmental Research and Public Health*, 19(14). Doi: 0.3390/ijerph19148755

6. Berthold, M., Meyer, M., Dahlen, L. (2022). Einfluss der stadtstruktur auf das raumbezogene sicherheitsgefühl. *Monatsschrift für Kriminologie und Strafrechtsreform*, 105(1), 17-34. Doi: 10.1515/mks-2021-0119
7. Bojesen, M., Boerboom, L., Skov-Petersen, H. (2015). Towards a sustainable capacity expansion of the Danish biogas sector. *Land Use Policy*, 42, 264-277. Doi: 10.1016/j.landusepol.2014.07.022
8. Bulut, M., Celik, H. (2022). Farmers' perception and preference of Islamic Banking in Turkey. *Agricultural Finance Review*, 82(5), 871-889. Doi: 10.1108/AFR-02-2021-0022
9. De Beule, F. et al.(2022). Proximity at a distance: The relationship between foreign subsidiary co-location and MNC headquarters board interlock formation. *International Business Review*,31(4). Doi: 10.1016/j.ibusrev.2021.101971
10. Delivand, M.K. et al. (2015). Optimal locations of bioenergy facilities, biomass spatial availability, logistics costs and GHG (greenhouse gas) emissions: A case study on electricity productions in South Italy. *Journal of Cleaner Production*, 1-11. Doi:10.1016/j.jclepro.2015.03.018
11. Ebrahimi, Z. D. et al. (2022). Using a GIS-based spatial approach to determine the optimal locations of bikeshare stations: the case of Washington D.C. *Transport Policy*, 127, 48-60. Doi: 10.1016/j.tranpol.2022.08.008
12. Elsheikh, R. (2022). GIS-based services analysis and multi-criteria for optimal planning of location of a police station. *Gazi University Journal of Science*, 35(4), 1248-1258. Doi: 10.35378/gujs.828663
13. Ferrari, G. et al. (2022). Network analysis for optimal biomethane plant location through a multidisciplinary approach. *Journal of Cleaner Production*, 378, 1-15. Doi: 10.1016/j.jclepro.2022.134484
14. Firoozi, M., Magnan, M., Fortin, S. (2019). Does proximity to corporate headquarters enhance directors' monitoring effectiveness? A look at financial reporting quality. *Corporate Governance: An International Review*, 27(2), 98-119. Doi: 10.1111/corg.12264
15. Fish-Romito, V. (2021) Embodied carbon dioxide emissions to provide high access levels to basic infrastructure around the world. *Global Environmental Change*, 70. Doi: 10.1016/j.gloenvcha.2021.102362
16. Freire, S. M. L. et al.(2021). Meaning and dimensionality of state of comfort in patients with chronic hemodialysis kidney disease. *Texto Contexto*, 30. Doi: 10.1590/1980-265X-TCE-2020-0037
17. Gai, A. M., Sir, M. M., Maulida, R. R. (2022).Influence analysis of regional loans on basic infrastructure establishment to recover economy during the Covid-19 Pandemic in Sikka Regency, East Nusa Tenggara, Indonesia. *IOP Conference Series: Earth and Environmental Science*, 1015. Doi: 10.1088/1755-1315/1015/1/012012
18. Grizane, T.; Jurgelane-Kaldava, I. (2019).The contribution of universities to regional development. *Research for Rural Development*, 2, 247-254. Doi: 10.22616/rrd.25.2019.076
19. Hanchard, M. S. (2020). Digital maps and senses of security: the influence of a veracious media on urban life. *Urban Planning*, 5(4), 301-311. Doi: 10.17645/up.v5i4.3452
20. Hoffman, A. M., Shelby, W. (2017). When the “laws of fear” do not apply: effective counterterrorism and the sense of security from terrorism. *Political Research Quarterly*, 70(3), 618-631. Doi: 10.1177/1065912917709354
21. Ighodaro, C. A. (2021). infrastructure development and economic growth in Sub-Saharan Africa: insight from electricity, internet usage and mobile phone. *Nigerian Journal of Economic and Social Studies*, 63(2), 187-207. Disponível em: <https://njess.org/journal/njess/articles?id=62>. Acesso em: 27 dez. 2022.
22. Kaur, H., Habibullah, M. S., Nagaratnam, S. (2018). The impact of natural disasters on secondary school enrollment rates. 7(3), 299-305. Doi: 10.14419/ijet.v7i3.25.17586

23. Li, N., Li, R. Y. M., Nuttapong, J. (2022). Factors affect the housing prices in China: a systematic review of papers indexed in Chinese Science Citation Database. *Property Management*, 40(5), 780-796. Doi: 10.1108/PM-11-2020-0078
24. Lin, H., Xu, M. (2022). Capacitated preventive health infrastructure planning with accessibility-based service equity. *Journal of Urban Planning and Development*, 149(1). Doi: 10.1061/jupddm.upeng-4104
25. Maffezzoli, F. A., Ardolino, M., Bacchetti, A. (2022). The Impact of the 4.0 Paradigm in the Italian Agricultural Sector: A Descriptive Survey. *Applied Science (Switzerland)*, 12(18). Doi: 10.3390/app12189215
26. Maurya, P., Muthukumar, P., Anandalakshmi, R. (2022). Methanol cookstove a potential alternative to LPG cookstove: Usability, safety and sustainability studies. *Sustainable Energy Technologies and Assessments*, 53. Doi: 10.1016/j.seta.2022.102508
27. Morrill, R., Beyers, W. (1991). Locating branch campuses for the university of Washington. *Journal of Geography in Higher Education*, 15(2), 161-171. Doi: 10.1080/03098269108709145
28. Papavasileiou, C. et al. (2021). Perception of biohazards: a focus on schools in Western Attica, Greece. *Euro-Mediterranean Journal for Environmental Integration*, 6(1). Doi: 10.1007/s41207-020-00231-6
29. Phongpipattanapan, S., Dasananda, S. (2013). Spatial modelling for optimal locations and allocations of schools in educational service area office-2, Nakhon Pathom province, Thailand. *The Social Sciences*, 8(4), 359-364. Doi: 10.36478/sscience.2013.359.364
30. Sakti, A. D. et al. (2022). School location analysis by integrating the accessibility, natural and biological hazards to support equal access to education. *Internacional Journal of Geo-Information*, 11(12), 1-27. Doi: 10.3390/ijgi11010012
31. Strutynska, L. R. et al. (2018). Determining the sites of optimal location of regional logistics centers. *Naukovyi Visnyk NHU*, 6, 148-155. Doi: 10.29202/nvngu/2018/16
32. Ta, G. C. et al. (2022). Prevention of technological disasters: Adoption of indicative criteria associated with GHS in regulating major accident hazards. *Process Safety and Environmental Protection*, 162, 583-594. Doi: 10.1016/j.psep.2022.04.017
33. Worlanyo, A. S., Alhassan, S. I., Jiangfeng, L. (2022). The impacts of gold mining on the welfare of local farmers in Asutifi-North District in Ghana: a quantitative and multi-dimensional approach. *Resources Policy*, 75. Doi: 10.1016/j.resourpol.2021.102458
34. Xiao, H. (2022). How does air pollution affect corporate information environment? *The Journal of Financial Research*, 45(4), 987-1016. Doi: 10.1111/jfir.12305
35. Yang, D. et al. (2022) Relation between noise pollution and life satisfaction based on the 2019 Chinese Social Survey. *International Journal of Environmental Research and Public Health*, 19(12). Doi: 10.3390/ijerph19127015
36. Zurek, M. (2022). Real Estate markets and lending: does local growth fuel risk? *Journal of Financial Services Research*, 62, 27-59. Doi: 10.1007/s10693-021-00358-9

