Varazdin Development and Entrepreneurship Agency and **University North**
in cooperation with
Faculty of Finance - D. A. Tsenov Academy of Economics
Faculty of Management University of Warsaw
Faculty of Law, Economics and Social Sciences Sale - Mohammed V University in Rabat
ENCGT - Ecole Nationale de Commerce et de Gestion de Tanger - Abdelmalek Essaadi University
Polytechnic of Medimurje in Cakovec

Economic and Social Development

100th International Scientific Conference on Economic and Social Development – "Economics, Management, Entrepreneurship and Innovations"

Book of Proceedings

Editors:
Andrey Zahariev, Stoyan Prodanov, Dean Uckar

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CONTENTS

KNOWLEDGE SHARING IN BULGARIAN COMPANIES: MOTIVATING FACTORS

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ABSTRACT

In the current century, knowledge has become the most important resource of the organisation. Its management is considered a key factor in achieving competitive advantage. A central process in knowledge management is its sharing. However, sharing cannot occur if people are not motivated to share their knowledge with each other. Previous research has identified a wide range of factors influencing internal and external motivation of employees to share their knowledge. In this study, based on a literature review and empirical research conducted in Bulgarian companies, a series of motivating factors have been identified and ranked according to their influence on individuals' motivation to share knowledge. The results of the study can be used by managers of Bulgarian businesses in managing knowledge sharing.

Keywords: *Knowledge, Tacit Knowledge, Explicit Knowledge, Knowledge Management, Knowledge Sharing, Motivation*

1. INTRODUCTION

Over the past three decades, Knowledge Management (KM) has been regarded as a key factor in achieving competitive advantage and prosperity for companies. During this period, the interest in knowledge and its management has steadily grown. An indicator of this interest is the large number of academic articles, books, reports, as well as conferences and scientific forums dedicated to the topic (Hislop et al., 2018). The most intensively studied process within KM is knowledge sharing (KS) in organisations. Serenko & Bontis (2016), in their study on counterproductive behaviour in knowledge sharing, noted that in 2015, the Journal of Knowledge Management published 68 articles, with more than half (35) of them focused on the issue of knowledge sharing. Knowledge sharing in companies cannot occur if the people, who are the primary holders of knowledge, are not motivated to do so. One potential reason for the failure of the knowledge sharing (KS) process is the lack of understanding of what motivates individuals to share their knowledge. Therefore, it is important to understand the factors that influence people's attitudes and willingness to share knowledge. Over the mentioned period, numerous studies, both theoretical and empirical, have been conducted aiming to identify and assess the factors that influence people's motivation to share knowledge. While the number of studies on the topic is impressive on a global scale, in Bulgaria, the research interest in Knowledge Management (KM) issues, particularly Knowledge Sharing (KS), is extremely weak. The aim of this study is to identify the most significant motivating factors for knowledge sharing through a literature review. Based on the results of an empirical survey conducted in Bulgarian companies, the study aims to assess their influence on attitudes, willingness, and behaviour of employees towards knowledge sharing. Understanding these factors, as well as the strength, intensity, and direction of their impact, will assist managers in Bulgarian business organisations in effectively managing the knowledge sharing process. This will ensure that knowledge reaches the individuals who need it and that maximum benefit is derived from organisational knowledge.

2. KNOWLEDGE, KNOWLEDGE MANAGEMENT AND KNOWLEDGE SHARING IN THE COMPANIES

Understanding knowledge requires tracing the hierarchical relationship between "data – information – knowledge" (Chmielecki, 2013). Data refer to unprocessed numbers or facts that usually lack specific meaning (Wojciechowska-Dzięcielak, 2012). Processing them in a specific context, with the aim of their practical application, transforms them into information. The contextual elements embedded within information make it more valuable than the raw data (Harrison & Hu, 2012). Information is transformed into knowledge when it is processed in the minds of individuals. Conversely, knowledge is converted into information when it is articulated and presented in the form of text, graphics, words, or other symbolic forms. Knowledge refers to information that exists within the consciousness of people: it is personalised information; "information is converted to knowledge once it is processed in the mind of individuals" (Alavi & Leidner, 2001, p. 109). Indeed, knowledge relies on information, and information relies on data. According to Bakker et al. (2006), the key word is interpretation: individuals receive data and information from their environment and create knowledge through interpretation. A similar perspective is presented by Smith & Bollinger (2001), who define knowledge as an individual's ability to interpret information based on their own experience and skills. An individual's knowledge is formed through cognitive processes and therefore exists only in the individual's consciousness (Fahey & Prusak, 1998). The individual knowledge possessed by employees, whether explicit or tacit, can add value to the product, the customer, and the organisation (Ipe, 2003). Alavi & Leidner (2001, p. 113) classify ten different types of knowledge: tacit, explicit, individual, social, declarative, procedural, causal, conditional, relational, and pragmatic knowledge. However, many researchers agree that by nature, knowledge can be categorised into two main types: tacit and explicit knowledge. In every organisation, the ratio between explicit and tacit knowledge varies, and their combination forms what is known as "organisational knowledge". The knowledge, skills, intellect, and experience possessed by individuals are considered tacit knowledge. Knowledge that can be codified into figures and words, as well as easily transmitted or transferred between individuals, is known as explicit knowledge (Razmerita et al., 2016). Tacit knowledge is difficult to transfer (Lin et al., 2008), and its transfer requires interaction (Harrison & Hu, 2012). It is always associated with a specific individual, highly dependent on the context, and is generally considered more valuable than explicit knowledge. Extracting and converting tacit knowledge into explicit knowledge is difficult and sometimes impossible, as it resides deep within a person's consciousness. Some researchers argue that explicit and tacit knowledge have different economic values (Reychav & Weisberg, 2010). Explicit knowledge is considered relatively cheaper because it is easy to transfer, whereas tacit knowledge has higher value as it requires direct contact and observation of behaviour of employees and is associated with more complex acquisition methods. According to Von Hippel (1994), tacit knowledge is more valuable because it is difficult to acquire and, due to its "stickiness," it takes more time and effort to share compared to explicit knowledge. The differences between tacit and explicit knowledge are useful for understanding the mechanisms through which knowledge is transferred between individuals and for facilitating this process (Grant, 1996). In other words, distinguishing between these two types of knowledge is important from a management perspective, as tacit and explicit knowledge require different approaches in their management. Additionally, the choice of an appropriate knowledge sharing process depends on its frequency and the recipient of knowledge, whether it is an individual, a group, or a company (Dixon, 2000). The importance and significance of knowledge for achieving competitive advantage and prosperity of a company are recognised by the majority of researchers. Knowledge is a key strategic resource (Harrison & Hu, 2012; Osorio-Londono et al., 2021; Smith & Bollinger, 2001; Zheng, 2017); one of the most important resources for the survival of an organisation (Ayodele et al., 2016);

the foundation for developing sustainable long-term competitive advantage for any organisation (Mohajan, 2019); a unique organisational asset (Lilleoere & Hansen, 2011); the most valuable and only source of sustainable competitive advantage (Chmielecki, 2013); a primary source of value creation (Anwar et al., 2019). Knowledge, on its own, cannot be a competitive advantage. The success of a company does not solely depend on the static volume of knowledge it has accumulated. Knowledge leads to the attainment of competitive advantages only if it is managed properly. Knowledge management (KM) includes a variety of activities and processes. For example, according to Schultze & Leidner (2002), it includes generation, representation, storage, transfer, transformation, application, embedding, and protection of organisational knowledge. The practices of KM include identification, collection and selection, organisation, application, sharing and creation of knowledge (Jabbary & Madhoshi, 2014, p. 126). Jain (2007) describes KM as a conscious process of capturing, creating, storing, transforming, sharing, and utilising information to serve employees, organisations, and their customers. Harrison & Hu (2012) view KM as the creation, transfer, storage, retrieval, and utilisation of knowledge within firms and across organisational boundaries. We share the viewpoint of Becerra-Fernandez & Sabherwal (2010) that the fundamental processes in KM are the creation, sharing, and utilisation of corporate knowledge, with the goal of extracting maximum value from knowledge resources. Knowledge management aims to minimise knowledge loss and fill knowledge gaps (Al Shatti et al., 2018), providing competitive advantages to organisations (Babcock, 2004; Wang & Noe, 2010). Despite the importance and significance of knowledge for the success of a company, it should be noted that knowledge has limited value if it is not shared (Iftikhar & Lions, 2022; Small & Sage, 2006). The sharing of knowledge can be defined in various ways depending on the context in which it is considered (Tompang & Yunus, 2017). Knowledge Sharing (KS) is a crucial process in knowledge management that makes knowledge, expertise, and skills accessible to others (Wang & Hu, 2020). KS involves the movement of knowledge among different units and participants within an organisation (Andreeva & Kianto, 2011). Therefore, it is a process through which knowledge held by individuals is transformed into a form that can be understood and used by others, benefiting everyone. In this way, KS is an important tool that converts individual knowledge into collective organisational knowledge (Mohajan, 2019). The importance of knowledge sharing in knowledge management can be interpreted as a blood circulating in the body (Aliakbar et al., 2012). Knowledge sharing is a process in which employees disseminate their knowledge within the organisation (Ryu et al., 2003). Ayodele et al. (2016) define knowledge sharing as an activity through which knowledge (information, skills, or experience) is exchanged among people within an organisation. According to Khakpour et al. (2009, p. 44), knowledge sharing is defined as "knowledge transfer from the source of knowledge to a recipient of knowledge". The authors specify that the source of knowledge can be an individual or an organisation, and the recipient of knowledge (the core and purpose of knowledge sharing) should not be passive but actively participate in the sharing process. Becerra-Fernandez & Sabherwal (2010) define knowledge sharing as the process through which knowledge (explicit or tacit) flows between individuals or is used by others (groups, departments, or organisations). On the other hand, Bartol & Srivastava (2002) define knowledge sharing as the sharing of information, ideas, suggestions, and expertise related to the organisation between individuals. Knowledge sharing leads to the dissemination of valuable knowledge within the organisation and reduces the risk of knowledge leakage outside of it. In the specialised literature on KS, two perspectives are considered: one-way or two-way. According to the one-way perspective, sharing involves the dissemination of knowledge in one direction, from the provider to the receiver (Yi, 2009) and the author argues that sharing depends entirely on the provider, rather than the knowledge receiver. However, this rarely happens, for example, when an experienced employee shares knowledge with a novice.

In all other cases, sharing is considered two-way, where employees exchange knowledge, experience, thoughts, and skills related to the work process. Most researchers share the two-way perspective of KS. For example, Mohajan (2019) considers KS as a two-way process in which staff members share and exchange their knowledge. Emphasizing the reciprocity in knowledge sharing, Van Den Hooff et al. (2012) view knowledge sharing as a two-way process in which individuals reciprocally exchange their knowledge and collaboratively generate new knowledge. Similarly, Zebardast et al. (2020) share the view that individuals mutually transmit their knowledge and experience to each other. Lin, C. P. (2007) also considers knowledge sharing as a bidirectional process where individuals share organisationally relevant experiences and information with each other.

3. LITERATURE REVIEW

Sharing knowledge is vital for organisations, but it cannot be achieved if people are not motivated to do so. Knowledge belongs to the individual, and they are the ones who decide whether to share it with others or not. In other words, an employee cannot be forced to share their tacit knowledge. Sharing tacit knowledge cannot be included as an obligation in an employee's employment contract, and workers cannot be penalised for withholding tacit knowledge (Osterloh & Frey, 2000). Employees in a company need to be motivated to share their knowledge. This means that managing individual motivation should become a central theme for those in charge of knowledge management within the company. To manage motivation, it is necessary to examine the factors that influence employees' willingness to share knowledge and their behaviour. Liu & Fang (2010) examine motivation in terms of its source and classify it into intrinsic and extrinsic, clarifying that these two types of motivation are not mutually exclusive and can coexist in an individual simultaneously, at varying levels of intensity. Intrinsic motivation develops in the early stages of a person's life (Nguyen et al., 2019). It implies that individuals find the activity itself interesting, enjoyable, effective, and stimulating (Foss et al., 2009). People are willing to share their knowledge because they feel satisfied or fulfilled when they see the positive outcomes of the assistance they provide to others in the community (Lin, 2007). Intrinsic motivation includes the qualities of an employee to engage in a task for his/her benefit (Hsu et al., 2007) and it encompasses interest in a specific activity, altruism, the pleasure of helping others, enjoyment, curiosity. Unlike intrinsic motivation, external motivation arises from external pressure (Olatokun & Nwafor, 2012) and comes from certain expectations or targeted reasons for performing a specific activity, determined by various types of rewards (Ipe, 2003), reciprocity (Chang & Chuang, 2011), support from management (Jabbary & Madhoshi, 2014), community status, and reputation (Chang & Chuang, 2011). The strength of the influence of intrinsic and extrinsic motivation on attitudes, intentions, and behaviour regarding knowledge sharing differs. For instance, a study by Cho et al. (2015) demonstrates that the impact of intrinsic motivation on knowledge sharing is nearly twice as strong as that of extrinsic motivation. Additionally, intrinsic motivation for knowledge sharing tends to be more enduring and sustainable over time (Pee & Lee, 2015). Lin (2007) conducted a study involving 172 employees from 50 large organisations in Taiwan and found that the motivational factor "pleasure of helping others" is strongly associated with employees' attitudes towards knowledge sharing and their behaviour in knowledge sharing activities. The external motivational factor "reciprocal benefits" is also found to be positively related to the intention to share knowledge. However, Lin did not discover any significant relationship between expected organisational rewards and attitudes or intentions towards knowledge sharing. Amayah (2013) identifies three categories of motivating factors that influence an employee's willingness to share knowledge with other employees: personal benefits, community-related considerations, and normative considerations. Generally, people are motivated to share their knowledge because they expect sharing to bring them benefits.

These benefits can take various forms, such as status and career advancement, improved professional reputation, emotional or intellectual gains. People are inclined to actively participate in the knowledge sharing process when they perceive it as enhancing their professional reputation and when they feel strongly connected to others in the community. Considerations related to community refer to the moral obligation that people feel towards the community they belong to. By sharing knowledge, they establish connections with their colleagues, build a stronger community, or reinforce their position within a particular community. Normative considerations encompass the values and cultural norms that employees adhere to and that influence their attitudes and behaviours in knowledge sharing. In their study, Razmerita et al. (2016) found that the most important individual-level factors that motivate people to share their knowledge are the joy of helping others, the awareness of the importance of knowledge sharing, the recognition that it is valuable for the company they work for, the encouragement and acknowledgement of knowledge sharing by the employer, and the integration of knowledge sharing as an integral part of the organisational culture. According to Chang & Chuang (2011), knowledge sharing (KS) is more likely to occur when individuals are motivated. They conclude that reputation building and status enhancement are important motivating factors for knowledge sharing. KS is also facilitated by a strong sense of reciprocity, both in terms of giving and receiving assistance, as well as a strong sense of fairness. Altruism, identification, reciprocity, and shared language have a significant and positive effect on KS, while reputation, social interaction, and trust have a positive effect on the quality but not the quantity of shared knowledge (Chang & Chuang, 2011). Hung et al. (2011) conclude that motivational factors such as reciprocal benefits, self-efficacy, and the pleasure of helping others have a strong relationship with employees' attitudes and intentions to share knowledge. In contrast, rewards (monetary or non-monetary incentives to encourage knowledge sharing) as an external motivational factor do not show a significant influence on employees' attitudes and intentions to share knowledge. Rewards are only a temporary measure to overcome barriers that hinder the knowledge-sharing process, as individuals tend to revert to their previous behaviour once the rewards are discontinued (Hsu et al., 2007). Although rewards are considered a powerful motivating factor for knowledge sharing (Lin & Lo, 2015), the results of some studies indicate that they do not influence or may even have a negative relationship with attitudes and behaviours toward knowledge sharing (Bock & Kim, 2002; Cheah et al., 2009).

4. METHODOLOGY

In the current study, the motivating factors for knowledge sharing were identified based on a literature review and taking into account the author's research experience in this field. An online survey was conducted from February 16, 2023, to March 17, 2023, in collaboration with the German-Bulgarian Chamber of Industry and Commerce (GBCIC) to assess the impact of factors motivating individuals to share their knowledge. For this purpose, a survey questionnaire was developed, structured into four main sections: general company information, knowledge sharing within the company, respondent's background information, and knowledge sharing - barriers and motivating factors. This approach allowed for gathering more information about the knowledge sharing process within the surveyed companies, although this report focuses solely on the motivating factors for knowledge sharing. The survey questionnaires, along with the accompanying letter explaining the nature and objectives of the study and indicating the deadline for questionnaire completion, were sent to 420 companies operating in Bulgaria and included in the GBCIC database. The fully completed questionnaires returned were 57 (13.57%). The scope and formulations of the motivating factors for knowledge sharing are presented in Table 1.

№	Factors motivating knowledge sharing
1.	Career advancement/growth
2.	Recognition and respect from colleagues
3.	Recognition from management
4.	Monetary rewards/bonuses
5.	Professional growth
6.	Support from management
7.	Satisfaction from knowledge sharing
8.	Building strong relationships with colleagues
9.	Reciprocity

Table 1: Motivating factors for knowledge sharing

The participants in the study were asked to indicate the extent to which they agreed with the provided knowledge-sharing motivating factors. A five-point Likert scale was used, ranging from 1 (strongly disagree) to 5 (strongly agree). Calculating the mean score allows for ranking the motivating factors based on the strength of their influence on individuals' motivation to share their knowledge.

5. RESULTS AND DISSCUSSION

The companies participating in the survey are from various economic sectors, different size groups, and have different capital origins. They represent 24 industries, with the largest share held by companies from the "Information Technology and Software" sector (10.53%), followed by "Consulting Services" and "Mechanical Engineering" at 8.77% each, and "Law", "Logistics and Freight Forwarding" and "Wholesale and Retail Trade" at 7.02% each. Large and medium-sized enterprises dominate, accounting for 31.58% each, followed by small enterprises at 28.07%, and micro-enterprises at 8.77% (Fig. 1). The share of companies with Bulgarian and foreign capital is equal, at 40.35% each, while the remaining companies have mixed capital, with more than half of the surveyed firms (52.63%) being part of a larger foreign organisation.

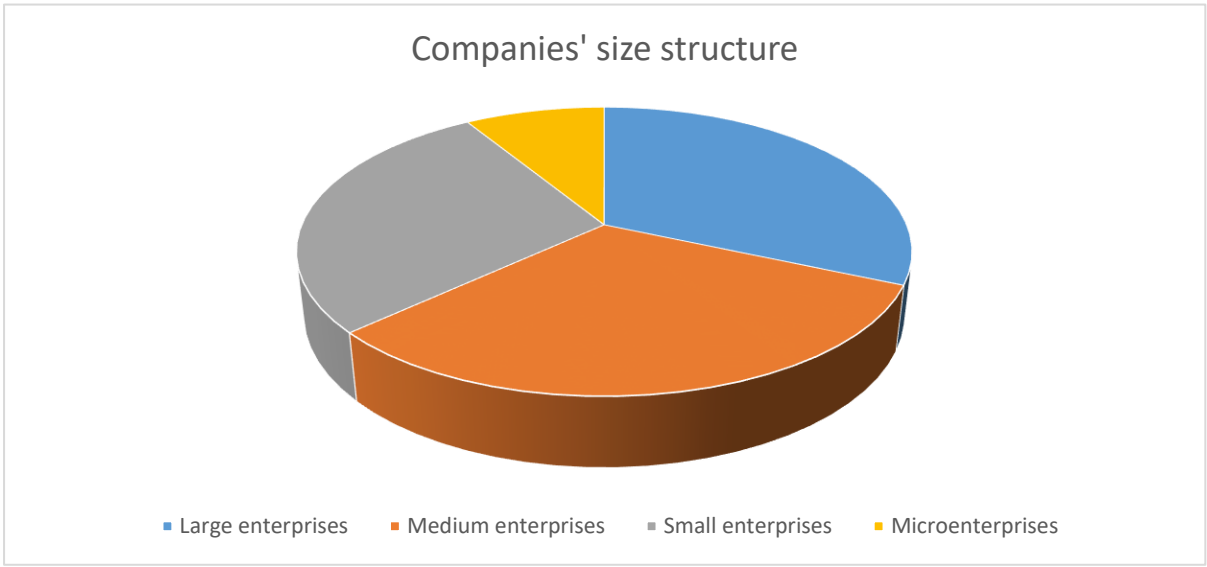

Figure 1: Companies' size structure

Nine of the surveyed companies (15.79%) have established a knowledge management unit, while in almost half of the companies (45.61%), knowledge management is the responsibility of the Human Resources Department.

It is expected and understandable that 8 companies (small or micro-enterprises) responded that they do not require a dedicated unit for knowledge management. Convinced of the benefits of KM, 14 companies state that they will establish a unit in the future to manage organisational knowledge. Formal knowledge sharing (in the form of regular meetings, gatherings, discussions, team-building activities, trainings, mentoring, forums, etc.) prevails over informal knowledge sharing (spontaneous and irregular meetings and discussions in corridors, smoking areas, during lunch or banquets, phone calls, etc.). The questionnaires were mainly completed by managers, as well as by employees working in administrative and production departments of the companies, with 66.67% of the respondents being women. In terms of the length of service in the company, the largest group (35.09%) consists of individuals with more than 15 years of experience, while the smallest group (5.27%) includes respondents with less than 1 year of experience in the company. In Table 2, the average ratings given by the respondents for the mentioned motivating factors are presented in descending order. It should be noted that the respondents did not take advantage of the opportunity provided to them to add additional motivating factors to the list.

№	Factors motivating knowledge sharing	Mean
1.	Building strong relationships with colleagues	4.2456
2.	Satisfaction from knowledge sharing	4.1403
3.	Support from management	4.1403
4.	Recognition from management	4.0877
5.	Recognition and respect from colleagues	3.9825
6.	Professional growth	3.9298
7.	Reciprocity	3.6316
8.	Career advancement/growth	3.2807
9.	Monetary rewards/bonuses	3.1930

Table 2: Motivating factors for knowledge sharing, presented in descending order

As noted by Hislop et al. (2018), regardless of the approach adopted by an organisation, the motivation of employees to participate in such processes will be key to their success. Individual motivation is a critical factor influencing knowledge sharing. The results of the study showed that internal motivation plays a more significant role in the process of knowledge sharing than external motivation. Individuals with internal motivation willingly share their knowledge because they find this activity enjoyable, satisfying, meaningful to themselves and the community they belong to, and aligned with their personal values system. On the other hand, individuals who are externally motivated participate in the knowledge sharing process under the influence of external factors – due to fear of punishment, threats, support from management, expectations of receiving similar behaviour from the other party, promised rewards, bonuses, career advancement, etc. It should be noted that in real life, external and internal motivational factors for knowledge sharing act in combination, and the ratio of internal to external motivation varies for each individual. What motivates employees in Bulgarian companies to share their knowledge most is the opportunity to develop and strengthen their relationships with colleagues within the company. Knowledge sharing primarily develops at an individual level. It is a social process, involving the interaction and communication among individuals within a community. The more actively they participate in the knowledge sharing process, the stronger the connections and closer relationships are formed among the participants. Good relationships among community members, in turn, enhance mutual trust, and without trust, knowledge sharing becomes impossible. Secondly, the study showed that employees are highly motivated by the pleasure and internal satisfaction they experience when sharing their knowledge with colleagues, as well as by their interest in this activity.

This corresponds to the finding of Olatokun & Nwafor (2012) that employees who derive pleasure from helping others through knowledge sharing are more likely to engage in this process, meaning that the enjoyment of helping others is an important determinant of behaviour in knowledge sharing. Through empirical research, Wasko & Faraj (2005) also concluded that the enjoyment of helping others is positively associated with knowledge sharing. Support from management is the third most significant factor that encourages employees in Bulgarian companies to share their knowledge. This support can play an important role in eliminating the fears and concerns that some employees have regarding sharing their knowledge with others, such as the fear of losing their competitive advantage and becoming easily replaceable. Recognition from management, recognition and respect from colleagues, and opportunities for professional growth are other factors that motivate individuals to share their knowledge. Recognition from management is present when they value the employee's knowledge and utilise it in making managerial decisions. Knowledge sharing is a way to gain respect of the people you work with and be recognised by them as an expert in a particular field, thus building and improving your reputation within the team. In general, reciprocity is based on the mutual giving and receiving of knowledge. Reciprocity is usually considered an important external motivating factor. However, our study showed that reciprocity does not have a strong influence on employees' intentions to share their knowledge, meaning that they share their knowledge without expecting reciprocal behaviour from others. Furthermore, in reciprocity, there is always an element of uncertainty as to whether the knowledge received in return will be useful and applicable to the work one performs (Hislop et al., 2018). Although rewards are considered an effective tool for promoting knowledge sharing (Bartol & Srivastava, 2002), our research showed that they do not influence the attitudes and behaviours of employees to participate in this process. It confirmed the findings of previous studies that rewards are not positively correlated with knowledge sharing (Bock & Kim, 2002). Knowledge sharing can to some extent be described as a spontaneous process in which people share what they know without necessarily considering whether it will bring them any benefits or not.

6. CONCLUSION

Every initiative for knowledge sharing is doomed to failure without strong motivation from individuals and within an environment that supports sharing. Understanding the motives that drive people to share their knowledge with each other is of crucial practical importance. The discussed motivating factors above play different roles in shaping and reinforcing employees' behaviour in the process of knowledge sharing. The results of this study, albeit limited in scope, offer some guidance to managers for improving knowledge sharing processes within their companies. Identifying and assessing the impact of these factors on employees' internal and external motivation will facilitate them in knowledge management, particularly in the context of knowledge sharing. Ensuring a continuous flow of knowledge within an organisation is not an easy task and requires intensive efforts from the management. It is the task of management to build a culture that encourages employees to share their knowledge and maintains an environment in which people feel motivated and free to do so. Additionally, it is advisable to apply an individualised approach to motivating employees, as different individuals may be motivated in different ways to share their knowledge.

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IMPACT OF INNOVATIVE INDEX EVENT STUDY ON US AND CHINESE FINANCIAL SECTOR

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ABSTRACT

This paper analyzes the impact of launching a new RMB exchange rate index on the financial industry sector for both U.S. and Chinese stock markets by applying the methodology of event study. The abnormal returns of selected listed companies were calculated based on the actual market data for 261 trading days. The results show that introducing the new RMB exchange rate index affected the financial industry sector of the Chinese stock market for a greater number of days than the impact on the financial industry sector of the U.S. stock market. This useful information can be tapped for introducing efficient management of the financial industry sectors in a differential framework.

Keywords: *CFETS Exchange Rate index, Differential efficiency, Financial Industry Sector of Stock Market, Return of Stock, RMB*

1. IMPACT OF INNOVATIVE INDEX EVENT STUDY ON US AND CHINESE FINANCIAL SECTOR

As a foundation of many financial theories and practices, the efficient market hypothesis refers to one of the most fundamental issues in finance dealing with why and how prices change in the stock markets. The term "efficient market" was firstly introduced in a paper written by Professor Eugene Fama in 1965. This hypothesis states that stock prices fully reflect all available information about the value of the firms. Our paper deals with the efficient market hypothesis to empirically examine how new information, launching a new RMB exchange rate index, affected the financial industry sector of stock markets in U.S. and China. With the tendency of business globalization and accompanied growth of their economy, China has gotten involved with international business in a variety of countries around the globe. So their currency, the Renminbi (RMB), plays a more important role in the global trading community than it used to do. It joined the ranks of the US Dollar, British Pound Sterling, Euro and the Japanese Yen as the fifth elite currency in October of 2016. Chart 1 shows the movement of USD/RMB exchange rate from 1981 to 2015. As the policy associated with the RMB exchange rate changed, it was expected to, and did, have a variety of effects on different economic issues impacting not only the Chinese economy but also its global trading partners. An earlier research by Bishnoi and Lan using monthly data from July 2005 to September 2013 showed that under RMB appreciation, the relationship between the Shanghai Stock Exchange (SSE) Composite Index and RMB exchange rate to be negative, while the relationship between the S&P 500 Index and RMB exchange rate was positive.

Chart following on the next page

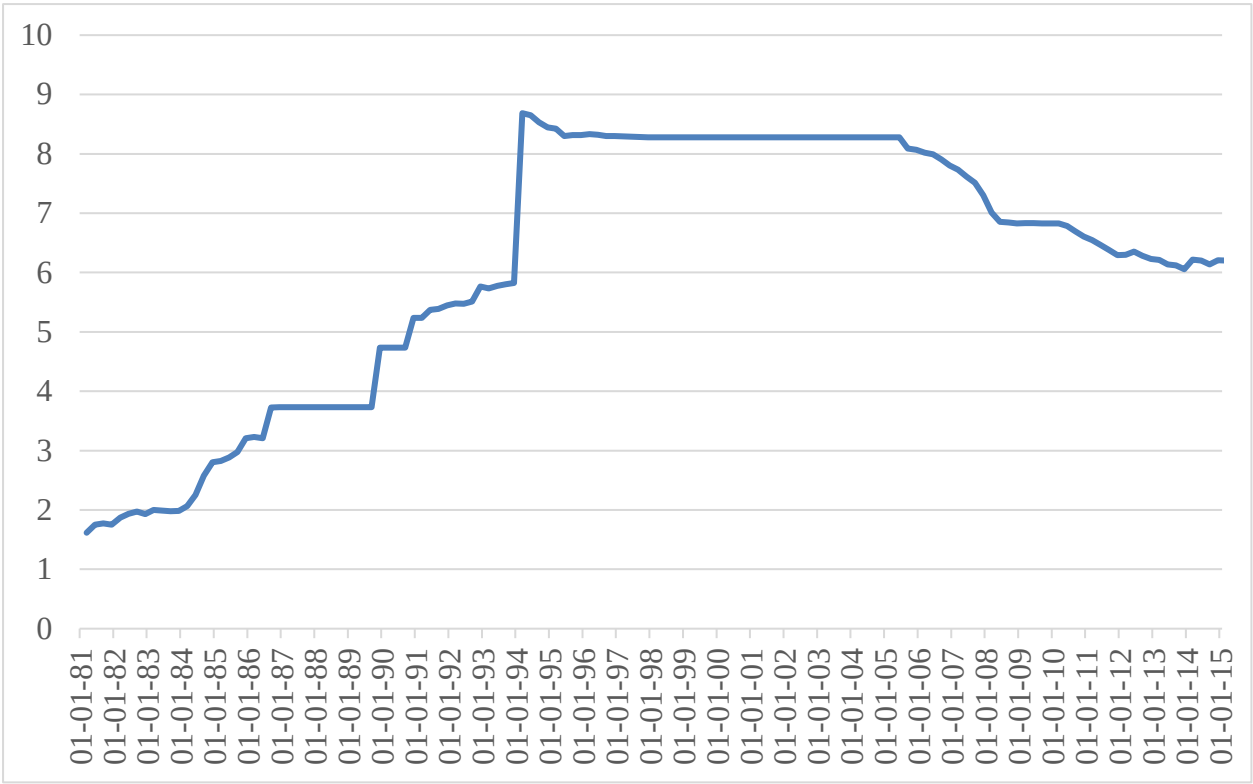

Chart 1: USD/RMB Exchange Rate
(Data Source: Bloomberg)

Several phases in the development of the Chinese exchange rate system are visible since the country was founded. No integrated exchange rate was used in the country from 1949 to 1952. The exchange rate of RMB was depended on the demand and supply in foreign exchange market in that time period. From 1953 to 1979, they applied the fixed exchange rate system whereby the exchange between the U.S. dollar and RMB was fixed at around $1=RMB2.20. After 1971, the U.S. unilaterally terminated convertibility of the U.S. dollar to gold as the Bretton Woods system was seen as breaking down. Meanwhile, China applied a dual exchange rate system from 1981 to 1993 by applying a fixed exchange rate system for international settlements at around $1=RMB2.80. After 1994, the country adapted a managed floating exchange rate regime based largely on the demand and supply in the foreign exchange market. With the intensification of the Chinese financial revolution, it vigorously implemented the managed floating exchange rate regime in 2005. The People's Bank of China increased the magnitude of the exchange rate fluctuation between the U.S. dollar and the RMB from 0.3% to 0.5% in May of 2007 and further modified it to 1% in April of 2012. Thus in the foreign exchange markets, the major participants have continued to use a bilateral exchange rate of RMB against the U.S. dollar to assess the exchange rate movement for a very long time. Albeit the China Foreign Exchange Trade System published a new RMB exchange rate index, also known as the CFETS exchange rate index, on its website on December 11, 2015. This event was a signal that China was loosening its long-time peg of the RMB to the U.S. dollar and was targeting a basket of currencies instead. Since this event happened on the eve of a widely expected and long overdue U.S. Federal Reserve rate hike, it also accelerated the depreciation of the RMB. This paper focusses on examining the influence of this event on the daily return of stocks in the financial industry sector of U.S. and China.

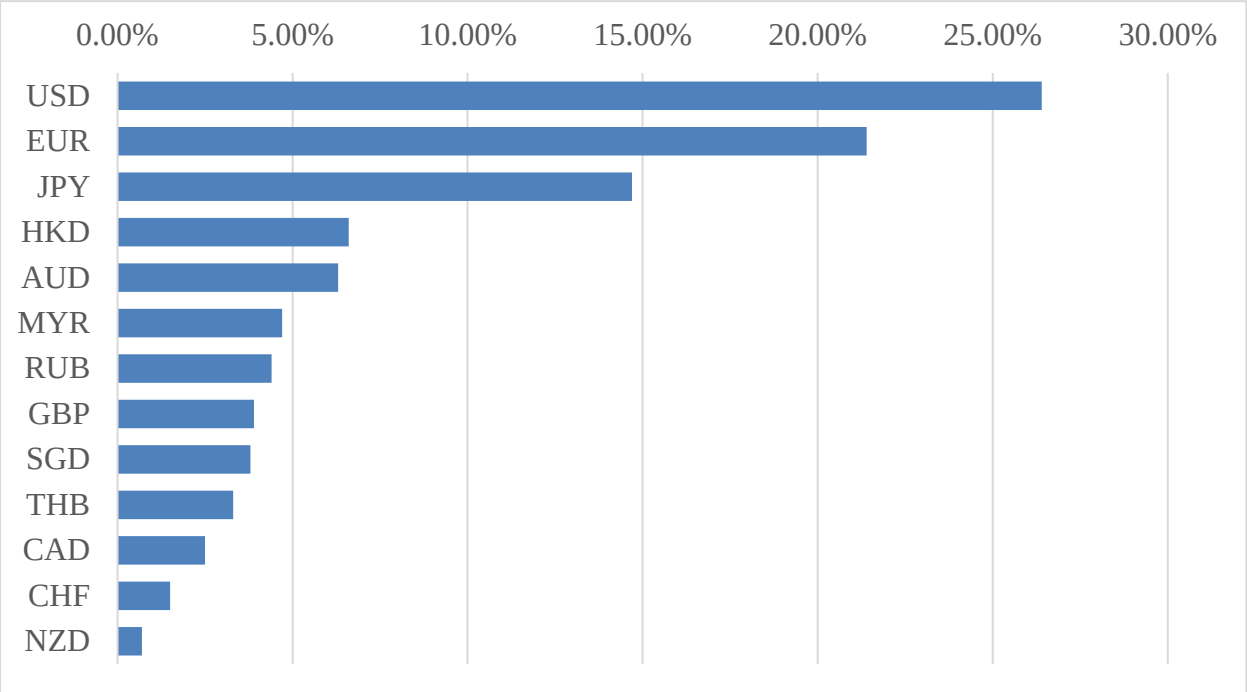

Chart 2: Construction of CFETS Currency Basket
(Data Source: China Foreign Exchange Trade System)

Chart 2 shows that the CFETS exchange rate index referring to a basket including 13 currencies which were selected based upon international trade-weights with adjustment for re-export trade factors. The top 3 currencies in this basket are U.S. dollar, Euro and Japanese Yen, with weights of 26.4%, 21.4% and 14.7% respectively.

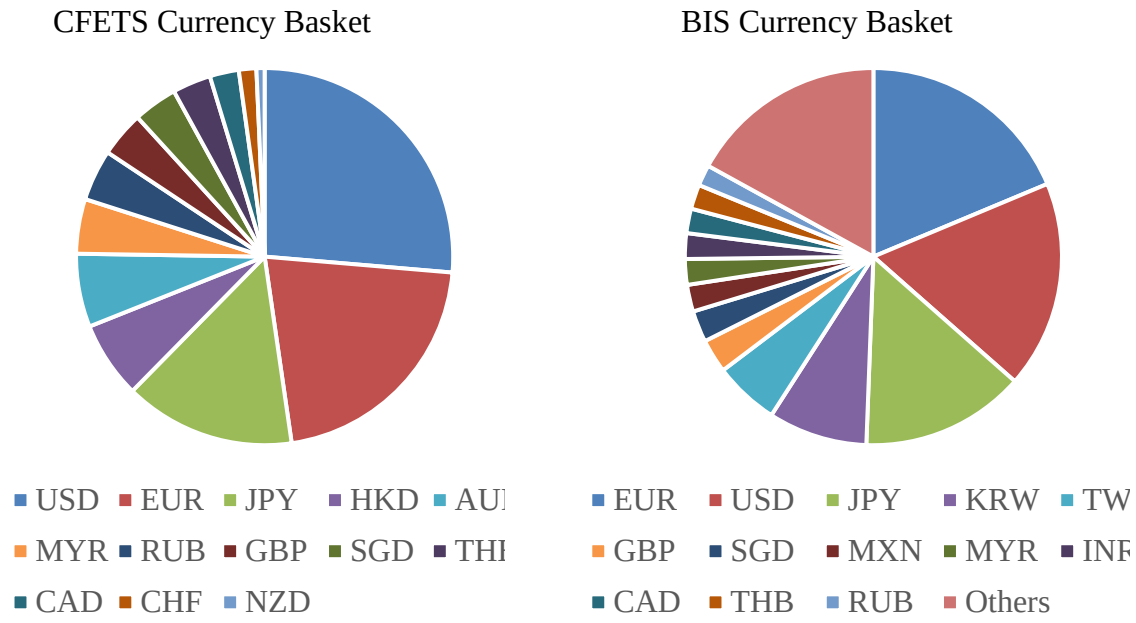

Chart 3: Comparison between CFETS and BIS Currency Basket
(Data Source: China Foreign Exchange Trade System)

Chart 3 compares the weights of different currencies in the CFETS exchange rate index and the BIS effective exchange rate index. Weights assigned to the major currencies including U.S. dollar, Euro, Japanese yen, Australian dollar, Malaysian Ringgit and British pound in the

CFETS exchange rate index are higher than weights assigned to these currencies in the BIS effective exchange rate index. In addition, whereas the BIS effective exchange rate index diversifies the weights into 40 currencies, the CFETS exchange rate index focuses on 13 dominant currencies. The CFETS regularly publishes the RMB exchange rate index to guide market participants in focusing more on the basket- based exchange rate instead of the bilateral RMB/USD exchange. The stability of this index can be seen from the published data on file. By the end of November 2015, the above two indices had appreciated by only 3.50% and 1.56% respectively since the end of 2014. Chart 3 shows the movement of these three indexes in latest three months. In order to provide more reference points, CFETS also publishes RMB exchange rate indices based on the SDR currency basket and the BIS currency basket respectively.

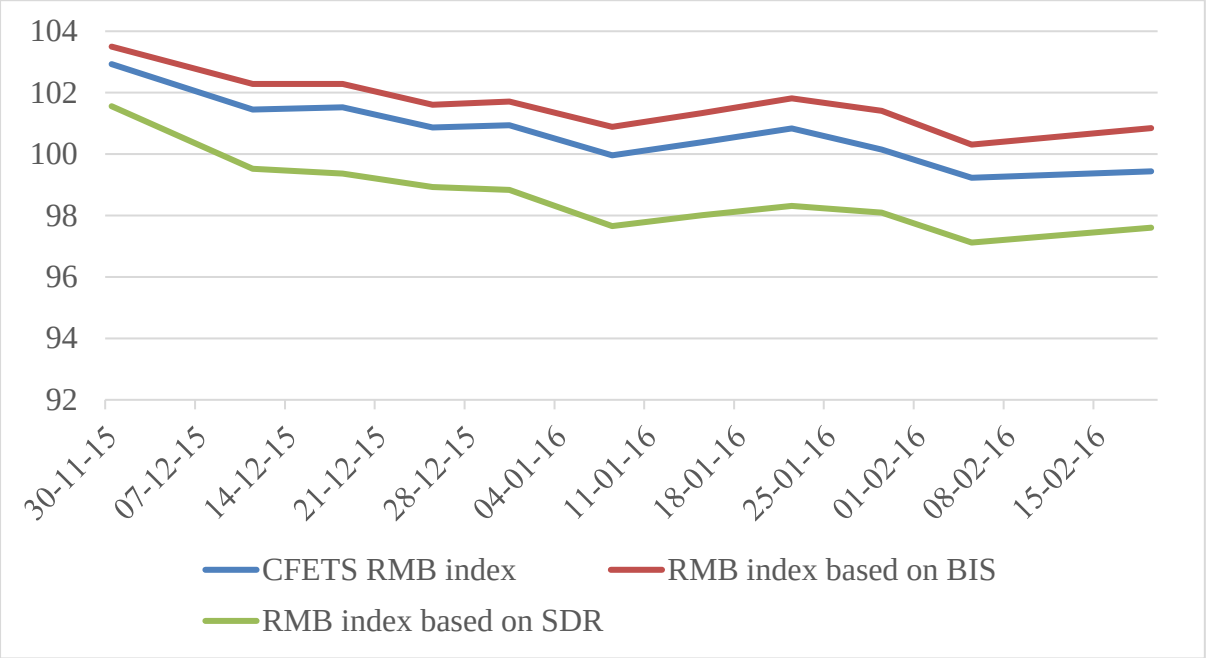

Chart 4: Movement of Each Index
(Data Source: China Foreign Exchange Trade System)

2. LITERATURE

Most research related to RMB exchange rate index is majorly indicative of the different methods to calculate the index and the effects of the application for the index. Wang Yang and Rong Jing (2015) took the characteristic of China's foreign trade into consideration and created net import partner and net export partner currency baskets based on the traditional RMB effective exchange rate while also measuring the fluctuation of RMB effective exchange rate from the perspective of China's net import partners and net export partners which made an effective supplement for the traditional RMB effective exchange rate. They concluded that due to the deep influence by U.S. dollar, the net import index, net export index and BIS broad index are highly correlated. Guo Kun and Cheng Siwei (2012) found that the RMB exchange rate index is strongly related to several macro-economic variables of China, such as total trade volume, CPI and industrial added value. They also applied the trade date of 2009 and indicated that the currency basket of RMB should be determined by considering the international trade with Euro zone and the re-export business of Hong Kong. In order to analyze the RMB exchange rate regime based on the price index of a basket of goods, Li Yang (2013) introduced the continuous contracts trading prices of four domestic futures and spot exchanges replacing the prices of the 40 items in the basket. The research showcases the results of weighted price index of a basket of goods as the anchor of RMB exchange rate.

Xu Guoxiang et al (2014) proposed a theory and method for compiling the RMB exchange rate index and designed a comprehensive multi-angle programming of the RMB exchange rate index system, which includes the RMB developed market index, RMB emerging market index and RMB whole market index. This RMB exchange rate index system could be applied to analyze China's import and export competitive conditions under different markets. Breaking away from most research focus previously on the methods of RMB exchange rate index calculations, we examine the effects of launching a new RMB exchange rate index which highlights the de-pegging of the RMB to the U.S. dollar and its impact on the financial sector of the stock market.

3. DATA COLLECTION

For our sample, we selected 32 listed companies associated with the financial industry sector in the U.S. stock market and the Chinese stock market. For each company, we collected its daily adjusted closing stock prices for 262 days. Since the new RMB exchange rate index was launched on December 11, 2015, we define this day as day 0 and calculated 261 daily return observations for period starting at day -251 and ending at day 10 relative to the event. The first 251 days in this period (-251 to 0) is designated the "estimation period", and the following 10 days (0 to 10) period is designated the "event period."

4. METHODOLOGY

We applied the methodology of event study in this paper to examine the impact of introducing new RMB exchange rate index on both the U.S. and Chinese financial industry sector of the stock market. We used $R_{i,t}$ as the observed arithmetic return for security i at day t. Define $A_{i,t}$ as the excess return for security i at day t. For every security, the excess return for each day in the event period is estimated using the following formula:

(1) Mean adjusted returns

$$A_{i,t} = R_{i,t} - \overline{R}_i$$

$$\overline{R}_i = \frac{1}{241}\sum_{-251}^{-10} R_{i,t}$$

where $\overline{R}_i$ is the simple average of security i's daily returns in the (-251, -10) estimation period.

(2) Market adjusted returns

$$A_{i,t} = R_{i,t} - R_{m,t}$$

where $R_{m,t}$ is the return on the Center for Research in Security Prices equally weighted index for day t.

(3) OLS Market model

$$A_{i,t} = R_{i,t} - \widehat{\alpha}_i - \widehat{\beta}_i R_{m,t}$$

where $\widehat{\alpha}_i$ and $\widehat{\beta}_i$ are OLS values from the estimation period.

Given the excess returns based on each method, the statistical significance of the event period excess returns is assessed for each sample. The null hypothesis to be tested is that the mean day 0 excess return, such as the simple average of market model excess returns, is equal to zero, and thus concerns the average effect of an event on returns to shareholders.

The test statistic is the ratio of the day 0 mean excess return to its estimated standard deviation which is estimated from the time-series of mean excess returns. The test statistic for any event day t (in this case t=0) is

$$\frac{\overline{A_t}}{\hat{S}(\overline{A_t})}$$

Where

$$\overline{A_t} = \frac{1}{N_t}\sum_{i=1}^{N_t} A_{i,t}$$

$$\hat{S}(\overline{A_t}) = \sqrt{\frac{\sum_{-250}^{0}(\overline{A_t} - \bar{\bar{A}})^2}{251}}$$

$$\bar{\bar{A}} = \frac{1}{251}\sum_{-250}^{0} \overline{A_t}$$

and where N_t is the number of sample securities whose excess returns are available at day t.

5. RESULTS

For large sample (sample size n≥30), we test of hypothesis about population mean μ.

H_0: $\mu = 0$
H_a: $\mu \neq 0$ → two-tailed test

Test statistic:

$$\text{t} - \text{test value} = \frac{\overline{A_t}}{\hat{S}(\overline{A_t})}$$

T (Date)	U.S.	China	α = 0.050
	Two-tailed t-test value	Two-tailed t-test value	t(0.025)
10	4.1964	12.4497	2.042
9	1.3396	3.1827	2.042
8	10.3438	3.0340	2.042
7	10.8727	0.9299	2.042
6	5.2366	6.5799	2.042
5	8.9375	0.5700	2.042
4	8.7387	8.5937	2.042
3	14.0839	0.4472	2.042
2	10.3938	12.3949	2.042
1	1.0664	8.3183	2.042
0	13.3314	1.2264	2.042

We apply $\alpha = 0.05$ level of significance for a hypothesis test as seen in the above table. The financial industry sector in the U.S. stock market has t-test value of less than the table t value on day 1 and day 9. In contrast, the financial industry sector of stock market in China has t-test value of less than the table t value on day 0, day 3, day 5 and day 7. Thus we can reject H_0, accept H_a, and conclude that based on our research, we have evidence to prove that launching a new RMB exchange rate index did have significant effect on daily stock return on these days where the t-test value is less than the t table value. Overall, both financial industry sectors of the stock markets in the U.S. and China were affected by this event, but the impact was felt for longer in China.

6. CONCLUSIONS

This paper empirically examines the impact of launching a new RMB exchange rate index on both U.S. and Chinese financial industry sectors of the stock market. We collected stock prices of 32 listed companies related to the financial industry sector in the U.S. stock market as well as the Chinese stock market for 262 trading days. We then calculated the abnormal returns for these companies and evaluated the t-test valued of the abnormal returns for the event date and 10 days after the event. The results clearly show that introducing the new RMB exchange rate index, by which China de-pegged RMB to U.S. dollar and targeted a basket of currencies, affected the financial industry sector of the Chinese stock market for more days than it influenced the financial industry sector of the U.S. stock market. This useful information can be tapped for introducing efficient management of the financial industry sectors in a differential framework.

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INTEGRATION OF EDUCATIONAL INNOVATIONS IN BULGARIAN SCHOOLS

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ABSTRACT

The report clarifies the essence of educational integration. Emphasis is placed on the efforts of the educational system in spreading innovative approaches and techniques. The thesis that educational integration is the path to innovation and modernization of Bulgarian education is defended.

Keywords: *education, educational integration, educational innovations, innovative school*

1. INTRODUCTION

The Bulgarian education system is called upon to provide educational products/services adequate to contemporary social and economic conditions. Educational innovation in general does not aim to eliminate the concepts and principles already established, but to transform them into new ones, creating a modern educational vision. Innovation is faced with the challenge of minimizing to the greatest possible extent the negative impact of unfavorable factors (lack of information, low level of qualification, weak motivation and leadership, lack of teamwork, poor management, etc.) through the integration of innovative methods, techniques , methods. In this regard, overcoming the problem areas is a prerequisite for the achievement of modern, quality education for all educational levels and in all structural units of the educational system. At the same time, it is also a foundation for building a society prepared for the professions of the future. All of this changes the role of education in creating favorable conditions that allow students to self-determine.

2. ABSTRACTION

Since the beginning of the 20th century, education has focused on the student's individuality. In order to ensure education adequate to modern times, priority is given to the development of personal potential, the prevention of early dropout of students from educational structures, the increase of motivation, commitment, humanity (Nikolaeva, 2021). Innovative learning as a type of social innovation is a change aimed at a complete renewal of the education system (Planinska, 2018). This, in turn, is an invariable condition for increasing motivation and results, developing key competencies that promote leadership, responsibility, an active position, initiative, and the ability to take risks. Specific to innovative education is the preserved object-subject relationship, with each individual student as an object. (Planinska, 2018). During the first years of democratization in Bulgaria, the concepts of "intellectual education" and "educational integration" appeared (Totseva, 2010). The term "integration" is of Latin origin and in literal translation means uniting separate parts or elements into a single whole (Rechnik, 1978). Integration is a process of turning "previously separate units into constituent parts of an unified system" (Ivanova, 1998). "Educational integration is a process of uniting educational subjects within a common educational environment to meet the same educational standards" (Nunev, 2009). Education is carried out in accordance with Bulgarian legislation through a variety of methods and forms, tailored to the identity. In the inclusive policies of the European Union, educational integration aims to: ensure equal access to quality education for all; to affirm the intercultural education; to create prerequisites for successful socialization; to encourage mutual respect, understanding and cooperation (Ivanova, 1998).

Integration should be understood as a way of perceiving and spreading innovative methods, techniques, processes, allowing positive changes in education, ensuring an increase in the results of the educational process, and in particular, the achievements of the individual. Innovations in education aim to turn the student into an invariable participant in the innovative educational process. The teacher takes on the role of supervisor, co-researcher and simulator. Learning activities can be characterized as follows (Vasileva, 2004):

- active involvement of all participants in the learning process;
- cooperation;
- research work;
- communication in the form of a conversation;
- encouraging students to find answers themselves;
- supporting team work;
- supporting individual work;
- rejection of the standard method of assessment;
- encouraging self-esteem.

A prerequisite for the creation of a new culture of learning and life is the new world order, including the concern for the development of competences. Education, offering adequate tools for acquiring knowledge and competitiveness, is built on the new principles. From this it follows that the inefficiency of the traditional educational process is due to: the lack of bilateral reciprocity in the teacher-student relationship; limitations regarding creativity, experience, individual search for results, acquisition of "ready-made" knowledge, etc.
Therefore, the emerging new education is oriented towards (Rogers, 1983):

- a foundation built in the system of basic education for all;
- developing skills for broad integration;
- constant self-improvement;
- self-education, self-training, self-qualification, self-evaluation, etc.

The modern educational environment prioritizes the construction of a model and/or strategy oriented towards finding solutions through the integration of new good practices. The path to achieving quality, proven through successful implementation, introduces and popularizes educational innovation. The first official state document in which the term "innovations" appears is the Pre-school and School Education Act (Totseva, 2018). One of its main principles is innovation and effectiveness of pedagogical practices and the organization of the educational process (Ministry of Education and Science, 2016). In this direction, the Ministry of Education and Science is making tremendous efforts for successful educational integration at all levels and in all structural elements of the system, highlighting several priority areas (Ministry of Education and Science, 2016):

- inclusion of children in education structures as early as possible;
- inclusion and retention of persons from vulnerable groups in the system;
- adapting curricula and programs to meet business needs;
- integration of innovative approaches and methods.

As a result of innovative activity and educational integration, the aim is to improve the learning process. The innovation of the Bulgarian school allows the application of good practices, which determine educational achievements. In this aspect, the innovative school has the following main characteristics (Radev, 2018, p. 69;70):

- innovative educational ideas;
- increased parental involvement in school life;

- use of good practices;
- introduction of different learning styles;
- high level of learning through experience;
- going beyond standard measures of success.

In this sense, the improvement of the quality of education is achievable in schools which (Ministry of Education and Science, 2016):

- develop and introduce innovative elements in terms of the organization and/or content of training;
- organize the management in a new or advanced way;
- use new teaching methods;
- develop new learning content.

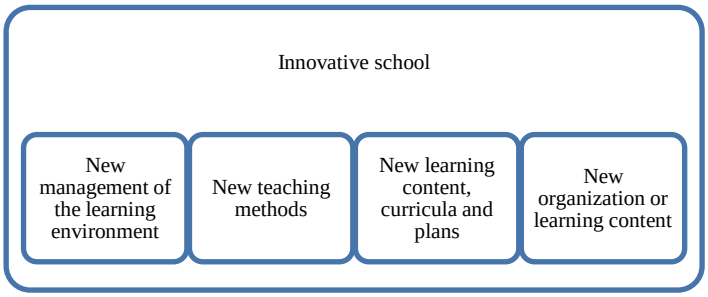

Figure 1: Innovative school
(Source: Adapted from (Ministry of Education and Science, 2016))

Today, 542 out of a total of 1,948 have the status of innovative schools, and the first ones were launched in the 2017/2018 school year.

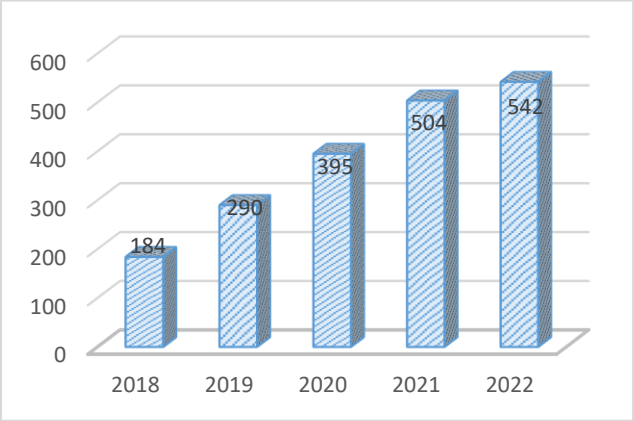

Diagram 1: Number of innovative schools
(Source: Adapted from (Ministry of Education and Science, 2023))

Diagram 1 shows the change in the number of innovative schools over the last five years. We can quite reasonably claim that this progress is a major indicator for improving the overall educational vision and the results of each of its participants. To acquire the status of an innovative school, an application is made by developing a project proposal for pedagogical innovation, which covers all or part of the participants in the educational process and can last up to 4 years (MES, 2016). The Minister submits to the Council of Ministers a proposal to adopt a list of innovative schools by May 31 each year (Ministry of Education and Science, 2016).

The project proposals are evaluated by a commission in which psychologists, sociologists, pedagogical specialists, natural and legal persons take part (Ministry of Education and Science, 2016). Diagram 2 shows the distribution of innovative schools in all regions of the Republic of Bulgaria.

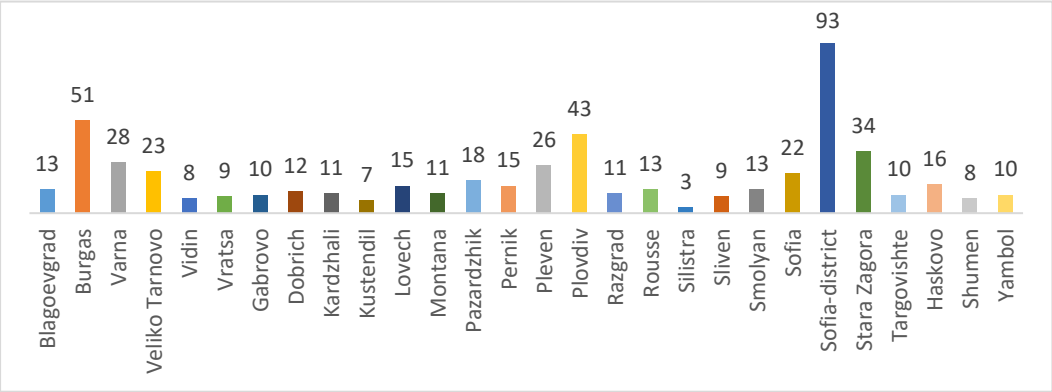

Diagram 2: Number of innovative schools by district
(Source: Adapted from (Ministry of Education and Science, 2023))

The highest concentration of innovative schools is observed in the city of Sofia, followed by Burgas region and Plovdiv region, and with the fewest schools included in the list of innovative ones are Silistra region, Gabrovo region and Vidin region. Another opportunity to integrate educational innovations is the National Program "Innovations in Action". From September 1, 2022 to October 21, 2022, any school can apply for this program within the academic year 2022/2023. The program is aimed at supporting schools and teachers implementing innovative activities, as well as schools with innovative practices and those with the potential to develop innovations in the field of natural sciences, digital technologies, engineering thinking and mathematics (STEM). The main goal of the program is (Ministry of Education and Science, 2023):

- Establishing a network of innovative schools;
- Providing targeted support for creativity development;
- Support for using innovative and interactive methods;
- Support for innovation in teaching methods;
- Developing the educational STEM environment, etc.

The existing policies to promote educational innovative integration are:

- Partnerships between schools and universities;
- Partnerships between schools and business organizations;
- Partnerships with non-governmental organizations;
- Platforms for the exchange of good practices between teachers:
  - http://www.etwinning.net/ (eTwinning);
  - http://www.schooleducationgateway.eu/ (School Education Gateway);
  - http://start.e-edu.bg/ (e-edu.bg);
  - http://www.teacher.bg (teacher.bg);
  - http://bglog.net/nachobrazovanie/ (BgLOG primary education);
  - https://ucha.se/ (Ucha.se);
  - https://www.shkolo.bg/ (Shkolo)
  - https://edu.mon.bg/ (A digital backpack).

Educational institutions themselves choose what innovations to implement in accordance with the individual needs of students and according to state educational standards, which largely support the integration of pedagogical innovations. Efforts in this regard are aimed at: introducing new teaching methods; creation of new curricula and programs; introduction of office and augmented reality applications; multimedia, interactive tools; digital technologies; new ways of managing educational structural units, etc.

3. CONCLUSION

Although the number of innovative schools increased almost three times over the last five-year period, their relative share compared to the total number of Bulgarian schools is still low. Equivalent to innovative activity in education are the attitudes of principals, teachers and administrative staff. And the activities themselves, linked to innovative educational integration, are equally adequate to the current situation and absolutely timely. The efforts made in the policies concerning Bulgarian education provide an opportunity to overcome a number of problems, make adequate decisions, and achieve quality. In this context, the modernization of Bulgarian education is a prerequisite for successful implementation. In this line of thought, the need to introduce innovative practices underpins the construction of a new model and/or strategy corresponding to traditional ones.

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ASSESSING THE QUALITY OF SUSTAINABILITY REPORTING: A CASE STUDY OF BULGARIAN SOFIX COMPANIES

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ABSTRACT

The main purpose of this study is to assess the quality of the sustainability reporting of the companies included in the SOFIX index of the Bulgarian Stock Exchange. Achieving this goal is based on the development and implementation of a methodology for assessing the quality of sustainability reporting. The methodology is based on publicly available information from companies' websites and assesses quality of sustainability reporting with a final score ranging from zero (no sustainability reporting) to twenty (sustainability reporting in accordance with global best practices). The result of the implementation of the methodology in the Bulgarian companies included in the SOFIX index shows that although there are some good examples, the overall assessment of the quality of sustainability reporting is rather unsatisfactory. Driven by regulatory requirements, sustainability reporting is most often limited to the minimum requirements set by the European Union Directive on Non-Financial Reporting (2014/95/EU).
Keywords: *Bulgarian Stock Exchange, ESG, GRI, SOFIX, Sustainability reporting*

1. INTRODUCTION

Sustainability reporting is now an established practice for the largest business organizations (KPMG International, 2022). Moreover, the importance of sustainability information is equated in importance with the financial information that companies are required to disclose. It is therefore no surprise that sustainability reporting is gradually transforming its nature from a voluntary activity to a mandatory part of the accountability of large enterprises. Thus, with the adoption by the European Commission of the Corporate Sustainability Reporting Directive (CSRD), all large European companies will be obliged to disclose information on sustainability, as well as to subject it to independent verification (audit). In addition, it is envisaged to develop and adopt uniform standards for reporting information on sustainability, as well as for its auditing. The time is not far when medium-sized enterprises will also be covered by this global process, of course with lighter requirements and procedures. These changes are aimed at overcoming two main problems, namely: the insufficient extent of dissemination of sustainability reporting (including the existence of significant differences between individual countries on this indicator) and the unsatisfactory quality of the information disclosed, as well as the overall reporting process. In our opinion, the second problem is much more important and at the same time much less studied. It destroys confidence in the concept of sustainability as well as in business organizations that claim to be sustainable. Moreover, it is precisely the gaps related to the quality of disclosed sustainability information that allow the process to be used as a tool for greenwashing (Wilson, 2013), (Roberts & Koeplin, 2007). This is why this study focuses specifically on the quality of sustainability reporting, meaning both the quality of the content of sustainability reports and the quality of the reporting process. This is because even the best quality sustainability report loses its meaning if it cannot be easily and quickly discovered by stakeholders. The aim of the research is to create and approve a methodology for quantitative assessment of the quality of sustainability reporting, which can be applied relatively quickly and easily, is applicable to companies from different sectors, allows self-assessment and comparison with other companies and past periods. The companies included in the SOFIX index of the Bulgarian Stock Exchange (BSE) were selected for the approval of the methodology.

This is the oldest and main stock index of the BSE. It is considered a benchmark index and reflects the performance of the fifteen most liquid and actively traded companies registered on the BSE.

2. LITERATURE REVIEW

The problem of assessing the quality of sustainability reporting is relatively poorly developed in the scientific literature (Hahn & Kuhnen, 2013). Most research in this area focuses on the degree of acceptance of sustainability reporting (Deloitte, 2019), (KPMG International, 2022), evaluation of the content of reports (Stefanova, Frances, Petrova, & Dineva, 2019), (Stefanova, et al., 2021), (The ESG Transparency Index of Ukrainian Companies 2020, 2020) or the relationship between reporting sustainability information and the company's financial performance (Hardiningsih, Januarti, Yuyetta, Srimindarti, & Udin, 2020), (Aggawal, 2013), (Alsahlawi, Chebbi, & Ammer, 2021). And while the share of companies that do not report information on sustainability is decreasing (KPMG International, 2022), problems related to the quality of disclosed information are still tangible and relevant (Michelon, Pilonato, & Ricceri, 2015). One of the main reasons for the existence of this problem is the lack of consensus among academics about what quality really is when it comes to sustainability reporting. Some authors equate it with the use of established reporting standards, guidelines and frameworks, such as the Global Reporting Initiative standards (Rezaee & Tuo, 2019). Others – by subjecting the sustainability report to an independent external review or audit (Al-Shaer & Zaman, 2018). Still others are more comprehensive, specifying a number of criteria that sustainability reporting should meet in order to be said to be of good quality (Khan, Bose, Mollik, & Harun, 2021). Among them are Hammond and Miles (2004), according to which, to be defined as qualitative, sustainability reports must meet the following requirements: inclusion of quantitative information; subjecting the report to an independent assurance review (verification); adopting appropriate goals and reporting progress towards their achievement; reporting negative information; use of established reporting structures, guidance and standards; inclusion of a statement (declaration) from the executive director or manager; inclusion of all important topics and issues; ensuring wide and easy access to the report. When evaluating reports in the Best Report category of the CR Reporting Awards ranking, Corporate Register recommends that voters be guided by the following five main quality criteria in the evaluation, namely: content, communication, credibility, commitment, and comparability (Corporate Register, 2023). Of particular note are the principles that the Global Reporting Initiative (2023) puts before organizations with a view to achieving quality sustainability reporting. This is the "gold standard" in sustainability reporting, and according to it, in order to guarantee quality, the following basic principles must be observed: accuracy, balance, clarity, comparability, completeness, sustainability context, verifiability, aligning and credibility. Other researchers go further, not just proposing a set of criteria for the quality of sustainability reporting but developing comprehensive methodologies for its assessment. One of the first attempts to create and implement such a methodology was implemented in 2013 by KPMG. In their study of corporate social responsibility reporting, they thoroughly evaluated the quality of reports published by the 250 largest companies, as ranked by Forbes. This assessment is based on seven criteria, namely (KPMG, 2013): strategy, risk and opportunity; materiality; target setting and indicators; suppliers and the value chain; stakeholder engagement; governance of corporate responsibility; transparency and balance. The assessment scale that uses the methodology is from 0 to 100 points, and the average assessment of the investigated enterprises is 59 points. The other major consulting company, namely Deloitte, also offers its methodology for assessing the quality of sustainability reports, which is called the Sustainability Reporting Scorecard. It was later adapted by Habek (2014) and applied to the assessment of the quality of sustainability reporting of 32 Polish enterprises.

The methodology is based on 23 evaluation criteria (with 7 less than the criteria used in Deloitte's Sustainability Reporting Scorecard), distributed in 5 categories, namely: communication effectiveness, commitment and management quality, sustainable development program, quantitative assessment of performance, credibility. Each criterion is given a quantitative rating on a positive scale from 0 to 4. The average rating of the enterprises is 34% of the maximum possible, which, according to the author, means that sustainability reporting in Poland at that time was still in the initial stages of its development. A similar conclusion was reached by Astupan and Schönbohm (2012), who assessed the quality of sustainability reports published by Polish companies included in the WIG 20 and mWIG 40 indices of the Polish Stock Exchange. They apply a methodology that assesses the quality of the reports through 55 indicators, distributed in four directions - company profile & report parameters; corporate governance; Triple Bottom Line (TBL) dimensions; and accessibility and presentation. Depending on which category the indicators fall into, they are evaluated using a scoring system divided into three stages – basic scoring (from 0 to 1 points), qualitative scoring (from 0 to 1.5 points) and performance scoring (from 0 to 1 points). This means that the maximum score for each criterion is 3.5 points. The maximum number of points that a sustainability report can receive is 162.5, and the results show that the average result the WIG 20 is 57.40% and for the mWIG 40 is 31.76% from the maximum (Astupan & Schönbohm, 2012). Some authors believe that methodologies for assessing the quality of sustainability reporting should be adapted to the specifics of the industry in which companies operate. Among them are Khan, Bose, Mollik, and Harun (2021), who develop a methodology assessing the quality of sustainability reporting in the banking sector. It is based on a small number of indicators - 11, which are divided into two sub-dimensions - significance and reliability. The first sub-dimension is assessed through the indicators: connection of the sustainability strategy with the overall business strategy; stakeholder engagement; performance targets; performance indicators; and integration with business processes and operations. The second sub-dimension, namely reliability, is assessed using six indicators: ongoing feedback and stakeholder dialogue; trends over time; readability; external verification; accuracy; and value/timeliness of the data. The final score is obtained as an arithmetic mean between the weighted scores of all 11 indicators. As a summary of the literature review, the conclusion can be formulated that the theory still lacks a generally accepted methodology for assessing the quality of sustainability reporting. At the heart of this problem are differences in understanding of what constitutes quality as it relates to sustainability reporting and what are the best criteria by which to judge it. The question of the balance between the desire for the highest possible accuracy of the evaluation, which implies the use of more evaluation criteria, and the difficulty in its implementation, caused again by the number of criteria, remains open. In the reviewed methodologies, the criteria used vary from 11 to 55 in number.

3. METHODOLOGY

To create a methodology for assessing the quality of sustainability reporting, the basic concepts must first be defined. This means proposing definitions of the nature of sustainability, sustainability reporting, and then quality in that context. In this regard, it should be noted that there is a definition of the essence of sustainable development that can be presented as generally accepted. This is the definition given in The Brundtland Report, officially titled "Our Common Future." According to the Brundtland Report: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (World Commission on Environment and Development, 1987). However, the understanding of the essence of sustainability reporting is not so unified. There are a large number of definitions for it, given by both individual researchers and institutions, such as GRI, UN Global Compact, AccounAbility, The International Organization for Standardization (ISO)

and others. Despite their large number, it can be argued that there are no significant differences between the individual definitions where sustainability reporting (also known as corporate social responsibility reporting, corporate citizenship reporting, sustainability reporting, ESG reporting) can be defined as a systematic process of generating, evaluating, disclosing and communicating information about the economic, social, environmental and management performance of the organization so that its contribution to the achievement of sustainable development can be assessed. It can be implemented in practice by publishing a separate report, by integrating the information in the annual activity report (integrated report), by including it in the company's website or in another innovative way. The last and most important definition that needs to be given to develop an adequate methodology is to define what constitutes quality in terms of sustainability reporting. In this regard, based on the views on the main characteristics (criteria) related to the quality of sustainability reporting given by Hammond & Miles (2004), Corporate Register (2023), Global Reporting Initiative (2023) and KPMG (2013) it can be concluded that sustainability reporting is qualitative, which: regularly discloses, in an accessible and comprehensible manner, sufficient in volume, up-to-date, prospective, comparable, balanced and credible (audited) quantitative and qualitative information regarding all material topics, related to sustainability. After the basic concepts have been defined, the indicators should also be identified, which, together with the evaluation scale, are the basis of the methodology for measuring the quality of sustainability reporting. The evaluation indicators are defined in two main directions and are presented in table 1.

Code	Name	Description	Scale
I. *Indicators for the quality of sustainable reporting content:*			
I_1	Completeness (content)	Based on a materiality assessment, the report should contain a sufficient volume of information on all identified significant topics related to sustainability.	0-4
I_2	Actuality	The disclosed information must be up to date, i.e., to disclose the status at the time of reporting with respect to all material topics and matters.	0-4
I_3	Perspective	The information should put the process into perspective, i.e., to disclose the sustainability goals that the company has set for itself, as well as the progress made in realizing them.	0-4
I_4	Comparability	Disclosed information should allow comparability with previous periods and other enterprises. This means that it must contain information for at least one previous accounting period.	0-4
I_5	Measurability	The information that is disclosed must contain quantitative data and key performance indicators.	0-4
I_6	Balance	The information should include data on the company's negative sustainability footprint (pollution, work incidents and accidents).	0-4
I_7	Visualization	Information should be presented using appropriate visual elements – figures, tables, maps, multimedia components, etc.	
I_8	Credibility	The information should be subject to an external independent assurance assessment to increase stakeholder confidence in its credibility. Here it is important to indicate how much of the information has been independently verified and on what basis it was done.	0-4
II. *Indicators for the quality of the sustainable reporting communication process:*			
I_9	Regularity	The information must be disclosed regularly and in a timely manner. If possible, information on sustainability should be published simultaneously with the company's annual activity report, as both types of data - financial and sustainability - are equally important.	0-4
I_{10}	Communication	The information must be easily discoverable by interested parties. The best option is to publish it in a separate section of the company's website. It is a good practice for the information to be presented in at least two languages - the official one for the respective country in which the company operates and English.	0-4

Table 1: Indicators for assessing the quality of sustainability reporting (Source: author)

The adopted rating scale for the ten main indicators (I) of the quality of sustainability reporting is a 5-point Likert scale ranging from 0 (lowest rating) to 4 (highest rating). After each indicator receives its score, a final summary Quality of Sustainability Reporting (QSR) score is calculated using the following formula:

$$QSR_i = I_1 \times \left(\frac{\sum_{n=2}^{8}(I_n)}{7}\right) + \frac{\sum_{n=9}^{10}(I_n)}{2}$$

The final score is on a positive scale ranging from 0 to 20 points. It allows comparing the performance in a chronological order, i.e., with previous periods as well as with other organizations. The score is the result of the sum between two sub-indices. The first assesses the quality of the content of sustainability reports, where the score is obtained as the product of the assessment of the scope of the published information and the arithmetic mean value of the quality of this information (measured by the indicators of relevance, perspective, comparability, measurability, balance, visualization and credibility). This way of scoring is used to prevent the possibility of a company receiving a relatively high, but undeserved, score if it discloses a small amount of information (for example, only about the fight against corruption), but in accordance with the quality criteria. In this situation, if the most common approach for calculating the final assessment is used - by summing up the assessments of the individual indicators, the company would receive an almost maximum result. The second sub-index assesses the quality of the sustainability reporting process. This is necessary because the proposed methodology measures the quality of sustainability reporting, not simply the quality of the reports published for this purpose.

4. RESULTS

The methodology for assessing the quality of sustainability reporting has been approved among the companies included in the SOFIX index of the Bulgarian Stock Exchange (BSE) as of August 2023. These are the fifteen most liquid and most traded companies on the BSE. Basic information about them is presented in the form of a Table 2.

№	Company name	Activity	Website	Type of the sustainability report
1	Advance Terr fund	Financial and insurance activities	www.advanceterrafund.bg	No sustainability report
2	Bulgarian Real Estate Fund	Financial and insurance activities	www.brefbg.com	No sustainability report
3	Bulgarian Stock Exchange	Activities of holding companies	www.bse-sofia.bg	Non-financial declaration
4	CB Central Cooperative Bank	Financial and insurance activities	www.ccbank.bg	Non-financial declaration
5	CB First Investment Bank	Financial and insurance activities	www.fibank.bg	Non-financial declaration
6	Chimimport	Activities of holding companies	www.chimimport.bg	Non-financial declaration
7	Doverie United Holding	Activities of holding companies	www.doverie.bg	Non-financial declaration
8	Eurohold Bulgaria	Activities of holding companies	www.eurohold.bg	Non-financial declaration
9	Gradus	Financial and insurance activities	www.gradus.bg	Non-financial declaration
10	Holding Varna	Activities of holding companies	www.holdingvarna.com	Non-financial declaration
11	Monbat	Manufacturing	www.monbatgroup.com	Non-financial declaration
12	Neochim	Manufacturing	www.neochim.bg	Non-financial declaration
13	Shelly Group	Financial and insurance activities	www.allterco.com	No sustainability report
14	Sopharma	Manufacturing	www.sopharma.bg	Non-financial declaration UNGC COP
15	Sopharma Trading	Wholesale and retail trade	www.sopharmatrading.bg	Non-financial declaration

Table 2: Company information
(Source: https://www.bse-sofia.bg/bg/indices/sofix and companies' websites)

The assessment is based on publicly available information generated by the companies' websites. Through an analysis of their content, as well as the content of their annual activity reports, it was found that 80% of the companies surveyed disclosed information about sustainability. In absolute terms, these are 12 of the 15 companies surveyed.

The tool they all use to report sustainability is called a non-financial statement and is regulated in the Non-Financial Reporting Directive (Directive 2014/95/EU). According to this directive, enterprises of public interest, which have more than 500 employees, are obliged to include in their annual activity reports a non-financial statement, which should contain a minimum amount of social and environmental information. Of the 12 companies that reported sustainability by publishing a non-financial statement, 11 fall within the scope of the directive, and 1 publishes non-financial statement voluntarily (Bulgarian Stock Exchange). The same company also used a specialized ESG reporting tool. It is called "Oxygen" and is a web-based system created for reporting of sustainable practices by Bulgarian companies. Two of the studied companies are members of the United Nation Global Compact (UNGC) initiative, and one of them has published, in addition to its non-financial statement, the Communication On Progress, which is mandatory for every UNGC member organization. It should be noted that the two reports are largely identical. The other UNGC member company, namely the Bulgarian Stock Exchange, joins the initiative in 2022 and still has no obligation to report its progress. The conclusion that can be drawn from the data presented is that sustainability reporting among the surveyed companies is primarily driven by its mandatory nature. In this regard, it can be expected that the content of the reports will be limited to the minimum regulatory requirements, and when it comes to the non-financial declaration, they are not high at all. On this basis, it can also be hypothesized that the quality of sustainability reporting among the surveyed companies will not be high. It is fully confirmed by the results of the sustainability reporting quality assessment presented in Figure 1.

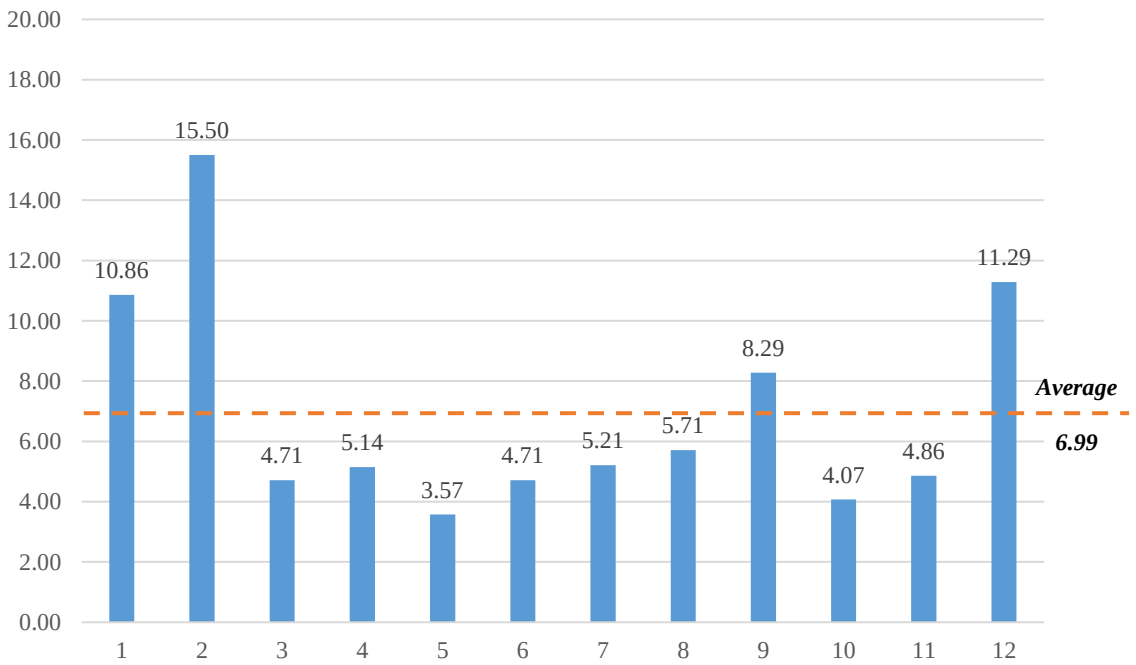

Figure 1: QSR assessment results
(Source: author's calculation)

The average rating for the quality of the sustainability reporting of the surveyed enterprises can be defined as low - 6.99 points out of a maximum possible 20.00 points. In addition, approximately 67% of companies scored below the overall average (see Figure 2). Only four companies scored above average, and one of them stands out significantly and can be cited as a good example of sustainability reporting quality with a score of 15.50 points.

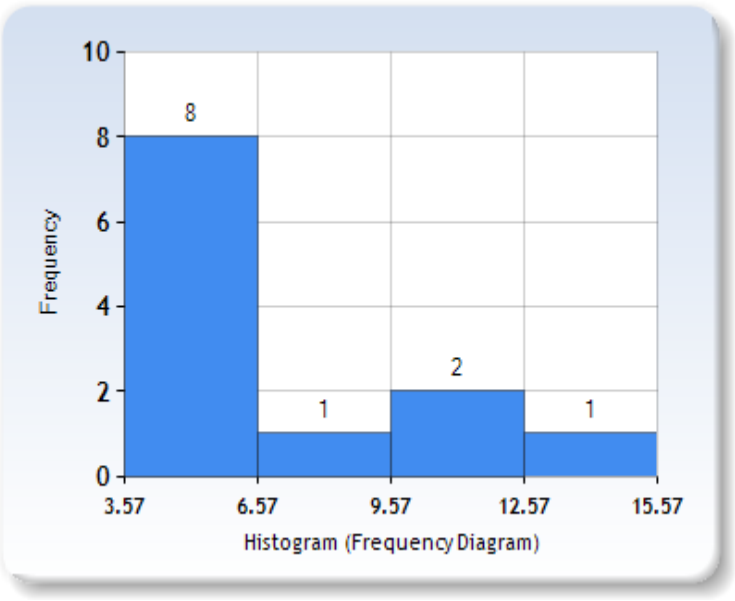

Figure 2: QSR score histogram
(Source: author's calculation)

To identify the reasons that led to this average rating for QSR, the performance of the surveyed enterprises should be analysed in relation to each of the ten evaluation indicators. Such an analysis would reveal both existing weaknesses and potential strengths in corporate sustainability reporting. Figure 3 was developed for this purpose.

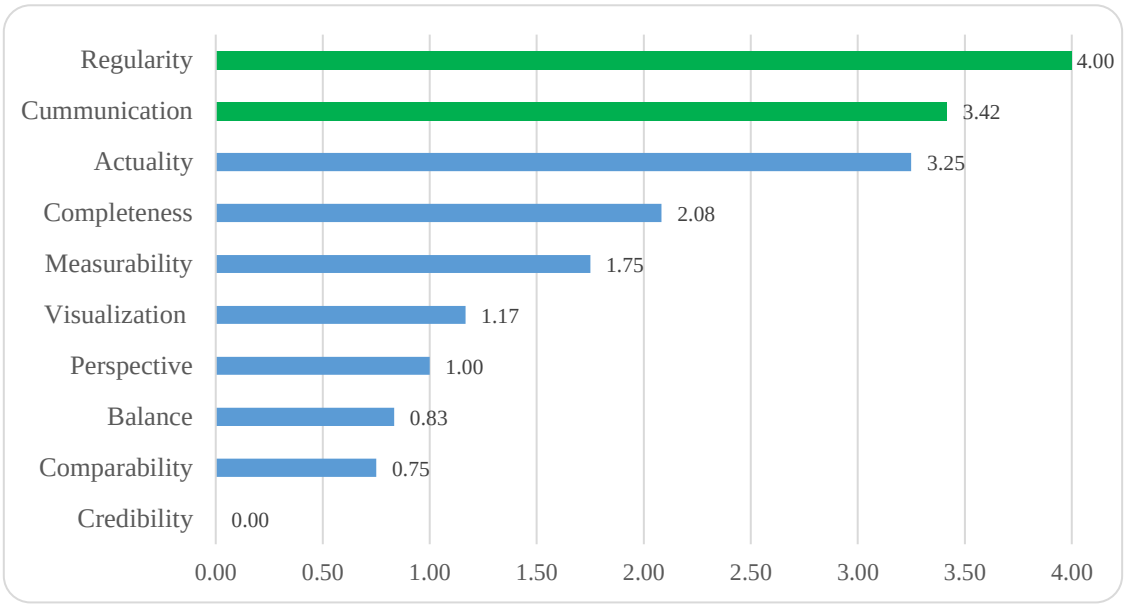

Figure 3: QSR score histogram
(Source: author's calculation)

It can be seen from Figure 3 that the indicator with the worst performance is "credibility" - 0 points. None of the companies surveyed subjected the sustainability information they disclose to an independent external assurance review. For comparison, a KPMG study conducted in 2022 among 4,581 large enterprises found that 47% of them subject their reports to independent external assurance (KPMG International, 2022).

The performance of the investigated enterprises is also weak in the "comparability" indicator. Most of the investigated non-financial statements disclose information on sustainability relating only to the current period. There are no comparisons with previous periods, which does not allow to establish the trend, i.e., whether the company is improving its sustainability performance or, on the contrary, it is deteriorating. Balance is also not among the strong points of research reports. In general, data on the negative footprint of businesses is not reported, possibly for fear of reputational damage. Prospective data are also lacking. It does not specify sustainability goals that the company has adopted and plans to achieve over a period. Thus, both the strategic framework and the progress of the company cannot be assessed. Visualization is also not among the strengths of sustainability reports. In most of them it is completely absent, and in others it is reduced to one or two tables or figures. The volume of disclosed quantitative information is also not sufficient. Key performance indicators are missing. This reflects negatively on the possibility of an adequate assessment of the company's performance, as well as a comparison with other companies and previous periods. A final weakness of the research reports is related to their scope. However, this is a key indicator and reflects significantly on the final assessment. Most companies disclose sustainability information that does not exceed the minimum requirements of the Non-Financial Statement Directive. Only two entities have made a materiality assessment when selecting reporting topics. The performance of enterprises in the indicators of actuality, communication and regularity has a positive effect on the QSR assessment. Almost all enterprises disclose up-to-date information for the reporting period, which is available on their websites in both Bulgarian and English. The regularity of the process is guaranteed by the mandatory nature of the non-financial statement, which should be published simultaneously with the annual report on the company's activities (as part of it or as an independent document). From what was written above, it can be concluded that the low assessment of the quality of sustainability reporting of the studied companies is due to the poor performance in the indicators assessing the sub-index quality of sustainable reporting content, as far as the two indicators (communication and regularity) from the second sub-index, namely quality of the sustainable reporting communication process have high average scores.

5. CONCLUSION

Today, the problems with sustainability reporting are not related to the share of companies that disclose non-financial information (at large enterprises it approaches 100%), but to the quality of this information and the approaches related to its communication. To overcome these problems, it is useful to create a tool that allows quick and easy assessment (self-assessment) of the quality of sustainability reporting, as well as comparisons with previous periods and other business organizations. The methodology proposed by us allows this assessment to be realized by using ten indicators, which, although few, are sufficient to guarantee the adequacy and accuracy of the result. Its testing after the companies from the SOFIX index of the BSE showed that there are significant problems related to the quality of sustainability reporting among the surveyed companies. The reason for this is related to the fact that the reporting process among Bulgarian enterprises develops due to its normative regulation, and not as an internally motivated activity. Considering the existing positive correlation between the size of the company and the quality of corporate reporting (Deloitte, 2019), it can be expected that among smaller Bulgarian enterprises the problem would be even more significant. Therefore, factors affecting the quality of sustainability reporting, as well as software systems supporting organizations in the reporting process, could be the subject of future research. These systems can be particularly useful for small and medium-sized enterprises that do not have the necessary human and financial capital to integrate sustainability reporting processes at a quality level.

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THE LOGISTICS OPERATIONS, ORGANIZATIONAL IDENTIFICATION OF THE COMPANY AND ENTREPRENEURIAL ACTIVITY OF BULGARIAN BREWERIES ENTERPRISES

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ABSTRACT

The development of contemporary logistics is stimulated due to its importance in increasing the efficiency of a company's daily operations and corporate profitability. Logistics takes a central place in the company's strategy. It is essential for the competitive advantage and survival of the company in the market. Logistics involves the integration of all operations in the information and material supply and handling, transportation, warehousing, production as well as commodities distribution and placement. Contemporary logistics is a complex of operations for managing the effective forward and reverse material and information flows in the corporate supply chains and time. Modern companies are threatened by various challenges coming from the surrounding environment. To maintain their competitive advantage, they need to actively support the achievement of a stable organizational identity. Organizational identity sets prospects in the organization of internal stakeholders through their understanding of important characteristic features that give meaning to the work of their members. Companies to remain competitive, must be recognized in the market. Therefore, require bright and distinctive characteristics to help them.

Keywords: *Corporate practice, Identification, Logistic operations, Material flows, Organizational identity*

1. INTRODUCTION

The development of modern logistics is pleased by the contribution to increase the efficiency of economic activity and corporate profitability. It also occupies a central place in the realization of the companies' aspiration to gain a competitive advantage in the market. The technical, technological, economic integration of the units of the chains passing through these flows, which binds them into a single system, is developing. The efficiency of the management of material flows is sharply increased, based on the achievement of the communication capabilities of technologies that increase the monitoring of the movement of flows at all stages within and between companies. In the theory of business management, too much importance is also given to the study of the problems that arise and are solved on the occasion of the state, analysis and evaluations of the impact of the external environment. Along with the logistics activities, the thesis is confirmed that the better the manager or entrepreneur knows the environment, the greater the chances of success. The practice of most of the large companies is to create special departments and units and hire specialists dealing with the solution of this particular problem. Such an approach is difficult to implement in the management of entrepreneurial organizations for two reasons: firstly, the impossibility of allocating such human and financial resources for this, and secondly, the impact of the external environment is much stronger on small entrepreneurs, than on large firms. Modern companies face various challenges coming from their environment. To maintain their competitive advantages, they need to actively support the achievement of a stable organizational identity. Organizational identity sets the perspective of the organization for internal stakeholders through their understanding of its most important characteristics that give meaning to the work of its members over an extended period of time.

The role of the organization's communications in this process is significant because they support the creation and legitimization of its specific profile. 1. Logistics activities in the company require integration and partnership. Modern logistics is defined as a set of activities for managing the movement of material and accompanying flows in space and time. This also improves the company's competitiveness. Through the logistics approach, all operations and activities of supply, production, warehousing, storage, placement and distribution are integrated and directly linked. The emphasis of the current development is the logistics activities building the company's logistics process and its impact on the company's organizational identification. The aim is to trace the state of company logistics after Bulgaria's integration into the European Union and reveal the prospects for development in this area of company activity.

In order to achieve the goal set in this way, tasks related to:

1) Defining the state of company logistics after the integration of Bulgaria into the EU;
2) Bringing out prospects for the development of company logistics in the conditions of economic adaptation of the country to the parameters of the European market. The priorities of the EU countries in the field of logistics are mainly related to logistics activities concerning modern technologies for transportation, storage and handling of cargo, modern rolling stock, up-to-date logistics infrastructure, high-speed transport, combined technologies in freight transport, combined with the necessary terminals and mobile composition, European standards for crossing borders, distribution, etc. A company that seeks to increase its competitiveness and improve its corporate practice in the conditions of dynamically developing markets can achieve this by using the advantages of company logistics activities in terms of material, information and human flows or by using the services of specialists in this referral partners. A firm becomes competitive if:
   - bet on modern warehouses, equipped in accordance with the requirements for loading and unloading activities;
   - adopt modern transport solutions using the possibilities of multimodal transport;
   - invests funds in modern information technologies to monitor stock availability and systems for satellite tracking of means of transport along the planned routes, allowing the owner of the cargo to receive regular information about its location;
   - updates staff knowledge related to customer service.

Logistics is a process of strategic importance for the company, for its supply and demand, for its resources and markets. The process linking logistics activities helps to create and maintain long-term partnership relations between the company, supplier and customer. In this way, a prerequisite is created for coordinated and integrated activity with a view to extracting innovative and technological advantages by means of a strategic orientation towards intra-company and international activity (Cousins P., 2005). It is not by chance that some authors define logistics activities as an integration system developing on three levels: management of logistics relationships, management of joint logistics chains and management of joint business networks (Harland, C., 2006). The factors mainly affecting the degree of integration of logistics are competition in the industrial branch, proximity to partners, opportunities for joint investment programs and nature of the manufactured products. Integrated logistics activities are a consequence of the optimization of material financial and information flows of the company, including suppliers and customers as important entities in the logistics relationship. The strategy in action is centered on reaching that phase of mutual trust where the long-term partnership brings positive synergistic effects for the parties. The idea is that, other things being equal, the higher the trust between the partners, the greater the attitude of cooperation between the parties. Partnership is hard to build - there is a need for additional communication, coordination and risk sharing.

It only makes sense if it produces better results than the companies achieve without partnering. And even when the partnership is guaranteed, it can fail if the partners enter with different expectations. Partnership drivers fall into four categories of partnership objectives—assets and efficiency, from a cost perspective, increased customer service, marketing advantages, and profit growth and stability. It is necessary in the negotiation process to build specific and precise descriptions of the category of driving forces of the partnership with the relevant metrics. Negotiation teams need to be motivated and their expectations calibrated (Harvard Business Review, 2009). The next step is for the teams to use an appropriate scale measuring the likelihood that they will achieve the desired results for each of the four categories. Openness in negotiations allows the parties to refocus on what they can gain from working together. In agreement, the focus shifts to the organizational environment, where the key factors are: compatibility of corporate cultures, compatibility of management philosophy and techniques, a strong sense of community and symmetry between the parties. The goal is to overcome the mentality, to respect the spirit of the partnership, to discover the differences between the partners that may cause problems in the future. In addition to these factors, others should be evaluated such as: common competitors, direct contact, potential for exclusivity, prior experience, and common end users. These additional factors do not limit the partnership if they are absent, but if they are present, they deepen the relationship. It is necessary to emphasize the negotiation process and the components of management - the general activities and processes, including: planning capabilities, joint operational control, communications and sharing of risk and rewards. For each component, the current status and whether change is needed for the partnership should be determined. Today, through partnership and integration in logistics activities, many companies have increased efficiency in terms of costs, user-supplier communication in the areas of: freedom of information exchange regarding prices, schedules and quality control; removing orders for each individual shipment; involving suppliers in the design of the product and its specifications; joint solving of management tasks; use of electronic data interchange.

2. SCOPE AND EVOLUTION OF LOGISTICS ACTIVITIES

Logistics activities cannot be carried out efficiently if monitoring and coordination are not carried out during the so-called supply chain, logistic chain. It is built through the systematic management by suppliers and customers of procurement, supply sources, production, ordering, inventory, warehousing and customer service (Monezka, R., 2007). In practice, all activities specific to logistics are manifested in logistics chains and the effect of management is enhanced. In the logistics chain, a grouping of logistics activities (supply, production, warehousing, transportation, distribution) and their immediate participants (suppliers, customers) in a single system is observed, subject to the availability and provision of a certain set of means (informational, material, financial). The expansion of the logistics chain invariably leads to the complexity of its composition. It necessarily requires from the company maximum transparency and accuracy of activities and operations from the moment of transformation of the resource base to the moment of satisfaction of consumer preferences. The factors on which the complexity of the logistics chain depends are: the chosen strategy for the integration of logistics activities, the consequences of overproduction, the overloading of transport systems, the requirements for sustainable social development and environmental control. A trend in modern production is that more and more companies start to shorten the life cycle of the products they create. It is fueled by the rapid changes in technology, by the globalization of markets. The main critical area is the production activity. It significantly affects the complexity of the logistics chain, the profitability of the enterprise and its sustainability in the conditions of a changing company environment. That is why experts recommend thorough planning of production and related logistics activities.

It is believed that this will help to build from ch. t. of company interests of an optimal model of a complex logistics chain. Logistics chains are complex because they are characterized by a high degree of uncertainty in time. However, they are adaptable and dynamically developing. Long logistics chains and uncertainty in product demand are not new problems for company logistics managers. Globalization of the economy puts companies in new conditions. The reliable forecast for logistics activities (including changes in product design, delivery destination, sales strategy, product range, packaging change, degree of management centralization, etc.) becomes even more urgent. Moving towards solutions to the problems, companies are looking for greater complexity of logistics activities and the possibility of reducing logistics costs. The main factors favoring the development of logistics activities are:

- economic growth, expressed in higher productivity and innovation activity;
- logistics perspectives, expressed in reducing logistics costs, reducing the number of suppliers, focusing on the main activities for companies and outsourcing peripheral ones, forming logistics alliances, etc.;
- regionalization, expressed in the different consumer preferences, the unsynchronized legal base and the high levels of trade within the regions;
- technological development, expressed in the use of the Internet and innovations, leading to a reduction of the technological time for a certain logistics activity;
- deregulation manifested in the financial sphere and transport.

The importance of logistics activities for small and medium-sized companies is extremely important for the corporate and social responsibility of the state in relations with business. This requires compliance with standards, monitoring and control, otherwise the dependence on risk management parameters becomes greater. Local legislation and the global spread of logistics activities are identified as the determinant of economic development with increasing impact and scope (OECD, 2008). We can summarize that global logistics integrates various logistics activities, allowing companies to satisfy their customers faster and more reliably.

3. ORGANIZATIONAL IDENTIFICATION OF THE COMPANY

Defining organizational identity is a complex task. There is a "lack of consensus regarding the meaning and definition" of the two terms (Dimitrova, Ya., 2013), due to their multifaceted nature. Despite the fact that the search for the most appropriate definition of organizational identity can become a "search for utopia", identity, and hence identification, require complex and multi-directional research (Maki, Shannon, 2008), because identity represents a "unique concept", i.e. the organization is unique, different from other collectives presented as "social actors". Therefore, the domain of organizational identity requires a self-definition of the organization in its relations with others like it (Kim, H., 2010), as well as an analysis of the meanings shared by its members, giving meaning to what the organization represents for themselves (Palashev, N., 2008). The perspective of considering the organization as a "social actor" derives from the institutional theory and is based on the fact that the leaders "define" the organizational identity and through the legitimized institutional norms and "transmit" its meaning to the members of the organization. Organizational identity is also seen as a model created by the shared understanding of the organization's members about its main and distinctive characteristics (Dimitrova, Ya., 2013). To reveal the nature of the model of the organizational identity, it is necessary to outline:

1) The characteristics that the employees define as central to the company.
2) The characteristics that distinguish the company from other similar ones.
3) The characteristics that are permanent, stable over time, connecting the present with the past and the future.

Ballmer sets a different perspective on the characteristics of identity (Kim, H., M. Lee, H. Lee, 2010), considering them in their complexity, including the multifaceted and multidirectional nature of identity, its variability, which represents the development of identity, and its marked heterogeneity. In reality, organizational identity is not only a complex model, but also has the ability to vary depending on the context in which it is expressed. Modern research suggests that it is flexible, with less central features and even less distinctive. In its organizational essence lies the aspiration to maintain consistency in the character of the organizational identity, as well as its distinctiveness. An effective organizational identity also promotes change. The organizational identity is considered as a significant strategic advantage for the organization. An important characteristic of organizational identity is the fact that it is the force that supports the adaptation of the organization when it is subjected to pressure from the external environment.

4. THE ENTREPRENEURIAL ACTIVITY OF THE LARGE BREWING ENTERPRISES IN BULGARIA

The significant brewers in our country are"Zagorka" AD is the largest brewery. It carries out its activity in the production of beer in the town of Stara Zagora. Produces and sells the following brands: "Zagorka", "Ariana", "Heineken", "Amstel", "Starobarno". "Kamenitsa" AD is a brewing company operating in a brewery in the town of Haskovo. Its brands are: "Kamenitsa", "Astika", "Burgasko pivo", "Slavena", "Stella Artois", "Bex", "Staropramen". "Carlsberg Bulgaria" AD is a beer producer with accelerated positive development. The two breweries are in Shumen and Blagoevgrad. He is the co-founder of the first Bulgarian company licensed for the recovery of packaging waste. It offers the following brands: "Shumensko", "Pirinsko", "Holsten", "Tuborg". „Bolyarka VT“ AD is one of the oldest breweries in Bulgaria. Beer is a symbol of the old capital city, and the offered brands are: "Bolyarka", "Balkansko", "Schweik", "Kings", "Kaltenberg", "Warsteiner". "Lomsko Pivo" AD was built by the Czech brothers Malotin and Hozman in 1894 in the town of Lom. The product line includes: "Almus", "Shopsko pivo", "Lomsko pivo", "Mizia", "Gredberg". We will characterize the entrepreneurial activity of the listed enterprises for the last few years according to the indicators: Market share - the highest is of "Zagorka" AD, due to the revenues by brands from sales on the domestic market. It is supported by „Kamenitsa“ AD, „Carlsberg Bulgaria“ AD, „Bolyarka VT“ AD and „Lomsko Pivo”AD. Evaluation of quality and price - the quality of the products of "Zagorka" AD is very high, "Kamenitsa" AD, "Carlsberg Bulgaria" AD, "Bolyarka VT" AD are high, and "Lomsko pivo" AD is average. As for price, brewers initiate changes to balance seasonal fluctuations demand. Implement strategies targeting consumer preferences and giving them an edge over competitors. Evaluation of the management of the competitive drive - "Zagorka" AD, "Kamenitsa" AD and "Bolyarka VT" AD manage the competitive drive in the European market, through strategic marketing organization and programs, innovation management and quality management systems. „Carlsberg Bulgaria“ AD and „Lomsko Pivo“ AD manage competitive pressure through strategic programs. Measures to improve the efficiency of FIXED ASSETS – „BolyarkaVT“ AD and „Carlsberg Bulgaria“ AD implement fuller capacity loading and timely removal of unfit FIXED ASSETS . "Zagorka" AD and "Lomsko Pivo" AD implement modern forms of production and labor organization. "Kamenitsa" AD emphasizes the technical and technological level of the production activity. Measures to improve the efficiency of CURRENT ASSETS - "Bolyarka VT" AD and "Lomsko Pivo" AD apply reduction of unfinished production, brevity of product realization and timely collection of receivables. "Zagorka" AD, "Kamenitsa" AD and "Carlsberg Bulgaria" AD are resorting to reducing production stocks, shortening the production cycle through improved technologies and stimulating the brevity of product realization and collection of receivables.

Assessment of labor productivity - the highest is in "Zagorka" AD, followed by "Carlsberg Bulgaria" AD, "Kamenitsa" AD and "Bolyarka VT" AD. The lowest in "Lomsko Pivo" AD. Assessment of staff qualifications – the level of staff competencies is average for „Kamenica" AD, „Bolyarka VT" AD and „Lomsko Pivo" AD and high for „Zagorka" AD and „Carlsberg Bulgaria" AD.

5. CONCLUSION

Bulgaria has the opportunity to exert a favorable influence on the development of logistics in Southeast Europe, thanks to its membership in the EU. In this part of Europe, the logistics sector is developing relatively modernly, although not at the level of developed economies. It is noteworthy that in South-Eastern Europe, more and more attention is being paid to consumer satisfaction, the growth strategies of companies are becoming more and more aggressive, the scope of these economies with logistics platforms located in them is expanding. The optimization of logistics chains contributes to the economic development of South-Eastern Europe. The best starting point is therefore export-import relations and the policy of attracting FDI (foreign direct investment). In this regard, Bulgaria has yet to prove itself as a major logistics terminal and a location with a high concentration of logistics centers of significant regional importance. The prospects are for the implementation of joint investment projects and joint infrastructure projects. Such undertakings are an opportunity to promote Bulgarian logistics at the international level. In the conditions of the dynamics of the environment, it is necessary to look for opportunities to manage the organization, which will help it not only in survival, but also in the possibility of increasing its competitiveness. In connection with this, a change in communication practices is necessary in order to present the positive aspects of the organization's activities, maintaining the identity, image and reputation in the environment in which it carries out its activities. An effective organizational identity, realized both inside the organization and outside it, is a guarantee for the success of the organization. Competent management, based on it, of the corporate image and corporate reputation is a guarantee of increasing the competitive advantages of the organization.

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ANALYSIS OF STUDENTS' SATISFACTION WITH INTERNSHIP - THE ROLE OF MENTORS

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ABSTRACT

The internship is one of the most important elements of all study programs, as it directly connects students with the practical aspect of their chosen profession and allows them to apply theoretical knowledge directly in practice. An important role in the implementation of the internship is played by the mentor and his way of supervising the process of acquiring practical knowledge in the business world. The internship should give students an insight into the profession they have chosen as part of their education and further strengthen their choice and motivation to stay in the hospitality industry. The key factor in this sense is the students' satisfaction with the internship programs, which is significantly related to the satisfaction with the supervision process in the internship. The purpose of this paper is to investigate the influence of mentors on students' satisfaction with the internship and on their intention to continue their professional involvement in the hospitality industry. The study analyzed a survey (n=704) of undergraduate students who completed their internship in hotel facilities in the Republic of Croatia in the period from 2015 to 2023. The results of the survey over the observed period of six academic years show a systematic increase in student satisfaction with the involvement of mentors in the internship, as well as with other elements that are important for the successful completion of the internship.

Keywords: *Internship, Mentor, Student satisfaction, Hospitality industry, Education*

1. INTRODUCTION

Tourism as one of the most important part of the Croatian economy shows a constant trend of growth and development. With the growth of companies operating in the tourism segment, the need for highly specialized and well-trained personnel is also increasing. This is particularly true for the hospitality industry, which requires a capable, educated and well-trained workforce in order to be successful and competitive in the tourism market (Ko, 2007). Ivančić et al. (2022), referring to previous research (Adeola, 2016; Bontis et al., 2015; Sardo, et al. 2018; Elsharnouby & Elbanna, 2021), state that human capital plays a crucial role in hotel performance. Wilks and Hemsworth (2011) point out that the evolution of the hotel sector and increasing complexity have led to a demand for highly skilled human resources in all categories. One of the ways to ensure such a human resource profile is to adequately train students by including internships in study programs. Real business experience cannot be gained through traditional lectures, but only through direct contact with the business environment. For this reason, internships are an important part of education for tourism students as they can experience real business situations and develop realistic expectations for their career path (Ko, 2014, Ayres, 2006; O'Mahony et al. 2001). In addition, Farmaki (2018) notes that internships are a valuable component of tourism and hospitality education. The goal of internships is for students to acquire specific knowledge and skills that cannot be taught in traditional classes. Therefore, an important role in this segment of education is played by the business organizations involved in the implementation of professional internships, as well as the mentors within these organizations. Hardie et al. (2018) positively correlate organizational commitment to the internship organization with interns' attitudes toward internship success. Chen & Shen (2012) specifically emphasize the influence of a successfully completed internship on students'

positive attitudes toward the intention of further engagement in the hospitality industry. Govekar Okoliš (2012) states that two factors are extremely important for the implementation of a quality internship: a mentor in the business organization where the internship is conducted, and a well-designed plan and program for the implementation of the internship. Additionally, it is important to note that previous research also suggests that inadequately designed internship programs and insufficient mentor involvement can influence student departure from the hospitality industry after the internship is completed (Chen & Shen, 2012, Richardson, 2008, Roney & Öztin, 2007). In particular, Wu & Wu (2006) point to students' lack of desire to remain involved in the hospitality industry after completing the internship. More detailed research has shown that students' poor experiences (Robinson et al., 2015; Koc et al., 2014; Lee & Chao, 2013; Zopiatis & Theocharous, 2013; Fox, 2001) during the internship may lead them to leave the profession completely. The purpose of this paper is to determine student satisfaction with mentors' involvement in the internship, their availability, and their expressed interest in student learning and work during the internship. It also examines the students' readiness to pursue a career in the hospitality industry after completing the internship.

2. LITERATURE REVIEW

2.1. The importance of internship

The acquisition of practical knowledge has many meanings. Ko (2008), citing Fox (2001), states that an internship is an opportunity to bridge the gap between theory learned in college and practical reality. An internship can be defined as an opportunity to test the theoretical knowledge and skills acquired, an opportunity to analyze interests and career choices in a realistic business setting. Liu et al. (2011) point out that "internships are learning experiences". Referring to previous research, Farmaki (2018) states that internships can boost students' self-confidence, increase value in the labor market, improve adaptability and familiarity with the profession, and enable knowledge exchange. Citing the research of Sahrir et. al (2016), Magnaye (2022) states that the internship program provides students with the opportunity to improve their academic knowledge, enhance their soft skills, and learn other skills that are crucial for employment after graduation. An internship provides students with more opportunities when exploring career choices (Ko, 2008) and gives them insight into all areas of business. Timbang & Castano (2020) point out that internships are recognized as an integral part of the academic pathway for hospitality students. Petrillose & Montgomery (1998) state that most hospitality professionals agree with the fact that students who participate in internship programs are more marketable (Cheng et al., 2004). Trinidad (2020) notes that internships play an important role in improving skills, are the culmination of experiential learning, and are important for students' professional and personal development. Hospitality companies should increase their collaboration with educational institutions and promote the implementation of internship programs by systematically disseminating information about the success of such programs and the benefits that students can achieve. This is the right way of collaboration between educational institutions and the real economy, which will result in new employees in the hospitality industry from the interns who initially chose this career path.

2.2. The role of mentor

Students describe the internship as more valuable than classroom instruction (Ko. 2008), which underscores the need and importance of mentoring the entire internship process. In their work, Liu et al. (2011), citing Dreher & Ash (1990), define mentoring as the extent to which the supervisor assigns a task to the intern and provides appropriate support in accomplishing the task, as well as helps the intern gain a positive impression of the organization. Citing Romanan et al. (2002) and Frei et al. (2010) Han et al. (2014:593) define a mentor as "an active partner in the ongoing relationship between mentor and mentee, helping the mentee maximise his or

her potential, and reach personal and professional goals." Mentors are crucial figures in interns' work lives, determining what tasks they take on and in what area they improve their professional skills. Liu et al. (2011) additionally emphasize the importance of the mentor's role, noting that mentoring by supervisors can improve interns' positive prospects for a career in the industry. By sharing their knowledge, offering advice, providing challenges, and offering support (Chin et al., 2020; Moss et al., 2014; Karel & Stead, 2011), mentors help students develop professionally and personally. For the entire mentoring process to be successful, the mentor-student relationship must be based on mutual trust, as this is the only way to facilitate mutual professional development and the opportunity to provide feedback information (Petrilla et al., 2015). Numerous authors emphasize the importance of strong professional and interpersonal skills (Chin et al., 2020; Sabatino et al., 2015; Baglin & Rugg, 2010) that mentors must possess for the mentoring process to yield positive results. Research shows that the lack of internship supervisor training in providing feedback and mentoring students (Hardie et al., 2018) can lead to a lack of satisfaction with the internship. In particular, Hardie et al. (2018) highlight previous research confirming that student supervision in the internship is important in creating a positive experience for the future. Adequate internship supervision allows students to more easily adapt to the work environment and new business situations while intensifying learning outcomes (Kim et al., 2012). In particular, the importance of feedback (Hardie et al., 2018) is emphasized for students while performing work assignments in the internship, which allows them to apply the theoretical knowledge they have acquired in a business setting (Matthew et al., 2012).

2.3. Interns' satisfaction

Liu et al. (2011) define three outcomes that can be used to determine the usefulness of an internship: interns find their work assignments interesting and enjoy coming to the internship, they perceive the company as an attractive place to work, and they have a generally positive attitude toward further involvement in the hospitality industry. D'Abate et al. (2009), in their research on factors influencing student satisfaction with the internship, found that the factors of monetary incentives, location of the internship, and flexible work hours had the least influence. It is interesting to note the results of the research on which factors have the greatest influence on student satisfaction with the internship and which can be directly linked to mentor involvement in the implementation of the program. From D'Abate et al.'s (2009) research, the following factors have the greatest influence on student satisfaction with the internship: task importance, feedback, work environment, supportive supervisors, opportunities to learn new information and lessons that cannot be taught in the classroom.

3. METODOLOGY

The student satisfaction with internship survey was conducted at a college in Croatia from 2015 to 2023. The survey included fourth-year students who completed an internship in one of the 170 hotel facilities on the territory of the Republic of Croatia. Each academic year, after comleted internship program, a survey was conducted on student satisfaction with the organization and implementation of the professional internship, as well as satisfaction with the work and commitment of mentors in the company where the internship takes place. In the academic years 2019/2020 and 2020/2021, the survey was exceptionally not conducted in this way, as the pandemic COVID made it impossible to complete the internship in hotel facilities. The two-part questionnaire consisted of 26 questions was used for this study. The first part was designed to capture student demographic characteristics (gender, study program, high school diploma). In the second part, students were asked to rate their satisfaction with the internship program, satisfaction with mentor involvement, confidence in future career, and satisfaction with the organization of the internship program on a 5-point Likert scale. Statements were rated on a scale of (1) strongly disagree; (2) disagree; (3) acceptable; (4) agree; (5) strongly agree.

The research design was based on previous research that addressed the importance of appropriate supervision and engagement in mentoring activities to the success of the internship program (Hardie et al., 2018; Ko, 2008). During the period of six academic years, a total of 1593 students (both full time and part time students) were involved in the internsip process and a total of 704 students (44%) participated in the study. 79% of surveyed students were female and 21% were male.

4. RESULTS AND DISCUSSION

The descriptive statistics of the respondents are shown in Table 1. A total of 1593 students were involved in an internship program during the observed period, and 44% of the students participated in the survey.

Academic year	Number of students involved in internship program	Surveyed students	Share of surveyed students (%)	Male (%)	Female (%)
2015/2016	230	152	66	22	78
2016/2017	255	138	54	43	57
2017/2018	262	142	54	47	53
2018/2019	266	167	63	22	78
2021/2022	276	64	23	22	98
2022/2023	304	41	13	20	80
Total	**1 593**	**704**	**44**	21	79

Table 1: Number of surveyed students per year

The survey was conducted by means of an anonymous questionnaire distributed to students in printed form between 2015 to 2019 after the completion of the internship, and in 2022 and 2023 the survey was conducted online. Regardless of the general opinion that the online form of the survey is faster and more efficient, and that the literature suggests that it is a more acceptable method of communication with younger age groups (Tess, 2013), this form of survey did not prove to be sufficiently successful. A larger sample of student respondents was collected by surveying students using printed survey forms.

Statements	2015/2016	2016/2017	2017/2018	2018/2019	2021/2022	2022/2023	Mean
compliance with the established conditions for professional practice	4,0	4,3	4,5	4,4	**4,4**	**4,5**	4,4
availability for communication	3,7	4,3	4,3	4,3	**4,3**	**4,6**	4,3
commitment to providing feedback on the student's work	3,2	3,9	3,8	3,9	**4,1**	**4,3**	3,9
interest in student learning and work	3,1	3,7	3,5	3,8	**4,0**	**4,1**	3,7

Table 2: Students' satisfaction with the internship mentors

Since the introduction of the internship and the involvement of mentors in its implementation, student satisfaction in each segment has steadily increased over time. Possible reasons for this trend include the continued implementation of intensive communication with mentors. The mentors was engaged in sharing feedback and were involved in the process of improving the organization and implementation of the internship.The period of adjustment of mentors to work with students in the role of educator and mentor is necessary to master the new roles. Additional consultations and training of mentors allow them to better prepare for the role they play in the overall educational process of students. Such a form of cooperation between the educational institution and the mentor affects their competences and work with the students, so that the students' satisfaction systematically increases. A significant incease difference in the students' evaluation of mentors' involvement in the internship is particularly evident in the post-pandemic period, which can easily be linked to the fact that the hospitality industry has recently had significant problems finding suitable and trained staff. It can be assumed that there has been a significant change in the awareness of mentors in the hospitality industry about the importance of students coming to their facilities and that they have become aware of the potential they can realize through students as potential future employees. Internship supervisors must take their role seriously. Among other things, their role is to closely monitor the entire process of the internship and the student's experience, providing appropriate constructive feedback (Marinakou & Giousmpasglou, 2021). In any case, mentors must be qualified and experienced individuals who have all the necessary knowledge to adequately supervise interns. In order to have the necessary knowledge, mentors need to be constantly trained on how to properly guide and provide feedback to an intern. Mentors can inspire interns and become role models in business, which only emphasizes their importance in the successful implementation of the internship.

Statements	2015/2016	2016/2017	2017/2018	2018/2019	2021/2022	2022/2023	Mean
implementation of the internship according to the established program	3,8	4,0	4,2	4,3	**3,8**	**4,3**	4,1
knowledge and skills acquired during the internship	2,8	3,5	3,0	3,1	**3,6**	**3,7**	3,3
Evaluation of satisfaction with the internship	3,4	3,6	3,3	3,5	**3,8**	**3,9**	3,6

Table 3: Students' satisfaction with the internship program and organization

The results of the survey show a high level of satisfaction in the segments of internship performance according to the established program and satisfaction with the knowledge and skills acquired during the internship. In order for students to have a realistic picture of their expectations of the results of the internship, it is necessary to familiarize them with all elements of the plan and the program, but also to work on developing the skills and competencies they will need to successfully complete the tasks in the company. In this way, students will be better prepared for the work environment and it will be easier for them to cope with real problems that inevitably arise in corporate situations. It is undeniable that additional efforts need to be made in the area of student satisfaction with the internship and its outcomes. Good planning of the implementation of internship programs in hotel companies can maximize the potential of

students to become highly qualified workers in the hospitality industry. Emphasizing the added value of the internship program by the companies in which it takes place meets the expectations of the students, and this will be one of the factors that will lead to student satisfaction with the internship.

Academic year	Job offer		Acceptance of the job offer	
	YES (%)	NO (%)	YES (%)	NO (%)
2015/2016	47	53	-	-
2016/2017	54	46	-	-
2017/2018	46	54	-	-
2018/2019	46	54	-	-
2021/2022	66	34	31	69
2022/2023	54	46	20	80

Table 4: Job offers received

The survey results show a relatively high percentage of students who received a job offer from companies were an internship was completed. In addition, students from the last two years were asked to answer the question whether they accepted the offered position. Interestingly, there is a high percetage of students, i.e. interns who declined the job offer. For the mentors and their companies it would be important to determine the reasons for offer rejections. It can be said that the companies that participate in the implementation of the internship program make extra efforts to increase the attractiveness of the hospitality industry to young people (Liu et al. 2011). Successfully completed internships reflect interns' desire to stay with the company and stick with their career choice. The goal of any company should be to retain talented employees, and conducting internships provides them with a pool of potential employees. In particular, Yiu & Low (2012) point out that students should not be treated as a solution to the labor shortage problem or as short-term, cheap labor (Chen & Shen, 2011). Quite the opposite: interns should be viewed as a new asset to the company that can contribute to the company's greater success through potential investment. This is the only way to avoid disappointments and bad experiences of interns that lead to a complete departure from the chosen profession.

5. CONCLUSION AND FUTURE RESEARCH

The internship is an important part of the educational process. It is irreplaceable for the acquisition of practical knowledge and skills that cannot be taught in the traditional classroom. The advantages offered by the internship make it a very valuable part of the study program. The opportunity to apply acquired theoretical knowledge in practice, solve real-life tasks in a business environment, find the best path in choosing a career, and acquire soft skills are just some of the benefits of an internship. Considering the importance of this form of educational programs, it is necessary to successfully integrate all interested parties in the whole implementation program. Educational institutions, students, companies, and mentors must share a common goal to ensure that the internship leads to the best outcomes for all involved. Educational institutions and companies must invest in building collaborative relationships based on sharing knowledge and experiences in students' educational processes. Continued investment in developing mentoring skills and encouraging the involvement of all staff in the interns' education and their adaptation to new ways of acquiring knowledge will increase student satisfaction and the possibility of sustained employment in their profession. Today's labor market is more complex, the market is increasingly competitive, and the workforce is becoming more diverse (Hurst & Good, 2009). Internships are playing an increasingly important role in attracting qualified personnel to the tourism industry, and internship supervisors are becoming individuals who can motivate students to stay in the profession

through their appropriate involvement. Another factor that highlights the importance of establishing an optimal system for supervising interns is the increasing labor shortage in the tourism industry and the reluctance of younger generations to pursue careers in these professions. Proper mentoring of students, where practical knowledge, experience, and the enthusiasm and commitment of the mentor are transferred to the students, is the only right way to motivate students to stay in the hospitality industry. It should not be ignored that the role of the interns themselves and their proactive engagement in the internship program can play a role in creating a positive experience during the internship (Liu et al., 2011). Students are often unaware of how demanding and challenging the work environment can be, and because they are not used to such a work environment, they have an unrealistic idea of what an internship should be like. In this case, it is reasonable to ask whether educational institutions, internship plans and programs, mentors, and the work environment are solely responsible for students' satisfaction with the internship or whether the emotional readiness of the students themselves should also be part of this equation. This study has some limitations in that the research was conducted at only one institution. While this contributes to the homogeneity of the group, it limits the generalizability of the research findings. It is recommended that further research be conducted with internship supervisors to obtain an overall picture. For further research, it is suggested to analyze in more detail whether a satisfied intern is also a more productive intern. Considering the relatively high satisfaction of students with practice, the high percentage of rejected job offers is interesting. In future research, it would be important, not only for the university, but also for employers, to determine the reasons why students - interns refuse offers.

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RUIN THEORY IN PRACTICE: ASSESSING MARKET VALUE VULNERABILITIES

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ABSTRACT

This scientific study investigates the financial theory behind the distinctions between the positive and negative price changes. We employ mathematical modeling to assess the probability of market value ruin, employing the concepts of ruin theory in a practical context. The paper presents an approach for solving the formulated mathematical problem. The key discoveries and implications of the investigation are succinctly outlined, emphasizing the importance of the obtained results. Furthermore, the study delves into the implications of these findings for portfolio management and risk assessment in financial markets. By shedding light on the underlying mechanisms driving positive and negative price changes, this research contributes to a deeper understanding of market behavior. We underscore the importance of proactively managing risk in financial markets and highlights the significant role of ruin theory in understanding and mitigating extreme market events. In addition to its immediate practical applications, the research contributes to the broader understanding of market behavior, providing a foundation for future studies in the field of financial economics. By exploring the intricate mechanisms underpinning positive and negative price changes, we pave the way for more nuanced and effective risk management strategies in an increasingly complex financial world.

Keywords: *Ruin Theory, Market Value, Price Changes, Probability*

1. INTRODUCTION

Exploring the statistical distributions and characteristics of positive and negative price changes, and respectfully returns holds significant importance in the realm of financial markets and investment strategies. The commonly accepted hypothesis posits that they follow the same distribution and share similar characteristics. Traditionally, price changes are believed to follow a normal distribution, assuming that the positive and negative price changes exhibit identical statistical properties and are symmetric. We will denote this as the null hypothesis, H_0. However, some researchers argue that the risks associated with positive and negative price changes are interdependent and akin, which we will denote as the alternative hypothesis, H_1.

2. THE FINANCIAL THEORY BEHIND THE DISTINCTIONS BETWEEN THE POSITIVE AND NEGATIVE PRICE CHANGE

2.1. Challenging the null Hypothesis

Despite numerous studies supporting the null hypothesis, there exists evidences that positive and negative price changes and returns may not always conform to the same distribution. In the work "Downside Risk in Stock Returns" (Ang et al., 2006), attention is drawn to volatility asymmetry and characteristics of negative returns, which may indicate distinct distribution properties. While the relationship between money supply, inflation, and interest rates is a fundamental concept in finance and macroeconomics, further exploration reveals a nuanced interplay of factors. The Quantity Theory of Money, as advocated by economists like Irving Fisher and Milton Friedman, suggests that an increase in the money supply leads to inflation. This aligns with the notion that emitting more money into the economy can contribute to higher inflation rates (Friedman, 1969). Additionally, the Fisher Effect posits that changes in nominal interest rates are linked to changes in inflation (Mishkin, 2007).

An increase in nominal interest rates could signal expectations of higher inflation, reinforcing the idea that interest rate fluctuations can influence inflationary pressures. However, the complexity of stock return distributions is illuminated by the work of Ang et al. (2006). In "Downside Risk in Stock Returns," the authors draw attention to volatility asymmetry and distinct characteristics of negative returns (Ang et al., 2006). This implies that while positive returns and price changes might be influenced by factors like money supply and inflation, negative returns and price changes could be driven by different elements such as market sentiment, external shocks, and investor behavior. Empirical studies have contributed to our understanding of these dynamics. Fama's research (1981) examines the link between stock returns, real economic activity, inflation, and money growth, shedding light on the multifaceted interactions among these variables. Furthermore, Bekaert and Wu (2000) explore asymmetric volatility in equity markets, highlighting the differential behavior of positive and negative returns. Campbell and Hentschel (1992) introduce an asymmetric volatility model that captures the varying degrees of volatility in stock returns. It is assumed that positive returns and price changes are influenced by the issuance of monetary resources and the expansion of money in circulation, as well as inflation. However, changes in interest rates, particularly an increase, affect the magnitude of inflation. It is noteworthy that inflation tends to remain positive, with deflation being a rare occurrence. This assertion aligns with financial theory and various empirical observations. In accordance with the aforementioned hypothesis H_1, an inference could be drawn that there are substantial grounds for separately considering positive and negative price changes on prices. While in the long run, positive price changes are strongly influenced by the continuous issuance of new monetary assets by central banks, changes in interest rates can affect inflation but are not the primary factor for cessation of it. However, dynamic changes in supply and demand can influence short-term price movements and could be an important cause for the emergence of negative price changes. In the present study, we neither affirm nor negate the validity of either hypothesis. Further and more comprehensive investigations are required for this purpose. The possibility that conditions under both hypotheses hold true under specific different market circumstances should not be ruled out. We consider a scenario under the hypothesis H_1, where the following conditions hold for the price parameters:

- Positive price changes on price exhibit a long-term trend that remains unaffected by short-term fluctuations;
- Declines in the value of the price result from the dynamics between supply and demand and can occur in varying amounts and frequencies.

Given the presence of the above two conditions, the application of the Ruin Theory could help for calculation of the probability of the price falling below a certain threshold, which is also the subject of the current study. However, prior to this, we must address the following question: "How could the cumulative positive price changes be modeled?"

2.2. Positive price changes

Modeling the positive price changes is of paramount importance for the application of **Ruin theory**. Taking into account the aforementioned conditions under H_1, we could represent the cumulative positive change of the price with the following equation:

$$CR_t = c.t, \quad (1)$$

where CR_t represents the cumulative positive price changes of the asset in the period t;
t denotes the time period;

c stands for the weighted average positive price changes of the asset for a medium-term or long-term period.

When determining the weighted average positive price change of the asset, dynamics and trends of inflation, interest rates, money supply, and economic development are taken into account. We assume that the differences in c across individual periods tend to approach 0, which leads us to assume that $c\ is\ constant$.

3. EMPLOYING MATHEMATICAL MODELING TO ASSESS THE PROBABILITY OF MARKET VALUE RUIN - PRACTICAL APPLICATION OF RUIN THEORY

Ruin theory, also known as the theory of collective risk or insurance risk theory, is a branch of probability theory that deals with the analysis of financial losses or "ruin" that may occur in an insurance or risk-sharing context. The theory focuses on studying the probability of an entity's financial reserves being exhausted due to the occurrence of adverse events, such as insurance claims or other financial liabilities. In the present study, we will employ this theory to compute the likelihood of the price declining below a specified threshold.

We are present the following equation:

$$U_t = U_0 + ct - D_t, \tag{2}$$

where U_0 represents the initial price, U_t is the current price, c denotes the weighted average positive price change for a single period, and D_t is the sum of negative price changes up to moment t. The primary focus of the model is to explore the probability that the price U eventually drops below 0 or below a certain threshold δ ($\delta \in [0, +\infty]$).
In cases where the threshold $\delta > 0$, U_0 is obtained through the following equation:

$$U_0 = U - \delta \tag{3}$$

The measure, known as the probability of ruin, is defined as:

$$\psi(U_0) = \Pr(U_t < 0), \qquad 0 < t < +\infty \tag{4}$$

The function $\psi(U_0)$ represents the probability of ultimate ruin given a specific initial price U_0. We assume that the positive incomes per unit of time are greater than the weighted average value of the negative incomes, expressed as $c > \lambda * w$, where λ is the Poisson parameter and w is the absolute value of the mean of the distribution of negative price changes. c could also be expressed in terms of the relative security loading, as $c = (1 + \theta)\lambda * w$, where θ e is the relative security loading. λ represents the Poisson parameter of the distribution of the count of negative price changes $N(t)$, where $P(N(t) = k) = \frac{(e^{-\lambda} * \lambda^k)}{k!}$, $k \in \mathbb{N}^0$, and $N(t)$ is the count of negative price changes at a moment t.

3.1. Lundberg's Inequality

In the general context, the computation of the probability of ultimate ruin $\psi(U_0)$, is exceedingly intricate. Lundberg's inequality provides an upper bound for $\psi(U_0)$. This inequality offers two prominent advantages over the precise expression for $\psi(U_0)$:

- It is readily derived;
- When U_0 is small, the approximation is highly accurate.

Lundberg's inequality is formulated as follows:

$$\psi(U_0) \leq e^{(-RU_0)}, \tag{5}$$

where U_0 represents the initial surplus (in this context, the initial price), and R is an additional parameter known as the adjustment coefficient, which will be discussed in the subsequent lines. Equation (5) illustrates that the probability of ruin is bounded by a function that exponentially decreases with respect to U_0. In other words, equation (5) underscores the profound significance of the empirical observation that the higher initial price mitigates the probability of ruin. The probability of ruin diminishes exponentially with the regulatory coefficient R as well.

3.2. Adjustment coefficient

The formulation of Lundberg's inequality is contingent upon the initial surplus U_0 and the adjustment coefficient R. To apply the inequality, the value of R must be determined, which can be found as the unique positive root of the equation:

$$M_x(R) = 1 + (1 + \theta)w * R, \tag{6}$$

where $M_x(y)$ represents the moment-generating function of the distribution of individual claims (in this context, the negative price changes), θ denotes the relative security loading, and w is the absolute value of the mean of the distribution of negative price changes. Equation (6) is commonly solved numerically.

R is a growing function of the relative security loading θ. This correlation is intuitively expected, as an increase in θ should render ruin less probable. Lundberg's inequality demonstrates that an increase in R is associated with a reduction in the upper bound of $\psi(U_0)$. In brief, an increase in θ diminishes the probability of ruin $\psi(U_0)$. Naturally, a larger variance is correlated with greater risk. Consequently, it is anticipated a higher value of $\psi(U_0)$ for the exponential distribution due to the greater risk, leading to a smaller value of R. The adjustment coefficient R grows with θ and is smaller for the exponential distribution compared to the constant distribution of negative price changes. R could be conceived as an inverse measure of risk.

3.3. Estimating $\psi(U_0)$

In the general case, it is exceedingly challenging to compute the probability of ruin. When the negative price changes are composed of a Poisson process, an equation for $\psi(U_0)$ could be derived. Specifically, $\psi(U_0)$ satisfies the equation:

$$\frac{d}{dU_0}\psi(U_0) = \frac{1}{(1+\theta)w}\left(\psi(U_0) - \int_0^{U_0} p(x)\psi(U_0 - x)dx - [1 - P(U_0)]\right) \tag{7}$$

Equations of this nature are referred to as integro-differential equations. In the general case, numerical solution is required. However, in the case of exponential distribution, it could be directly verified that:

$$\psi(U_0) = \frac{1}{1+\theta}e^{-\frac{\alpha\theta U_0}{1+\theta}} = \frac{1}{1+\theta}e^{-RU_0}, \tag{8}$$

where α is the rate parameter of the exponential distribution.

4. SOLUTION OF THE FORMULATED MATHEMATICAL PROBLEM - APPLICATION

4.1. Solution

We utilize the monthly values of troy ounce gold for the period from December 31, 2008, to July 31, 2023. As an initial price, we consider the gold price at the end of July 31, 2023, which is specifically denoted as $U = USD\ 1\,964.19$. Our objective is to determine the probability $\psi(U_0)$ of the gold price declining to $\delta = USD\ 1\,700.00$.

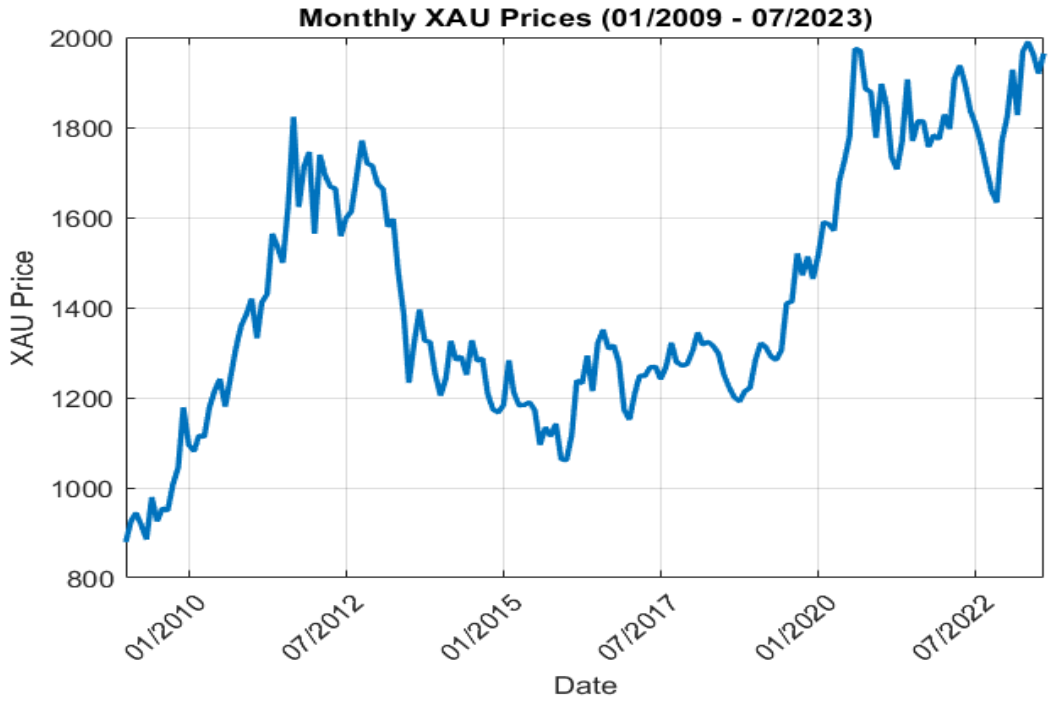

Figure 1: Monthly Prices of Gold (USD/troy ounce)

To accomplish this, we apply formula (3) to calculate U_0.

$$U_0 = U - \delta = USD\ 1\,964.19 - USD\ 1\,700.00 = USD\ 264.19.$$

Using market data, we find that $t = 175$, $c = USD\ 29.38$, and $w = USD\ 23.17 \rightarrow \alpha = 0.0432$. In the calculation of the value of w, we consider both the number and size of declines that occurred during the respective month.

Figure following on the next page

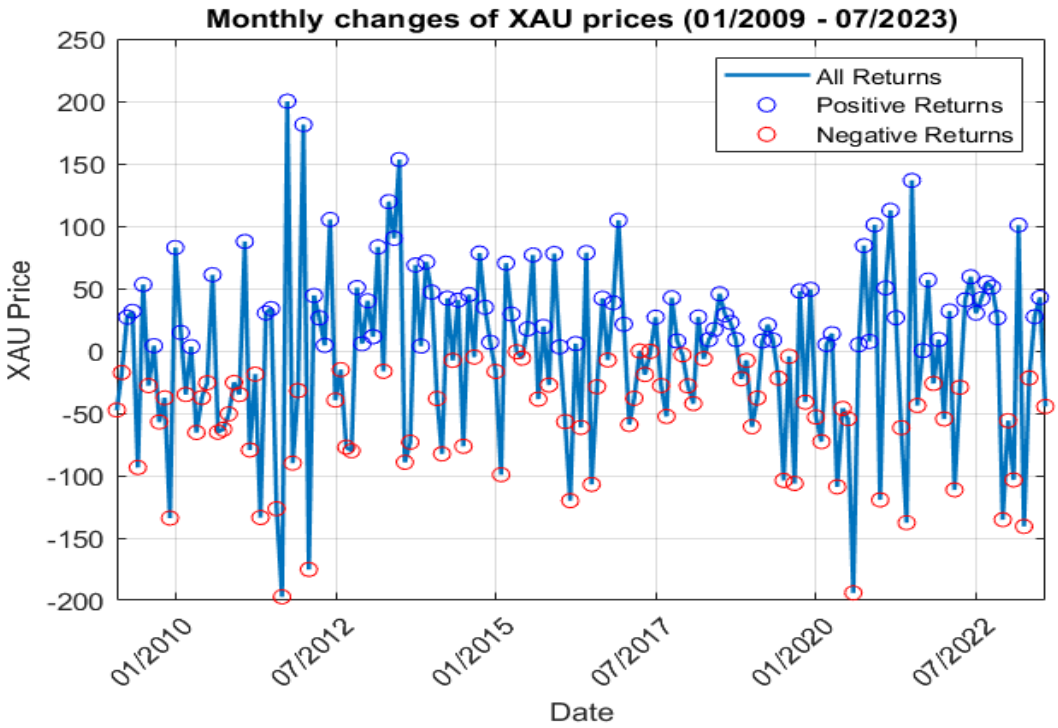

Figure 2: Monthly price changes of Gold prices (USD/troy ounce)

Assuming that price changes of gold follow an exponential distribution, we can then apply formula (8) to obtain an analytical solution to the problem. Please note that the estimation of λ is not the focus of the current study but rather a subject for future research.

If $\lambda = 1.0$, then $\theta = c/(\lambda * w) - 1 = 0.2678 \rightarrow$

$$\rightarrow \hat{\psi}(U_0) = \hat{\psi}(264.19) = \frac{1}{1+0.2678} e^{-\frac{0.0432*0.2678*264.19}{1+0.2678}} = 7.10\%$$

If $\lambda = 1.1$, then $\theta = c/(\lambda * w) - 1 = 0.1525 \rightarrow$

$$\rightarrow \hat{\psi}(U_0) = \hat{\psi}(264.19) = \frac{1}{1+0.2678} e^{-\frac{0.0432*0.1525*264.19}{1+0.2678}} = 19.19\%$$

When $\delta = USD\ 1\,900.00,\ then\ U_0 = USD\ 64.19 \rightarrow$

If $\lambda = 1.0$, then $\theta = c/(\lambda * w) - 1 = 0.2678 \rightarrow$

$$\rightarrow \hat{\psi}(U_0) = \hat{\psi}(64.19) = \frac{1}{1+0.2678} e^{-\frac{0.0432*0.2678*64.19}{1+0.2678}} = 43.94\%$$

If $\lambda = 1.1$, then $\theta = c/(\lambda * w) - 1 = 0.1525 \rightarrow$

$$\rightarrow \hat{\psi}(U_0) = \hat{\psi}(64.19) = \frac{1}{1+0.2678} e^{-\frac{0.0432*0.1525*64.19}{1+0.2678}} = 60.13\%$$

4.2. Interpretation of Results

The calculated probabilities of ruin, $\psi(U_0)$, for different values of λ offer valuable insights into the risk of the gold price declining to the predefined threshold δ. A lower value of $\psi(U_0)$ indicates a lower risk of ruin, while a higher value implies a higher risk.

For $\lambda = 1.0$:

- When $\delta = USD$ 1,700.00, $\psi(U_0)$ is 7.10%, suggesting a relatively low risk of the gold price falling below this threshold.
- When $\delta = USD$ 1,900.00, $\psi(U_0)$ increases to 43.94%, indicating a substantially higher risk if the threshold is raised.

For $\lambda = 1.1$:

- When $\delta = USD\ 1{,}700.00, \psi(U_0)$ increases to 19.19%, indicating a higher risk compared to the case with λ = 1.0.
- When $\delta = USD\ 1{,}900.00, \psi(U_0)$ further increases to 60.13%, indicating a significantly higher risk.

4.3. Sensitivity Analysis

The analysis demonstrates that changing the δ value can significantly impact the probability of ruin. This sensitivity analysis is crucial for risk management, as it allows stakeholders to assess the impact of different financial scenarios on the likelihood of ruin. Parameter Sensitivity: The choice of the parameter λ, representing the intensity of the exponential distribution, also influences the results. A higher λ corresponds to a higher rate of price change, which can increase the risk of ruin. This highlights the importance of understanding and estimating this parameter accurately.

4.4. Limitations and Assumptions

It's important to acknowledge the assumptions made in this analysis, particularly the assumption that gold price changes follow an exponential distribution. Real-world financial data often exhibit more complex patterns, and deviations from this assumption can impact the accuracy of the results. Additionally, market conditions can change over time, and the analysis assumes stationarity of parameters, which may not hold in practice. In such a case we should use a numerical solution of equation (7).

4.5. Risk Management Implications

The results of this analysis can inform risk management strategies for investors and institutions dealing with investments. Depending on their risk tolerance and financial goals, stakeholders can adjust their investment strategies, such as setting stop-loss levels or portfolio diversification, to mitigate the risk of ruin.

5. SUMMARIZING THE KEY FINDINGS AND OUTCOMES OF THE RESEARCH

In summary, this scientific study has delved into the intricacies of financial theory concerning positive and negative price changes. By employing advanced mathematical modeling and integrating ruin theory concepts into practical applications, we have shed light on the underlying mechanisms that govern market value fluctuations. Our study challenged the conventional belief that positive and negative price changes follow identical distributions, presenting a compelling argument for their interdependence. As the dynamic nature of financial markets continually evolves, we must acknowledge that achieving absolute precision in our assessments may remain an elusive goal. Nonetheless, the probability of market value ruin estimated in this study offers a pragmatic and realistic framework for comparative evaluations of different assets and informs portfolio management decisions. While our analysis may not pinpoint the exact timing of potential ruin, it provides invaluable insights for risk assessment and aids decision-makers in making well-informed choices. The probability of ruin is a value that is independent of time and is always positive. However, what's crucial is its value. The higher its value, the greater the probability of the price falling below a certain threshold. This is a crucial metric for investors, effectively indicating which stock is more dependable for long-term investments. Through the example presented with gold prices, we have demonstrated the practical utility of our approach. This research contributes to a deeper understanding of market behavior, emphasizing the importance of adaptability and ongoing monitoring in risk management and investment strategies.

In the ever-changing landscape of financial markets, the knowledge gained from this study equips stakeholders with a valuable tool to navigate the complexities of investment decisions and financial risk management.

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IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON THE RETAIL INDUSTRY: CHANGES IN ONLINE CLOTHING SHOPPING IN THE EUROPEAN UNION

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ABSTRACT

The innovative application of information and communication technologies is transforming organizational dynamics and modeling the next evolutionary level of the retail industry. Retailers are reimagining the potential of digital technology advances in demand forecasting, consumer data collection, digital platform creation and transforming consumer behavior towards online shopping. The main purpose of the present study is to interpret more significant manifestations of the influence of information and communication technologies on the development of the retail industry, considering the change in consumer behavior, specifically in online clothing shopping, and on this basis to derive certain dependencies. In the studied problem, the examination of economic theories, conceptual judgments and empirical works helps to explain the measured dependencies. Respondents to the study are individuals from the 27-member states of the European Union. The data on their income, consumption costs, online purchases and demographic profile refer to the ten-year period 2011-2021. The measurement of the manifested dependencies is carried out by the method of linear regression and correlation. With the help of software for computer processing - IBM SPSS Statistics, and the Excel program, corresponding analyzes and evaluations are carried out. Data are used as the main information source for the data on the respondents' budgets from Eurostat. In formulating more important findings of the study, it comes to determine the variations in the influence of such demographic and economic determinants of European consumers' online shopping behavior for clothing, such as: gender, age, level of education, employment status, disposable income, consumer spending, online clothing purchases. The results obtained from the conducted study are useful for characterizing the changing behavior and attitudes towards online clothing shopping in the European Union.

Keywords: *information and communication technologies, retail industry, online clothing shopping, determinants of consumer behavior*

1. INTRODUCTION

In the digital age, information and communication technologies are transforming the retail industry. This shift is challenging retailers to use innovative technologies, such as augmented reality and the Internet of Things, to connect with consumers. In an effort to stay relevant, retailers, including apparel, are rethinking the use of digital systems to forecast demand, collect and store consumer data, create a personalized shopping experience for consumers. The main goal of the present development is to interpret more significant manifestations of the influence of information and communication technologies on the development of the retail industry,

taking into account the change in consumer behavior, specifically in online clothing shopping, and on this basis to derive certain dependencies . In order to achieve the thus outlined goal, the following research tasks are set: systematization and discussion of conceptual ideas and judgments about the advantages and results of the use of information and communication technologies in the retail industry; delineating a methodological framework of the study of consumer behavior in online clothing shopping, taking into account demographic and economic determinants; formulation of more important conclusions and generalizations of the research.
Respondents to the presented survey are individuals from the 27 member states of the European Union. The data on their income, consumption expenditure and demographic profile refer to the time interval 2011-2021. The evaluated ten-year period allows to provide representative data on the variations in the dimensions of disposable income, consumer spending of the respondents and online shopping for clothing in the European Union. Analyzing and evaluating the emerging dependencies between consumer spending and respondents' disposable income allows relevant application of the single linear regression and correlation method. Online shopping, including clothing, is examined through the lens of the reflection of information and communication technologies on the transformation of European consumer behavior. The study analyzes the impact of such demographic and economic determinants of online clothing shopping as: gender, age, education level, employment status, amount of disposable income, amount of consumer spending on clothing purchases, online purchases of clothing. Thus, the chosen and applied research approach provides an assessment of the direction of change in online clothing shopping by European consumers as a manifestation of the impact of information and communication technologies.

2. LITERATURE REVIEW

The modern retail industry, including the apparel retail industry, uses a wide range of information and communication technologies (ICT) that are leading to a revolutionary change in the way sales and promotion of the product portfolio are carried out. (Hunter & Perreault Jr., 2006), (Marshall, et al., 2012), (Ahearne, et al., 2013), (Heeks, 2010), (Hagsten, 2022), (Kuruzovich, 2013). Thus, the retail industry increases its ability to effectively adapt to increased consumer demands and build competitive advantages. ICT is fundamental to the growth of retailers and is a major tool for improving sales technology, which includes commercial aspects of supplier and customer relationship management, as well as automation applications (Hunter, 2011, pp. 426-454). In this regard, *G. Hunter* and *W. Perreault* examine the impact of ICT on two aspects of retail industry performance – customer satisfaction performance and business process performance. They conclude that retailers with a better technological orientation are better able to use reliable and quality information so as to facilitate sales planning and demonstrate "intelligent" behavior towards consumers (Hunter & Perreault Jr, 2006). Similar is the view of *S. Gohmann, J. Guan, R. Barker* and *D. Faulds*, according to which ICTs fulfills various functions in the implementation of sales - systematization and analysis of market information, management of customer relationships, sales automation, preparation of reports and development of sales forecasts (Gohmann, et al., 2005). *D'* s opinion also deserves attention. *Johnson* and *S. Bharadwaj that* with the help of ICT, retailers are creating digitized sales opportunities by developing websites designed to provide information and transact with consumers (Johnson & Bharadwaj, 2005). Along these lines, for example, apparel retailers are increasingly considering the introduction of technology to become experiential destinations rather than just places to shop (Beata, 2016). ICT is defined as a competitive imperative through which useful value can be provided to users and positive interaction can be realized. The technologies under consideration enable business improvements in terms of better experience and engagement to consumers, streamlining operations and creating new business models (Fitzgerald, et al., 2013, p. 2).

So ICT is becoming a major tool for changing the philosophy and model of doing online business in the retail industry, compared to conventional business, which creates additional value and multiplies the beneficial effects for consumers. (Jain, et al., 2021). In practice, the development of ICT creates new circumstances for retailers to conduct their business electronically, i.e. automation of commercial transactions. In this way, a number of effects are achieved, such as: in-depth study of market segments and their behavior in the marketing space, implementation of interactive communication with consumers in the sales process and exchange of valuable information without geographical and time limitations, increase of company indicators and competitiveness (Schwertner, 2017). In the specialized literature, the claim is made that the use of ICT is associated with the process of digitization and the desire for higher awareness of both those working in the field of retailing and end users. The studied technologies have an essential role not only for business processes in the retail industry, but also for the more effective satisfaction of consumer requirements. Establishing new contacts and greater proximity with consumers are the basis for the development of ICT and their implementation in the retail industry (Beata, 2016). The findings are that increased use of ICT in addition to user inclusion can lead to higher productivity and operational efficiency (European Commssion, 2012). The retail industry can use the multiplier effect of digital transformation strategically, increasing the long-term value of the business being conducted. Retail companies, including clothing retailers, make business decisions based on a huge amount of information, the collection, use and storage of which are quite difficult without the help of ICT. Artificial intelligence (AI), for example, creates favorable opportunities for data analysis, which allows retailers to combine relevant products with the characteristics of consumers. ICT impacts and supports the supply chain and logistics operations of retail companies (Kern, 2018). ICT infrastructure plays a significant role in the efficient functioning of retail spaces, mainly in large chains with links to centralized financial and inventory databases (Jeong & Shim, 2010). Through the prism of e-commerce, ICT is an exceptional assistant in marketing, in consumer visits, in product selection, in receiving and processing orders and payments, including tax payments (Das, 2018). However, ICTs must have a "universal design" to be more effective than their broad socio-economic application, i.e. they should not limit the access of certain social groups to the market of goods and services (IATP, 2023). ICT is often associated with real risks such as hacking attacks, system instability and phishing attacks on customer accounts. UNESCO Dictionary Information and communication technologies are defined as a diverse set of technological tools and resources used to transmit, store, create, share or exchange information (UNESCO Institute for Statistics, 2009). Similar is the definition of the European statistical office Eurostat, which defines ICT as a set of technical means that serve to process information and support communication (Eurostat, 2016). In order to perform their functions, ICTs are made up of hardware and software components (Shankar, et al., 2021). In the age of digital transformation in retail industry, including the retail clothing industry, various technological solutions are constantly being implemented. A key role in increasing sales revenue is the so-called traditional or cloud-based "point of sale" (POS) that transforms positive consumer feedback from shopping into important economic information for retailers (Маринов, 2021). POS can be essential to the profitability of companies (Cote, 2015) by managing and controlling unit costs, inventory, and hence supply and merchandising. The POS systems allow real-time synchronization of information in stores about customer orders, sales, inventory and the user themselves. In the apparel retail industry, POS often is identified with the place where the transaction process ends in stores, but the field of activities is not limited to recording sales information, but also has other useful functionalities: omnichannel sales; offline orders and payment method; easy and personalized reporting; cash management; warehouse synchronization and real-time inventory management; loyalty programs, incl. personalized promotions, gift cards and other means to improve the user experience; integration

with social networks; an alternative to click - and - collect shopping. In concrete terms, the advantages of ICT thus brought to a full extent have their power of manifestation in the clothing retail industry. ICT is bringing significant changes to the relationship between retailers operating in the clothing market and consumers shopping online or offline. Further investigation of the reduced relationship allows tracking the dynamics and changes in online clothing shopping. Compliance with the research objective set in the present study requires directing the study to establish the changes in online clothing shopping of European consumers, considering their demographic and economic profile.

3. MATERIALS AND METHODS

The research conducted focuses on analyzing and evaluating online clothing shopping. The type of shopping thus highlighted is considered through the prism of its determination by the use of information and communication technologies by individuals from the 27-member states of the European Union. The level of consumption of the selected respondents is measured by a set of different indicators, considering: consumer preferences; the amount of disposable income; the amount of consumer spending by groups of goods, as well as demographic characteristics of gender, age, education and employment status. Methodologically, the measurement of the manifested dependencies is carried out by applying the method of single linear regression and correlation. With the help of the statistical software for computer processing - IBM SPSS Statistics, as well as the use of the Excel program, the highlighted dependencies are analyzed and evaluated. The main source of information on respondents' budgets is Eurostat. In the course of the research, in a certain sequence, the dependence of online clothing shopping on such determinants as: gender, age, education and employment status are subjected to analysis and assessment. In the next analytical step, the results of a study of the dependence "consumer spending on online clothing shopping - disposable income of individuals from the 27-member states of the European Union" are presented. As a result of the analysis, a presentation of the manifested variations in the power of impact of the outlined determinants on the change of the behavior of the European consumers when shopping for clothes online is reached.

4. RESEARCH RESULTS

The ever-changing apparel retail industry, taking advantage of information and communication technologies, is creating new added value in satisfaction and seamless consumer experience. New research shows that today's consumers still prefer shopping, including for clothing, in physical stores to virtual reality, but are looking to more technology to enhance their shopping experience. Data collected by a global trade association dedicated to improving the retail environment - Shop Association, include findings that 81% of apparel consumers surveyed expect augmented reality (AR) to improve shopping in physical stores, and 65% agree that increased personalization is key to future purchase decisions (Shop. Association, 2023). The results of the cited survey present predictions about the impact of emerging technologies on future clothing shopping: the expectation of nearly 53% is that they will try on clothing in the same way as before; over 48% express a desire to use virtual changing rooms; about 28% - augmented reality (AR), and 23% rely on artificial intelligence (AI) to determine the items that best match their fashion style (Shop. Association, 2023). In addition, roughly 1/3 of respondents to the survey cited want access to "virtual personal users" who can provide recommendations based on their style and taste when shopping online (Shop. Association, 2023). The search for greater shopping convenience is changing consumer behavior. Assessing the data on the changing consumption patterns of modern European consumers is a basis for establishing an ever-increasing trend of online ordering and purchasing of goods and services, including clothing. According to data released by the European statistical office - Eurostat, in 2021 nearly 38.53 % of consumers who have access to information and communication

technologies make online purchases of clothing (including sportswear), shoes or accessories (Eurostat, 2023). This means that nearly 4 out of every 10 European internet users shop online for clothing. The comparative data make it possible to establish that at the beginning of the analyzed period 2011-2021, the evaluated indicator amounted to 19.30%, i.e. the expansion of the possibilities of access to the Internet causes an increase by more than two times. Within the framework of the present study, the survey conducted on online clothing shopping by natural persons from the 27-member states of the European Union allows to establish its degree of dependence on selected determinants, such as: gender, age, level of education and employment status. The obtained results testify to the manifestation of significant variations in the strength of influence of the highlighted determinants: see Figure 1.

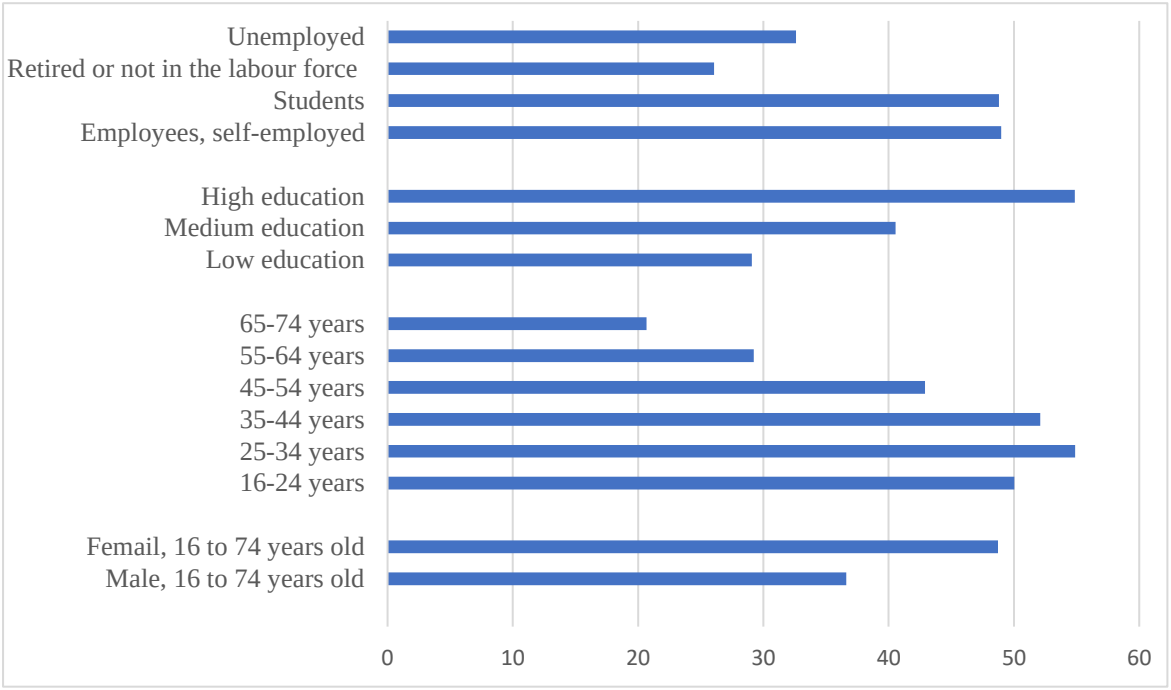

Figure 1: Internet users in the 27-member states of the European Union who bought or ordered clothes (including sport clothing), shoes or accessories in the previous 12 months, 2021 (% of individuals who used the Internet in the previous 12 months) (Source: Eurostat. https://ec.europa.eu/eurostat/databrowser/view/ ISOC_EC_IBGS__custom_7021063/default/table?lang=en)

As can be seen from the data in Figure 1., in 2021, observing the demographic determinant "gender", nearly 48.73% of women and 36.62% of men, as consumers in the European Union, use the Internet for online ordering and purchasing of clothing (including sports), shoes and accessories. The achieved values of the measured indicator testify that clothing is among the product groups with the highest distribution in online purchases. From the given data, it is found that the relative weight of women who order clothing and buy it online is 12.11% higher than that of men. European consumers in the age groups 25-34 years and 35-44 years are more active in searching and buying clothes online with a relative share of 54.89% and 52.11% of the total, respectively. Given the importance of identifying differences in consumer behavior, individuals in the 55-64 and 65-74 age groups are also active, 29.22% and 20.66%, respectively, in online purchases of clothing items. According to employment status, the relative share of the group of employees and self-employed persons, as well as that of students, represent the highest percentage of the total number of online clothing buyers - as follows - 48.97% and 48.80%. The comparison is made with respect to the unemployed and pensioners or non-working persons

from the European Union. According to acquired education, the relative weight of respondents with a higher level of education who shop for clothing online amounts to 54.87% and exceeds the share of surveyed consumers with secondary education (40.56%) and with lower or primary education (29.07%). Therefore, nearly 6 out of every 10 European consumers with a higher level of education shop for clothing online, using the possibilities of information and communication technologies. In the subsequent exposition, the analysis of online clothing shopping by natural persons from the 27-member states of the European Union is carried out by means of a study of the dependence "consumer expenditure on shopping for clothing - disposable income". The obtained results are visualized by means of three tables and two figures. With the help of Table 1., based on the application of the single linear regression and correlation method, a visualization of the values of the measured correlation and determination coefficients is achieved. The analyzed data refer to the period 2011-2021, published by the European statistical office Eurostat.

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.468	0.219	0.132	15825.326
The independent variable is Disposable income.			

Table 1: Model Summary

(Source: https://ec.europa.eu/eurostat/databrowser/view/nama_10_co3_p3/default/table?lang=en; https://ec.europa.eu/eurostat/databrowser/view/teina090/default/table?lang=en)

By means of the following Table 2., data are visualized that allow to analyze and estimate the value of the variance.

	Sum of Squares	df	Mean Square	F	Sig.
Regression	631421258.500	1	631421258.500	2.521	0.147
Residual	2253968606.980	9	250440956.331		
Total	2885389865.480	10			
The independent variable is Disposable income.					

Table 2 : Anova

(Source: https://ec.europa.eu/eurostat/databrowser/view/nama_10_co3_p3/default/table?lang=en; https://ec.europa.eu/eurostat/databrowser/view/teina090/default/table?lang=en)

Analyzing and evaluating the calculated coefficients is aided by the data visualized using Table 3.

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Disposable income	0.019	0.012	0.468	1.588	0.147
(Constant)	186619.152	79812.620		2.338	0.044

Table 3: Coefficients

(Source: https://ec.europa.eu/eurostat/databrowser/view/nama_10_co3_p3/default/table?lang=en; https://ec.europa.eu/eurostat/databrowser/view/teina090/default/table?lang=en)

Figure 2. presents the relationship between consumer spending on clothing (including sportswear), footwear and accessories, on the one hand, and the disposable income of respondents from the European Union, on the other.

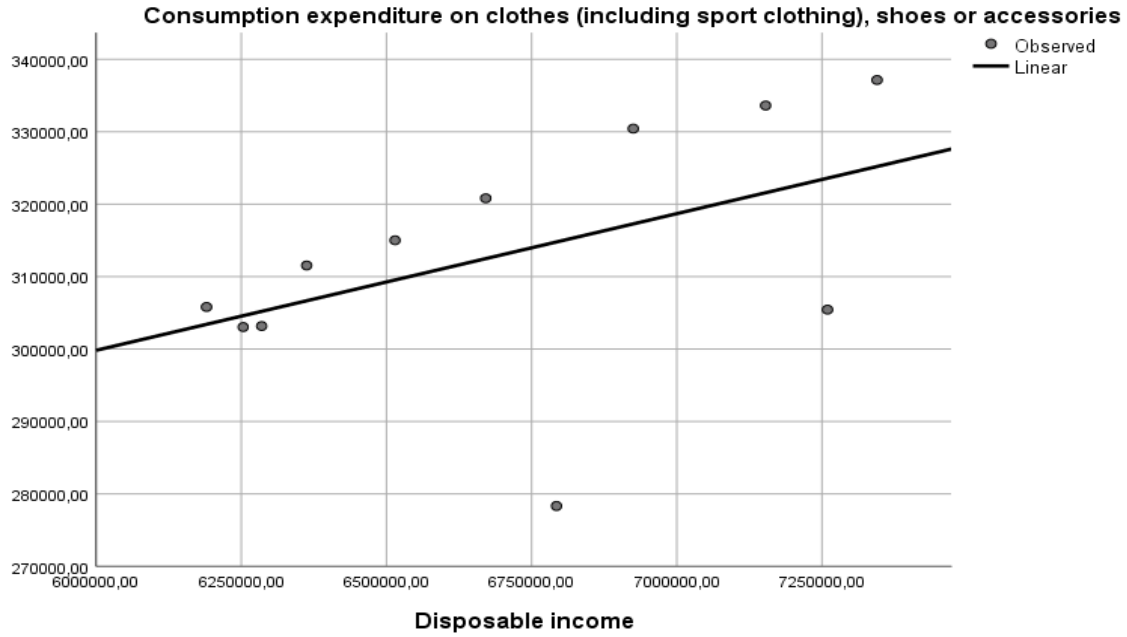

Figure 2: Relationship between consumer expenditure on clothing (including sport clothing, shoes or accessories) and disposable income of individuals in the 27-member states of the European Union
(Source: https://ec.europa.eu/eurostat/databrowser/view/nama_10_co3_p3/default/table?lang=en; https://ec.europa.eu/eurostat/databrowser/view/teina090/default/table?lang=en)

From an analytical point of view, the main indicators of the dependence evaluated in the present study are reduced to the three coefficients - of regression, correlation and determination. As the data from Table 3. show, the first of the coefficients listed in this way – that of regression, takes the value of 0.019. The obtained result is a reason to accept the assumption that when the disposable income of the studied individuals from the 27-member states of the European Union increases by 1 euro, an average increase of 0.019 in the costs of purchasing items from the clothing product group is reported. Observing the data presented in Table 1., it is concluded that the coefficient of variation R assumes the value as follows: R = 0.468. Analysis of this coefficient helps measure the strength of the relationship between variables. Based on the references in the specialized literature, at $0.3 < R \leq 0.7$, an average strength dependence is established, i.e. moderate degree of dependence or moderate correlation. In the determined analytical order, parallel to the coefficients of regression and variation, the next coefficient subject to analysis and evaluation is reduced to that of determination. The utility of its calculation finds expression in measuring the relative weight of variation in consumer spending on clothing shopping. In accordance with the data visualized using Table 1., the coefficient of determination takes the value: R2 = 0.219. The established result constitutes a basis for formulating the assessment that nearly 22% of the differences between the consumers of clothing between individuals from the 27-member states of the European are due to the inequality in the amount of income available to them. According to what is shown in Figure 2., it is clear that the values of disposable income of the respondents are presented on the abscissa axis, and the value of consumer spending on clothing (including sportswear), shoes and accessories is presented on the ordinate axis.

The existence of the moderate correlation found in the present study between the variable quantities allows us to accept the statement that the actual values of consumer expenditure studies tend to be distributed around the regression line.
With the help of the following Figure 3., the dynamics and development trends of disposable income, consumer spending on clothing and online purchases of clothing (including sportswear), shoes or accessories of individuals from the 27-member states of the European Union are visualized during studies ten-year period 2011-2021.

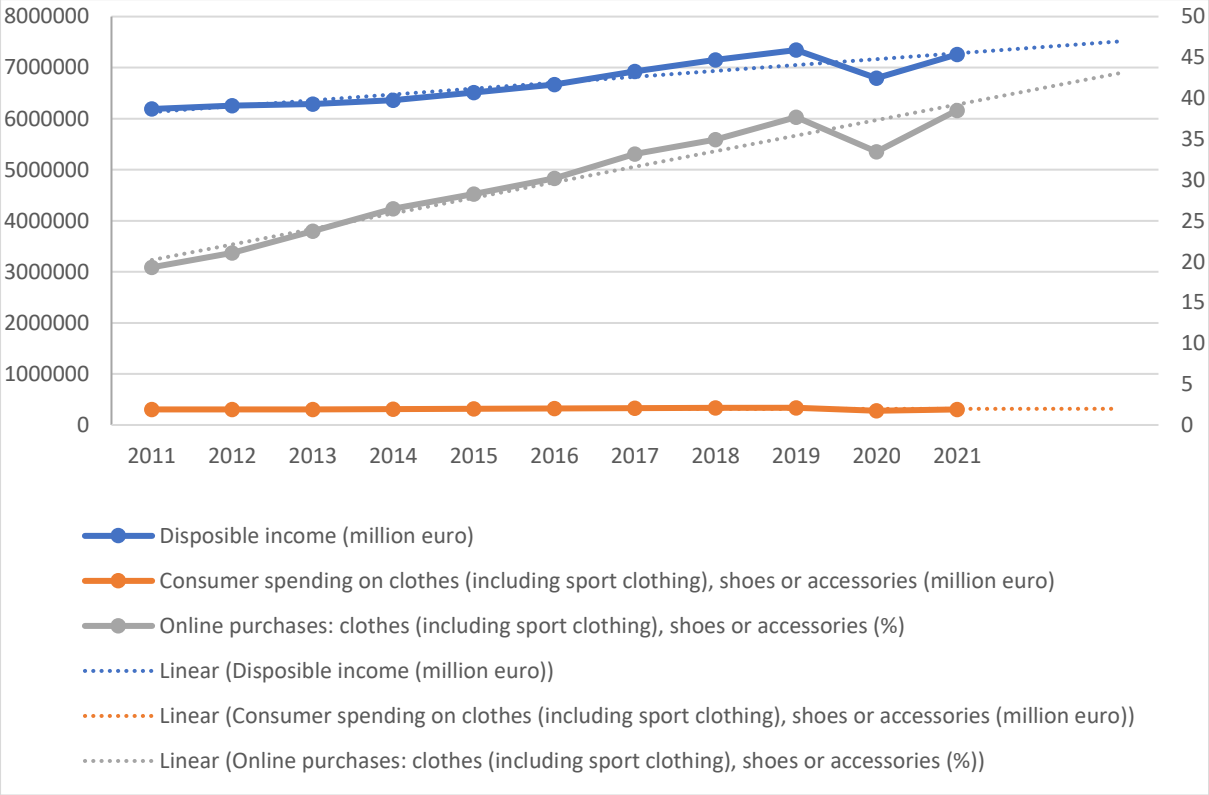

Figure 3: The dynamics and development trends of disposable income, consumer spending on clothing and online purchases of clothing (including sportswear), shoes or accessories of individuals from the 27- member states of the European Union

Figure 3. has two axes – the right axis represents online purchases of clothing (including sportswear), shoes or accessories. The left axis describes the respondents' disposable income and consumer spending. Online clothing purchases during the research period 2011-2021 follow a trend of moderate annual growth. In 2020, there was a decrease compared to the previous year by about 5.06%, but in the last year of the analyzed period, the highest value was reached for the entire studied period. The data, visualized through the considered Figure 3, also allow to analyze and evaluate the dynamics and trends of development of the disposable income and expenditure on clothing consumption of the respondents from the 27-member states of the European Union. During the analyzed period, according to the regression model, the disposable income of the respondents increased. An increase was also found in the size of the expenditure on clothing consumption. In this analytical direction, the finding that disposable incomes follow faster rates of growth compared to the amount of clothing expenses is significant.

5. DISCUSSION

The analysis carried out in the present study allows to measure the power of influence of selected demographic and economic determinants on the behavior of European consumers in online clothing shopping.

There is an opportunity to compare and examine results obtained by other researchers published in the specialized theory. In this direction of knowledge in the 80s of the 20th century in his development with interpretations of works by D. Keynes and Cambridge women Keynesians, regarding the revolution in the economy that should be carried out, the theorist L. Passinety came to the conclusion that the current real income of individuals is one of the most important determinants of the level of consumption (Passinetti, 1981). Thus, the researcher prioritizes disposable income as the determinant of consumption in the short run. Therefore, the above reasoning shows that consumer behavior is determined by the influence of a heterogeneous set of determinants, but among them, the consideration of those of an economic and demographic nature is of particular analytical and applied utility.

6. CONCLUSION

The study thus conducted allows to formulate the generalization that demographic and economic determinants have a significant impact on the online purchases of clothing by European consumers. This line of research should emphasize the power of influence of key demographic determinants of consumption, such as gender, age, education and employment status. The observed variations in the size of respondents' disposable incomes outline the changing behavior of European consumers when shopping for clothing online. Of particular practical importance is the result measured over the evaluated ten-year period - 2011-2021, a result representing that nearly 22% of the differences between clothing users between individuals from the 27-member states of the European Union are due to the inequality in the size of the available of them income, as a significant economic determinant. Overall, the research results obtained show that online clothing consumers in the European Union have comprehensive digital options for ordering and purchasing items from the product group under consideration. For this reason, in the foreseeable future, apparel retailers should convert at an increasingly rapid pace to the use of digital systems to forecast demand, collect and store consumer data. Thus, in the digital age, apparel retailers will stay relevant by applying information and communication technologies in creating the personalized shopping experience consumers are looking for.

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APPLICATION AND EFFECTS OF THE EUROPEAN UNION'S 'FARM TO FORK' STRATEGY IN BULGARIA

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ABSTRACT

In 2020, the European Commission presented its 'farm to fork' strategy as one of the key actions under the European Green Deal. The strategy includes several initiatives and legislative proposals to achieve the combination of food security for consumers, sustainability in accordance with climate changes and the protection of biological diversity, as well as secure incomes and the exploration of new business opportunities in the food industry. This report examines the specific goals and areas of intervention for the Bulgarian agri-food sector in implementing EU's 'Farm to Fork' Strategy in the context of current climate-related events. The research is part of a scientific project on the effects of the European sustainability strategy on the development of agriculture in Bulgaria.

Keywords: *Agri-food sector, European Green Deal, Farm to fork strategy, Innovative technologies, Sustainable Development*

1. INTRODUCTION

For thousands of years, the main factors of production have been two - natural (land, water, natural resources) and labor (human capital). With the industrial revolution, the focus shifted to financial means (capital) and the entrepreneurial spirit, and in the new post-industrial society the emphasis falls on intangible production and innovation. The development of high technology in combination with artificial intelligence is considered the panacea that will help us get out of difficult situations and do unthinkable things until recently - from extending life expectancy and finding cures for deadly diseases to colonizing planets and space exploration. But these same technologies have had an impact, and over time have contributed to perhaps the foremost challenge facing the planet that humanity is called upon to deal with in the 21st century - climate change. At the Earth Summit in Rio in 1992, the United Nations Framework Convention on Climate Change was adopted, in which representatives of 154 countries recognized the threat of increasing greenhouse gas emissions as a result of human activity. According to its provisions, the governments of the member countries aim to reduce the concentration of greenhouse gases in the atmosphere and to develop and adopt national strategies for mitigation and adaptation to the expected consequences of climate change. In the three decades after Rio 1992, a number of legislative initiatives were undertaken at the state and supranational level, activities, practices and business models were organized, linked to the gaining popularity of the concept of sustainable development. In 2016, the Paris Agreement on climate change was signed, which was supposed to improve the implementation of the Framework Convention. It states that in order to achieve its goals to: *'nationally determined contributions to the global response to climate change, all Parties are to undertake and communicate ambitious efforts...' (EUR-Lex, 2016)*. In 2019, the European Commission presented its vision for sustainable development of the Union for the next ten years, called the European Green Deal. It follows the spirit of the Paris Agreement and represents an 'ambitious' strategy for economic growth dominated by a resource-efficient and low-carbon economy and a just environmental transition. The transition to a green economy involves new challenges in areas such as energy, waste management, transport, agriculture, construction, and many other areas to address global climate change. *(European Commission, 2022)*. At the heart of the Green Deal is the Farm to Fork Strategy, presented in April 2020, which takes a deep look at

sustainable food systems while recognizing the intrinsic connection between healthy people, societies, and a healthy planet *(European Commission, 2020)*. This strategy is the main lever of the European Commission to achieve the UN Sustainable Development Goals (SDGs). The aim of this paper is to examine the specific goals and areas of intervention for the Bulgarian agri-food sector in implementing EU's 'Farm to Fork' Strategy in the context of current climate-related events.

2. OVERVIEW OF CURRENT CLIMATE DISTURBANCES AS A DRIVER OF CHANGE

Globalizing societies and their economies in latter years are not only exposed to different kinds of shocks caused by humans (trade disputes, rising tariffs, intensified global flows of data, finance, and people, etc.) but also feel a greater expose to natural disasters whose effects can travel rapidly and effortlessly across countries *(Figure 1)*.

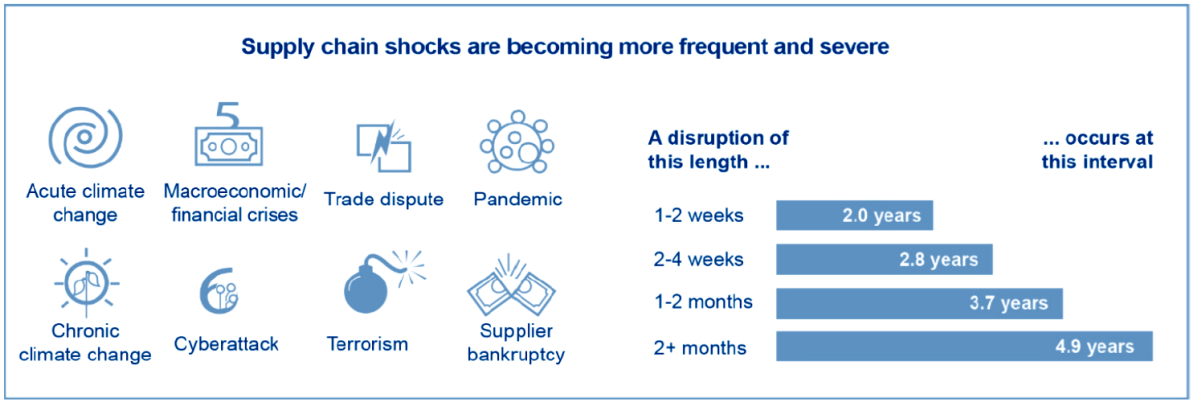

Figure 1: Types of shocks to global value chains and their frequency
(Source: Grumiller, J., Raza, W., Grohs, H., Essletzbichler, J., Pintar, N., 2021)

As economic theory starts to analyze the relationship between trade openness and such different types of conflicts, some reports suggest that sector-specific shocks in a country or region lead to increased macroeconomic volatility. There is a common assessment amongst scientists that an increase in the number and length of supply chain disruptions is more likely due to extreme weather events such as heatwaves, droughts, heavy rains, and storms who tend to happen locally, and international trade and diversified supply chains are beneficial to security of supply after such natural disasters. Since these shocks happen less often that those on a country or regional levels, their effects could be less severe: *'if the country is open to international trade and has diversified supply relations with other countries'* (*Grumiller, J., Raza, W., Grohs, H., Essletzbichler, J., Pintar, N., 2021)*. Weather-related shocks, acute or chronic, come with significant economic expenses. In 2015, US $13.8 trillion of the world's financial assets could have been affected by climate change. As they become more frequent, more than US $300 billion in 2017 were lost due to extreme climate events, a considerable growth compared to the US $30 billion in 1980 *(Figure 2)*. The biggest contributors were economic growth and urbanization, which account for a 55% share of the total increase in economic losses over the period. The corresponding number for the emerging economies is even higher - an 8% yearly increase in economic losses over the same period, 70% of them due to growth and urbanization. In the past 40 years global GDP grew by 2.8% on average annually, and today more than 50% of the global population lives in urban areas, compared to the 30% in 1950s, and is expected to rise to near 70% by 2050 *(Swiss Re Institute, 2020)*.

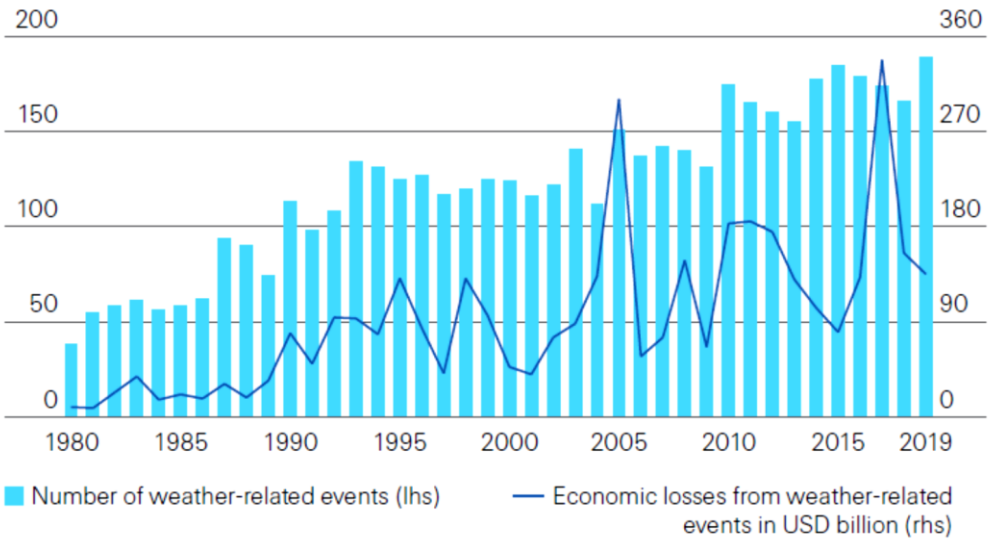

Figure 2: Number of weather-related events and associated economic losses, 1970-2019 (USD billion, 2019 prices)
(Source: Swiss Re Institute, 2020)

The first of the goals set out in the Paris Agreement on climate change is to keep global warming to safe levels - to keep the rise in global average temperature well below 2°C compared to pre-industrial levels, and to achieve the containment of the global rise to 1.5 °C, which should lead to a significant reduction in the risks and impacts of climate change. This goal is long-term and certainly one of the most difficult to achieve in terms of the time and resources needed. So far the results don't show to be encouraging. In September 2023, the World Meteorological Organization (WMO) came out with data that the months of June, July and August 2023 were the three hottest months in the history of the Earth since the beginning of observations *(World Meteorological Organization, 2023b)*. Global sea surface temperatures have also been at record highs for the past three months, and Antarctic Sea ice extent remains at a record low for this time of year. The Earth recorded both its hottest August on record and the second hottest month ever after July 2023. The calculations also show that August 2023 overall was about 1.5°C warmer than the pre-industrial average for the year 1850-1900 *(Figure 3)*. Additionally, in May 2023 WMO predicted that at least one of the next five years had a 98% probability of being the warmest on record and a 66% chance of temporarily exceeding 1.5°C above levels of the period 1850-1900 *(World Meteorological Organization, 2023a)*. However, the World Meteorological Organization reassures that on the long-term warming trend, the data is not yet conclusive that we will necessarily exceed the 1.5°C level set in the Paris Agreement permanently. At the same time, the probability of a temporary exceedance of 1.5°C has increased steadily since 2015, when it was close to zero, and for the years between 2017 and 2021 there was a 10% chance of an exceedance.

Figure following on the next page

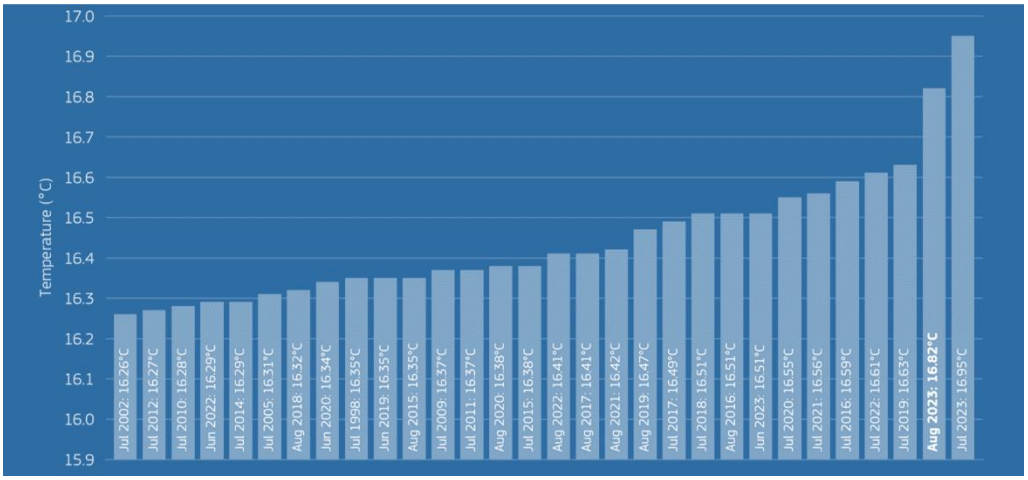

Figure 3: The 30 warmest months on record globally
(Source: World Meteorological Organization, 2023b)

At the same time, a research by the European Academies' Science Advisory Council (EASAC) shows that we are already experiencing an intensification of shocks, due in particular to extreme weather events, and this frequency has increased over the past 50 years *(EASAC, 2018)*. Some of the important conclusions in the EASAC report are:

- the number of floods and other hydrological events has quadrupled since 1980 and doubled since just 2004;
- climatological events, such as extreme temperatures, droughts, and forest fires, have more than doubled since 1980;
- meteorological events, such as storms, have doubled since 1980 *(Figure 4)*.

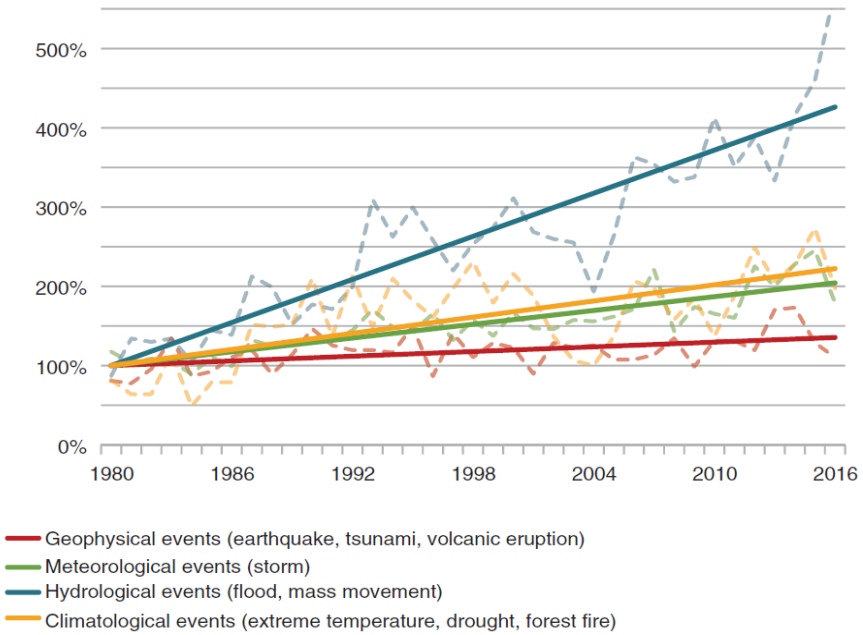

Figure 4: Trends in different types of natural catastrophe worldwide 1980-2016
(Source: EASAC, 2018)

In this context, due to drought and frequent heat waves in the summer of 2023, some countries of the European Union are experiencing the consequences of the most serious drought in the last 500 years.

In Italy, the combination of the two phenomena led to a 10 percent reduction in summer agricultural production. The lack of precipitation also affected the energy sector: in France it created problems for the cooling of nuclear reactors; in Germany - for the transport of coal as a substitute for the reduced import of natural gas from Russia; in Norway and Italy it led to the reduced production of hydroelectric energy *(Ghisellini, P., Ncube, A., Rotolo, G., Vassillo, C., Kaiser, S., Passaro, R., Ulgiati, S., 2023).* One way of tackling effects of extreme weather and resource reduction is through sustainable agricultural practices. Conventional agricultural production relies on chemical fertilizers and pesticides to boost yields, but at the same time creates a range of problems that threaten food production systems in the long run. In contrast, sustainable agriculture practices could lead to water savings of 60–70%, savings in energy network power of 80–90%, chemical fertilizer savings of 60–70%, and savings in spraying of over 50%, but their widespread adoption is still deficient *(Elshaer, I., Azazz, A., Hassan, S., Fayyad, S., 2023)*.

3. EU'S 'FARM TO FORK STRATEGY' AND ITS GOALS AND AREAS OF INTERVENTION IN BULGARIA

The sustainability of food systems is already becoming an obvious global issue. The European Union wants to play a key role in setting new global standards for food security in order to adapt food systems to diverse challenges. In addition to its new policy initiatives, an enforcement of existing legislation was made through the adoption of its 'Farm to Fork' strategy *(European Commission, 2020).*

3.1. Overview of EU's 'Farm to Fork' Strategy key points

Reconciling society's needs for sufficient quality food combined with preventing the destruction of natural capital is at the heart of the European Union's proposed more sustainable agri-food systems based on the circular economy and the 'Farm to Fork' strategy. The Strategy is at the core of the European Green Deal - the 2019 pledge to reach climate neutrality by 2050 and a commitment to make Europe the first climate neutral continent, setting its long-term target of reducing net greenhouse gas emissions by at least 55% by 2030. Adopted in April 2020, the 'Farm to Fork' strategy challenges the request for sustainable food systems while recognizing the intrinsic relation amidst healthy people, societies, and a healthy planet. The Strategy sets out regulatory and non-regulatory initiatives with the following goals:

- to impose a neutral or positive environmental impact;
- to contribute to climate change mitigation and adaptation to its impacts;
- to reverse biodiversity losses;
- to ensure food security, nutrition and public health, and everyone's access to sufficient, safe, nutritious and sustainable food;
- to preserve food affordability while generating a fairer economic return, promoting fair trade and the competitiveness of the European supply sector;

The Strategy launches some measurable targets that include:

- to reduce by half the overall use and risk of chemical pesticides and the use of more hazardous pesticides by 2030;
- to enhance provisions on integrated pest management and stimulate greater use of safe alternative ways of protecting harvests from pests and diseases;
- to reduce nutrient losses by at least 50%, while ensuring that there is no deterioration in soil fertility, with a view to reducing the use of fertilizers by at least 20% by 2030;
- to accomplish at least 25% of organic farming of the EU's agricultural land by 2030;
- to revise animal welfare legislation.

Some early research point out various flows in the Strategy. Giannou states that the Strategy supports job creation in the food and agriculture sector without outlining for whom the jobs will be created, and what would be the job description needed *(Giannou, C., 2022).* According to Mowlds, those targets are ambitious, considering the current trends and figures, as the EU-27 would need to increase by nearly two and a half times its current rate of growth to achieve the target of 25% of agricultural land under organic farming *(Mowlds, S., 2020)*. Other authors had concerns such as: the need for properly taking the soil into more account in the Strategy as it has the key role in mitigating greenhouse gas emissions; a more participative approach in considering alternatives for those who could lose from the transition toward more sustainable food systems - food producers, processors, retailers, and consumers; a change in the attitudes of the society to support the required changes by a transition to a higher role of organic farming; the importance of linking the increased proportion of land devoted to organic agriculture with the use of modern biotechnologies and breeding techniques *(Ghisellini, P., Ncube, A., Rotolo, G., Vassillo, C., Kaiser, S., Passaro, R., Ulgiati, S., 2023)*. A 2023 Eurobarometer surveys show that more than 77% of EU citizens consider climate change a very serious problem at this moment, and it ranks among the top three in 16 of the 27 Member States *(European Commission, 2023)*. The transition to a green economy should be sped up in the face of energy price spikes and concerns over gas supplies is a statement, supported by 58% of respondents. A majority of Europeans think that the EU, national governments, business and industry are the ones responsible for tackling climate change. Interestingly enough, Bulgarians are second to last with 35% to acknowledge they participate in some way personally in nature conservation (the last one being the Romanians with 29%), and they are overall less satisfied with what their national government is doing - 73%, compared to 67% EU average.

3.2. The 'Farm to Fork' Strategy in Bulgaria - initial position and areas of intervention

The Bulgarian Ministry of Agriculture and Food published in August 2023 for public discussion a draft of the National Action Program to contribute to the implementation of the objectives of the 'Farm to Fork' Strategy until 2030. The purpose of the National Program is to outline instruments, measures and activities related to the implementation of specific goals and commitments, contributing to the protection of the climate, the environment, biodiversity and natural resources for the period up to 2030. The Program also updates and upgrades the strategic framework for managing the agrarian sector aligning with the following national documents *(Ministry of Agriculture and Food, 2023)*:

- The National Development Program Bulgaria 2030
- National plan for recovery and sustainability of the Republic of Bulgaria
- Strategic plan for the development of agriculture and rural areas for the period 2023-2027.
- National Climate Change Adaptation Strategy and Action Plan to 2030.
- Integrated plan in the field of energy and climate of the Republic of Bulgaria 2021-2030.
- National Air Pollution Control Program 2020-2030
- National program to reduce total annual emissions of sulfur dioxide, nitrogen oxides, volatile organic compounds and ammonia in atmospheric air
- National framework for priority actions for Natura 2000 for the period 2021-2027.
- National program for conservation, sustainable use and restoration of soil functions 2020-2030.
- Circular Economy Transition Strategy 2022-2027

The Program admits that the warming trend that began in the late 1970s continues and the expected climate changes have a significant impact on natural ecosystems and the population - in fact, they are already largely manifesting. In Bulgaria, 20 of the last 23 years after 1989 have positive anomalies of the average annual air temperature compared to the climatic norm of the

base period 1961-1990. In 2019, the average annual temperature in Bulgaria is 13.3°C or on average 2.1°C above the climatic norm.
While climate warming in northern Europe will generally have a positive effect on agriculture, some agricultural production systems in southern Europe may be threatened. As for Bulgaria, the most vulnerable areas in the near future will be:

- spring agricultural crops - due to the expected precipitation deficit;
- crops grown on infertile soils;
- crops from non-irrigated areas;
- the arable lands in South-Eastern Bulgaria, where even under the modern climatic conditions, the rainfall amounts are insufficient for normal growth, development and formation of the productivity of agricultural crops.

One of the key intervention areas is EU's Green Deal and thus 'Farm to Fork' Strategy is the level of greenhouse emissions - carbon dioxide, methane and nitrous oxide. The latest data on Bulgaria's greenhouse gas emissions show a rise after a 3-year decline and a return to 2013 levels, which indicates that additional measures are needed, despite being better that the EU and world's averages *(Figure 5)*.

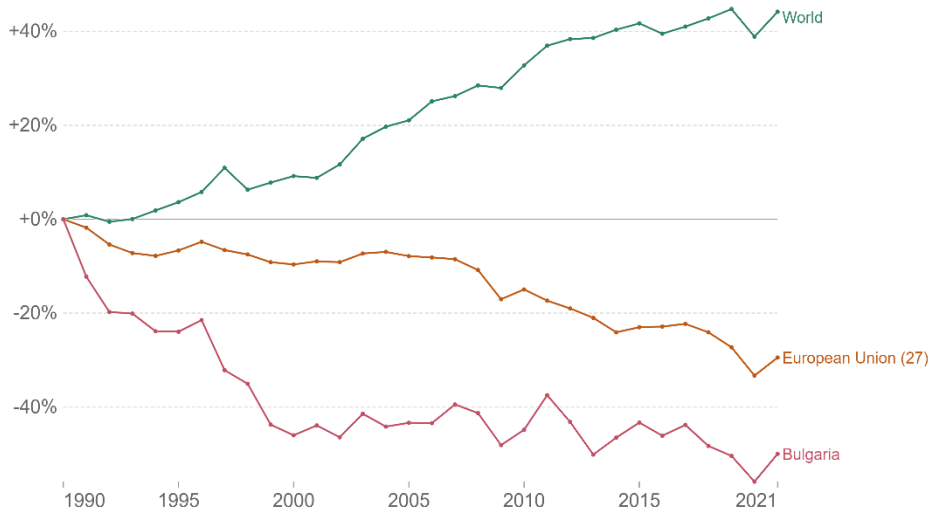

Figure 5: Total greenhouse gas emissions by World, European Union and Bulgaria, relative change, 1990-2021.
(Source: Ritchie, H., Roser, M., Rosado, P., 2020)

The agricultural sector is the third largest source of greenhouse gas per capita after 'Electricity and heat' and 'Transport' sectors for 2019 *(Figure 6)*. There is a reduction in emissions from agriculture for the period 1988-2019 as a direct consequence of the general decline in agricultural activity. Greenhouse gas emitted from agriculture are obtained as a result of the activities and processes of production and processing of agricultural products, fertilization of soils and treatment of animal waste. In the period 2005-2019, soils in the country are in a good ecological condition in terms of stocking with biogenic elements and organic matter and in terms of contamination with heavy metals, metalloids, and persistent organic pollutants. The results show that the levels of pesticide use in the country are below average compared to developed European countries, but have been increasing in recent years, and with changes in the climate and the increase in average annual temperatures in the coming decades, it may increase even more *(Figure 7)*.

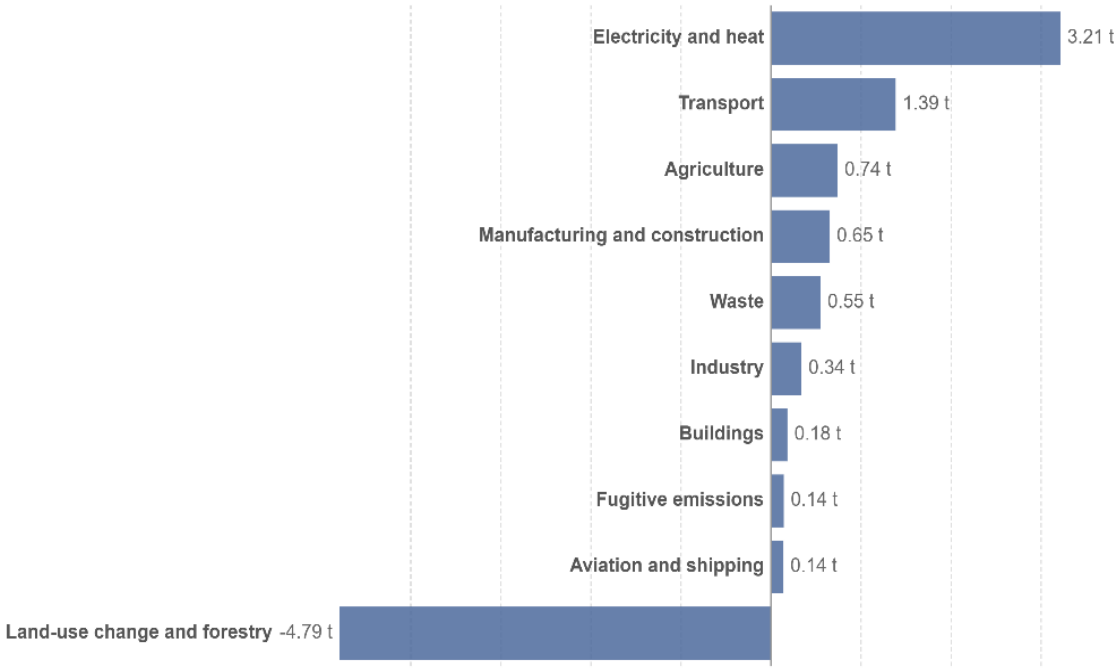

Figure 6: Per capita greenhouse gas emissions by sector for Bulgaria, 2019. (Source: Ritchie, H., Roser, M., Rosado, P., 2020)

The total areas on which organic production methods are applied in 2022 are 110,440.68 ha, 27.96% more compared to 2021 and represent 2.85% of the used agricultural area in the country. For comparison, the average value of this indicator amounts to just over 9% for the European Union.

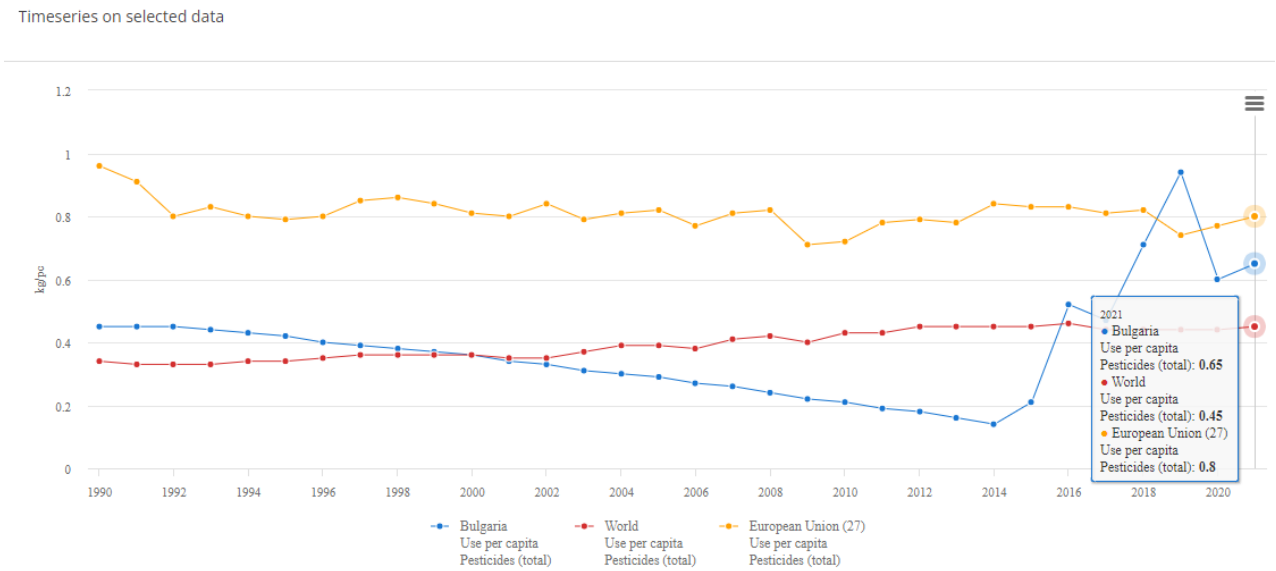

Figure 7: Use of pesticides per capita for Bulgaria, EU and the world, 1990-2020) (Source: FAO, 2023)

To achieve the set goals of promoting green investments, sustainable management of natural resources, adapting to climate change and mitigating its consequences in agriculture, the Program formulates six strategic goals and subsequent measures to achieve them *(Table 1)*:

No	Strategic Goal	Measures	Indicative Budget
1	Ensuring sustainable food production	13	BGN 3 307 479 496
2	Ensuring food security	9	BGN 1 113 504 804
3	Stimulating sustainable food processing and food services practices	6	BGN 73 618 136
4	Promoting sustainable food consumption and facilitating the shift to healthy, sustainable diets	9	BGN 46 604 090
5	Reducing food loss and waste	5	BGN 1 130 000
6	Combating food fraud along the food supply chain	4	BGN 4 099 978

Table 1: Strategic goals and measures in Bulgaria's National Action Program concerning EU's 'Farm to Fork' Strategy
(Source: Ministry of Agriculture and Food, 2023)

This green transition model will be based on research, innovation, technology, and investment. Accelerated knowledge transfer and advisory services are key for all farmers to have equal access to the implementation of technological innovations and proven good production practices. Evaluation of the results and updating of the National Program will be carried out based on Three-Year Action Plans and their annual update (*Ministry of Agriculture and Food, 2023).*

4. CONCLUSION

To secure a decent and viable environment and well-being for the next generations, urgent changes in many economic sectors are needed, the agri-food sector being one of the most vulnerable ones. A period of structural shifts is ahead in the entire nutrition sector – from the cultivation and use of land and natural resources, through processing and turning them into food products, to their use by the end consumer, and beyond – utilization, compost, and recycling. In this regard, we can summarize the following conclusions after the points observed in this report:

- Since the new wave of globalization in the 1970s, societies have been exposed to various kinds of shocks by natural disasters, who have become more frequent, at growing economic expenses, and lead to increased macroeconomic volatility.
- When these shocks happen on country or local levels, international trade and cooperation, and diversified supply chains could be beneficial to cope with the effects.
- As the world experiences its hottest summer in 2023 since the beginning of observations by the WMO, the data is not yet conclusive whether we would exceed the 1.5°C level set in the Paris Agreement on climate change, but the probability of that has increased steadily since 2015.
- The European Union wants to play a key role in setting new global standards for food security through new policy initiatives such as the adoption of its 'Farm to Fork' strategy in 2020.
- Negative effects of climate change are being observed around the whole world, but emerging and underdeveloped economies experience higher increase in economic losses.
- Bulgaria is lagging behind the EU's Green Deal efforts as it continues to have the most carbon-intensive economy in the EU. Effective involvement of national and local authorities, private sector and NGOs in sustainable policy-making has been slowed down by political instability. Policy efforts need to be accelerated and speedy implemented on all levels. The dissemination of information on EU's Green Deal policies must be combined with investments in skills needed for the green transition of Bulgarian economy as a whole and the agri-food sector in particular.

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DIGITAL TECHNOLOGIES FOR SUSTAINABLE SOLUTIONS IN THE AGRICULTURAL SECTOR

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ABSTRACT

Developing a sustainable agricultural sector requires its digital transformation. To optimize production activities, digital technologies are assigned promising results. In this aspect, it is considered that the digitization of the agricultural sector along the plant/animal-food-consumption chain has no alternative. This is emerging as a global trend for conducting modern agriculture. The digitalization of the sector aims to increase the income of agricultural producers, optimize the production costs, track of end products and others. The technological renewal of the agricultural sector is aimed at the application of artificial intelligence, robotics, cloud services, large databases, the Internet of Things, blockchain and others. The digitization of the agricultural sector puts economic entities in front of the need to implement modern tools in their activities. This requires farmers to understand the benefits of applying digital technologies as a result of their application in crop and livestock production. For this purpose, indicators are being studied for reporting the results of their application in crop and animal breeding activities. The systematization of the benefits of their application support the claim that it is necessary to use digital technologies to develop sustainable solutions for current and future challenges, including in the agricultural sector. To study the factors affecting their introduction, we adhere to the established European-level index for the penetration of digital technologies in the economy and society, known as DESI (Digital Economy and Society Index). To really measure the penetration of digitization in the agricultural sector, attention is directed to the following indicators for analysis: 'digitalization of agriculture'; 'modernization of the agricultural sector'; 'digitalization of the economy in rural areas'. Publicly available information is needed to allow analysis of the state of digitization of the economy, respectively of the agrarian sector. This will enable transparency of production activities and up-to-date information on the condition of cultivated plants and animals.

Keywords: *Agricultural Sector, Digitization, Digital Technologies, Digital Economy and Society Index (DESI), Indicators for Measuring Digitization in the Agricultural Sector*

1. INTRODUCTION

Our modern times are characterized by the efforts of various economic entities in the state, public and private sectors towards an ever wider implementation of digital technologies. The current development focuses on measuring the benefits of their application. They are expected to contribute to the sustainability of processes in the economy, respectively in agriculture. From this position, the indicators for reporting the results of the application of digital technologies in the agricultural sector are studied. Digital transformation and its impacts have long been the subject of extensive research. Scholars and representatives from practice direct their efforts to create theoretical, and at the next stage, practical models for digitalization of the agricultural sector. In this aspect, the various activities in the agricultural holdings are covered. The digital infrastructure is a foundation and a necessary prerequisite for the realization of the digital transformation. It includes both communication networks and devices, equipment, systems and other means of connection, information exchange, process management, etc. The European Commission is working towards a digital transformation that benefits all Europeans.

The skills to work in a digital environment require a systematic and coordinated approach at the national and European level, including cross-sectoral cooperation.
In its interdependence of social, economic and ecological approaches, the agrarian sector strives to achieve sustainability from the decisions taken for its implementation. In this regard:

- In *a social* aspect, sustainability is expressed in the support of rural communities in line with the Common Agricultural Policy of the European Union. Digital solutions are all about transforming the methods of producing safe food while meeting high health, environmental and ethical standards, to maintain an independent food system.
- In *an environmental* aspect, the European agricultural policy is aimed at the sustainability of the decisions taken on climate change, the protection of natural resources and the promotion of biological diversity. Digital solutions are aimed at incentives for environmentally friendly and socially inclusive economic growth to achieve food security, without pressure on the environment.
- *Economic* sustainability comes down to justified benefits for farmers at the European level. Digital solutions are primarily aimed at ensuring a decent standard of living for farmers through efficient use of natural resources without causing harm to the environment.

In implementation of the European Green Pact, the European Commission adopted in 2020 key documents relevant to achieving the sustainability of the agricultural sector, namely:

- 'Farm to Fork' strategy,
- The EU 2030 Biodiversity Strategy
- A plan to reach the 2030 climate target.

These key strategic documents provide a comprehensive response to the challenges facing the agricultural sector. Digital technologies must be accessible to all economic entities, including farmers. The national policy is aimed at inclusion and support through training, provision of resources and incentives for the implementation of new solutions in the agricultural sector. As key digital technologies for the sector, we define: Internet of Things, autonomous robots, cloud technologies, big data, artificial intelligence, blockchain technologies, digital platforms and others. We consider the following to have significant transformative potential for the agricultural sector:

- *Internet of Things*. Sensors that collect information in real time and send it for post-processing and analysis. The devices provide information on basic indicators such as moisture, soil structure, etc.
- *Artificial Intelligence*. These are systems that analyze their own environment and, with a certain degree of independence, take actions to achieve specific goals. They allow evaluation of the quality of the production.
- *Blockchain*. A technology that enables the tracking of production from the producer to the consumer. Through a provided code, each product becomes visible along the agro-food chain. The technology finds a successful application in the supply chains of food products - fruits and vegetables, for example.

Digital technologies applicable in the agricultural sector are aimed at improving working conditions in terms of increasing productivity and reducing manual labor.

2. EXHIBITION

Digitization is presented as a transition to the inclusion and use of digital technologies and digitized information. The aim is to simplify and speed up processes and tasks, and make them more efficient and/or more economical (European Court of Auditors, 2022).

At the European level, the priorities in the field of modern technologies are outlined in the European Union Strategy for Smart, Sustainable and Inclusive Growth 'Europe 2020' and more specifically in:

- Program in the field of digital technologies in Europe, adopted in 2010;
- Digital Single Market Strategy adopted in May 2015.

One of the highlights in the construction of a sustainable Common Agricultural Policy of the European Union is aimed at the digitization of the agricultural sector (European Commission, 2018). As a member of the European Union, Bulgaria has undertaken to adhere to the implementation of the set goals, including in relation to digital technologies. In this sense, the prepared documents correspond to the planned implementation plans. At the national level, a number of laws and by-laws have been adopted from the point of view of the use of modern technologies. Key areas of the Agricultural Modernization Fund, which is part of the National Plan for Recovery and Sustainability, are sustainable agriculture and digital connectivity (What will more than BGN 4.3 billion from the new Agricultural Modernization Fund go to?, 2021). The budget for the agricultural sector amounts to BGN 4,321,675,000 (2% of the total budget). The support is aimed at all registered farmers. For the period 2021-2026 BGN 543,600,000 have been provided (BGN 247,100,000 allocated by the Recovery and Sustainability Mechanism and BGN 296,500,000 national co-financing, including BGN 247,100,000 private co-financing). The possibilities for financing the agricultural sector in the 'Sustainable Agriculture' part in the context of the National Plan for Recovery and Sustainability are aimed at two directions (Agriculture in the Recovery and Resilience Plan of Bulgaria, 2022):

- First direction: Increasing the competitiveness and sustainable management of agricultural holdings.
- Second direction: Technical and technological renewal of the agricultural sector.

The support is implemented through two projects. The first project 'Fund to promote the technological and ecological transition of agriculture' is aimed at investments for:

- technological and ecological modernization;
- centers for preparation for marketing and storage of fruits and vegetables;
- construction/reconstruction and equipment of livestock facilities for breeding and evaluation of male breeding animals;
- the efficient use of water in agricultural holdings.

The second project, specifically targeting the 'Digitization of Farm-to-Fork Processes', which was scheduled for launch by the end of 2022, was officially presented on July 7, 2023. It is planned to build an Electronic Information System, consisting of five modules, namely:

- Module 1. Use of plant protection preparations.
- Module 2. Control of the use of antimicrobial veterinary medicinal preparations.
- Module 3. 'Farm to Fork' tracking of products along the agri-food chain.
- Module 4. 'Platform for online training and consulting'.
- Module 5. Communication network of field sensors and rain sensors.

The platform will ensure a unified exchange of data from and to the administration and farmers. The planned funds of BGN 23,900,000 (BGN 19,949,000 provided by the Recovery and Resilience Mechanism and BGN 3,925,000 national co-financing) have an implementation period of 2021-2025 (National Recovery and Resilience Plan of the Republic of Bulgaria, 2022, pp. 129-131). With the implementation of the planned projects with financing from the Fund, what has already been achieved under the Program for the Development of Rural Areas for an

ecologically sound and digital solutions-based agrarian sector will be upgraded. In order to ensure that double funding for the same expenditure is not allowed, under the mentioned Program and the Recovery and Resilience Plan, control will be carried out at the level of the beneficiary/final recipient. The so-called green and digital transition will contribute to the introduction of new digital technologies and solutions in agricultural holdings, to increase energy and resource efficiency and to improve the capacity of agricultural holdings to achieve the goals of the Green Deal. The timely start of the activities, in compliance with the set deadlines, will allow timely reporting of the results. To study the possibilities of applying digital technologies in the agricultural sector, the analysis follows the index introduced in 2015 to measure the penetration of digital technologies in the economy and society, known as DESI (Digital Economy and Society Index). It is subject to permanent updating, expressed in the exclusion, unification, inclusion of new groups of sub-indicators that form it. This complicates and limits the analysis in terms of comparability of data by individual years. The DESI digital penetration index in the economy and society was developed by the European Commission and was officially presented in Brussels on February 24, 2015. It is introduced as a new analysis tool reflecting the current state of each member state of the European Union. The index is also perceived as a foundation for the implementation of the Single Digital Market Strategy. In its essence, the index is a set of 30 indicators (The European Commission announced a new index for the penetration of digital technologies in the economy and society, 2015), divided into five groups: Connectivity, Human capital, Internet usage, Integration of Digital Technology and Digital Public Services – see Table 1.

Indicators	**Definition**
Connectivity	Fixed and mobile broadband connectivity of European households
Human Capital	Digital skills of Europeans in the field of modern technologies
Internet usage	Internet options for Europeans to use content, communication links and online transactions
Integration of Digital Technology	Digitization of business activity and e-commerce
Digital Public Services	Access to electronic services

Table 1: Indicators forming the index for the penetration of digital technologies in the economy and society (DESI)
(Source: Digital Economy and Society Index (DESI), 2018 Country Report, Bulgaria. (2018). European Commission)

Through a weighting system, each member state is ranked according to its achievements in the field of digitization. Connectivity and human capital are identified as key indicators. They are given 25% of the total result, followed by the implementation of digital technologies – 20% and respectively 15% are given to the use of the Internet and Digital public services. The subsequent selection of indicators has forced the reflection of corrections in the data, manifested in a recalculation for previous periods. Data for the subgroups forming the Index for the penetration of digital technologies in the economy and society (DESI) for 2017 have been adjusted to the urgent corrections at the European level. The refined update of the index of five groups (listed in Table 1), from the moment of its introduction in 2015 to 2022 (respectively to 2023) counts 4 groups (33 indicators), reduced to:

- Human Capital
- Connectivity
- Integration of Digital Technology
- Digital Public Services

The above is in support of the difficulty that manifests itself in terms of the depth of the analysis and the author's interpretation of reliable, sustained, unified information, including for the agrarian sector. When measuring the Index for penetration of digital technologies in the economy and society (DESI) for 2022, Bulgaria occupies the penultimate place compared to the member states in the European ranking - see Figure 1.

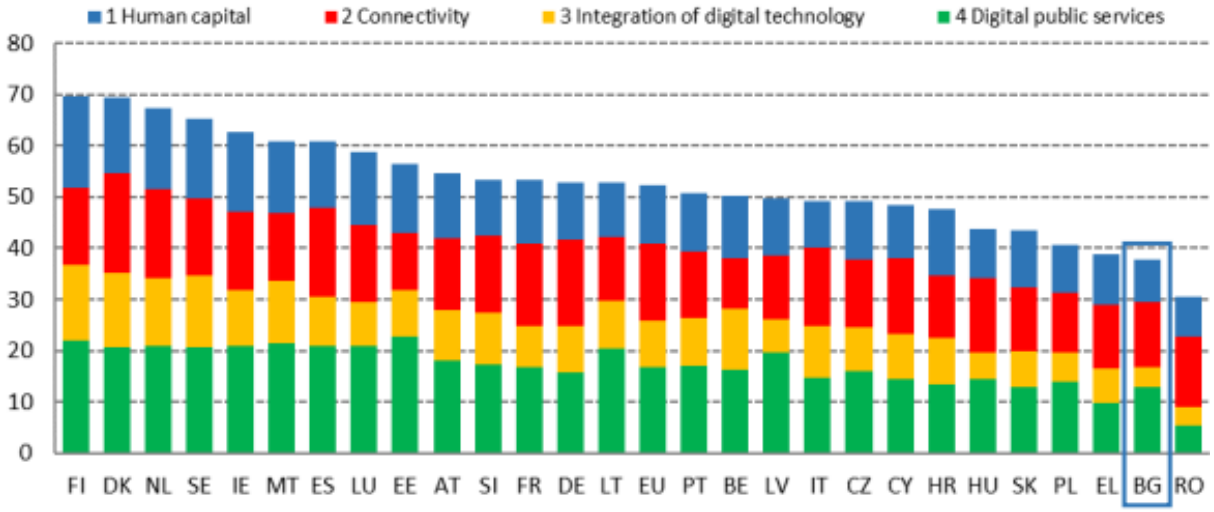

Figure 1: European ranking of member states to measure the 2022 Digital Economy and Society Index (DESI)
(Source: Digital Economy and Society Index (DESI), 2022 Country profile, Bulgaria. (2022). European Commission)

This is an indication of the penetration of digital technologies at a slower pace compared to other EU member states (Digital Economy and Society Index, 2022) - see Figure 2.

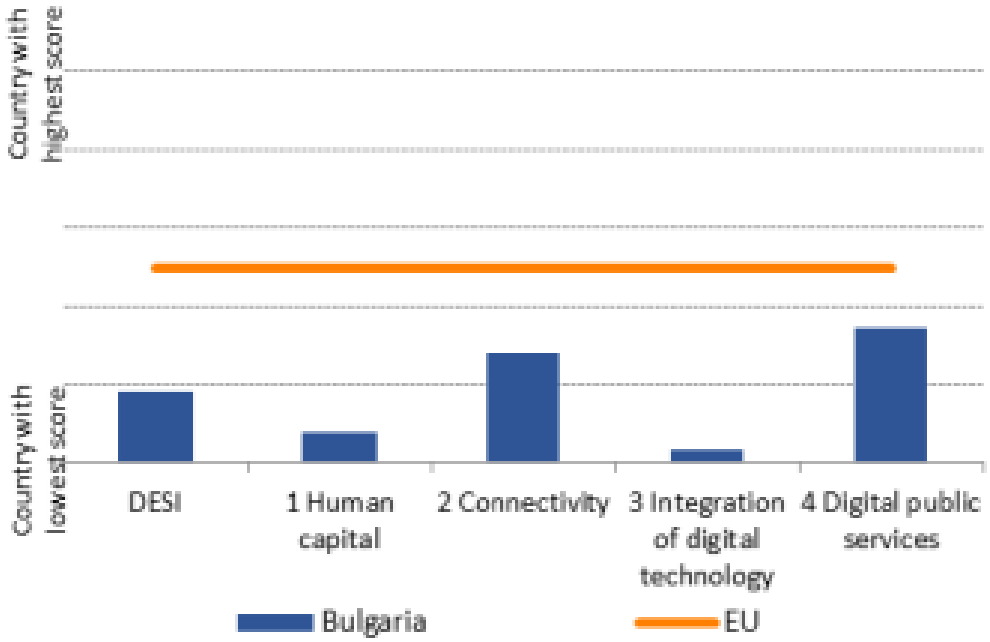

Figure 2: Graphic presentation of Bulgaria's achievements in implementing the index for the penetration of digital technologies in the economy and society (DESI), 2022
(Source: Digital Economy and Society Index (DESI), 2022 Country profile, Bulgaria. (2022). European Commission)

According to the results measured for 2022, the weaker achievements of Bulgaria in the introduction of digital technologies are the result of the indicators of *human capital* and *readiness for the implementation of digital technologies in business*.m To really measure the penetration of digitization in the agricultural sector, it is necessary to study, adhere to and refine the following indicators for analysis (European Commission, 2018): digitization of agriculture, modernization of agricultural holdings, digitization of the economy in rural areas. Member States limit support for the introduction of digital technologies to a maximum of 30% of eligible costs. At the European level, in fulfillment of the **cross-sectoral objective** of modernization of the agrarian sector, the indicator ***'digitalization of agriculture'*** is proposed. It is calculated as the share of farmers benefiting from support under the Common Agricultural Policy of the European Union. The idea is to reduce the amount of raw materials used to achieve environmental sustainability by applying technologies for precise agriculture and smart farming. In this direction, farmers are provided with access to scientific research, training, sharing of knowledge and services and others. Regarding the results, the number of beneficiaries supported under the common European policy will be taken into account, including refinement by types of interventions. Bearing in mind that digital agriculture is a consequence of its predecessors precision agriculture and smart farming to achieve ecological sustainability:

- Precision agriculture can be presented as a technological approach to monitoring, measuring and analyzing the needs of individual fields and crops.
- Smart farming optimizes complex agricultural systems by interpreting and using data.
- The development of precision agriculture and smart farming evolved with the advent of digital agriculture in 2010, i.e. accessibility to all farmers through a digital format of existing networked systems.

Formulated in this way, the indicator 'digitization of agriculture' does not provide clarity about the way of its calculation. Presented as 'the share of farmers benefiting from support under the Common Agricultural Policy of the European Union', it is appropriate to give instructions as to what/to whom this share relates. For this purpose, information is needed on the share of supported registered agricultural producers conducting precision agriculture and smart farming. In this way, the indicator can be presented as a ratio of supported registered agricultural producers conducting precision agriculture and smart farming to farmers using support under the Common Agricultural Policy of the European Union.

$DA = \frac{APpa+APsf}{AP}\ x100$, where

DA - digitization of agriculture
APpa - assisted registered agricultural producers conducting precision agriculture (number)
APsf - assisted registered farmers practicing smart farming (number)
AP - agricultural producers using support under the Common Agricultural Policy of the European Union (number)

Calculated in this way, the indicator will give an idea of the percentage contribution of precise agriculture and smart farming to the digitization of the agricultural sector. The analysis can be deepened by calculating their individual (precision agriculture and smart farming) share in the total share. Since the unregistered agricultural producers who do not benefit from support, but who apply digital technologies in their activity, remain outside the scope, we believe that it is necessary to refine the durability of the 'digitization of agriculture' indicator.

From the point of view of the specific objectives of the European Union:

- With an emphasis on market orientation and competitiveness (at the local, national, European and international level), stabilization of markets and others, the *'modernization of agricultural holdings'* indicator is calculated. It tracks the share of farmers receiving support for investments aimed at restructuring and modernizing their farms, including improving their resource efficiency.

Support is linked to production and the hectares for which it is provided are tracked.
When calculating the *'modernization of agricultural holdings'* indicator, we also consider that it is necessary to refine its structural strength from the point of view of its contribution to accounting for the benefits of the application of digital technologies. For this reason, we suggest that it be presented as the attitude of farmers conducting precision agriculture and smart farming, receiving investment support for the purpose of restructuring and modernizing their holdings, including for improving their resource efficiency, to farmers receiving investment support for the purpose of restructuring and modernization of their farms, including to improve their resource efficiency.

- In order to promote social and territorial cohesion in rural areas, the indicator *'digitalization of the economy in rural areas'* is calculated. It tracks the share of the population in rural areas supported for digitization of agriculture and the share of rural areas covered by support under the 'Smart Villages' strategy.

From the point of view of the sectoral programs, the number of producer organizations establishing an operational fund/programme is relevant. The indicator *'digitalization of the economy in rural areas'* enables the calculation of:

- the share of the population in rural areas supported for digitization of agriculture to the total share of those supported in the region under the Common Agricultural Policy of the European Union. The analysis can be deepened with information on the percentage contribution, specifically of the support for digitization of agriculture, in the general structure of support with European funds.
- the share of rural areas covered by support under the 'Smart Villages' strategy to the total share of support under the 'Smart Villages' strategy.

The scarcity of publicly available information and the lack of such in the field of the agrarian sector make the present analysis difficult and do not allow individual interpretation of the information.

3. CONCLUSION

The European policy in the field of digital technologies is primarily aimed at the production of better quality food, increasing the efficiency and profitability of production in the agricultural sector, protecting natural resources and the environment. This is why digitization is significant at every stage of the production cycle: primary production of products – processors and traders – consumers. The agricultural sector is significantly lagging behind in the digitalization process. The following conclusions can be drawn from the digital transformation study:

- Digital agriculture is the result of the evolution of precision agriculture to connected, knowledge-based agricultural production systems in agriculture – smart farming. The aim in the field of digital agriculture is to use all the available information, knowledge and experience to enable building on what has been achieved.
- The digital agricultural system collects data to facilitate the farmer in his choice of making management decisions.

In order to fulfill the set goals of implementing digital technologies in various areas of the economy and public life, as a priority at the national level, it is necessary:

- to improve the digital skills of the workforce;
- to promote the use of modern technologies such as blockchain, artificial intelligence and others.

Digital transformation in agriculture is a necessary process that cannot be stopped. An analysis of published research on the current state and degree of penetration of digital technologies in the agricultural sector reveals significant differences in agricultural holdings in terms of their legal status, size and region. The interest of agricultural producers in digital technologies in the agricultural sector takes into account the specifics of their activity. With the application of digital technologies, the choice of a solution is sought, the implementation of which is based on sustainable, time-based approaches, methods and practical solutions. Considering that the digital transformation is a process that will continue to transfer digital technologies in all spheres of our lives and that it is a starting point in the development of Europe 2030, the following recommendations can be made for the implementation of digital technologies in the economy of Bulgaria and in particular in the agricultural sector.

3.1. First recommendation

From a *normative* point of view, as a regulator of economic activity, the state is obliged to create a framework for the introduction and application of digital conditions in the economy, resp. in the agricultural sector. The use of the decentralized input data in the agro-food chain allows the identification of the following stages:

1) First stage. Merge existing data registers.
2) Second stage. Upgrading the datasets.
3) Third stage. Automation of data processing processes.

It is necessary to undertake state actions, real incentives to modernize the qualification of the human resource. At the national level, for this purpose, it is necessary to strengthen the role of the state, through advisory services and regional networks in rural areas at the level of agricultural holdings.

3.2. Second recommendation

In *a theoretical* aspect, it is necessary to acquaint farmers with the benefits of digital technologies. The acquired knowledge, skills and abilities will help to create digital operating models applicable in various sectors of the economy, including in the agricultural sector. Prospective developments on the issues developed would be useful for research in this area, provided that sufficient data and realistically established indicators are available. The accumulation of large databases is helpful for timely and adequate decision-making in real time, as well as for strategic planning of agricultural processes.

3.3. Third recommendation

The successful implementation of digital technologies *in practice* requires a real consideration of the benefits of their application. We believe that the future will require the use of digital systems in the field of the agrarian sector, which requires clearly covering the indicators for reporting the results, resp. the benefits of digitization of the sector. The country lacks in-depth analyzes of the state and development of digitization in agriculture and rural areas of Bulgaria, despite their great, in our opinion, theoretical and practical significance. Publicly available and timely information is needed to allow analysis of the state of digitization of the economy, respectively of the agrarian sector.

We join the generally accepted opinion that digital technologies will transform the agricultural sector in a global aspect. In this regard, they should be understandable and accessible as a priority to farmers. We also recognize the fact that there are a number of issues that need to be overcome in terms of human resources and connectivity. The adaptation of applied models to the digital economy will allow organizations to represent the scale of modern technologies. The potential benefits of using digital technologies are expressed in increasing yields and tracking animal welfare, optimizing the resources invested in the process, and others. Considering that social development in all sectors of the economy is aimed at digital transformation, it is necessary to use digital technologies to develop sustainable solutions for current and future challenges, including in the agricultural sector.

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FORECASTING ANNUAL ELECTRICITY CONSUMPTION: ARTIFICIAL NEURAL NETWORK APPROACH

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ABSTRACT

Forecasting energy consumption is critical for suppliers and distributors to reduce trading risks and contribute to the sustainability of electricity generation and supply systems. Short-term forecasts of electricity consumption are essential to produce sufficient quantities to meet demand at the right time. On the other hand, long-term forecasts can be of great use for planning, developing strategies, and managing electricity more efficiently, as well as indicating potential investment needs in production facilities (Acar et al., 2022). In this paper, a model is built to predict annual electricity consumption using Artificial Neural Networks. For this purpose, a dataset from the public data platform where one can find or publish datasets to build models based on Machine Learning methods, is used. The dataset contains records of annual electricity consumption of residential and commercial consumers in several Dutch cities. A MultiLayer Perceptron network was used for modeling. Two models with different architectures were built and compared to find the model with the best performance that can be used in practice. Model performance was evaluated with SMAPE and MAPE, which are commonly used to evaluate Artificial Neural Network models as well as other forecasting models. The purpose of this paper is to provide a basis for further research in the field of applying intelligent methods to predict energy consumption as a component of effective energy management.
Keywords: *Artificial Neural Networks, consumption forecasting, electricity*

1. INTRODUCTION

Electricity is the fastest growing source of total energy demand, and today almost every modern economy depends on a reliable and affordable supply of electricity (International Energy Agency, 2020). Global events in recent years, starting with the pandemic, inflation, and conflicts, have created uncertainties in energy supply and prices, especially for natural gas, which the European Union (EU) largely imports (Eurostat, 2023). The disruptions in the energy market (as well as climate change), which have had a significant impact on electricity systems, have once again made the country's leaders aware of the importance of generating energy from renewable sources, but also, ultimately, of energy independence. The ability to generate electricity from renewable sources such as wind and solar power makes the electric power industry a leader in the clean energy transition and helps meet climate goals. It is therefore not surprising that this sector is attracting more investment than oil and gas combined. Approximately 21% of total energy consumption in the EU is electricity consumed from a variety of sources. 39% of the electricity consumed was generated in fossil fuel power plants, 35% came from renewable sources, while 26% was generated in nuclear power plants (Eurostat, 2019). Among renewable sources, wind turbines (13%), hydropower plants (12%), biofuels (6%), and solar energy (4%) accounted for the largest share of electricity consumed (Eurostat, 2019). To effectively manage energy, Energy Management Systems (EMS) are available for organizations in the industrial, commercial, and public sectors to help reduce energy waste and improve existing processes to reduce energy costs (Arthur, 2021). EMS typically consists of hardware components such as sensors, meters, and controllers, as well as software to collect, store, and analyze energy consumption data (Conexus.com, n.d.). Although EMS provides certain information in the form of reports, graphs, etc., such systems lack detailed analysis of

the interrelationship of all the collected data. Also, there is a lack of methods that could predict future consumption and identify important predictors of energy consumption. For this reason, many researchers are striving to develop models based on innovative Machine Learning methods that predict consumption with high accuracy. Such models could be used in practice to predict daily, monthly, or annual energy consumption. Accurate estimation of future energy consumption can be extremely important to energy suppliers and distributors in planning and adjusting to supply needs. For example, if electricity demand is underestimated, the power system may experience electricity shortages. On the other hand, if electricity demand is overestimated, many available resources are used to generate the overestimated demand (Barić et al., 2019). Therefore, the aim of this paper is to build an Artificial Neural Network (ANN) model to forecast annual electricity consumption and analyze the behavior of the model. A Multilayer Perceptron (MLP) network was used to build two models that differed in the structure of neurons per layer and the activation function used. The performance of the two models was compared and several significant variables were identified. Guidelines for future research are also provided in order to build highly accurate models that can be applied in practice and to identify significant predictors of electricity consumption.

2. PREVIOUS RESEARCH

A review of previous research in the field of electricity consumption forecasting shows the use of various traditional statistical methods for forecasting, such as multiple linear regression (MLR), autoregressive moving average (ARMA), etc. However, more and more authors are introducing newer approaches such as ANNs, which have proven to be successful in forecasting energy consumption, among other applications, and also have certain advantages over statistical methods. The advantages of ANNs include learning from historical data, handling data with disturbances and missing data, dealing with complex nonlinear functions, robustness and high efficiency, even in cases where complete information for the studied problem is missing (Ekonomou, 2010; Zekić-Sušac, 2000). In Ekonomou (2010), several neural network models were built to forecast long-term electricity consumption in Greece based on actual consumption data between 2005 and 2008. The input variables were annual temperature, installed electrical capacity, annual electricity consumption per capita, and gross domestic product, while the output variable was final electricity consumption. MLP network, Backpropagation Algorithm (BP) and different activation functions were used and several possible architectures were tested. The neural network model results outperformed the linear regression results, while the Support Vector Machine (SVM) method gave similar results. Azadeh et al. (2008) forecasted annual electricity consumption in energy-intensive manufacturing sectors. The data used in this study were real data of energy-intensive sectors in Iran from 1979 to 2003. The input variables included electricity price, number of consumers, price weighted mean of fossil fuels, electricity intensity at high consumption, and value added in each sector, and the output variable was electricity consumption in each of the sectors (kW/h). By using the MLP, they were able to obtain more accurate annual estimates compared to the regression model. Zhang and Wang (2012) used a Fuzzy Wavelet Neural Network (FWNN) – a version of a ANN that has proven to be a promising strategy in identifying nonlinear systems and also addresses the imprecision of sensor data that can be challenging for traditional ANNs (Kharazihai Isfahani et al., 2019). Real data from the period of high energy consumption from 1983 to 2003 were used to forecast annual electricity consumption in cities with high consumption. The inputs of the model were maximum and minimum temperature, humidity and weather conditions, maximum, minimum and average consumption before the test day, while the value of electricity consumption for the test period was the output of the model. When compared with Gray's model with the same settings, FWNN resulted in lower relative and Mean Absolute Percentage Error (MAPE) error, i.e., higher accuracy of the model. Lalis and Maravillas (2014) proposed an eight-step scheme

that can lead to an optimal model for dynamic time series forecasting using an Adaptive MultiLayer Perceptron (AMLP). Two different datasets from two different countries (USA and Canada), each divided into three overlapping parts (training, validation, and test samples), were used in experiments to measure the robustness and accuracy of the AMLP model. The proposed scheme for AMLP was found to be successful in forcasting long-term electricity consumption. This was demonstrated by calculating the root mean squared deviation (RMSD) and the coefficient of variance of the RMSD, which describes the model's fit. In Kandananond (2011), several forecasting methods were used: autoregressive integrated moving average (ARIMA), neural networks, and Multiple Linear Regression (MLR) to formulate a forecasting model for electricity demand in Thailand. In this study, historical electricity demand data from 1986 to 2010 were used, where the input variables were population, gross domestic product, stock market index, and income from export of industrial products, and the output variable was electricity consumption. The performance of each approach was compared and the results showed that the neural network model had the lowest MAPE of 0.996%. From the analysis of previous research, it can be concluded that the authors have used statistical forecasting methods and different versions of neural networks as the methodological basis for predicting long-term electricity consumption. Most often, electricity consumption or demand is forecasted, and the models built for this purpose vary depending on the selection of input variables and time and spatial coverage. In the observed literature, models were mainly built to predict total electricity consumption/demand at the country level, so variables such as GDP, population, production of specific sectors, weather conditions, etc. were found to be significant. Since there is no general theory that defines variables for forecasting electricity consumption, researchers focus mainly on obtaining the most accurate model possible with the set of variables available to them. For the purposes of this paper, it was opted for traditional MLP network to gain insight into the initial success of such a model and to determine the possibilities of further tuning of the model.

3. METHODOLOGY

3.1. Sample

For the experiment, the data set on energy consumption in the Netherlands taken from the data platform Kaggle, is used. According to information from the platform, the Dutch energy network is managed by several companies that publish data on natural gas and electricity consumption in the areas they manage on their websites every year. The data was anonymized by combining zip codes so that each entry (case) describes at least 10 consumers. With this information, it should be kept in mind that for each individual case, the data set shows the value of the total annual electricity consumption of at least 10 consumers. This market is non-competitive, i.e., the supply zones are allocated, meaning they provide energy to approximately the same zip codes each year. There may be minor changes from year to year due to either a change in administration or different combinations of zip codes. Data from several energy companies are available, and the dataset from the company Westland-infra, which manages the energy network of several municipalities in the south of the Netherlands, was selected. Westland-infra supplies natural gas and electricity to households and commercial consumers. The selected dataset contains data on electricity consumption in 2020, and there are 2557 cases described by 14 variables. The year 2020 is also the last year available on the platform, and more recent data can be found on the company's website.

3.2. Preprocessing

Several variables from the initial dataset were omitted for lack of informativeness and impractical coding due to the excessive number of possible modalities. The variables of categorical type *city* and *type of connection* were coded to be suitable for the input values of the neural network model.

There were no missing values in the data sample, so no intervention was needed in terms of using a specific method to replace them. After the initial data preprocessing, a total of 9 variables were used to build the neural network model, which are presented and described in Table 1 along with their descriptive statistics. Of the 8 input variables, 6 are continuous type and 2 are categorical. An output variable *annual consume* is defined, which is of continuous type and represents the annual electricity consumption in kWh for each group of consumers.

	Variable	*Variable description*	*Descriptive statistics*
Input variables			
Continuous			
1.	*annual consume lowtarif perc*	percentage of consume during the low tarif hours (from 10pm to 7am, and during weekends)	n=2557 Min: 0% Max: 100% x̄: 94,15% σ: 10,48%
2.	*delivery perc*	percentage of the net consumption of electricity – the lower, the more energy was given back to the grid (in the case of the presence of solar panels)	n=2557 Min: 0% Max: 100% x̄: 86,95% σ: 14,47%
3.	*perc of active connections*	percentage of active connections in the zipcode range	n=2557 Min: 0% Max: 100% x̄: 99,57% σ: 4,48%
4.	*type conn perc*	percentage of presence of the principal type of connection in the zipcode range	n=2557 Min: 27% Max: 100% x̄: 74,68% σ: 15,86%
5.	*smartmeter perc*	percentage of smartmeters in the zipcode range	n=2557 Min: 0% Max: 100% x̄: 74,19% σ: 25,76%
6.	*num connections*	number of connections (consumers) in the range of zipcodes	n=2557 Min: 10 Max: 182 x̄: 23,63 σ: 13,96
Categorical			
7.	*city*	name of the city (1='s-Gravenzande, 2=Naaldwijk, 3=Wateringen, 4=Monster, 5=De Lier, 6=Poeldijk, 7=Honselersdijk, 8=Den Hoorn ZH, 9=Maasland, 10=other)	n=2557 1=449 (17,56%) 2=418 (16,35%) 3=299 (11,69%) 4=288 (11,26%) 5=233 (9,11%) 6=145 (5,67%) 7=144 (5,63%) 8=134 (5,24%) 9=120 (4,69%) 10=327 (12,79%)
8.	*type of connection*	principal type of connection in the zipcode range – # fuses X # amperes (1= single fuse connection type, 2=three fuses connection type)	n=2557 1=1734 (67,81%) 2=823 (32,19%)
Output variable			
9.	*annual consume*	annual electricity consumption in kWh	n=2557 Min: 900 Max: 31287 x̄: 4488,16 σ: 3451,1

Table 1: Descriptive statistics of the variables (Source: author)

3.3. Artificial Neural Networks

ANNs are multipurpose computational models capable of learning and adapting to estimate almost any function (Zekić-Sušac, 2000). They are a simplified representation of the complex processes that occur in the human brain, while from a Machine Learning perspective they are one of the ways to fit a model to observed historical data in order to classify or predict something (Berry and Linoff, 2000). Learning in ANNs is an iterative procedure that works through layers composed of neurons, where there is one input layer, one or more hidden layers, and one output layer. For simplicity, Figure 1 shows the MLP structure with only one hidden layer. Note that ANN can even have hundreds of layers, known as a Deep Neural Network.

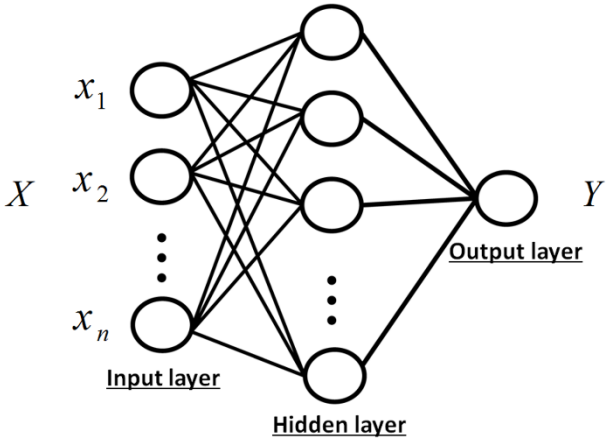

Figure 1: Structure of a one hidden layer ANN
(Source: Yu et al., 2017)

The data from the input vector X of n elements with values $x_i \in R$, $i=1, 2, \ldots, n$ enters through the input layer and are multiplied by random initial weights w_i from the interval [-1, 1]. The input layer passes the weighted sum of all x_i values to a hidden layer, which generates its output y_c using an activation function as follows (Has and Zekić-Sušac, 2017):

$$y_c = f\left(\sum_{i=1}^{n} w_i x_i\right)$$

where f is the activation function that transforms the input of the neuron to produce the output of the hidden layer neuron. If there is more than one hidden layer, the activation function is used through all hidden layers until the output layer is reached (Zekić-Sušac, 2000). In the output layer, the predicted output is compared to the actual output and the global error E is determined. Each output unit has its own local error e, which is then used to adjust the weights by a certain learning rule until the global error E is minimized (Zekić-Sušac, 2000). In other words, the network parameters are adjusted in each iteration to minimize the difference between the actual and predicted output.

The network's performance is assessed by computing the difference between the predicted output y_c and the actual output y_a. The goal is to obtain a ANN model that has the smallest possible error. There are several metrics that can be used to evaluate the performance of an ANN model, and they depend on the problem at hand. For regression-like problems, common metrics include mean absolute percentage error (MAPE) and symmetric mean absolute percentage error (SMAPE).

MAPE measures the mean absolute percent difference between the predicted and actual values of the output variable according to the equation (Chicco et al., 2021):

$$MAPE = \frac{1}{n}\sum_{t=1}^{n}\frac{|y_t - y_c|}{|y_t|} \cdot 100$$

where y_t is the actual output value, y_c is the value predicted by the model, and n is the number of cases in the sample. The MAPE value represents the average percentage of the model's prediction error. In other words, it provides information on how far the predicted values are from the actual values on average. SMAPE is similar to MAPE, except that it takes into account the direction of the error and is calculated by the following equation (Chicco et al., 2021):

$$SMAPE = \frac{1}{n}\sum_{t=1}^{n}\frac{|y_t - y_c|}{(|y_t| + |y_c|)/2} \cdot 100$$

SMAPE calculates the mean absolute percent difference between the predicted and actual values of the output variable, but instead of dividing by the actual values, it divides by the average of the predicted and actual values. This results in a metric that is symmetric around zero, meaning that errors in the positive and negative directions are penalized equally. According to Chicco et al. (2021), SMAPE is increasingly used in Machine Learning because it addresses some of the shortcomings associated with MAPE. However, the choice of model performance measure depends on the specific problem being solved as well as the network designer. Also, there are a number of other performance measures for ANN models for the regression problem.

4. RESULTS

Two ANN models were built and the results of both models are presented below. Table 2 shows the tested network architectures of both models, which differ in the number of hidden neurons, the structure of the final network, and the activation function chosen. Considering that the electricity consumption of the observed households and commercial consumers is in a wide range of values, it is expected that the mean squared error (MSE) is large. For this reason, the SMAPE was calculated and displayed as the average percentage deviation from the actual output values. It is easier to interpret and brings its meaning closer to practitioners (Tonković et al., 2009). SMAPE addresses some of the shortcomings of MAPE, which, for example, does not treat deviations that are higher or lower than the actual values, which can lead to a distorted picture of the model's accuracy (Zekić-Sušac, 2017b; Toffalis, 2015). MAPE was additionally calculated for comparison with SMAPE values.

Model	*Sample distribution*	*Number of hidden neurons*	*Final network structure*	*Activation function*	*SMAPE*	*MAPE*
1	60% 20% 20%	Min.: 1 Max: 40 Opt.: 38	MLP 18-38-1	Logistic (sigmoid)	30.99%	36.59%
2	60% 20% 20%	Min.: 1 Max: 50 Opt.: 29	MLP 18-29-1	Tangent hyperbolic	30.38%	35.64%

Table 2: Results of the two best MLP neural network models (Source: author)

In Model 1, 40 networks were trained, and the one that gave the most accurate results on the validation sample was retained. A 60%-20%-20% sample split means a random distribution of the total number of units into a training (60%), a validation (20%), and a test subsample (20%). The minimum and maximum number of hidden neurons were selected heuristically, while 38 hidden neurons were determined by the network by including the option to calculate the optimal number of neurons in the hidden layer. The structure of the final network shows the structure of the network by layers. The MLP 18-38-1 network structure denotes a MultiLayer Perceptron network with 18 neurons in the input layer, 12 in the hidden layer, and 1 in the output layer. The number of neurons in the input layer depends on the number of input variables, and in this case 18 is the sum of the number of continuous input variables and each modality of categorical input variables. 12 neurons in the hidden layer were calculated by the network in an automatic procedure as the optimal number of neurons, and one neuron is in the output layer as it tries to obtain a numerical value for each of the cases. The logistic activation function was chosen as one of the most commonly used activation functions that propagates the signal through the layers of the network and transforms input values into continuous values in the interval [0, 1] (Zekić-Sušac, 2000). The logistic activation function is S-shaped and achieves nonlinearity in neural networks, allowing them to model more complex nonlinear relationships between variables characteristic of real-world problems. The error function (sum of squares) is predefined in the Statistica software and the learning algorithm was the BFGS optimization algorithm. With these settings, the network provided a model with SMAPE of 30.99%, meaning that, on average, the predicted values differed from the actual values by 30.99%. In addition, a MAPE was calculated that is slightly higher and is 36.59%. For Model 2, 50 networks were trained, and one network that gives the most accurate results on the validation sample was retained. The distribution of the sample into subsamples is the same as for Model 1, as is the learning algorithm. The minimum number of hidden neurons is set to 1 and the maximum to 50, while the network determines the optimal 29 neurons in the hidden layer in the automatic procedure. In Model 2, a tangent hyperbolic activation function similar to the logistic function covering the interval [-1, 1] was chosen (Zekić-Sušac, 2000). With these settings, the network yielded a model with a slightly lower SMAPE of 30.38% and MAPE of 35.64%. Sensitivity analysis in modeling refers to the evaluation of the influence of predictors on the output variable. The response of the network (i.e., the error it produces) to variations in the input variables is observed. The result of the analysis is a sensitivity coefficient, whose higher value means that the predictor has a greater influence on the output variable (TIBCO Statistica, 2020). If the coefficient is less than 1, the network would actually perform better if this variable were removed from the model (TIBCO Statistica, 2020). Sensitivity analysis was performed using the Global Sensitivity Analysis test. Table 3 shows the coefficients for all input variables.

	Model 1		*Model 2*	
No.	*Variable*	*Sensitivity coefficient*	*Variable*	*Sensitivity coefficient*
1.	*type of connection*	2.126588	*type of connection*	2.230694
2.	*type conn perc*	1.467966	*type conn perc*	1.381938
3.	*city*	1.283722	*city*	1.291008
4.	*smartmeter perc*	1.056756	*smartmeter perc*	1.073587
5.	*delivery perc*	1.022123	*delivery perc*	1.020572
6.	*annual consume lowtarif perc*	1.004645	*num connections*	1.012812
7.	*num connections*	0.999168	*annual consume lowtarif_perc*	0.999262
8.	*perc of active connections*	0.981710	*perc of active connections*	0.981904

Table 3: Analysis of the sensitivity of output variables to input variables (Source: author)

In both models, the variables: *type of connection*, *type conn perc*, *city*, *smartmeter perc*, and *delivery perc* had the greatest influence on the output variable, and the least in both models was the variable *perc of active connections*. In Model 1, the variables *num connections* and *perc of active connections* had a sensitivity coefficient of less than 1, and in Model 2, *annual consume lowtarif perc* and *perc of active connections*, and it would be advisable to remove them from the model.

5. DISCUSSION AND CONCLUSION

After building the model and analyzing the results, the performance of the model was compared. Although both models gave similar results, Model 2 proved to be slightly better, using the tangent hyperbolic activation function and with the network determining the optimal 29 hidden neurons. Considering only the value of the calculated errors SMAPE (30.38%) and MAPE (35.64%) of the better model, a satisfactory level of model accuracy was not achieved such that the model would be applicable in practice. Figure 3 shows the actual electricity consumption and the consumption predicted by the more successful Model 2 on the validation sample. It can be seen that the predictions of the model differ more for consumer groups with larger consumption jumps.

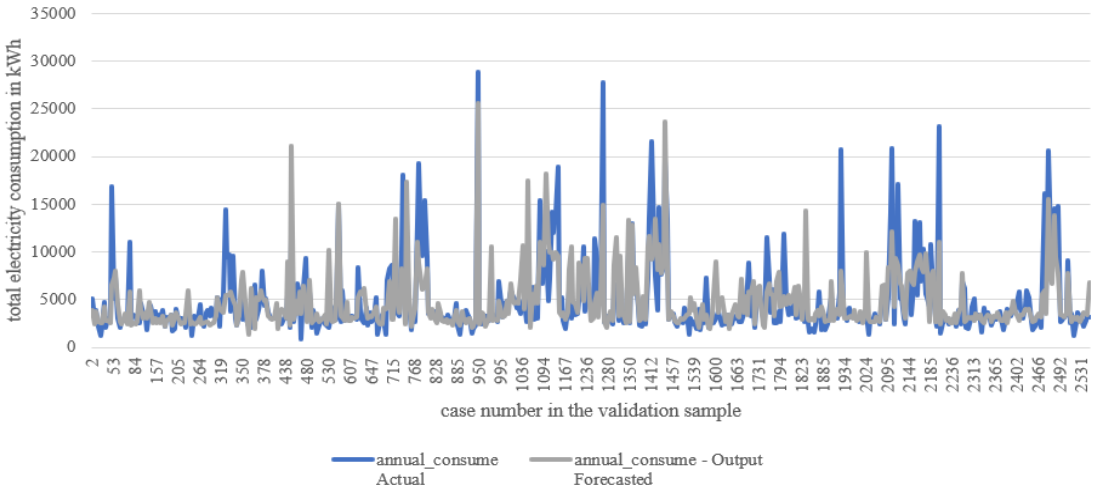

Figure 2: Actual and forecasted electricity consumption in 2020 (Source: author)

Since the final data set does not contain a large number of variables, there was initially no need to reduce the number of input variables, but it is certain that such an intervention could lead to a more accurate model. There are methods by which, at the data preparation phase, those that will be significant for the model are extracted from the list of possible predictors, and only those are taken as input variables in the modeling. One of these is the Feature Selection test, which aims to remove uninformative or redundant predictors from the model (Kuhn and Johnson, 2013), i.e., to reduce the number of input variables to those that are believed to be most useful for the model to predict the target (output) variable (Brownlee, 2019). The idea is to get a better performing model by using fewer variables with higher significance. Sometimes a model with a reduced number of variables does not perform better than one with all available variables, as in Zekić-Sušac (2017), but working with a smaller number of variables requires less time in data collection and preparation and fewer resources related to computer processing power. To determine whether the list of possible predictors contained those that were significant to the model, the feature selection test was performed following the example of Tonković et al. (2009), in which the p-value is calculated from the corresponding F-values, thus testing the importance of each predictor (TIBCO Statistica, 2020). The test results are given in Table 4.

No.	*Predictor*	*F-value*	*p-value*
1.	*type of connection*	658.7111	0.000000
2.	*type conn perc*	129.8076	0.000000
3.	*smartmeter perc*	26.9413	0.000000
4.	*city*	3.4790	0.000278
5.	*num connections*	1.5945	0.144605
6.	*annual consume lowtarif perc*	1.0007	0.428662
7.	*delivery perc*	0.9350	0.493136
8.	*perc of active connections*	0.4697	0.625265

Table 4: Importance of predictors
(Source: author)

It can be seen that according to the F-value for modeling electricity consumption, four variables were most significant: *type of connection*, *type conn perc*, *smartmeter perc*, and *city*. This means that the best predictors of annual electricity consumption are the type of main connection in the consumer group (with one or three fuses of a given amperage), the share of this connection type and smart meters in the consumer group, and the city in which the consumers are located. Other variables used in the modeling were not found to be significant at the 5% level. The aim of this paper was to build a forecasting model using Artificial Neural Networks. Using real data on annual electricity consumption, two models with different architectures were built to compare their performance. To compare the performance of the model, the SMAPE and MAPE errors were used, both of which represent the average percentage deviation from the actual values. Considering only SMAPE and MAPE, Model 2 was slightly more successful, for which a tangent hyperbolic activation function was used and whose final neuron structure per layer was 18-29-1. Model 2 resulted in SMAPE and MAPE of 30.38% and 35.64%, respectively. In the post-modeling phase, the Global Sensitivity Analysis showed that the input variables related to the type of connection (number of fuses with the corresponding amperage) had the greatest influence on the output variable, and the variable indicating the share of active connections in the consumer group had the least influence. Although the model did not achieve satisfactory accuracy, there is potential to improve its performance through redesign. A guideline for future research is to redesign the model in such a way as to initially test the importance of the variables, and to select the input variables that have a greater influence on the output variable. Furthermore, given that the output variable (total electricity consumption) has a very wide range of values (900-31287 kWh) and expectedly resulted in high error values, it would also be advisable to apply strategies to improve the performance of the model. Some of the strategies include normalizing or categorizing the values of the output variable (low, medium, high consumption). Also, it is always desirable to have a larger data set in order to train the network more successfully as well as to extend the research with an additional set of variables that would potentially prove important in modeling electricity consumption. For example, in the case of natural gas consumption in public buildings, variables that describe the use of the building, such as the number of users, employees, and working hours, have been shown to be significant (Zekić-Sušac, 2017). Likewise, incorporating newer approaches and algorithms that have been shown to be more successful compared to more traditional neural networks would make a valuable contribution to understanding new approaches. The goal of the model redesign is to obtain a model with an acceptable error that could serve practitioners as a tool for forecasting long-term electricity consumption to enable more efficient management, better strategic decisions, and potential savings.

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OPPORTUNITIES FOR INCREASING ECONOMIC GROWTH THROUGH ENTREPRENEURSHIP BASED ON BUSINESS INNOVATION

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ABSTRACT

In today's dynamic world, economic growth is the basis of the increasing opportunities for future development of economies. It creates a good resource base, generates activity, promotes positive attitudes among investors, partner institutions, other economic players, etc. One of the most effective ways to realize economic growth is the creation and maintenance of sustainable processes of entrepreneurial activity and the engagement of business with innovation. Innovating through the creation and development of an entrepreneurial business brings a number of positive and multi-directional benefits to individuals, communities and economies. Scientific research and business practice show unequivocally that starting an entrepreneurial business based on innovation provides more opportunities and a more favourable environment for the formation of processes of a positive strategic nature. The complex nature and high-risk nature of innovation and entrepreneurial business in general require coordination and concerted action between the state, business organizations, educational institutions and local communities. The implementation of a multidirectional and coordinated model of cooperation between the participants in the innovation and entrepreneurial ecosystem is recommended. The application of such an approach favours the realization of multiple effects, which in turn presuppose subsequent processes of growing entrepreneurial activity with high added value. A strategic vision, purposeful actions and an integrated approach along the production value chain are recommended, based on the cycle "investment in education and innovation – innovation and entrepreneurial culture – business innovation – entrepreneurial business – economic growth – investment in education and innovation".

Keywords: *Business innovation, Economic growth, Entrepreneurial business*

1. INTRODUCTION

The study of economic growth has been a subject of interest for many decades. Neoclassicals analysed capital accumulation and labour growth as drivers of economic growth and viewed technological progress as an exogenous factor (Solow, 1956; Swan, 1956). Other researchers extend the neoclassical model of economic growth, taking into account technological change based on the creation of new knowledge, dependent on human capital (Lucas, 1988) and specifically – on the human capital included in the realization of R&D (Romer, 1990; Jones, 1995; Young, 1998; Erken, Donselaar and Thurik, 2018). Regardless of the adopted model of economic growth, development of society is achieved on the basis of good functioning of economic systems and opportunities to generate sources to finance the needs of various social/economic groups. The creation of income, such as input cash flows, which subsequently finance the main pillars of the economy, forming an environment for its normal functioning and stimulating its viable businesses, is of utmost importance. At the same time, achieving similar results is possible if the specifics of the environment, the peculiarities of the functioning of society and the economy, the sources of new perspectives and financial flows at different levels are taken into account - individuals involved in the economic turnover; business formations with history and stable positions, personal and business potential to drive development processes. All this requires the maintenance of a complex system of entities, actors, relationships and resource flows.

The highly dynamic environment and the turbulence in business put significant pressure on the search for new opportunities to achieve good business results for both individuals and the economy. The prevailing opinion is that businesses based on innovation are much more successful and viable. The search and implementation of utilities corresponding to the new needs of the market and taking advantage of its internal potential is an initial axis that the entrepreneur should pursue. Using business innovation as a starting point for starting an economic activity provides more opportunities and a longer-term market horizon than the conventional, standard business of providing current needs, relying on experience, striving to reduce costs or simply repositioning markets. Looking for the right innovations, implementing them in the right way, close connection with the market and speed of identifying the empty market niches/white fields puts the business "one breast" ahead of the key competitors. An essential point is the ability of economies to realize synergies from the advantages and benefits that entrepreneurship and innovation bring in themselves. Aggregating the positives of operating viable entrepreneurial businesses and the potential of innovation to generate income enables economies to maintain their viability and competitiveness by achieving economic growth and creating an environment to maintain its stability and generative capacity for subsequent growth.

2. ENTREPRENEURSHIP, INNOVATION AND ECONOMIC GROWTH

2.1. Entrepreneurship and economic growth

The entrepreneurial business is difficult, risky and requires competence and dedication. There are numerous issues that an entrepreneur must resolve before making an entrepreneurial decision; huge efforts and precise actions are required before starting an own business. At the same time, there are also a number of future benefits that can motivate and encourage individuals to organize and start their own business. On a regional and national level, many positives are also identified, which prompts the state, in the form of various institutions, to develop strategies and policies, to introduce tools to stimulate and support the start-up of entrepreneurial businesses. Entrepreneurship is a special sphere of economic activity, which is considered as a phenomenon that provides opportunities to optimize the structure of national economies, helps to multiply positive effects and forms an environment for generating processes for increasing economic growth. The dominant part of researchers advocates a similar thesis. According to Thurik (September 2008, 1), entrepreneurship is an important element in the organization of economies, with differences in growth rates often stemming from differences in the speed with which countries embrace entrepreneurial energy. He believes that entrepreneurship, its drivers and the consequences of its realization as a phenomenon in a functioning real economy can be best understood through the model of the entrepreneurial economy. In their studies, researchers emphasize: the key role of entrepreneurship in achieving economic growth (Audretsch et al., 2006); the relationship between entrepreneurship and economic growth (Hoselitz, 1952; Wennekers & Thurik, 1999; Parker, 2009), U-shaped relationship between early-stage entrepreneurial activity and levels of economic development (Wennekers et al., 2010, p. 220), the relationship between the level of entrepreneurial activity and economic growth and the mechanism of entrepreneurial processes that influence national economic growth (Shu, 2002); the complexity of the relationship between different measures of entrepreneurship and the level of economic development (Carree et al., 2007; Thurik et al., 2008;; Prieger et al., 2016; Van Praag and Van Stel, 2013); the ways in which entrepreneurship can contribute to growth (Toma, Marinescu and Constantin, 2018), the contribution of entrepreneurs based on employment, innovation, productivity, and individual utility levels (Praag and Versloot (2007); the contribution of entrepreneurship through the dissemination mechanism of knowledge and the role of entrepreneurial capital in turning it into a nurturing environment for growth (Audretsch, 2007; Audretsch & Keilbach, 2008; Audretsch et al.,

2006). Khyareh and Zamani (2023) concluded that overall economic freedom and its sub-components (e.g. rule of law, limited government size, regulatory efficiency and market openness) promote the positive effects of entrepreneurial activity on economic growth. Wong, P.K., Ho, Y.P. & Autio, E. (2005) found that of the different types entrepreneurship only entrepreneurship with high development potential has a significant impact on economic growth. Undoubtedly, there is a huge interest in the phenomenon of entrepreneurship. However, Erken, Donselaar and Thurik (2018) point out that research on the impact of entrepreneurship on economic growth and employment mostly refers to the field of in-depth ad hoc research (Van Praag and Versloot, 2007; Carree and Thurik, 20010; Prieger et al., 2016). Strategic aspects are not sufficiently represented, especially in the part "economic variables and economic growth or productivity development" (Bleaney and Nishiyama, 2002), and this is an important aspect. For Erken, Donselaar and Thurik (2018) entrepreneurship is shown to have a long-term effect on total factor productivity. It is interesting the opinion of Iyigun and Owen (1998), who claim that the achievement of economic development is accompanied by a decrease in the number of entrepreneurs relative to the total number of employed persons. According to them, as "secure" professional incomes increase in an environment of economic development, fewer and fewer people wish to become entrepreneurs.

2.2. Innovation and economic growth

Innovation is a powerful tool for developing economies, meeting market needs and generating income, growth and competitiveness. Economists unanimously confirm that innovation should be the basis of business. A number of researchers put the relationship between innovation and economic growth at the centre of their research (Yang, 2006; Petrova, 2010; Wu, 2011; Adak, 2015; Zhang, 2018). According to a series of OECD studies, technological innovation is the biggest driver of economic growth, focusing on some of the most distinctive features of innovation in highly industrialized OECD economies (OECD, 2006; Rosenberg, 2006). Considering innovation as the most important component of the long-term driver of economic growth, Bolan, Dragolea, and Telespan (2015) examine the relationship between innovation and economic growth. Of course, traditional business has its place, and it is an essential one. There are sectors that function well, with slow rates of innovation development and at the same time – stable indicators from the point of view of competitiveness. Within these sectors, the "'innovative flavour" is a source of additional benefits, income and growing market shares, but at its core is the enduring nature of the qualities and characteristics sought in traditional markets. At the heart of economic development, however, is the continuous pursuit of something new; something different; something better; something that can satisfy additional market needs in a better, deeper or more complex way. Even Schumpeter affirms the cluster approach to the development of innovations, which, like an avalanche, grows, expands its scope and affects an ever-larger segment of the economy (Schumpeter, 1961). The spread of innovations and the increase of their impact on the consumer and his behaviour contributes to the increase of incomes, the level of taxes, revenues in the budget, GDP and, accordingly, economic growth. Galindo and Mendez-Picazo (2013) analyse the relationship between innovation and economic growth, following Schumpeter's approach, taking into account entrepreneurial activity. A number of international institutions develop methodologies and publish rankings in the field of innovation, competitiveness, entrepreneurship, etc. The data show the strong dependence between the innovative development of an economy and its ability to generate GDP, create economic growth. Maier, Surugiu, Bumbac and Maier (2018) synthesize in several directions the ways of achieving economic growth, summarizing that it could be achieved by increasing the number of inputs, to increase the number of outputs, or to increase the number of outputs using the same inputs. From similar positions, they assert that innovation can lead to higher productivity, i.e. with the same input resources to achieve higher results.

As productivity increases, more goods and services are produced and the economy grows. The variety of innovation changes favours the existence of a huge network of pools for the development of business innovations, for the existence of a huge potential to transform the accumulated innovation knowledge into a working business that brings income and growth. Based on empirical data, Hasan, Tucci, and Christopher (Dec 2010) show that countries in which firms with higher quality patents operate have higher economic growth. They advocate the thesis that innovative development is important for achieving economic growth, but to realize accelerated rates, noticeable results and stable contributions, emphasis should be placed on radical innovation, on truly new patentable knowledge. Law, Sarmidi and Goh (2020) find that inadequate flows of innovative technologies in the long run have a detrimental effect on national innovation capacity. Ren and Wang (2009) examine the long-run relationship between technological innovation, institutional change and economic growth through cointegration analysis of Chinese data. They find that unlike institutional change, technological innovation has a negative impact on economic growth, regardless of the type of interaction between technological innovation and institutional change. And if the interaction between technological and institutional changes is taken into account, then as a result, technological innovation would have an even more unfavourable impact on economic growth. Alheet and Hamdan (Mar 2020) recognize the status of innovation as a key factor for business and an important element of economic growth, but consider that in stimulating it, they have different effects on individual regions and the country as a whole. Braunerhjelm (2008) develops models of knowledge creation and diffusion that can be integrated into existing models of economic growth. Regardless of the divergent results in some of the studies or the unfavourable findings in the strategic aspect, not taking into account the innovation impact or slowing down the pace of innovation-developed compared to that of economic growth would be even worse and lead to detrimental consequences for economies and the level of their competitiveness.

2.3. Entrepreneurship based on innovation

Entrepreneurship is a risky business implemented by brave people, aimed at achieving personal fulfillment, increasing independence, income and social status, who, based on passion, dedication, entrepreneurial spirit and strategic vision, start and develop a business, thus realizing personal positives and regional and national benefits. Malerba and McKelvey (2020) explore knowledge-intensive innovative entrepreneurship, which captures the main characteristics of a phenomenon vital to the modern economy. Enterprising people are the driving force for the development of the business environment, and entrepreneurial business additionally multiplies the benefits for economies by optimizing their structure and increasing the sources of income creation, the incoming cash flows in the personal and family, regional and national budgets. Regardless of the many positives, traditional entrepreneurial business can be much more successful and strategically oriented if it is based on innovation and specifically on business innovation. According to Baumol and Strom (2007, p. 233), entrepreneurs who focus their business on innovation in their products, on the technologies for their production, as well as on their market projections, play a key role in achieving economic growth. In business practice, there is a huge variety of types of innovation, a complete and detailed clustering of individual heterogeneities has been constructed. The combination of this species diversity within which to search for innovative changes and develop innovations is impressive. Entrepreneurial business is risky in itself, innovation is also risky, and the combination of entrepreneurship and innovation is even more so. There is a directly proportional dependence. It is well known that high risk with success also brings high income and a viable business for years to come. Innovations developed on the basis of hidden needs, those needs for the satisfaction of which entrepreneurs develop innovations, with the possibility of introducing them to the market at the right time, but ahead of their direct competitors, are extremely

successful. Snieska and Valodkiene (2015) analyse the role of factors affecting economic growth during economic recessions and the role of these factors in individual economic phases, using the example of Lithuania. They come to the conclusion that the main driver of economic growth in the long term is not the growth of exports, but of household consumption. Therefore, to increase this consumption, the presentation of attractive products is necessary, and in the dominant case these are innovative products, with improved or new characteristics. It is precisely because of this that, in the 21st century, interest in technological entrepreneurship (with high added value) is growing (Kwon and Jung, 2012; Ahn, Kim and Lee, 2022).

2.4. Economic growth and entrepreneurship based on business innovation

Entrepreneurship and innovation play a leading role in the transition from a resource economy to a knowledge economy. For Toma, Marinescu and Constantin (2018, 155), entrepreneurship and economic growth represent two multidimensional and interrelated concepts. According to Amini Sedeh, Pezeshkan and Caiazza (2022, 1198), innovative entrepreneurship is one of the key drivers of economic development. Audretsch in a number of independent or joint publications confirms the connection between R&D and innovation and the link between them - organization and, respectively - entrepreneurship (Audretsch et al., 2002; Audretsch, 2009; Michelacci, 2003). According to Akinwale, Alaraifi and Ababtain (2020), entrepreneurship is recognized as a major component of economic growth that is facilitated by innovation, and Thurik (2010, 2012) believes that technological change can be the most important determinant of expanded entrepreneurial opportunities. Galindo and Mendez-Picazo (2013) test the impact of innovation on entrepreneurial activity. They make empirical estimations to test hypotheses about economic growth and innovation that account for a range of quantitative and qualitative variables. For Malerba and McKelvey (2020), key players in the modern business scene are innovative entrepreneurs who intensively use new knowledge in the creation, dissemination and use of knowledge, introduce new products and technologies; draw resources and ideas from the innovation system; positively change the environment and dynamics in the economy. Bilgin, Gozgor and Rangazas (2021) examine the empirical effects of immigration on economic growth in a panel dataset of 30 Organization for Economic Co-operation and Development (OECD) countries. The results of their research show that for the positive relationship between immigration and innovation, the share of foreign students who start a new business is essential. entrepreneurship has a significant positive effect on a start-up's technological innovation, and this positive effect has a moderating effect that further promotes the positive effect of technological competitiveness on technological innovation. The empirical findings of Law, Sarmidi and Goh (2020) show that the inadequacy of the flow of innovative technologies in the long run has a detrimental effect on national innovation capacity. They recommend that the link between innovation and economic growth should be complemented by a good institutional framework for quality, skilled human capital and a wider network for commercializing the innovative product to ensure that economic activity in the area of innovation would lead to the promotion of economic growth. growth. Jian, Fan, Zhao and Zhou (Mar 2021) use a panel of 31 provinces of China during 1978-2017 to examine the effects of entrepreneurship on economic growth in the context of China's transformation from a centrally planned to a market-oriented economy. The data show a greater contribution of entrepreneurship than innovation to the achievement of accelerated growth. Akinwale, Alaraifi, and Ababtain (2020) reach similar results, reporting that entrepreneurship has a much greater impact on economic growth than innovation alone. They argue that entrepreneurship directly affects economic growth and innovation affects growth only through entrepreneurship. Therefore, to strengthen their role, it is necessary to increase innovation entrepreneurship and to stimulate the start-up of innovation-based businesses. The researchers definitely support the use of entrepreneurial initiatives and business innovations as a sphere of economic activity to realize economic growth and favour

an environment for its subsequent increase. The categorical theoretical and empirical confirmation of their importance necessitates the prioritization of the most important directions through which the various participants in the economic turnover can contribute to increasing economic growth. The main opportunities for increasing economic growth, based on the development of entrepreneurial and innovative activity, are characterized by a wide variety and multifaceted combinations of their manifestation, but the following can be indicated as more essential:

- Optimal use of the diversity of resources and stimulation of the circular economy.
- Support at all levels of a functioning innovation and entrepreneurial ecosystem, favouring and stimulating the launch of entrepreneurial initiatives.
- Formation in society of positive attitudes towards entrepreneurial business and innovation as a tool for business development.
- Improving the entrepreneurial and innovation culture, especially in relation to young people.
- Support of the various entrepreneurial and innovation networks as an environment for generating ideas, for creative interaction between many heterogeneous economic and educational agents, and for increasing their productivity based on synergistic effects of this interaction.
- An active role of state institutions, local authorities, business associations and various informal organizations to involve in the economic turnover of various risk groups of persons (uneducated, with reduced work capacity, from minority groups, migrants and others).
- Wide-ranging public awareness of the benefits of entrepreneurship as a sphere of economic activity and innovation as a source for meeting market demands and raising living standards.

3. CONCLUSION

Each of the considered areas – entrepreneurship and innovation, is in itself a phenomenon important for the development of economies and society as a whole. Without innovation there is no development. Without entrepreneurship, there is no possibility of practical transformation of the new into a successful business and successful innovation. Both entrepreneurship and innovation are important for economic growth. The rates of their development and the magnitude of their contribution to achieving growth are different for individual economies, industries, regions and local communities. The net impact and direct contribution of innovation or entrepreneurship to economic growth is difficult to measure. The combination of factors that in themselves affect entrepreneurial processes or innovation development are strictly individual for individual objects and aggregates of empirical research. The interdependent behaviour of entrepreneurship and innovation as individual and systematic systemic phenomena further adds increasing diversity in identifying different conclusions and different “readings” of the empirical results of individual studies. To achieve sustainability in innovation development, it is necessary to implement not sporadic innovations, but a continuous innovation process, within which the business develops innovations at a different stage of their readiness for the market; continuous process of maintaining and increasing the level of scientific knowledge; supporting formations for connection between science and business; innovation culture and environment mediating the behaviour of participants in the economic system. For the realization of sustainability in the intensity of entrepreneurial activity, a favourable environment and a stimulating entrepreneurial ecosystem should function, based on a clear message of support from state institutions and a wide network of intermediaries facilitating business start-up. For the sustainable development of entrepreneurship and innovation, a key role should be played by a developed educational system and a system for continuous improvement of knowledge and professional skills, providing up-to-date information, stable knowledge, an open attitude to new things and preparation for turning it into a profitable business and a successful career.

The large body of empirical research on entrepreneurship, innovation, and economic growth is an enormous asset to scholarly thought. Regardless of the specific focus of the study and the peculiarities of the obtained results due to their implementation in countries with different degrees of economic development, specific folk psychology and traditions, different willingness to take risks, different attitudes to personal initiative and the provision of self-employment, the view is confirmed that entrepreneurship contributes to the achievement of economic growth and favours the realization of sustainability in terms of trends for its future growth. On this basis, the generative potential for growth that entrepreneurship has can be enhanced by incorporating innovation as an object for realizing entrepreneurial business. Regardless of the different contribution and mode of impact on economic growth, entrepreneurship and innovation are important and play an essential role in economic development and the achievement of economic growth, especially if there is an adequate, interoperating entrepreneurship and innovation ecosystem.

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STRATEGIC FRAMEWORK FOR TRANSITION TO SUSTAINABLE ENTREPRENEURSHIP AND SUSTAINABLE SOCIETY IN BULGARIA - PRIORITIES AND IMPLEMENTATION OPPORTUNITIES

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ABSTRACT
This study analyzes strategic documents outlining priorities, guidelines, and recommendations for achieving sustainable development goals in Bulgaria. These documents provide a national and international framework for promoting entrepreneurial initiatives. The importance of a creative and adaptable approach to business challenges is emphasized. The study also highlights the unfavorable global situation and the existence of various barriers, difficulties, and risks facing small and medium-sized enterprises in Bulgaria. As a result, the issue of aligning goals with available resources is raised, and the need to reconsider deadlines for meeting requirements is stressed. The study proposes a model outlining the stages necessary for achieving these goals.
Keywords: *entrepreneurship, small and medium enterprises, strategic documents, challenges*

1. INTRODUCTION

The current state of development raises important questions that require a serious and responsible approach to adequately reflect the complexity of the situation. Overcoming challenges in Bulgaria necessitates creativity and flexibility as the country is an integral part of the globalizing world. While some challenges are common among other countries, some stand out at the regional level or are specific to Bulgaria's development. To resolve these challenges, non-standard thinking is required, combining typically Bulgarian features with current global requirements. Small and medium-sized enterprises (SMEs) play a decisive role in the development of Bulgaria's economy and are expected to become a driving force of economic progress. Their activity must align with national priorities and adhere to increasing requirements based on the concept of sustainable development. This approach can achieve economic prosperity and public welfare. The object of research in the current development is the main strategic document that forms the framework for the transition to sustainable development and entrepreneurship in the country. The focus of this research is on the development of SMEs in the industrial business field. This study examines the relationship between strategic documents and practical business applications in our country. The aim is to prove the necessity for continual adaptation of the development framework in response to the challenges and issues arising from contemporary societies. The thesis argues that it is beneficial for our country to follow a gradual approach towards implementing the tasks outlined in the sustainable development concept. To support this, a hypothetical stage model of the transformation process is constructed. National and European strategic documents provide guidelines, priorities, and recommendations for achieving Sustainable Development Goals (SDGs) in our country. They serve as the basis for developing entrepreneurial initiatives and are closely linked to funding opportunities. These strategic programs and documents should be viewed as opportunities to address pressing issues, such as those faced by small and medium-sized enterprises in the industry. While there are various strategic documents, some are of particular importance in improving the environment for entrepreneurship in our country. These include the National Strategy for Small and Medium-Sized Enterprises during the relevant period. 2021-2027; National Development Program BULGARIA 2030; National plan for

recovery and sustainability of the Republic of Bulgaria /PRS/; Program "Competitiveness and innovations in enterprises for the period 2021-2027. (PCIE 2021-2027). Adhering to these documents, we will try to select, link and explain some characteristic moments from them.

2. POLICY FRAMEWORK FOR SMEs

National Strategy for Small and Medium-sized Enterprises for the period 2021-In 2027, a significant policy framework was established for SMEs, which aligns with the EC Strategy for SMEs. The document takes into account crucial factors that contribute to the development and competitiveness of SMEs, such as access to markets, financing, and ICT solutions, digitalization of processes, qualified staff, and efficient, eco-friendly use of resources. The main objective is to support Bulgarian SMEs in achieving higher competitiveness, digitalization, sustainability, and export orientation. Additionally, there is a focus on reducing regional inequalities and promoting growth in less developed parts of the country. The document outlines specific areas of impact and corresponding measures, emphasizing that the driving force behind the establishment and growth of SMEs is access to global information and innovative technologies. The impact of the pandemic is also considered, with a particular emphasis on the development of high-tech economic activities, accelerating growth, increasing the competitiveness of start-up technology enterprises, and achieving economic, social, and environmental sustainability. This strategic document is aligned with other current strategic documents.

3. STRATEGIC FRAMEWORK OF NATIONAL DEVELOPMENT PRIORITIES

3.1. National Development Program BULGARIA 2030

National Development Program BULGARIA 2030 is a framework strategic document outlining the vision, goals and priorities until 2030. Transformation in all areas, including SMEs, must be consistent with the requirements set forth in it. Our strategic goals are to accelerate economic development, promote demographic growth, and reduce inequalities. To achieve these goals, we have grouped targeted policies into five interrelated axes of development: Innovative and Intelligent Bulgaria, Green and Sustainable Bulgaria, Connected and Integrated Bulgaria, Responsive and Just Bulgaria, and Spirited and Vital Bulgaria. Additionally, we have identified 13 national priorities that require targeted interventions in various areas. These priorities are accompanied by indicators of results and financial resources (as shown in Fig. 1). Following the National Development Program is closely linked to the practical implementation of the UN SDGs. It is worth noting that priority 3 in the first problem area, which focuses on "Intelligent Industry," has garnered the most attention.

Figure following on the next page

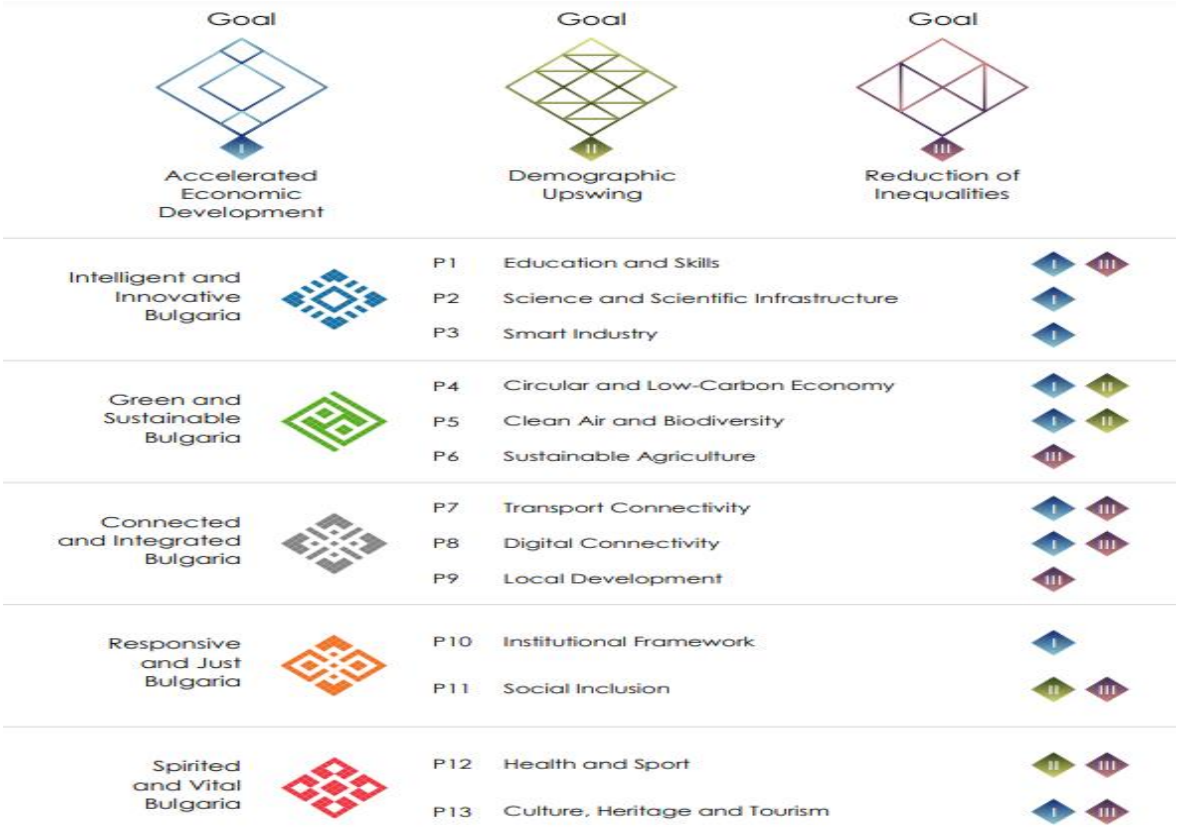

Figure 1: Links between goals, axes of development and priorities (Source: National Development Program BULGARIA 2030)

Referring to the National Development Program BULGARIA 2030 /Detailed Strategy/ https://www.mtc.government.bg/bg/category/283/nacionalna-programa-za-razvitie-blgariya-2030 /c.22-29/, we briefly note the most important points:

- The government, financial institutions, and technology industry are collaborating to digitize the economy and industry and promote research and development. To achieve this, digital tools and skills will be enhanced through training, and the connection between science and industry will be strengthened.
- To create a technologically intensive and innovative environment, several actions will be taken, including the development of innovation ecosystems, promotion of technological modernization, creation of a high-tech industrial base, stimulation of innovation in enterprises, and the establishment and upgrading of innovation centers. Start-up enterprises in the high-tech and medium-high-tech sectors will receive priority support. This will be achieved by building an entrepreneurial ecosystem that includes technology parks and business incubators.
- The internationalization of the innovation process is vital to increase the country's appeal to investors and succeed in the global market.

This aligns with the Sustainable Development Goals of ensuring secure work and economic growth, and innovation and infrastructure. It is important to note that the National Development Program BULGARIA 2030 is highly ambitious and aims to achieve significant goals.

3.2. National plan for recovery and sustainability of the Republic of Bulgaria

The Republic of Bulgaria has developed a National Plan for Recovery and Sustainability (RSP) that serves as an extension to ongoing national reform programs from 2021 to 2026.

The RSP comprises a series of measures and reforms that aim to achieve the following goals: 1) promote green transition and digital transformation, 2) foster smart, sustainable, and inclusive growth, 3) promote social and territorial cohesion, 4) ensure economic, social, and institutional sustainability, and 5) receive European funding based on the outcomes achieved. The plan identifies four pillars for the country's development, namely Innovative Bulgaria, Green Bulgaria, United Bulgaria, and Just Bulgaria. The primary focus of this plan is on Innovative Bulgaria, which aims to strengthen education and skills development, research and innovation, and smart industry. The plan emphasizes the significance of STEM-based learning, which provides a solid foundation for sustainable development through practical adaptation. Critical thinking, problem-solving, and information evaluation skills are essential for success. Creativity, communication, and collaboration are key principles, and applied competencies are crucial. The plan underscores that scientific and innovative transformation is critical to economic recovery.

4. BULGARIAN ECONOMY - COMPETITIVENESS AND INNOVATIONS

The program "Competitiveness and innovation in enterprises for the period 2021-2027. (PCIE 2021-2027) The focus of this program is on achieving intelligent and sustainable growth for the Bulgarian economy while implementing industrial and digital transformation. It serves as a tool for implementing the European cohesion policy, particularly the European Fund for Regional Development. Policy objectives are determined at the European level, with the first objective being to create a more competitive and smarter Europe through innovative and smart economic transformation and regional ICT connectivity. This includes developing scientific research and innovation capacity, introducing modern technologies, promoting the sustainability and competitiveness of SMEs, and creating new jobs. The second policy objective aims to create a greener, low-carbon, and sustainable Europe with a net-zero carbon transition economy. This involves promoting a clean and fair energy transition, green and blue investments, circular economy, climate change mitigation and adaptation, risk prevention and management, and sustainable urban mobility. Specific sub-goals include promoting energy efficiency and reducing greenhouse gas emissions, as well as transitioning to a circular and resource-efficient economy. The program is aligned with the other strategic documents and seeks to overcome the main challenges in Bulgaria's development. It aims to create the necessary conditions for quality development and sustainable growth. The report emphasizes the economic, sectoral, and territorial differences and identifies opportunities to promote innovation and competitiveness. The policy formation process considers three primary factors that affect medium and long-term goals. There are certain factors that are unique to the Bulgarian economy and impact how people view entrepreneurship, technological progress, productivity, institutions, and more. To address the delay that has been identified, it is necessary to implement measures that encourage the growth of Bulgarian SMEs. This should include a particular emphasis on start-ups and rapidly expanding businesses, as well as improving their access to funding and markets. It is also important to prioritize digitalization and innovation, while keeping in mind the characteristics of different regions and sectors. There are three main groups of factors to consider. The first group pertains to digitization and environmental processes, as well as the priorities of European policy towards small and medium-sized enterprises. The second group relates to the impact of the business cycle and external factors, such as the COVID-19 pandemic. Businesses have a significant impact on both domestic and foreign market demand, as well as production and investment levels. Implementing supportive policies that focus on adapting and enhancing resilience in the face of emerging crises can be beneficial. The document highlights the potential for growth among small and medium-sized enterprises (SMEs) in various national, sectoral, and regional dimensions. This is due to their significant presence in the number of businesses, job creation, and added value, particularly among micro-enterprises.

To achieve higher technological production and knowledge-intensive processes, targeted assistance is necessary. This is especially crucial because the Bulgarian economy differs significantly from that of the EU in terms of key indicators. The report notes that the processing industry has made significant progress in transitioning to economic activity with higher added value, which is expected to continue between 2021 and 2027. The weaknesses highlighted in the 2020 Report on Bulgaria by the EC suggest a need for certain recommendations. These recommendations mainly involve investing more in eco-friendly technologies, sustainable solutions, energy and environmental infrastructure, digitization, and R&D. Targeted investments are also needed to overcome regional backwardness. The report also calls for more efficient waste management, reduction in energy intensity of the economy, and greenhouse gas emissions while achieving energy efficiency. There is a need to raise the awareness of entrepreneurs about the possibilities and benefits of developing circular business models. Targeted investments in the implementation of product and processor innovations, and entrepreneurial ideas for new high-tech and medium-high-tech productions are foreseen in the industrial sector. Strengthening the "triangle of knowledge": research units - educational structures - business, is expected to reveal wider opportunities for upgrading the achieved innovation effect and digitalization. It is planned to increase the degree of internationalization of Bulgarian SMEs. Furthermore, it is crucial to enhance public attitudes towards entrepreneurship and provide support for start-up businesses, family businesses, and fast-growing SMEs. Funding should be allocated through a flexible and well-informed approach, which can be implemented nationwide to address the uneven development of different regions, together with integrated territorial strategies. We can summarize that it is necessary in practice to comply with the guidelines outlined in the cited strategic documents. It can be seen that by means of financial levers, they are primarily expected to push the development of Bulgaria along the path outlined by the concept of sustainable development. The future functioning of SMEs is set in a European and national framework, with serious challenges to overcome. It is very important to look for conformity with the situation in our country. The adequacy and effectiveness of the proposed strategies, goals, and tasks are directly related to the possibilities according to the given moment and place - Bulgaria, in the 20s of the XXI century.

5. GOALS AND IMPLEMENTATION - A CRITICAL VIEW

5.1. The situation in the country - an overview

Based on the information provided, it is evident that a significant change is needed. If a major transformation is in the works, it must consider the challenges and limitations specific to the situation to remain feasible. The strategic documents under review propose ambitious goals and objectives for the growth of the Bulgarian economy. Small and medium-sized enterprises (SMEs) in the country face unique challenges that are crucial for their survival. Based on strategic documents, a timeline has been established for achieving the goals of UR-2030. However, it's important to analyze the situation and opportunities both domestically and internationally to determine if this timeline is feasible or if it needs to be adjusted. In our view, it's worthwhile to examine the potential conflict between sustainable development policies and the current realities. One key issue to note is that the current global trends are not supportive of achieving the concept of sustainable development (SD). This difficulty arises because the questions at hand do not pertain to the implementation of one specific and tangible idea, but rather large-scale goals and tasks that are not fully understood. The process of achieving SD is complex and lengthy, with ups and downs, and it involves overcoming various limitations and obstacles such as financial constraints, limited resources, differences in mindset, conflicts of interests, and the impact of situational factors amidst global turbulence and uncertainty. The current alarming situation highlights the development of entropy, a state of unmanageability, and a tendency towards uncontrollable processes.

The current situation is not ideal for sustainable development. Basic prerequisites are missing and progress is moving in the opposite direction. The international situation is unstable and the health crisis is causing additional problems that will slow down the process. Attempts to speed up progress are creating tension in different areas. It's becoming clear that the ideal vision for sustainable development may not be achievable given the current environment. It's important to consider whether sustainable development is mainly an investment issue or if it's more complex than that. We shouldn't forget that sustainable development has a moral aspect that goes beyond just technological and economic progress. Coordinating economic, technological, social, and environmental objectives is proving to be a difficult task. Research has shown that many entrepreneurs are not prioritizing sustainable development goals. Instead, they are focused on other challenges that affect their business's survival and success. It's understandable that short-term strategies are dominant, and the concept of sustainable development imposed from outside is not yet fully embraced. However, progress can be made with time, understanding, and support. There are various obstacles to achieving the SDGs, including economic, financial, commercial, social, innovative, and political barriers, as well as weak policy monitoring and healthcare challenges. At a global, regional, and national level, the conditions are not favorable for achieving sustainable development within the given timeframes. Therefore, it's important to seek out new opportunities to implement the necessary changes and make sustainability the foundation for long-term success in business. *A strategy* is needed for better linking national policies: economic, financial, and social with "Agenda 2030" policies. Strategies are also needed to financially stimulate the required transformations in SMEs.

We consider the multiple obstacles, barriers and risks to be compelling reasons in defence of the understanding that it is unrealistic to make an immediate change towards reaching the ultimate goals of sustainable development by 2030. This applies not only to Bulgaria but also to other countries. It is advisable to review and rethink the transition, giving a new time horizon.

5.2. The transformation process - vision

The limitation in the volume of the development does not allow a more detailed presentation of understandings, but we will allow ourselves to present a synthesized one of the aspects of *our vision* for the transition to sustainable development and sustainable entrepreneurship in Bulgaria. Achieving the goal should be done step by step. In Fig. 2 we present the sequence of steps grouped into several stages ofdevelopment. The current moment indicates a preparatory stage where the basic requirements for achieving goals will be secured. Entrepreneurs' focus on immediate tasks can be explained in this context. We believe that the period until 2030 is the time to reverse trends and overcome backwardness. Key priorities for reconstruction include fighting inflation, reducing inequalities, unifying the population, improving the demographic situation, and more. After the successful completion of the preparatory stage, the movement towards a qualitatively new type of business and community behavior can begin. Positive trends are expected to slowly spread across all areas. However, the transitional stage may be marked by contradictions, inconsistencies, and compromises. Achieving sustainable development is a path of trial and error, and gradual accumulation and rethinking are necessary to achieve a qualitatively different state in our country. During the stage of accelerated development, a significant positive potential is unlocked, indicating a new business mindset that prioritizes taking responsibility for the long-term consequences of its actions.

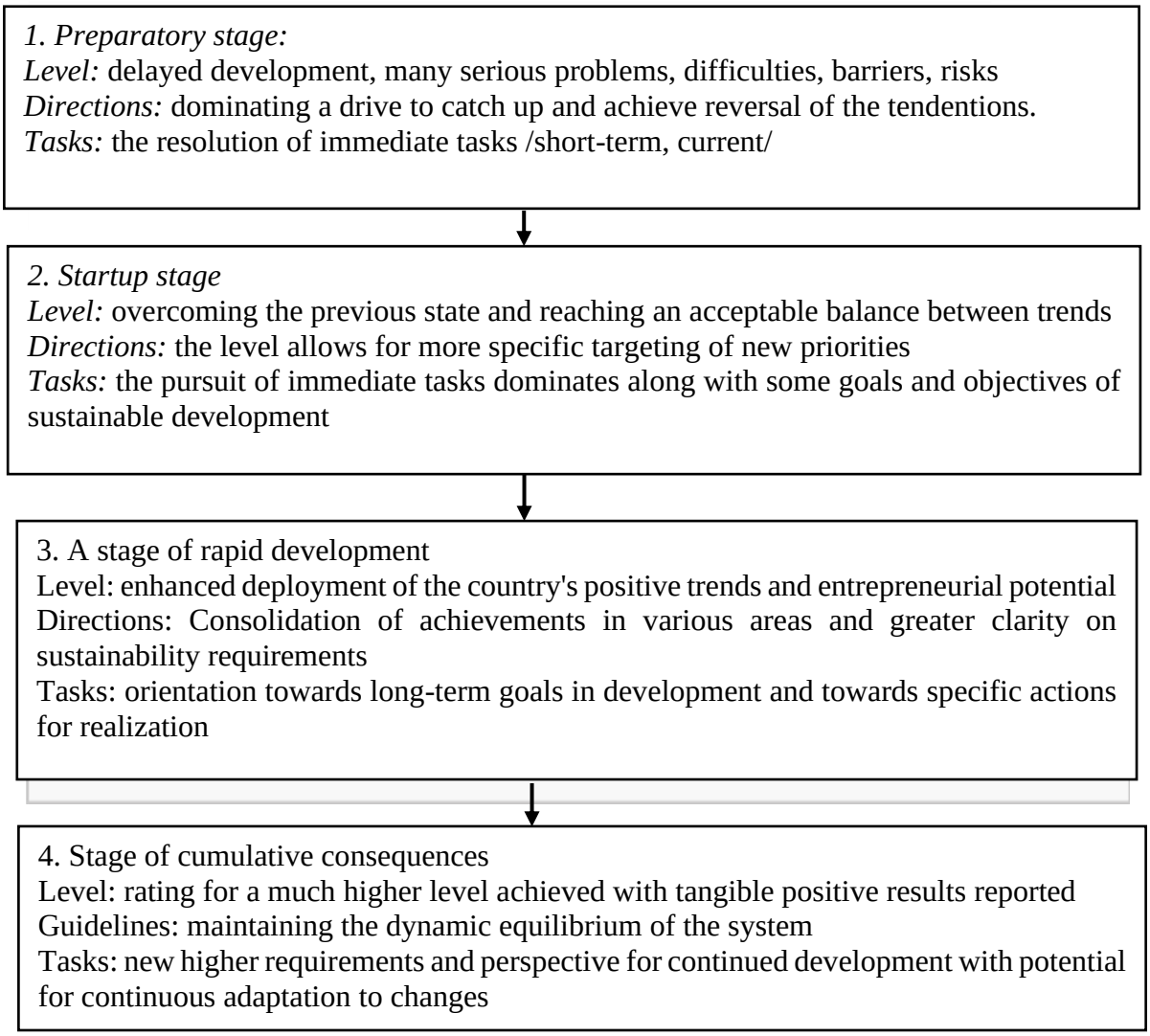

Figure 2: Stages of transformation
(Source: The author)

In the following stage, the cumulative consequences, businesses must adapt to maintain their high level of development. The ultimate goal is achieving sustainable development for Bulgarian entrepreneurship, evaluated based on sustainable development criteria. The concept emphasizes responsible entrepreneurial behavior and its impact on economic prosperity and overall social well-being. To achieve our ultimate goal, we need broad public support at every step. Realistic expectations, a deep understanding of the essence, sharing of ideas, and high motivation are essential to our success. As for the timeline, it remains uncertain due to the complexity and dynamics of the system. Predictions are probabilistic, and the outcome may not be exactly as expected. We must constantly generate new ideas and remain resourceful and innovative to uncover alternative solutions and hidden opportunities. This highlights the importance of creativity and unconventionality in the entrepreneurial mindset, in line with the thoughts of great minds throughout history who have recognized the uniqueness and significance of this figure as the engine of progress.

6. CONCLUSION

At this moment in history, societies are facing a range of threats and challenges due to the turbulence of global changes. Bulgaria, as a participant in these changes, has a responsibility to modernize its society and economy to meet high standards for sustainable development.

To successfully achieve this transformation, we believe that our strategic documents should reflect more realism and moderation in all areas of development. As we continue to navigate these changes, it is important to gain a deeper understanding of the processes at both national and supranational levels. Bulgarian SME entrepreneurs will play a significant role in meeting these responsibilities and should be included in the development of strategies to address important issues. Their practical experience can offer valuable non-standard ideas to help move us forward.

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THE NORMATIVE REGULATION OF THE BULGARIAN INDUSTRY - A STIMULUS/OBSTACLE FOR ITS DEVELOPMENT

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ABSTRACT
The current development examines the normative regulation of the Bulgarian industry. To a large extent, it can be, on the one hand, a stimulus, but on the other, a cause of negative results and consequences. The choice of industry is not accidental. Disputes about which of the two main branches - agriculture or industry - should be the leader is not new to our economic practice. Over the years, different opinions have prevailed and this has inevitably been reflected in the current legislative framework. The present analysis of the normative regulation during the various periods of the economic development of the country aims to evaluate its stimulating/retaining role for the Bulgarian industry. An answer is also being sought to the questions of how often and under what circumstances a fundamental change in the normative regulation of a given industry is necessary. At least for now, no definitive answers can be given from the results obtained.
Keywords: *incentive, industry, law, regulatory framework*

1. INTRODUCTION

The pursuit of creating various rules, restrictions, laws, norms, etc. is deeply rooted in human being. Already in ancient times, Roman and Greek philosophers in their works formulated many different laws and principles related to basic aspects of human existence. A typical example is the works of such thinkers as Plato - "Laws", Aristotle - "Politics", Marcus Tullius Cicero - "On the State", "On the Laws", Thomas Aquinas - "On Existence and Essence", etc. Moreover, the term "law" itself is found not only in scientific but also in religious works such as the Bible and the Koran. The laws related to the economic activity of the society form its normative regulation. This is done with the help of two different types of arrangements – legal and practical. The legal one includes the set of legal norms adopted and operating on the territory of the country - laws, normative acts, etc. In contrast, the practical one is based on the so-called customary law - a set of traditions, orders and customs, which is better known under the name "economic regulation. The object of the present development is the first - the regulatory framework of the Bulgarian industry. It includes the set of various types of laws, normative and sub-normative acts that form the normative framework of industrial production. The main task of the research is, based on a historical review of its development, to reveal to what extent this regulation can stimulate/restrain the industrial development of society. The specificity of the Bulgarian economic history necessitates the distinction of several main stages in the construction of the normative framework - origin, normative regulation of Bulgarian industry during the Third Bulgarian Empire, normative regulation of socialist industrial production and normative framework of modern Bulgarian industry.

2. ORIGIN OF THE REGULATORY FRAMEWORK OF THE BULGARIAN INDUSTRY

Although very short in time, this stage is essential for the overall economic development of Bulgaria. Liberation in 1878 found an underdeveloped economy entirely reliant on Turkish laws and customary law. This necessitates, at a very rapid pace, a complete reassessment and the construction from the ground up of a new legal framework, ensuring economic prosperity and

stability of the young Bulgarian state. This difficult task was taken up by the Provisional Government, which completely changed the tax system and adopted one of the first laws - the Law for the Improvement of the Condition of the Agricultural Population on Manor and Homestead Lands (1880), the Law on Markets (1880), the Law on Chambers of Commerce (1894), Commodity Exchanges Act, Lotteries Act (1898), etc. The main reason for these being the first laws adopted is the fact that, as a result of the Liberation, Bulgaria became a country with a predominant dominance of small agricultural producers and existing traditions in the field of trade. As for the normative regulation of the nascent Bulgarian industry, its beginning can be considered the Decree published in 1892 on problems in agricultural, craft and factory production (Vladigerov, 1940. p. 65). Only a few months later, in December 1893, the Law for the Development of Native Industry was adopted (Deneva, 2013, p. 27), which aims to create conditions for stimulating the European path of development of native industrial production. In 1893-1894, manufacturers of industrial goods were given the opportunity to use interest-free long-term loans, and after 1895 they could take advantage of discounting policies, mortgage loans, etc. credit instruments. The provision of quality raw materials for the young Bulgarian industry is of particular importance and its stimulation finds expression in the adopted laws for the upliftment of the silk industry from 1896, for the promotion and breeding of sheep with good quality wool from 1892, etc. The results obtained are quite encouraging, and this is the basis for the approval of the first Law on the Promotion of Local Industry, which provides a number of opportunities - tax exemption, duty-free import, free land for construction, reduction of transport charges on railways, advantage in government tenders, etc. . of Bulgarian industrial enterprises (Deneva, 2017, p.). In the years after that, this law underwent a number of amendments - 1905, 1909, but in general it was with its adoption that the construction of the normative regulation of the nascent Bulgarian industry ended. Assessments of the law-making activity of the young Bulgarian state are very contradictory. According to some specialists in the field of economic history, they are rather negative and are proof of the conduct of an "unsystematic economic policy". On the other hand, however, the achieved results - the increased number of industrial enterprises, the new sectoral structure of the young Bulgarian industry and the creation of the basic prerequisites for the emergence and development of industrial capitalism, are grounds for giving a positive assessment of this activity. The subsequent events and the obtained results in the field of industrial production are also reason to consider that the created normative regulation of the Bulgarian economy and in particular the industry have a stimulating effect on its development.

3. NORMATIVE FRAMEWORK OF THE BULGARIAN INDUSTRY DURING THE THIRD BULGARIAN KINGDOM

Although the formal beginning of the third Bulgarian state was established in 1878 with the signing of the San Stefano Peace Treaty, its legal beginning is connected with the act of independence of September 22, 1908, when Bulgaria declared its legal independence from the Turkish Empire. Its end occurred in 1947 when the so-called Dimitrov Constitution, and a little earlier on September 8, 1946, a referendum was held to abolish the monarchy. These two events marked the end of the third Bulgarian kingdom. As a period of time, its existence covers the years 1909 - 1946. Although not so long, this period is saturated with numerous events that left their mark on economic. A distinguishing feature of the economic policy is the promotion of Bulgarian production. A guarantee for this is the action of the Law for the Protection of Local Industry, adopted in 1909. With it, the first distinction of industrial production between promoted and non-promoted was introduced and the new sectoral structure of the Bulgarian industry was formed (Deneva, 2013. p.28). The events that took place in the meantime on the world stage and on our stage - the First World War, the Balkan and the Inter-Allied Wars - left their indisputable imprint on the world and, in particular, on the Bulgarian economy.

On the one hand, these are the many destructions and losses, but on the other - an opportunity to build a new economic order, economic growth due to the increased demand for goods and food. This necessitates the implementation of a significant transformation in the normative regulation of the Bulgarian economy. It finds expression in state regulation of foreign currency trade, introduction and increase of specific customs duties for groups of goods, etc. All of them created conditions for economic revival and in a short period of time, 1924-1926, the economy and above all the Bulgarian industry got back on their feet and reached the levels of before the wars. Quite logically, the change in the economic situation also requires corresponding amendments to the normative regulation. In response to these processes, an entirely new Act for the Promotion of Local Industry was passed in 1928. With its help, a significant transformation is carried out in the economic policy, moving from promotion to the application of other specific economic levers - industrial concessions, specialized tariffs for transportation on the railway network, etc. The stabilization achieved as a result of its application was too short and affected only individual branches of industrial production. At the same time, it led to the strengthening of the monopolization of the industry, and in order to limit it, the adoption of the Law for the Control of Cartels and Monopoly Prices in 1931 was necessary, which was one of the first within the European legislation of that period. The consequences of the action of this not quite adequate normative regulation were quite negative - in 1929 the country fell into a deep economic crisis and it got to the point that this law was declared "superfluous, even harmful" (Vladigerov, 1940. p. 74). The measures taken in response to the negative situation that occurred - adoption of a new law in 1936, the construction of a new organization of industrial production, the entry of foreign capital and the consistent anti-crisis policy, allowed the country to transition more easily and with significantly smaller losses during the world economic crisis - 1929-1933. The economic results achieved on the eve of the Second World War, especially in the field of industrial production, are proof that, regardless of vicissitudes, correctly constructed and adequate regulatory regulation can largely limit the upheavals in the country's economy. Unfortunately, the subsequent historical events left a very significant negative imprint on the Bulgarian economy. In a very short period of time, a completely new form of ownership and organization of economic activities is passed. With the adoption of the "new" constitution and the holding of the referendum at the end of 1946, in practice, not only the third Bulgarian kingdom, but also the established and operating normative framework of the Bulgarian economy and, in particular, the industry, came to an end. The efforts of many economists, lawyers and entrepreneurs to create adequate conditions for business during the first fifty years of the new history of the Bulgarian state turned out to be in vain. The legal acts adopted by the new National Assembly at the end of 1947 - Decrees on the nationalization of banks, mines and industrial enterprises, marked the end of an era and marked the beginning of a radically different way of building and functioning of industrial production.

4. REGULATORY REGULATION OF THE SOCIALIST INDUSTRIAL PRODUCTION

With the implementation of the nationalization and the introduction of the state monopoly on foreign trade, as well as the abolition of free competition, the beginning of a completely different regulatory framework is set in the Bulgarian economy, the impact of which is strongest in the field of industrial production. As a result of the built specific organization of the economy, the industrialization of the country carried out at very high rates and the new financial policy implemented, Bulgarian enterprises are strongly dependent on the state budget and on the decisions of the Council of Ministers and the State Council, as the highest bodies of the executive power. The normative regulation of this period finds expression in the adoption of decrees and decrees for the introduction of many different economic mechanisms for the regulation and management of economic relationships.

Their implementation in practice takes place through the adoption of five-year national and economic plans, containing the main goals, parameters and means of implementation. An exception to this rule is only the first such plan, which was adopted in 1947 and had a planning horizon of two years. It guarantees the implementation of electrification through the construction of a number of new energy capacities. Regardless of the increased volumes of industrial and agricultural production, they have not reached military levels. Already with the adoption of the first five-year plan - 1948-53, conditions were created for the emergence of disproportions in the Bulgarian economy, which most strongly affect industrial production. As a result of the short-sighted economic policy, inconsistent with the demographic and natural conditions, considerable capacities have been built, especially in industry, which, however, rely above all on the import of raw materials. It was in the 1950s and 1960s that this short-sighted policy, based not on one's own resources, but on specialization within the existing Union for Mutual Economic Assistance, created the problem of the country's resource base. New capacities, especially in heavy industry, are experiencing a shortage of raw materials. The development and application of chemical substitutes is used as a means to solve the problems that have arisen. This gives a strong impetus to the development of the chemical industry and to some extent modifies the sectoral structure of the Bulgarian industry. In parallel with this, the significant concentration of new jobs in the larger administrative centers started and intensified the processes of migration and depopulation of the small settlements. Throughout the analyzed period, a markedly extensive path of development was applied, which, accompanied by accelerated growth rates, supported by the import of cheap raw materials and ensured realization of production within the socialist camp, made the Bulgarian economy inefficient and uncompetitive with the Western European one. The disproportions that arose in the 1960s necessitated a total change in the regulatory framework and the transition to a completely new principle of functioning of economic structures, including those from industry - the principle of self-support. For this purpose, specialized programs are developed, the main goal and task of which is to intensify the economy and increase its competitiveness. For a certain period of time, this mechanism gave positive results and in the 70s of the last century, Bulgaria became a developed industrial country, distinguished by high growth rates. In the 1980s, as a result of the implementation of various management mechanisms, the pace of development slowed down and disproportions appeared in the pace of development of individual branches. This leads to a shortage of goods, especially consumer goods, the question of the quality of manufactured products is sharply raised, and quite rightly at the end of the 1980s signs of an economic crisis were observed (Deneva, A. 2019). This is proof that in this period the established and applied normative regulation, which is subject to frequent and significant changes, fails to fulfill its role as a regulator/stimulator of the national economy. The crisis in the industry is particularly large and deep, since, in addition to a shortage of quality products, it is also related to problems in the technical base, technological assurance, the size of the enterprises, etc. This is proof that in this period the established and applied normative regulation, which is subject to frequent and significant changes, fails to fulfill its role as a regulator/stimulator of the national economy. The crisis in the industry is particularly large and deep, since, in addition to a shortage of quality products, it is also related to problems in the technical base, technological assurance, the size of the enterprises, etc. The main prerequisite is the creation of an opportunity to build enterprises with a specific industry affiliation - the production of consumer goods, based on other types of property. With this, for the first time in the recent history of Bulgaria, the fact is recognized that the unified state ownership cannot serve as a basis for the development of effective economic activity. Only the variety of individual types of ownership – private, public, cooperative, etc., can provide the necessary prerequisites and conditions in this direction. With the change in the normative regulation, in practice, the mentioned negative processes are strengthened, there is a sharp drop in the level

of the main economic indicators, losses in the main markets, which quite logically leads to the closure of operating enterprises. The most deeply affected sector of the economy by the crisis turned out to be the industrial sector, whose volumes decreased by about 45%. Everything highlighted so far is a reason to claim that during this period the frequent changes in the normative regulation of industrial production turned it into its limiter and to a large extent the root cause of the negative rates of development in the late 1980s and early 1990s. those years.

5. REGULATORY FRAMEWORK OF MODERN BULGARIAN INDUSTRY

The last 33 years of the development of the Bulgarian economy are perhaps the most turbulent and difficult to assess. In this period, the economy went through many transformations – from those in the form of ownership and the principles of organization to the Europeanization of the current legislation. This is the time of the creation and implementation of a completely new and radically different from the previous normative regulation of economic activities, including those in industry. Its beginning is marked by the development and adoption of two important laws - the Commercial Law (July 1, 1991) and the Accounting Law (January 15, 1991), which are the basis of the new legal framework being built. Subsequently, a number of other laws were developed and put into effect - the Law on the Transformation and Privatization of State and Municipal Enterprises (08.05.1992), the Law on Profit Tax (1996), the Law on Property (1990), etc. .n. The main goal of the new regulatory framework is the creation of conditions for the application of the market principle of functioning of the economy. Regardless of the good intentions, for a short period of time 1990-1996, the Bulgarian economy, and in particular industrial production, literally collapsed. Not only many industrial enterprises, but also entire industries are closed. The level of unemployment has increased sharply, inflationary processes have significantly accelerated, and there is a massive devaluation of the national currency. The economic picture of this period is entirely negative and it is proof that new laws do not always lead to the expected results. In order to protect the national economy, the Currency Board was introduced on July 1, 1997. In connection with this, the official exchange rate of the Bulgarian currency was fixed to the German mark - the most stable currency at that time. For 26 years now, our economy has been functioning under the conditions of this board. This is not a small period of time, allowing to evaluate the result of its introduction. For the most part, the opinions of economists are positive. On the one hand, inflation was stopped, the stability of the Bulgarian currency was ensured, and on the other, conditions were created for strict financial discipline and stability of the banking system, as a counterbalance to the processes of 1994-96. The main result of the substantial change in the economy and its normative regulation is the achievement of economic macrostability at the beginning of 1999. It is she who becomes the primary reason for the start of the processes of preparation and accession of our country to the European Union. These processes are accompanied by the implementation of a number of changes in the normative framework of the economy . През този период са разработени и приети Нова иновационна стратегия и An investment program, the main task of which is to create the necessary conditions for the modernization of the economy by 2001. A certain backlog in the field of privatization has been reported, and for this purpose a new strategy in the field of privatization has been introduced. Pursuant to it, the scope of privatization processes in the energy, transport and services sectors was expanded and the Law on Privatization and Post-Privatization Control was adopted (October 31, 2001). In accordance with its requirements and the commitments made under the 1992 Association Agreement, the Agency for Post-Privatization Control was established. The purpose of these actions is to carry out a significant restructuring of industrial production, liquidate loss-making enterprises and support the newly created private sector. One of the government's main priorities during this period is improving the business climate and stimulating investments.

This necessitates the implementation of significant changes in the current legislation and its harmonization with that of the EU. An entirely new package of tax laws is being developed and adopted - the Corporate Income Tax Law, the VAT Law, the Personal Income Tax Law, the Local Taxes and Fees Law, etc. It is proceeding, albeit timidly, to ease the regulatory regimes as for the purpose at the end of 2000. 63 modes have been cancelled. The new legal regulation, albeit slower than expected, stimulated economic growth, and proof of this is the achieved results - a 6.1% increase in production in 2006. A private industrial sector was created and dynamically developed, which accounts for 31% of the added country value. Throughout the period 2001-2006, the upward pace of industrial production, accompanied by cardinal changes in its sectoral structure, is clearly outlined. With this, the basic requirements assumed by the pre-accession documents have been fulfilled and, quite logically, in 2007, Bulgaria was accepted as a full member of the EU. This act requires the complete compliance and alignment with the new European industrial policy of the normative regulation of the Bulgarian industry. For this purpose, a comprehensive package of documents concerning the industry has been adopted. The main role in it falls to the National Development Program "Bulgaria 2020". It outlines the main priorities and guidelines in the field of industrial production, fully consistent with the strategic European document "Europe:2020". In the parameters outlined in this way, the development of industrial production is regulated with the help of a rather comprehensive and to some extent cumbersome normative regulation covering 111 normative acts - laws, regulations, decrees, etc., out of a total of 276 laws operating in the economy. The new regulatory framework is characterized by a complicated and multi-hierarchical document flow, the presence of too many administrative procedures, a large number of restrictions, etc. With full reason, there is talk of over-administration of the business environment in our country and of the so-called administrative insufficiency. This finding is also supported by the World Bank's research on business conditions in individual countries during this period. According to them, during this period, Bulgarian managers spend significantly more time complying with different types of regulations:

Regulations and taxes	Bulgaria	The region	All countries
Time spent by managers on regulatory compliance (%)	17,37	5,64	7,63
Percentage of companies identifying tax administration as a major obstacle to doing business	23,33	23,19	27,20
Permits and Licenses			
Days required to obtain an operating license	48,16	37,31	30,03
Days required to obtain a building permit	135,99	128,06	64,28
Percentage of companies citing licensing and permitting regimes as the main obstacle to business development	21,26	11,14	14,84

Table 1: Indicators of the business environment
(Source: Deneva, A, Kostov, I. 2021)

According to one of the last such studies - in 2017 - "Doing business in the European Union 2017: Bulgaria, Hungary and Romania" (http://www.doingbusiness.org/reports/subnational-reports/~/media/WBG/DoingBusiness/Documents/Subnational-Reports/DB17-EU-Overview-Bul.pdf.) our country collects 73.51 points from ten main criteria - starting a business, obtaining a construction permit, connecting to the electricity grid, registering property, granting credit,

protecting minority owners, paying tax obligations, foreign trade, fulfilling contracts and declaring bankruptcy (Fig. 1). This gives our country the 39th place among 190 different countries. Unfortunately, the conditions of the business environment in our country are below the average values for the EU, despite the progress found according to the report.

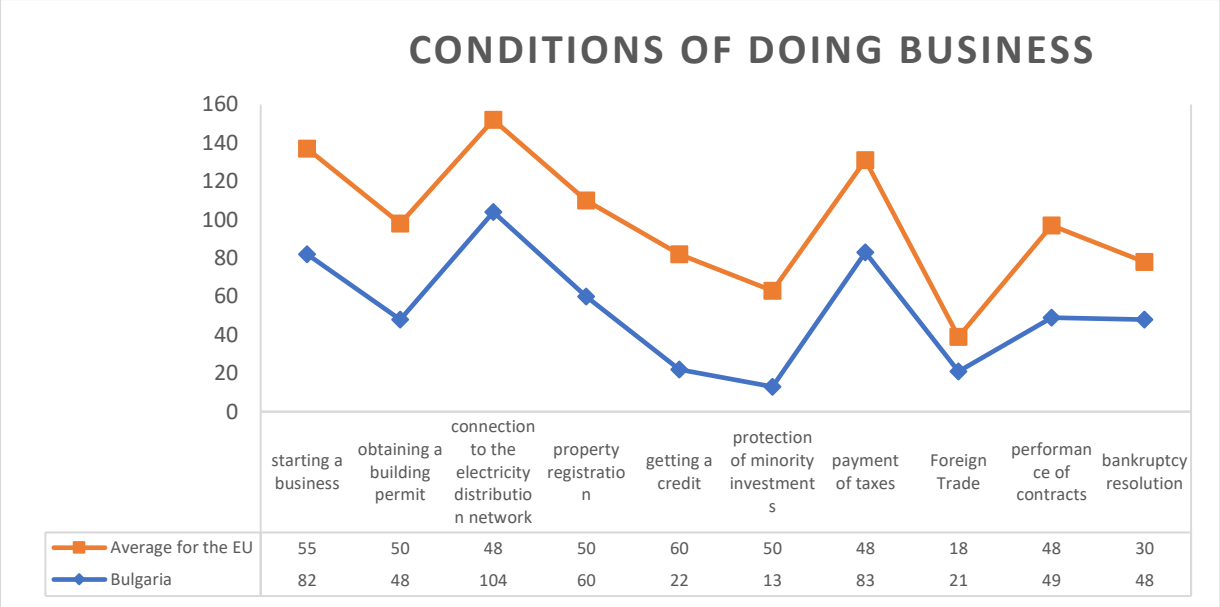

Figure 1: Conditions of doing business (Source:http://www.doingbusiness.org/reports/subnational-reports/~/media/WBG/DoingBusiness/Documents/Subnational-Reports/DB17-EU-Overview-Bul.pdf.)

In order to overcome this negative trend, steps have been taken to reduce administrative obstacles for business by removing and easing administrative regimes . In addition, an assessment of the impact of individual legal acts was introduced, as well as an improvement of the scope and access to information in the various types of registers. Measures are being taken to improve entrepreneurs' awareness of current regulations. Based on a study of some of the regulatory regimes considered to hinder the activity of small and medium-sized enterprises and 120 of the most frequently applied regulations, a special handbook was developed - "Business handbook for SMEs. The main task of the handbook is to reduce the administrative burden on small and medium-sized enterprises and encourage entrepreneurial activity. It covers the four main phases of the business cycle – start-up, business operations, restructuring and winding down. By its nature, it is entirely informative and is intended to assist and clarify the specifics of the normative regulation.

6. CONCLUSION

The construction of the normative regulation of the economy and in particular of the industry is a long and continuous process. It is related to the development and adoption of many different laws, mechanisms and regulations. The Bulgarian economic history is proof that when this regulatory framework is not entirely subordinated to political interests, but is consistent with objective economic laws and their manifestation, it can be a stimulus for the development of industrial production. Moreover, in this case, the regulatory framework also plays the role of a tool for dealing with the economic crises that have arisen. Normative regulation can be an obstacle and a limiter only when it is completely subordinated to the political interests of the ruling majority and is not consistent with the objective processes in the economy.

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DIGITAL TRANSFORMATION: IMPACT OF POSTMODERN SOCIETY ON THE REVENUE STRUCTURE OF THE GLOBAL MUSIC INDUSTRY

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ABSTRACT

The aim of the paper is to analyse the structure and trends of income of the global music industry in the context of the impact of digital transformation and postmodern society on changes in the income structure. The paper analyses the music industry categories, trends and revenue structure, and the overall financial result of the global music industry. Basic research is focused on the analysis of the relationship between income from physical audio carriers in relation to other income categories. The analysis also includes a comparison of revenues from digitized forms of the music industry in order to determine their impact on the total revenues of the industry. The research results point to fundamental changes in the structure of income in the last few years, i.e. income from streaming has become a dominant part of total income. Total revenues fell continuously due to the decline in revenues from physical audio carriers. With the development of streaming platforms and changing habits of listening to music content, trends have been changed and total revenues have been continuously growing in the last eight years. Revenues from streaming and performance rights are continuously growing, which indicates fundamental changes in postmodern societies, i.e. a strong impact of changes in consumer habits on the revenue structure of the music industry.

Keywords: *digital transformation, disruption, music industry, performance right, streaming*

1. INTRODUCTION

The digital transformation of business and the convergence of the media content distribution system has fundamentally changed the revenue structure of all media industries, and it has left the biggest mark on the music industry. The development of technology took place in parallel with changes in consumer habits in postmodern societies (Ryan 2019). The digitization of media content and the development of new playback platforms made it possible to listen to music on the move, which was a turning point for generating income in the music industry. The turn of the century was marked by Napster and widespread piracy that threatened the fundamentals of the global music industry's value chain (Waldfogel 2018). The emergence and development of streaming platforms marked the end of the classic revenue structure of the music industry, which was based on sales in "brick-and-mortar" stores. Revenues from the sale of physical audio carriers continuously decreased, while revenues from the sale of digitized content and copyrights appeared. The development of digitized platforms and the convergence of systems enabled easier distribution and availability of media content (Parker et al. 2016; Moazed, Johnson 2016). Distribution of content on platforms enabled the use of the zero marginal cost effect (Rifkin 2015), which significantly reduced distribution costs and directly influenced the development of streaming technology. Changes in consumer habits, and the development of postmodern society, and especially the habits of Generation Z (Seemiller, Grace 2019), gave an impetus to distribution in the streaming model, but also significantly influenced the growth of income in the Performance right and Synchronization categories.

The paper analyses the trend of the total income of the music industry, the impact of the growth of new forms of income on the total income, as well as the mutual relationship between the income of the new segments of the music industry. The paper also mentions the change in consumer habits in the context of growing nostalgia and returning to old habits of consuming music content.

2. LITERATURE REVIUW

The change of the social and managerial paradigm in the global music industry brought to the center of the analysis the research of the structure of income from different rights realized by the owners of music matrices. Christophers (2020) calls this form of income, which is realized on the basis of ownership rights, "balance sheet capitalism". For him, it is nothing but a new form of "rentierism" that was developed in the earliest stages of capitalism. Ownership of music rights is an intangible asset that enables global music corporations to increase their market influence. On the one hand, ownership ensures the restriction of the right to access music content to interested subjects who are not ready to pay for the consumption of the content, and on the other hand, it enables the commoditization of acquired rights and the development of a monopoly position within the music industry (Durand, Milberg 2020). Ownership of rights, as a form of intellectual property, aims to create an artificial monopoly over these assets in order to enable the creation of monopoly rents or above-average profit margins (Montgomery, Potts 2009). Pagano (2014) calls this form "intellectual monopoly capitalism" where the monopoly is not only based on market power resulting from management skills and abilities, but also on a legal monopoly over musical content that is commodified on the market. This new model of achieving financial gains was announced by Boldrine and Levine (2002) already at the beginning of the century, developing the thesis of intellectual monopoly, which implies the control of the subsequent use of content as the sale of "licensing rights", as opposed to the right to own and sell a musical sound carrier. Downloading and use of digital music content has been discontinued and replaced by streaming technology. Today, social networks are already included in everything, and streaming services have podcasts and other forms of media services that are continuously developing. The use of social networks enables additional forms of interaction between users of music content, which is a special opportunity for advertisers, i.e. for the commoditization of all products and brands related to the music industry (Smith 2019). Although users of streaming services have access to a seemingly inexhaustible resource (musical content on a streaming platform), "the copyright regime is used as a tool to create artificial scarcity" and in this way artificial monopoly rents are built to protect, previously purchased and stored, intangible assets (Meier, Manzerolle 2019). Streaming platforms operate in a market that has the characteristics of a strong oligopolistic industry with very few corporations holding ownership rights. The development of digital platforms for the distribution of music content has caused various claims about the inflexible structure and organizational inertia of global music corporations and overestimation of their real power (Negus 2019). Research into the financial operations of global music streaming platforms did not support claims about the inefficiency and overestimation of the power of global music corporations (Lozić et al. 2022). In Spotify's case, the three major corporations together control about two-thirds of its music catalogue; combined with Merlin – a digital rights agency for independent labels with a membership of around 20,000 independent labels and distributors – the four organizations hold the rights to music that accounts for 87 percent of Spotify's music content (Simon 2019). Streaming platforms such as Spotify and Apple Music have quickly transformed from a niche alternative to a dominant way of music distribution and revenue stream for the music industry (Webster 2019). What streaming platforms deserve the most is precisely the thorough change of the business model, and the abandonment of the organized market of buying and selling physical audio carriers, in favour of selling subscriptions on the platform (Hracks,

Webster 2021). A fundamental relationship within the music industry is the relationship between the artist and his audience. With the development of the digitalized way of producing and distributing musical content, this relationship becomes the fundamental discourse of study (Hagen). In addition, Baym (2019) emphasizes the importance of changing technology, because as technology changes, so does the dialectical dynamic that determines the relationship between artist and audience. Technology reshapes the model of interaction between artists and the audience and continuously puts pressure to change the model of interaction (Baym 2019). Platforms collect data on attendance as well as other user activities, and this data is a very valuable asset (Srnicek 2017), that is, an asset that is easily marketable and is continuously sold to advertisers (Drott 2018). The sale of data on users' musical tastes, as well as other related data, makes up an increasing part of the income of music streaming platforms, and they already cooperate with the largest social networks. The paper analyzes the structure of income in the new value chain of the global music industry, in the context of income from streaming and from dubbing and copyrights, in relation to classic forms of income from Physical. Revenues from synchronization and copyrights, i.e. a new model of revenue generation based on ownership or as we have already mentioned a new form of "balance sheet capitalism" is a new form of revenue generation for the media industry in a post-industrial society.

3. METHODOLOGY AND RESEARCH QUESTIONS

In the research and analysis of the revenue structure of the global music industry, the reports of the IFPI agency, which specializes in the global music industry and annually publishes an official report called "Global music report - State of the industry", were used. In addition to the agency's official report, scientific papers were used that refer to the topic of the global music industry, that is, to the area of business activities related to income from the sale of copyrights. The paper uses methods of financial and statistical analysis in order to determine the fundamental trends and changes in the revenue generation model in the music industry. The research and analysis is directed towards two basic research questions:

1) What is the relationship between the trend of physical revenue and streaming revenue of the music industry?
   What is the share of income from streaming in total income, i.e. what is the amount and what is the trend of income from commoditization of services on platforms (Smith 2019); how efficiently platforms are used with economies of scale (Meier, Manzerolle (2019); how real is the impact of streaming revenue in the context of music content rights realized by the three largest music corporations (Meier, Manzerolle 2019).
2) What is the income trend of performance right and synchronization?
   How much income from dubbing and copyrights affect the business performance of corporations (Negus 2019); how real is the impact of income from streaming and copyrights on intangible rights and intellectual property (Durand, Milberg 2020);
3) What is the share of income from the digital segment in total income?
   Is there room for claims that the sale of rights to music content is a special form of rentierism (Christophers 2020)?

The analysis of the structure, trends and impact of income of individual segments of the music industry on total income should be analysed as connected parts of the whole. The trends and level of income of individual segments are closely related to the changes brought about by postmodern society. In the second research question, research and analysis are focused on determining the impact of the performance right and synchronization categories, but their contribution cannot be separated or analysed separately from the analysis of total income and other income categories. The research results according to the given research questions are published in the Performance analysis chapter, and the final results in the Conclusion chapter.

4. PERFORMANCE ANALYSIS

The research and analysis is divided into four basic parts, that is, the analysis is focused on three research questions and analysis in the ANOVA model in order to determine the relationships between total revenues, on the one hand, and revenues from Physical and Streaming, on the other hand, as the two largest revenues music industry. Table 1 shows the revenues of the music industry by individual segments in the period from 2009 to 2022, which is the selected period in the research. This period was chosen because in 2009, revenues in all segments appeared for the first time.

Table 1: Global music industry revenue by segment ($; bill)

	Physical	Streaming	Digital	Performance right	Synchronisation	Sum
2009	9,6	0,4	3,5	1,2	0,1	14,8
2010	8,2	0,4	3,7	1,3	0,3	13,9
2011	7,5	0,6	4,1	1,3	0,3	13,8
2012	6,9	0,9	4,2	1,4	0,3	13,7
2013	6,1	1,3	4,1	1,6	0,3	13,4
2014	5,4	1,8	3,9	1,8	0,3	13,2
2015	5,2	2,7	3,6	1,8	0,3	13,6
2016	5,0	4,4	3,1	2,1	0,3	14,9
2017	4,7	6,2	2,5	2,2	0,4	16,0
2018	4,2	8,8	1,6	2,5	0,5	17,6
2019	3,9	10,7	1,4	2,4	0,5	18,9
2020	3,8	12,7	1,2	2,2	0,4	20,3
2021	4,4	15,7	1,1	2,3	0,5	24,0
2022	4,6	17,5	0,9	2,5	0,6	26,1

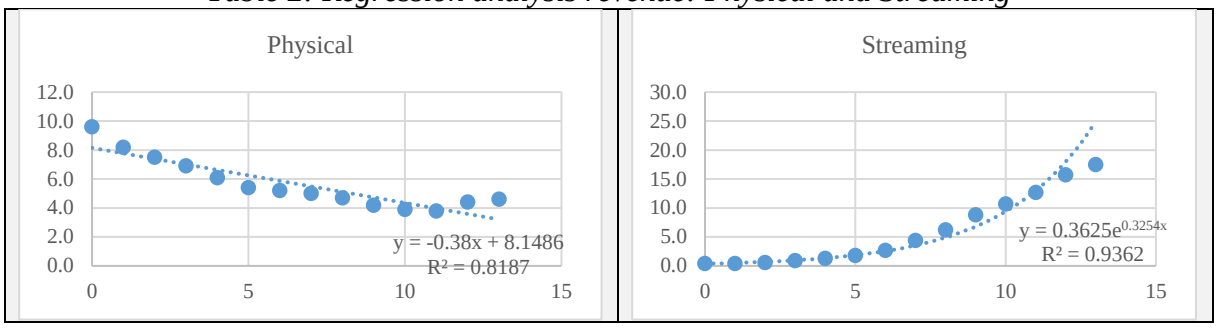
Source: IFPI Global Music Report 2022; Own illustration

The revenues of the music industry, according to the segmentation of the Global Music Report, are divided into five basic categories. All five core categories have continuous trends, unlike total revenue which first declines and then rises. In the selected period of analysis, revenues from Physical fell by 52.1%, compared to revenues from Streaming, which increased by 4725%. The revenue trend of these two categories had the most significant impact on the total revenue of the industry. Revenues in the Digital segment fell by 74.3%, while revenues in the Performance right segment grew by 108.3%. Revenues in the Synchronization segment are relatively small compared to total revenues, so their relative change is negligible.

4.1. Trends of Physical and Streaming segment

The revenues of Physical and Streaming are the two largest revenues of the overall music industry. Before the digitization and convergence of media content production and distribution systems, revenues from Physical were the core income of the music industry. In the analyzed period, revenues from Physical fell at an average annual rate of 5.1% per year (s=0.05067), with a coefficient of determination of 81.9% (R^2=0.8187), interpreted by the linear regression equation y=-0,38x+8,1486. The equation has a negative direction coefficient indicating a continuous decline in income. In the last two analysed periods, the trend has changed and revenues are growing again. The change in the income trend had a significant impact on the interpretation coefficient, which is borderline, but still sufficient for the analysis to be significant (R^2>0.8).

Table 2: Regression analysis revenue: Physical and Streaming



Source: Own illustration

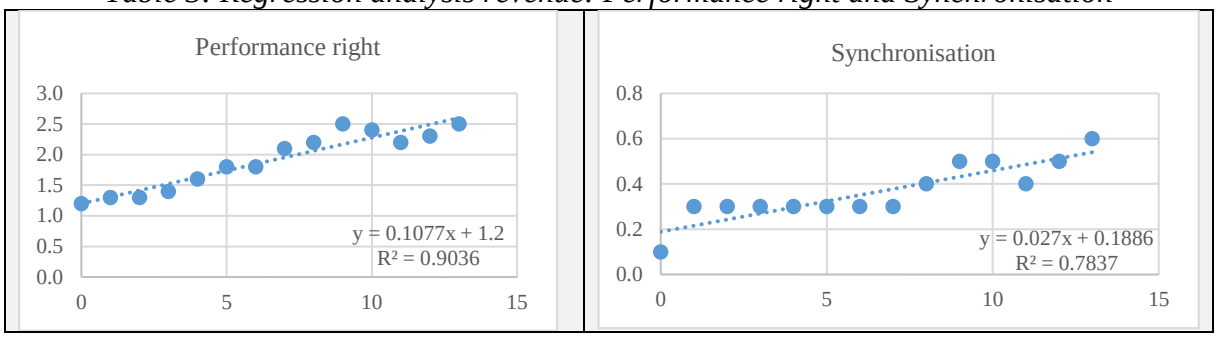
Revenues from Streaming had a completely opposite trend to revenues from Physical, growing at an average annual rate of 38.5% (s=38.45), with a coefficient of determination of 98.3% ($R^2$2=0.9827), interpreted exponentially regression equation y = 0,3625$e^{0,3254x}$. In the last two analysed periods, the inflection points are below the regression curve, which indicates a drop in income below the average rate, that is, a digressive growth in income. On the one hand, revenues from Physical are growing, and on the other hand, revenues from Streaming are growing digressively, which indicates changes in consumer habits.

4.2. Trends of Performance right and Synchronisation segment

The digital transformation of business has enabled new ways of distributing and consuming media content. Global media corporations adapted their operations and changed commoditization models, abandoning the classic linear model of production and distribution of media content (Lozić, Fotova Čiković 2021). In the music industry, this change was manifested by abandoning the ownership model and moving to a subscription model for media content. In 2001, the first revenues were recorded from the sale of copyrights, and eight years later from dubbing. Simon (2019) points out that more than three-quarters of the music industry's revenue is generated by corporations that are not the authors of the music content, but only the owners of the rights to the content. The distribution of content on digital platforms, the convergence of playback systems, the development of streaming technology, as well as the change in habits, laid the foundations for a completely new way of commoditizing ownership and copyright. Revenues from copyrights include revenues from the rights to music content broadcast on radio stations and television, and also include some forms of public performances (Bernstein 2007), at the same time, these revenues also include revenues from cable television, Internet radio stations, broadcasting in retail stores and Fig. (Pitt 2015). Income from copyrights includes payment for performance in private and public or business arrangements (Rutter 2016). Revenue from dubbing is the youngest category in the music industry. They have been recorded since 2009, according to which the period of analysis was chosen. Synchronization is an agreement in the form of a license by which the owner of the rights to the music content allows the user to synchronize the music content into some new media content. Revenue from dubbing refers to revenue generated from the use of music in the film industry. In the USA, music rights owners are not entitled to revenues from dubbing unless the film is shown on television (Bernstein 2007). Synchronization involves the use of background music in combination with moving images that together create media content that is displayed as a film or advertisement (Pitt 2015). The popular blues group Black Keys has licensed more than 300 of its songs for dubbing into various types of media content. A music group called Fun licensed a song called "We are young" in a commercial for Chevrolet Sonic, and the commercial was broadcast during the Super Bowl. Australian rock stars licensed the song "Are you wanna be my girl" in a commercial for Apple and became planetary popular stars (Lester 2020). Kate Bush licensed the song "Running Up That Hill" for the fourth season of the Netflix series Stranger Things,

after which the song experienced a sudden increase in popularity and became her first single to climb to the top of the music charts since 1978 (Smith 2022). The sale of the licensing right for synchronization would be closest to what Christophers (2020) defines as a balance sheet economy, that is, what Boldrine and Levine (2002) call an intellectual monopoly that implies the sale of "licensing rights". The development of the economy of platforms and streaming services has only intensified the situation of asymmetry of rights and information, which enables the creation of monopoly positions for rights owners in relation to other interested entities.

Table 3: Regression analysis revenue: Performance right and Synchronisation



Source: Own illustration

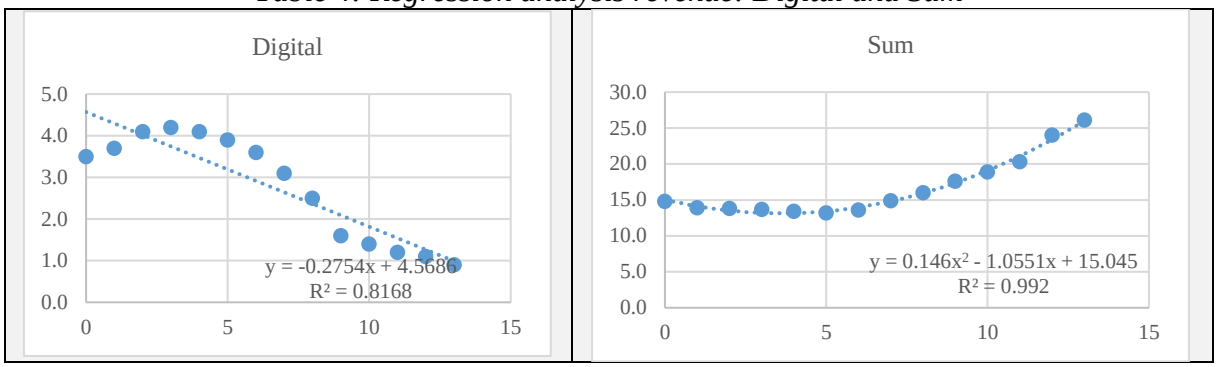
The research results showed the growth of income from Performance right at an average annual rate of 6.7% (s=6.73), with a coefficient of determination of 90.4% (R^2=0.9036), interpreted by the linear regression equation y=0,1077x+1.2. In 2020, revenues fell below the average growth rate, and the inflection points are below the average growth curve in the last three analysed periods. The drop in income coincides with the beginning of the development of the global Covid-19 pandemic, which proves that even the music industry, that is, certain segments of the music industry, were not resistant to the effects of the pandemic. Revenues in the Synchronisation segment grew at an average annual rate of 9%, with a coefficient of determination of 78.4% (R^2=0.7838), interpreted by the linear regression equation y=0.027x+0.1886. The coefficient of determination is not sufficient for the interpretability to be significant (R2=0.8), and in addition, revenues are less than 2% of total revenues.

4.3. Trends of Digital and Sum segment

The analysis of the share of the revenue trend from the Digital segment in total revenues is based on the third research question. In the context of the digital transformation of the industry, the analysis of revenues in the Digital segment points to the differences between digitization and digital transformation. Digitization of production enabled technological progress in the context of media content distribution, and digital transformation influenced the entire paradigm shift of media content production and distribution (Lozić 2019). Digitization, that is, the sale of digitized content in the pipeline model is not a digital transformation of business in the context of the transformation of business activities, as it is in the Performance right and Synchronization segments.

Table following on the next page

Table 4: Regression analysis revenue: Digital and Sum



Source: Own illustration

Revenues in the Digital segment grew until 2013, after which they continuously declined. The revenue trend in the Digital segment was interpreted with the regression equation y=-0.2754x+4.5686. The coefficient of the direction of the equation is negative, which indicates a continuous decline in income. The total income of the music industry decreases until 2014 and continues to grow thereafter. The income trend was interpreted with the regression equation y= 0.146x2-1.0551x+15.045. The share of revenue from the Digital segment was the highest in 2012, after which it continuously decreased. In the last analysed period, it amounted to 3.4% of the total income. The share in total revenues is higher by only 1.4 percentage points than Synchronisation's share in total revenues. The sale of individual media content, individual media numbers or ringtone content for smartphones cannot be interpreted as a digital transformation of business because it is a classic pipeline business model.

4.4. Anova

By analysing the revenue of the music industry segments, the Psychical and Streaming segments were determined as segments that significantly influence the trend of the total revenue of the music industry. In the ANOVA analysis model, revenues in these two segments were selected as independent variables that act on total revenues as a dependent variable. The results of the analysis indicate a strong connection between independent and dependent variables Multiple R = 0.99719, compared to Adjusted R Square 0.993373 (strings of less than 30 frequencies). The results of Regression Statistics indicate the significance of the analysis.

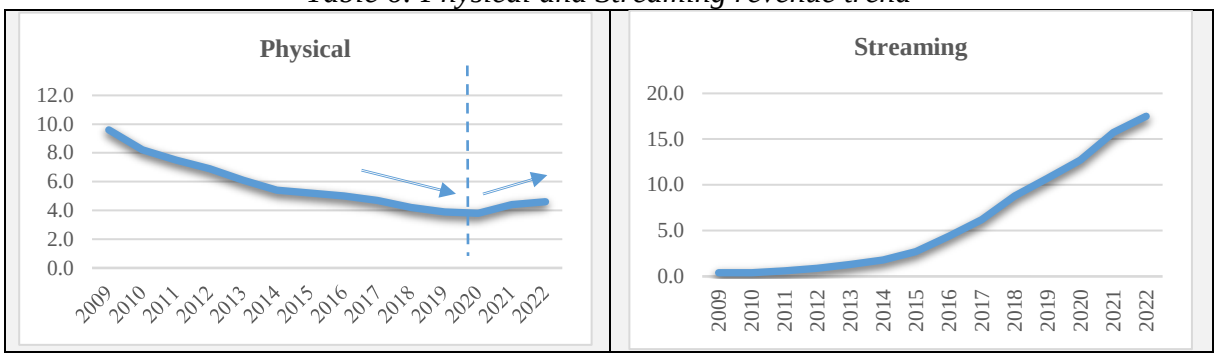
Table 5: ANOVA analysis

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0,997192486							
R Square	0,994392854							
Adjusted R Square	0,993373373							
Standard Error	0,339104178							
Observations	14							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	2	224,3236634	112,1618	975,3912	4,15031E-13			
Residual	11	1,264908077	0,114992					
Total	13	225,5885714						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	7,049723537	0,559532128	12,59932	7,04E-08	5,818201627	8,2812454	5,81820163	8,281245447
Physical	0,813042168	0,078231663	10,39275	5,02E-07	0,640855438	0,9852289	0,64085544	0,985228898
Streaming	0,842651821	0,022802765	36,95393	6,87E-13	0,792463274	0,8928404	0,79246327	0,892840367

Source: Own illustration

The results of the analysis in the ANOVA model proved a strong influence of the independent variables on the dependent variable, that is, the parameter Significance F proves that at least one of the selected independent variables significantly affects the trend of the dependent variable. The significance of the dependent variables, expressed as P-values, prove the strong influence of both independent variables on total revenues. The value of the independent variables is less than 0.05 at the significance level of 95%, which proves the strong connection and influence of the independent variables on the dependent variable, i.e. total income. The results of the analysis are shown in table 5.

Table 6: Physical and Streaming revenue trend



Source: Own illustration

The strong influence of postmodern society is recognized in the income trend of the independent variables. Revenues in the Physical segment were declining until 2020, and after that they are increasing again. Revenues from Streaming, in the first analysed periods, grow slightly until 2014, which is the "tipping point", after which they switch to exponential growth. The trend in the Physical segment points to post-modern societies and "mixes of styles". At some point, the generations who grew up in the "subscription culture" are exploring other forms of content consumption, and are returning to the habits of the older generation. The streaming revenue trend is a classic example of growth in the platform economy model. First, it is necessary to build a community (Shields 2021), create a network effect (Parker et al. 2016), and then exponential growth follows. Both trends are classic paradigms of postmodern societies.

5. CONCLUSION

The music industry went through a process of digital transformation and the technological model of content production and distribution was completely changed, which had a significant impact on the creation of completely new income categories. The classical music industry, as a part of the old media industries, generated income only in the model of selling physical carriers in "brick-and-mortar" stores. The contemporary music industry and postmodern society create income in many different forms, of which streaming income is the largest part of income. Subscription to streaming and listening to music on the go and "everywhere" are the fundamental characteristics of Generation Z. In the research and analysis, five fundamental conclusions emerged:

- Revenues from Physical change the trend in the last two analysed periods
- Revenues from streaming are growing digressively
- During the pandemic, income from Performance right fell
- In 2020, revenues from Synchronization fell
- Revenues in the Digital category are continuously declining, which proves the claim that the music industry has gone through a thorough digital transformation.

In the context of the first research question, the research results proved a strong dominance of Streaming revenues over Physical revenues. Revenues from Physical are continuously decreasing, in contrast to revenues from Streaming which are continuously growing. Revenues from Physical are growing in the last two analysed periods, which indicates a change in habits. A part of users returns to the "old" sound. For the next research, it will be interesting to analyse the trend of revenues from Physical, in the context of the slowdown in the growth of revenues from Streaming. In addition, the question of how much Psychical's income was affected by the Covid-19 pandemic, and how much by postmodernism and the mixing of lifestyles, remains an open question for new research. In the context of the second research question, research has proven the continuous growth of income from Performance right, but this income is still lower than the income in the Physical category. Revenues in the Synchronization category grow very slowly and are less than 2% of total revenues. On the one hand, revenues from Streaming and Performance rights justify the claim of "breakeven economy", while revenues from Digital and Synchronization do not have a significant impact on total revenues. This example also proves the impact of postmodern society on the income structure, i.e. the impact of a "mix of styles" on overall business performance. In the context of the third research question, the very small importance of revenues in the Digital category to total revenues has already been mentioned. In addition, revenues in the Digital category are continuously declining, and users have changed their habits related to the monetization of services. Digital transformation has enabled Streaming technology and new models of music content consumption. Total revenues continued to grow, as a result of the growth of streaming revenues.

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THEORETICAL AND APPLIED ASPECTS OF MONITORING AND INSPECTION IN PUBLIC SYSTEMS

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ABSTRACT

In recent years, more and more control forms have been successfully applied in practice. The modern view of the forms of control is that they are grouped into two groups - basic and specific. [1]Preliminary, current and subsequent are part of the first group. Monitoring, inspection, verification, audit, revision and diagnostics are assigned to the second group. The purpose of the publication is to analyze and present the nature, specificity and elements of monitoring and inspection as essential tools that influence decisions in public systems. From the standpoint of control science, monitoring and inspection are specific forms of control and, at the same time, instruments of influence through which the established results show the objective state, satisfaction and deviations in the systems.

Keywords: *signals, complaints, assignment, inspection, financial inspector, State Financial Inspection*

1. THEORETICAL AND APPLIED ASPECTS OF MONITORING

Monitoring is continuous monitoring in compliance with certain parameters. Through a system of observations, the dynamics of processes and phenomena are tracked, the application of this form allows to examine a large volume of information, therefore it can be applied to several objects at the same time. It is also applicable to the investment process and provides information for analysis. In this way, the continuity of the control impact and the possibility of flexible response are guaranteed. In economics, it is also seen as continuous control over the main economic indicators that characterize the enterprise's activity. It can be used by both managers and teams tasked with controlling the overall flow of the production processes. The observation in this direction shows that monitoring is also considered as a method of operational control. Based on what has been stated so far, it can be summarized that monitoring is considered dually, both as a form of control and as a method that is carried out: in a specific activity; in a project; in the overall work; in the performance of a given unit, organization or business; in the work of a separate team or individual members. This granularity helps in investigating a given problem by tracking the state and development of a particular system. My opinion is that in this way it is also established which practice is successful and the existing problems are taken into account in a timely manner. My opinion is that monitoring collects, processes, archives and uses a database consisting of information about every activity carried out. It characterizes its type, participants, target group, place, result and others. This database can be used by different users according to the specific needs of a given information.[2] Monitoring elements can be defined as follows: (see figure 1).[3]

[1] See Tsvetkova, N., Krumov, K., Kostova, S. and others, Theory of control, textbook for distance learning, Master's program Financial Control and External Audit. 2017. Svishtov: Academic Publishing Tsenov., p.151.

[2] See Art. 10, the Law on Financial Management and Control, The State Gazette of R. Bulgaria no. 21, 2006, last amendment no. 13, 2019

[3]In scientific literature, individual authors analyze four starting positions regarding monitoring. See Tomov, Y. Theory of control and audit. Svishtov: Academic Publishing Tsenov, p. 220. My proposal is that monitoring can be considered on the basis of the mentioned three elements, which are also illustrated in the corresponding figure.

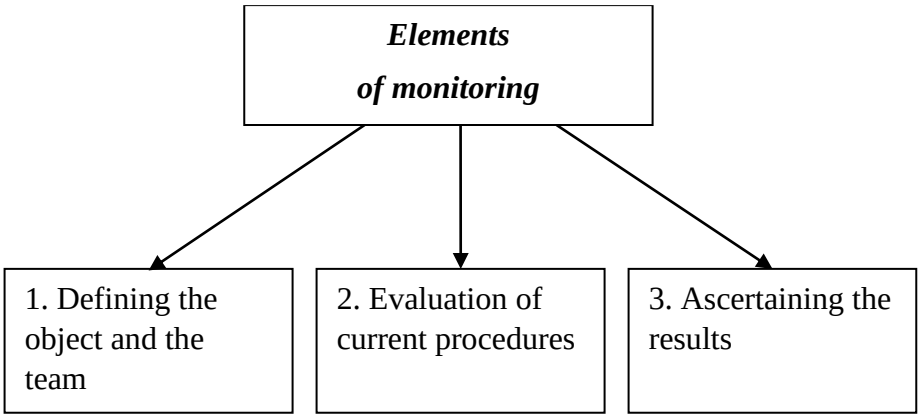

Figure 1: Elements of monitoring

Based on the information from the figure, it is clear that it is an organization of three consecutive elements, in which the chronology of their application should not be disturbed, such as defining the object and the team, evaluating the operating procedures and ascertaining the results, since it would nullify the effect of monitoring. A distinction needs to be made regarding the definition. It refers to the object and the team. The object is determined by the authority that requires monitoring. Along with this, there is a need to collect information about the development of phenomena and processes and their periodic verification. In relation with the team, it should be noted that its determination largely depends on the type of object. In practice, the monitoring activity to be investigated is specific and this implies a careful selection of the team. Its members can be - specialists, analysts, controllers and representatives of counterparties and clients. When evaluating the current procedures, it is taken into account that the state of the system or object is evaluated and analyzed and how this affects the implementation and achievement of the goals. Evaluation is very much a part of monitoring, but it is often separated from it in order to focus solely on results – their collection and processing of data on the success of an activity, project, program and logistics activity. This is fruitful as it gives an insight into the overall performance of the work and the objective data formed. The application of the assessment in the monitoring can be implemented in the presence of certain requirements or criteria. The same are set even when the monitoring tasks are defined. And the evaluation itself is realized by the experienced specialists and controllers through a comprehensive analysis of the controllable parameters, which are subject to continuous monitoring. The results are obtained after applying and complying with the previous two elements. It is natural to indicate after the assessment what was found during the monitoring of the site, the project, the system or the logistics activity. They are truthful when the team and its members conducted it in good faith, objectively, in a timely manner and did not "model" the results so that they are in the interest of the body that requires the monitoring. Depending on the findings made during the control activity, two approaches are possible:[4]

- *Giving recommendations* - this is the procedure when positive monitoring results are found and there are no deviations from the prescriptions. They are provided in writing and aim to continue the development of the site in accordance with the norms of behavior, standards and good practices. [5]

[4]The approaches were developed by the author, PhD. Nadezhda Tsvetkova.
[5] See Tsvetkova, N., Krumov, K., Kostova, S. and others, Evaluation of the control activity, textbook for distance learning, Master's program Financial Control and External Audit. 2012, Svishtov: Academic Publishing Tsenov, p.115.

- *Preparation of a corrective program* [6]- this is done when what is established does not correspond to the required norm of behavior. Therefore, there are *deviations* from the correct and effective development of the object, system, project or activity.

In the program, it is appropriate to specify the individual steps that the management must consistently and strictly observe. The goal is to appropriately correct the disturbed balance. A deadline is indicated within which the program should be implemented and deviations removed.

2. THEORETICAL AND APPLIED ASPECTS OF INSPECTION

Financial control in Bulgaria is implemented by state control bodies. They are called financial inspectors and carry out financial inspections. Their activity is not observed dependence by the management bodies of the inspected object. Inspection is an independent control activity that covers both current and past activity of the site. It is aimed at detecting and sanctioning the revealed violations and damages in the inspected systems. Financial inspectors work towards strengthening trust and disclosure, that is why during their control activity they are guided by the following principles:

- ***Legality*** – the overall activity is based on strict application of the laws. This principle is enshrined in the basic law of the country - the Constitution of the Republic of Bulgaria.[7] The implementation of the activity in the monitored objects must be done by observing the principle of legality in each of its spheres. It is equally important to keep correct records, to comply with the requirements of the Law on Accounting and Accounting Standards, to organize all production, commercial and other activities based on the requirements of normative acts and regulations. As regards commercial companies with the participation of the state or the municipalities, it is necessary to comply with the requirements of the appropriate Commercial Law for them. Analogous are the requirements for organizing information activities, maintaining correct relations with the competent bodies of the judiciary, introducing sound financial discipline, etc. Applying the principles of legality is an irrevocable obligation for every manager.
- ***Objectivity*** - this principle is determined by the presence of several prerequisites: [8]the accuracy of the data; accurate ascertainment; the presence of a causal relationship between the phenomena; the validity of the findings; the impartial behavior of the examiners towards the examinees. It is through the observance of the principles that true and honest reporting and documentation is achieved, which is an essential condition in the control activity. In this way, errors and violations are also prevented.
- ***The official start*** – it is the basis of the implementation of any activity. The inspector is obliged, within the scope of their powers, to take ex officio the relevant measures, as intended by the legislator. When performing his official duties, he should also be guided by the legal provisions that form his specific appearance as an examiner.

The principle of confidentiality presupposes not to publicize issues affecting the inspection being carried out, as well as information that has become known to the control authorities in the exercise of their activities. What has been ascertained in an official way should not be publicized, made public and provided to different persons and bodies in order not to hinder objectivity.

[6]The verifying authorities are also the authorities that should prepare the corrective programs. This is also a fundamental right of the control bodies in the system of inspection and control. See Art. 11, Law on the Public Financial Inspection, SG No. 33, 2006, last amendment, no. 85, 2017

[7] See Tsankov, P., Georgieva, Ts. Financial control - organization of the internal audit and the Public Financial Inspection. 2006, Sofia: Romina p. 75.

[8] See the provisions of Art. 3, Law on the Public Financial Inspection.

The preservation of company secrecy is extremely important, because the financial inspection authorities have unlimited opportunities to obtain important information about the objects according to various criteria. Confidentiality becomes especially important in the conditions of extremely rapid development of economic intelligence. [9]Sometimes it is necessary to obtain very little information in terms of volume and content in order to solve the "rebus" of the company secret. That is why this principle has been elevated to a basic one, and everyone working in the system of the state financial inspection must observe it without question. Good faith is a principle requiring financial inspectors to observe certain norms and etiquette of conduct. This includes benevolence, ethics, courtesy and responsiveness. They must be demanding and, at the same time, correct in their relations with the officials and management bodies of the site. In their work, it would be effective if they were guided by the objective principle when reflecting the facts, circumstances and the disclosure of the committed violations in the inspected objects. Planning is an important principle that regulates the implementation of the control activity through advance planning. Planning is carried out by types of objects, by period and by other specific criteria. It is in this way that the time for each inspection is appropriately and correctly allocated. The PFI Law [10]specifies the periodicity for carrying out inspections under para. 2 and the specific public procurement contractors subject to control for the relevant year. They are determined by analyzing information on the activity of awarding and executing public contracts and assessing the risk factors, according to the administrative capacity of the Agency. The principle of discoverability can be characterized as the disclosure of caused damages aimed at the property and interests of the public systems in which an inspection is conducted. Disclosure is realized by the control authorities, performing numerous checks for the correctness of the entries of the accounting data in the documents. My opinion is that with specific actions based on timely accounting, fact checks, inventories performed and internal controls implemented, violations will be minimized. In the opposite case - the so-called deviations are detected and at a later stage of time the officials who are part of these public systems are brought under property or other type of responsibility. Financial inspection is successfully implemented in practice by control bodies that have the power to dispose, and hence to control comprehensively and consistently public systems. They exercise state and financial control and inspect independently of the will of the inspected persons, organizations, companies and systems. The financial inspector checks the already completed activity of public systems, namely these are the objects that are subject to control. In a number of cases, it is aimed at the violations, damages and harms that can be revealed after the reports and complaints have been submitted to the competent authorities. The inspector is a civil servant and is legally authorized to counteract and thus protect the public financial interests according to art. 2, para. 1 of the Law of Public Financial Inspection. The application of the inspection in the so-called public systems / objects of control / is implemented by issuing an order. It is in a certain standard form, is issued by the director of the Agency and is not subject to appeal. Without it, it is impossible to start and run any inspection. [11] When the financial inspection is assigned to a team, the leader of the team is also defined in the order. Therefore, the legal details of the order are also important:

- basis for commissioning a financial inspection;
- name and headquarters of the inspected organization or person under Art. 4 of the Inspection Act of the Public Financial Inspection Agency /PFIA;
- the names and position of the financial inspector;

[9] See Tsankov, P., Georgieva, Ts. Financial control - organization of the internal audit and the Public Financial Inspection. 2006, Sofia: Romina, p. 75.
[10] See the provisions of art. 5, paragraph 2 and paragraph 4, Law on the Public Financial Inspection.
[11] See in detail the provisions of Art. 2, Instruction on the form, order, terms and movement of documents and acts drawn up during a financial inspection by the bodies of the Public Financial Inspection Agency, 12.04, 2021 / internal Act of the Control Institution/.

- specific tasks of the financial inspection;
- deadline for carrying out the inspection with specified start and end date;
- the designated working days for carrying out the inspection;
- an official who will carry out ongoing control.

It has already become clear that the financial inspection, in order to be legal, is assigned on the basis of an order expressly issued by the director of the Agency or officials authorized by them. In an occupational aspect, the order must be permitted by the heads of the department of the "Inspection Activity" Directorate (IA) in 2 copies: one for the Agency's records and one for the inspection file. [12] The copy for the records of the registry is agreed with the director of the Directorate "Inspection Activity". Once the order is in place, the control authorities /financial inspectors/ should check the object subject to inspection. In order to gain unrestricted access to it, to its premises, to its departments, to its officials and its accounting records, it is mandatory to legitimize itself in a legal way. They present their service card and show the inspection order. In this way, the possibilities for other persons to present themselves as control authorities in these systems are cut off.

Research part: The research was done in practice on the basis of objective documents and policies with which the control institution - Public Financial Inspection at the Ministry of Finance[13]

Criteria for conducting the survey during the inspection are: the regulatory framework in the field of inspection; reported and completed inspections; good practices; seeking property liability; seeking administrative responsibility; unexamined files and those without a court decision. In the course of the practical research, studies were made of the following documents:

1) Law of the Public Financial Inspection.
2) Regulations for the implementation of the Law on the Public Financial Inspection.
3) Organizational rules of the PFI Agency.
4) Instruction on the form, order, deadlines and movement of documents and acts drawn up in accordance with Art. 5, para. 1, items 1-6 of the Law of the Public Financial Inspection.
5) Instruction about providing access to public information.
6) Instruction on the organizational procedures for the assignment of the employees of the Public Financial Inspection Agency.
7) Internal rules for determining the criteria on the basis of which the report from the financial inspection should be sent to the authorities of the Prosecutor's Office on the basis of Art. 19 of the PFIA.
8) Internal rules for the implementation of preliminary control for legality in the Public Financial Inspection Agency;
9) With a strategy for the development of the PFI Agency for 2022 - 2024.
10) Operational plans for the development of the institution for 2022 - 2023

[12] The information is listed in the instructions and rules for considering complaints, signals and others, which are mandatory for application by financial inspectors. See instruction on the form, order, terms and movement of documents and acts drawn up during financial inspections by the bodies of the PFI Agency, Public Financial Inspection Agency, 2021; Rules for consideration of applications, complaints and reports received by the PFI Agency, State Financial Inspection Agency, 2020. /Internal methodological documents of the Public Financial Inspection Agency/.

[13] The study was carried out by Chief Assistant. PhD. Nadezhda Tsvetkova during the creation of a discipline in the master's program "Financial control and external audit" and its development for masters in regular and distance learning. The discipline is established in master's and distance learning, it is already studyable and is called "Financial Inspection". Documents and policies from the inspection system in Bulgaria have been provided based on the consent of the director of the institution and its internal rules for such information, the period of the required information covers 2022. In this publication, the first two criteria, from this study, are analyzed *due* to the fact, that it is not possible to exhaust all criteria within this scientific publication.

11) Annual goals of the administration of the PFIA for the 2022/2023 period.
12) Cooperation agreements with other control institutions and bodies in Bulgaria.

When analyzing the information collected so far, four essentials, that are, important parts of the legal framework, rules and instructions that can be distinguished are the following: first part – overall; second part – the specific part; third part – policies and rules for assistance; fourth part – sanctioning legal norms for correction. The conclusion that can be drawn is that they all describe the conduct of a statutory financial inspection in the Republic of Bulgaria in an extremely consistent and methodical manner. It is considered as a mandatory institutional framework and at the same time, it is necessary as a normative regulation and procedures. Any deviation from these policies and documents is a prerequisite for irregularities, errors and the presence of improper control practices. The received signals and requests for the assignment of financial inspections and their distribution by objects is illustrated in the following figure. See fig. 2.

Figure 1
Structure of inspections for 2022

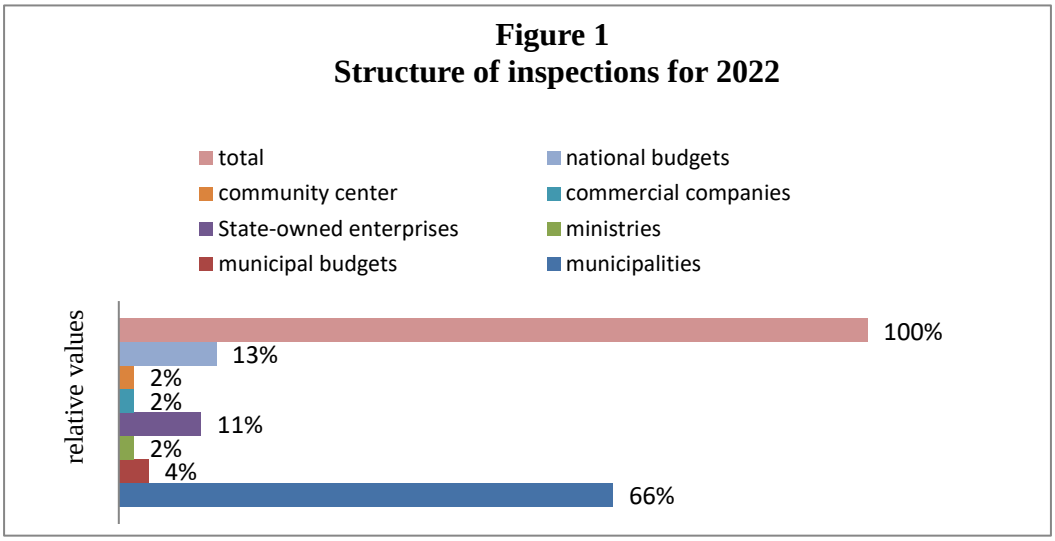

Figure 2: Structure of inspections for 2022
(Source: Annual report of the Public Financial Inspection Agency for 2022.)

It is noteworthy that the inspections carried out with the highest relative share are in objects such as municipalities - 66%. The goal is to cover all the activities of these municipalities and from there to identify the essential problems and risks in them. In the next place are objects such as commercial companies - 13% and 11% is the distribution in a structural aspect in the state, public enterprises, where the documentary and factual control is strengthened. In the inspection activity, it is also reported which authorities have requested the inspections to be carried out for 2022. This can be ascertained from the information in figure 3. See fig. 3.

Figure following on the next page

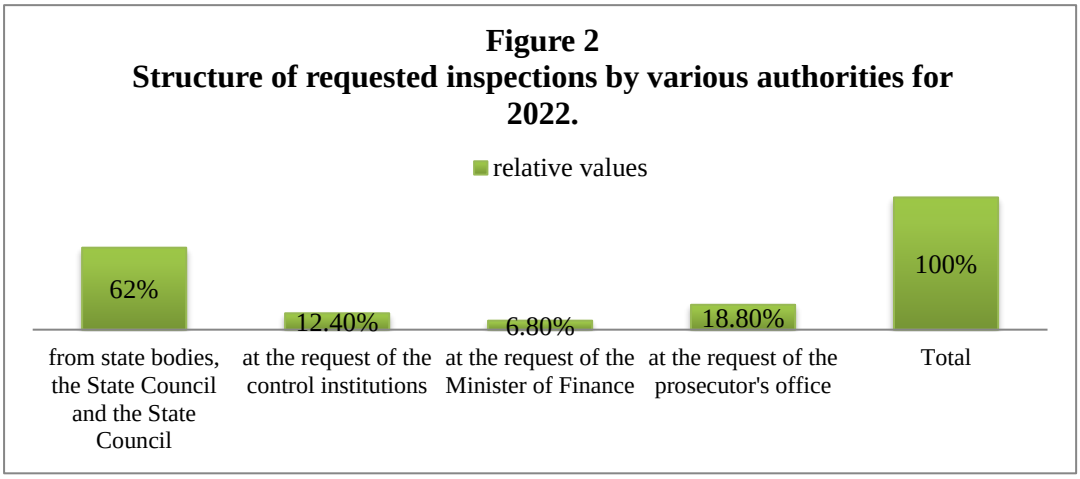

Figure 3: Structure of requested inspections by various authorities for 2022.
(Source: Annual report of the Public Financial Inspection Agency for 2022.)

It can be seen from the numerical data that the highest proportion of inspections /62%/ in which violations of the budgetary, financial-economic and reporting activities, and of the activity of awarding and executing public contracts in the object's characteristic of financial inspection, which are submitted by state authorities. This is indicative that there is still no good financial order, strict financial discipline in the studied systems, and hence - these violations worsen the state of the systems. The share of inspections commissioned by the Minister of Finance for which there are reports of irregularities, damages and violations is the lowest, which is only 6.8%. In the end, there are also rejected inspections, based on the recommendations of the Standing Committee and the Agency's lawyers, as they fall within the scope of other competent authorities, even though they were addressed to the Agency for PFI. At the end of the inspection activity, it is also important how many of these acts of the control authorities have been reviewed by the court. Confirmed and proven acts before the court are less than 10%, there are also revoked acts, which are 3%. The worrying trend is that almost 90% have remained unexamined and unspoken. This is indicative of the clumsiness of the judicial institution in our country. See figure 4.

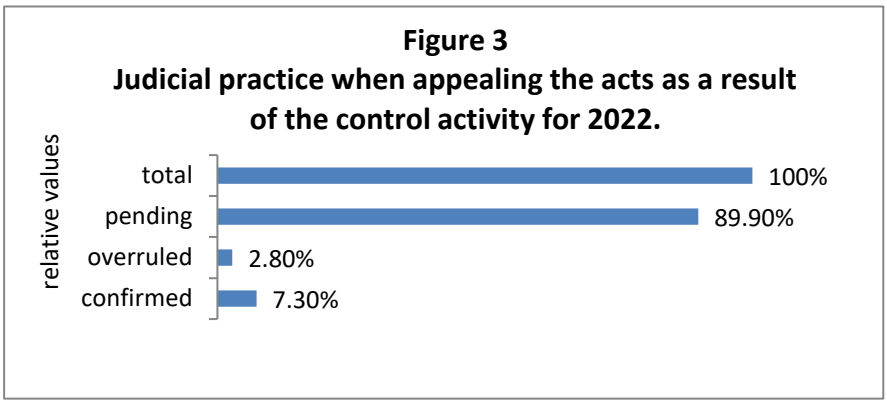

Figure 4: Judicial practice when appealing the acts as a result of the control activity for 2022.
(Source: Annual Report of the Public Financial Inspection Agency for 2022.)

3. CONCLUSION

It can be stated that monitoring has its place in control practice, but not as an independent form or activity, as it allows specific research in a short period of time, after this period significant changes have already occurred in public systems.

The inspection allows, through its application, to obtain a detailed report, rather than a snapshot, of the verified facts and, based on these detailed inspections, to draw up acts and reports from the control authorities, which have probative value before judicial authorities in our country and are grounds for seeking specific responsibility. Public systems are not isolated systems and yet fall within the scope of inspection and oversight. The aim is to show the governing bodies the objective picture, where are its deviations and what is the right way to put them in a state of equilibrium through recommendations, opinions, corrective programs and, in last resort, by drawing up acts in case of significant problems found in these systems.

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THE PERCEPTION OF BUSINESS ENVIRONMENT – CASE STUDY OF LIKA-SENJ COUNTY

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ABSTRACT

The main objective of this article is to investigate the perception of the environment in Lika-Senj County for the future development of entrepreneurship and to determine whether there is a significant difference in perception according to selected distinguishing characteristics: form of business, location of business and years in business. The importance of the chosen topic stems primarily from the role and impact that entrepreneurial activities have on the well-being of society, both economically and socially. The study poses two research questions: how is the environment perceived by the small and medium entrepreneurs interviewed, i.e. the financial environment in relation to entrepreneurship, specific government policies, priorities and support, government programs, R&D level and transfer, access to professional and commercial infrastructure and physical infrastructure. The study formulated three hypotheses to determine how the selected distinguishing characteristics influence perceptions of the environment. The results show that there is no statistically significant difference in the perception of all aspects of the environment in terms of years of operation, that there is a statistically significant difference in the perception of physical infrastructure, access to professional and commercial infrastructure in relation to both the form and location of business, and that there are significant differences in the perception of government programs in terms of location of operation.The study concludes that entrepreneurs in Lika-Senj County are dissatisfied with: specific government policies, government programs, R&D level and transfer, partially satisfied with access to professional and commercial infrastructure, and satisfied with the financial environment related to entrepreneurship and physical infrastructure.

Keywords: *entrepreneurship, entrepreneurial environment, Lika-Senj County*

1. INTRODUCTION

Entrepreneurship is very important, not only for the entrepreneurs themselves, but also for the economy of a country in general. The entrepreneurship is one of the fields with the most rapid evolution in economy, management, finance and even in legislation. legislation (Baron and Henry, 2010). Entrepreneurship is a promising business avenue that individuals, groups and governments can explore and adopt for economic progress. (Karani, Meshenga, 2021) Entrepreneurship can be named as one of the most important process fostering the economic growth of countries. Entrepreneurship is fundamentally associated with positive economic development (Acs et al., 2018; Toma et al., 2014), especially entrepreneurial capital (Audretsch, 2004; Urbano & Aparicio, 2016). In the literature that examines entrepreneurship and entrepreneurial activity numerous approaches can be noticed with different perspectives and different determinants.

Beginning from the early stages of entrepreneurship examination until the entrepreneurship perspectives in 21st Century. One of the most important objectives of any economy that wants to create incentives for the growth of its economy is undoubtedly to encourage entrepreneurial intentions and to stimulate a growing number of individuals to start businesses. Entrepreneurship helps strengthen innovation and competitiveness in any country and facilitates the creation of new jobs and new opportunities, especially for young people. Not all owner-managers decide to start a new business for the same reasons (Dunkelberg et al., 2013). Starting a business occurs after recognising an opportunity and making the intention to be entrepreneurial. Entrepreneurial opportunities are perceived differently by individuals depending on their individual circumstances. Since individuals face high levels of uncertainty and various challenges in exploiting entrepreneurial opportunities when starting a business, their access to organisational resources and capabilities enhances their ability to overcome these challenges and increases the attractiveness of starting a new venture (Choi et al., 2008). If the socioeconomic environment and the level of development of the entrepreneurial infrastructure in the environment from which the individual comes and which has shaped his or her behaviour have a stimulating effect on entrepreneurial intentions, it is more likely that the entrepreneurial intentions will later result in an entrepreneurial venture (Vasiljevna Yaluner et al., 2019; Gronhoj and Thogersen 2017). Without a well-designed environment in which the components are aligned and mutually supportive, an increase in the number of entrepreneurs cannot be expected. It can be achieved by creating a stimulating environment for all the actors that make up the entrepreneurial ecosystem (Thomas & Kelley, 2011), which will consequently lead to the creation of more entrepreneurs. Statistical data on entrepreneurship in Europe (observed through self-employment) show that only 37% of Europeans choose self-employment, while in the U.S. it is an option for more than 50% of adults. (Has and Oberman Peterka, 2021). Part of the reason lies in the existing entrepreneurial environment, which do not encourage the development of an entrepreneurial culture and do not contribute to the development of entrepreneurship. Some authors (Oleynik, 2002) claim that long-term and stable economic growth is the function of encouraging institutional and environmental conditions which will have a stimulating effect on the creation of new entrepreneurs. The low level of entrepreneurial activity in Lika-Senj County is accompanied by the lowest level of opportunity perception in this region, 8.4%. (GEM research, 2021). The state must directly achieve an increase in the number of entrepreneurs and entrepreneurial activities in underdeveloped areas such as Lika through an active economic policy if it wants to reduce the unequal development of regions. To reduce inequality, it is necessary to develop regionally profiled support, which is especially true for the services provided by the supporting institutions, such as counselling, educational programmes, mentoring programmes, and the like (Singer et al., 2018). There is a need to encourage entrepreneurs from developed areas to implement their entrepreneurial ventures in less developed areas, either through tax deductions or other incentives, to reduce the growth of development inequality. Infrastructure development, from transportation to entrepreneurship, needs to make less developed areas more attractive to investment by already established entrepreneurs, both domestic and foreign. (Požega, Ribić, 2022)

2. METHODOLOGY

Lika-Senj County lags behind the achieved economic and social level of development of other parts of the Republic of Croatia. Due to the above, and the fact that entrepreneurship is a generator of economic growth and development, the views of entrepreneurs on the business environment are very important so the main objective of this article is to investigate the perception of the environment in Lika-Senj County for the future development of entrepreneurship and to determine whether there is a significant difference in perception

according to selected distinguishing characteristics: form of business, location of business and years in business. The following research questions and hypotheses are formulated:
Research questions:

- How is the environment perceived by the small and medium entrepreneurs interviewed, i.e. the financial environment in relation to entrepreneurship, specific government policies, priorities and support, government programs, R&D level and transfer, access to professional and commercial infrastructure and physical infrastructure?
- How do the selected distinctive features of the enterprises influence their perception of environment?

Hypotheses:

- H1: There is a relationship between the perception of the business environment and the legal form of the company.
- H2: There is a relationship between the perception of the business environment and the location of the company.
- H3: There is a relationship between the perception of the business environment and years in business.

For the purposes of the project Start-up Nation: Croatian Thematic Network for the Development of Entrepreneurship and Self-Employment, funded by the European Social Fund, Operational Program Effective Human Resources 2014-2020, a survey was conducted among entrepreneurs in Lika-Senj County, with the primary objective of promoting the creation of high-quality intersectoral cooperation for the development of dialogue through the establishment of the Thematic Network "Croatia - Start-up Nation" for balanced socio-economic development of the Croatian economy. The research systematised the primary data collected by interviewing 104 entrepreneurs from Lika-Senj County. A database was also created to obtain results on the perceptions of the entrepreneurial environment among entrepreneurs and to identify the barriers to starting a business. Cronbach's alpha was calculated to test internal consistency and hypotheses were tested using the one-way ANOVA test. Primary research was conducted in the first half of 2022 through face-to-face interviews with entrepreneurs. The characteristics of the sample are shown in Table 1.

Distinctive feature (variable)	Value	Absolute frequency	Relative frequency (%)
Years in business	≤ 5 years	21	20,2
	> 5 years	83	79,8
Location of business	Village	28	26,9
	Town	30	28,8
	Municipality	45	43,3
Form of business	Enterprises	43	41,3
	Family business	44	42,3
	Craft	17	16,3

Table 1: Sample characteristics

2.1. Assessment of the entrepreneurial environment

In order to assess the environment for entrepreneurship development, the perception of the entrepreneurial environment among entrepreneurs in Lika-Senj County was analyzed using six variables listed in Table 2, as well as their arithmetic means, standard deviations and Cronbach's alpha.

Variable	Mean	Stand. devi	Cronbach alfa
V1 – Physical infrastructures and service access	2,51	0,638	0,894
V2 – Government concrete policies, priority and support	1,45	0,589	0,893
V3 - Professional and commercial infrastructure access	1,73	0,699	0,883
V4 – Government programs	1,65	0,651	0,884
V5 – R&D level of transference	1,35	0,635	0,894
V6 – Financial environment related with entrepreneurship	1,91	0,718	0,888

Table 2: Entrepreneurial environment variables
** Satisfaction with the environment is rated 1 - dissatisfied, 2 - neither satisfied nor dissatisfied, 3 - satisfied **Total Cronbach's alpha is 0.895*

Total Cronbach's alpha is 0.895 and represents the reliability of the measurement scale. For the measurement scale to be reliable, the value of Cronbach's alpha should be greater than 0.7 (De Vellis, 2003). This is fulfilled, besides, scales with less than 10 variables often have small values (less than 0.5) and then it is necessary to calculate mean values of correlations between variables, which is not the case in this work. Table 2 shows the values of Cronbach's alpha when a single variable is eliminated. From the values, it can be concluded that eliminating variables would not have a significant effect on increasing reliability. The standard deviation values show us that the values of the variables are equally consistent and that the variable related to physical infrastructure has the highest value, while the variable related to the R&D level of the transfer has the lowest value.

3. RESULTS AND DISCUSSION

In order to assess perceptions of the entrepreneurial environment, a measurement tool was developed that includes six variables related to the entrepreneurial environment. Each of the variables is rated on a scale of 1 to 3. A value of 3 represents a situation in which the entrepreneurial environment is fully fulfilling its role. The mean value of all variables describing the entrepreneurial environment except V1 are below the average value, which shows that entrepreneurs in Lika Senj County perceive the environment as uninspiring. Figure 1 shows the average values of the observed entrepreneurial environment.

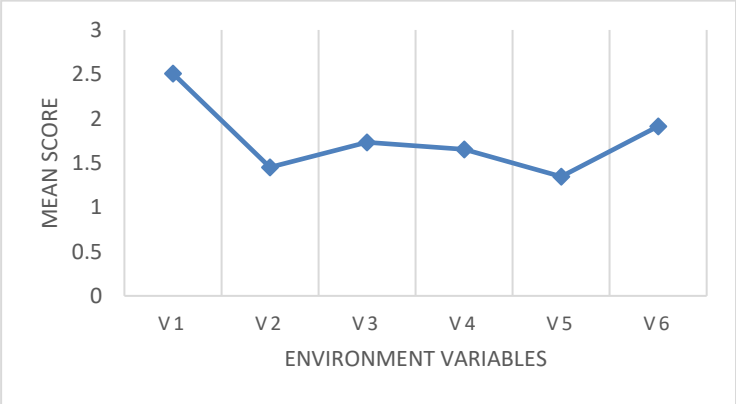

Figure 1: Average values of environment variables
Note: V1- Physical infrastructures and services access, V2- Government concrete policies, priority and support, V3 - Professional and commercial infrastructure access, V4 - Government programs, V5 - R&D level of transference, V6 - Financial environment related with entrepreneurship

All but one variable (V1- Physical infrastructure and access to services) are below average, i.e., entrepreneurs rate them as unsatisfactory. It can be concluded that physical infrastructure is the only one with which entrepreneurs are satisfied. The variable R&D level of transmission can be considered as the biggest obstacle, as 74% of the respondents rate it as unsatisfactory. The opinion of the respondents coincides with the findings of the CEPOR report for 2020, which states that the OECD report for Croatia (Supporting Entrepreneurship and Innovation in Higher Education Croatia) notes the strengthening of the capacity of higher education institutions in Croatia for knowledge exchange and cooperation with external stakeholders, but also the need for further progress in this area. The main obstacles are the outdated national regulation on intellectual property protection, legal obstacles to the employment of non-academics, the existence and operation of entrepreneurship centers exclusively related to economic education, the implementation of innovative and entrepreneurial initiatives on an ad hoc basis with minimal institutional support, with their realization depending on the enthusiasm and commitment of individuals, the insufficient development of human resources management in higher education institutions, and the inconsistent availability of funding sources for innovation and entrepreneurship. The report also makes recommendations to higher education institutions, emphasizing the need for better access to entrepreneurship education in all departments and units of higher education institutions and the introduction of knowledge-sharing activities as a strategic commitment of higher education institutions. (Mezulić Jurić, 2020). Variable V2 - Government concrete policies, priority and support was also rated 1 - dissatisfied by 60% of entrepreneurs, while only 5% declared themselves as satisfied. Variable V5 - Government programs, which refers to the existence of a sufficient number of programs for new and growing businesses, science parks and incubators that effectively support new and growing businesses, was rated as dissatisfied by 44% of entrepreneurs. These results were also confirmed by the GEM report - Global Entrepreneurship Monitor, which observes the relationship between the framework conditions for entrepreneurship and entrepreneurial activity at the individual level. The results of the study GEM in Croatia since the beginning of the study in 2002 indicate the following components as the weakest of the entrepreneurial environment: Government policy according to the legal framework, entrepreneurial education, and transfer of research results to the small and medium enterprise sector. Only two components (physical infrastructure and dynamics of changes in the internal market) have a stimulating effect on entrepreneurial activity, while the other components had the lowest values in the group of EU countries that participated in the survey GEM in the observed years (with the exception of government policies regarding priorities and support). The answer to the research question: How do the selected distinguishing characteristics of companies influence their perception of the environment? is part of the results of a statistical test of the scientific hypotheses.

H1: *There is a relationship between the perception of the business environment and the legal form of the company.*

Variable	F-value	α	p-value
V1	5,454	0,05	0,006
V2	1,226	0,05	0,298
V3	6,010	0,05	0,003
V4	2,184	0.05	0,118
V5	0,039	0.05	0,961
V6	1,287	0.05	0,280

Table 3: Results of one-way ANOVA test – H1

The results of one-way ANOVA test showed that there is a statistically significant relationship between the form of the company and the perception of physical infrastructure. Conducting the Post Hoc Tukey test revealed that there is a statistically significant difference in satisfaction with physical infrastructure between entrepreneurs operating in enterprises and family businesses, and between respondents from enterprises and crafts. The mean satisfaction score of entrepreneurs operating in a enterprise is significantly higher than the satisfaction score of entrepreneurs operating in the other two forms. Entrepreneurs operating in a enterprise are satisfied with the physical infrastructure, while those operating in the other two forms expressed neither satisfaction nor dissatisfaction, noting that those who work in crafts are the least satisfied. In addition, a statistically significant difference in the satisfaction of entrepreneurs with access to professional and commercial infrastructure was found in relation to the form of business. It results from the difference in the average satisfaction score of entrepreneurs operating in enterprise and family businesses. Entrepreneurs in enterprises are neither satisfied nor dissatisfied with access to professional and commercial infrastructure (average score of 2), while those in family businesses are dissatisfied (average score of 1.47).

H2: There is a relationship between the perception of the business environment and the location of the company.

Variable	***F-value***	***α***	***p-value***
V1	*3,294*	*0,05*	*0,04*
V2	*0,476*	*0,05*	*0,70*
V3	*5,166*	*0,05*	*0,007*
V4	*3,371*	*0.05*	*0,02*
V5	*0,774*	*0.05*	*0,51*
V6	*0,808*	*0.05*	*0,49*

Table 4: Results of one-way ANOVA test-H2

From the results presented in Table 4, it can be concluded that there is a statistically significant relationship between the location of the business and the perception of physical infrastructure, access to professional and commercial infrastructure, and government programs. Conducting the Post Hoc Tukey test revealed that there is a statistically significant difference in satisfaction with physical infrastructure between entrepreneurs who operate in the town and those who operate in municipality. The mean satisfaction score of entrepreneurs operating in a town is significantly higher than the satisfaction score of entrepreneurs operating in a municipality. Entrepreneurs operating in a town expressed satisfaction with physical infrastructure, while those operating in a municipality expressed neither satisfaction nor dissatisfaction, suggesting that those operating in a village are more satisfied with physical infrastructure than entrepreneurs operating in a municipality. In addition, a statistically significant difference was found in the satisfaction of entrepreneurs with access to professional and commercial infrastructure in relation to the location of the business. It results from the difference in the average satisfaction score of entrepreneurs operating in the village and in the town. Entrepreneurs in the town are neither satisfied nor dissatisfied with access to professional and commercial infrastructure (average score of 1.96), while those working in a village are dissatisfied (average score of 1.40). The post hoc Tukey test revealed that there is a statistically significant difference in satisfaction with government programs between entrepreneurs in the town and entrepreneurs in the village. The mean satisfaction score of entrepreneurs operating in a town (1.86) is significantly higher than the satisfaction score of entrepreneurs operating in a village (1.37).

H3: There is a relationship between the perception of the business environment and years in business.

Variable	F-value	α	p-value
V1	0,013	0,05	0,910
V2	0,041	0,05	0,840
V3	2,330	0,05	0,130
V4	1,983	0.05	0,162
V5	0,441	0.05	0,508
V6	0,558	0.05	0,457

Table 5: Results of one-way ANOVA test-H3

The results presented in Table 5 show that the years of business activity do not significantly affect the perception of the variables that determine the business environment. The mean values of the perception of the variables that present business environment depending of the years in business are presented in the following Figure 2.

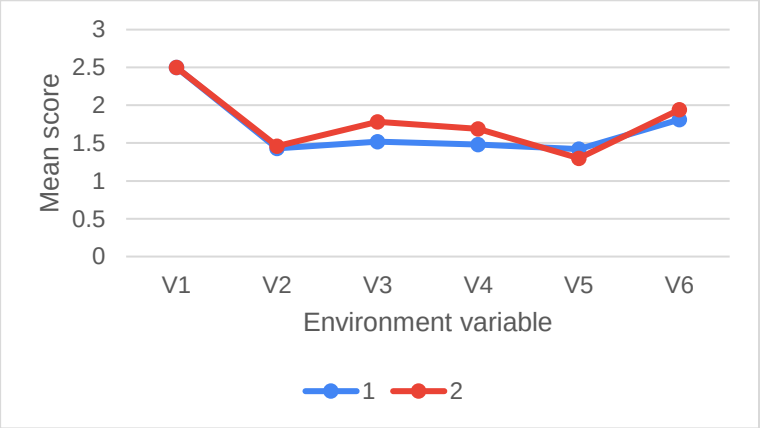

Figure 2: Mean score of environment variables depending on years in business

The graphs show that that there are small differences in the perception of entreprenurial environment by family businesses between enterprises which operate less than and more than five years and ranges from 1.3 to 2.5 points, which represents a below-average level in most variables except physical infrastructure. Line 1 in blue represents companies that have been in business for less than 5 years, and line 2 in red represents companies that have been in business for more than 5 years. Companies that have been in business for more than 5 years are slightly more satisfied with the environment than companies that have been in business for less than 5 years. Only in the perception of the R&D level of transfer is the situation different, which can be explained by the fact that in the first years of business entrepreneurs are focused on the development of their entrepreneurial idea and the survival of the company, and after the first years of business they think more about the transfer of new technologies and other knowledge, the introduction of the latest technologies, the support for engineers and scientists so that they can commercialised their ideas through new and growing companies.

4. SUMMARY

Since entrepreneurship is a generator of economic growth, and Lika-Senj County lags behind the development of other parts of Croatia, the goal of this research was to examine the perception of the environment and to determine the presence of obstacles in the business environment by entrepreneurs of Lika-Senj County in order to eliminate them and encourage

development entrepreneurship. Based on this research, it is clear that the business environment has similar characteristics for all groups of entrepreneurs according to most of the observed parameters. The entrepreneurs perceived the environment in the same way regardless of the years of their business activity. The business location criterion, by which businesses are categorized into the three groups of village, town and municipality, affects perceptions of physical infrastructure, access to professional and commercial infrastructure, and government programs. Enterprise form has a statistically significant effect on perceptions of two variables: physical infrastructure and access to professional and commercial infrastructure. Hypothesis H1 is accepted in this part and rejected in the part related to government programs, specific government policies, priority and support, R&D level of transmission, and financial environment related to entrepreneurship. Business location influences the perception of three of the six variables that characterize the entrepreneurial environment. The conclusion is that hypothesis H2 is accepted with respect to perceptions of physical infrastructure, access to professional and commercial infrastructure and government programs, and rejected with respect to specific government policies, priority and support, R&D level of transmission, and financial environment related to entrepreneurship. The years of business activity do not significantly affect the perception of the variables that determine the business environment so hypothesis H3 is rejected. The worst rated features of the entrepreneurial environment are R&D transfer and government programs and are among the greatest barriers to the creation, survival, and growth of all businesses. Eliminating these obstacles and creating a quality business environment are important factors for the development of entrepreneurship in Lika-Senj County and its economic growth and prosperity. There are limitations and restrictions in this study that should be considered in future research. The study was conducted only in one part of the country. It is necessary to extend it to the whole country, and an international comparison of the business environment factors would also be important.

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THE IMPACT OF WORKING CAPITAL ON FIRM RISK: EVIDENCE FROM BORSA ISTANBUL

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ABSTRACT

This study aims to evaluate the relationship between working capital management and firm risk by examining data from 83 Turkish manufacturing companies listed on Borsa Istanbul between 2015 and 2019. By utilizing the standard deviation of stock returns as a measure of firm risk through panel data analysis, this study establishes a connection between independent variables and firm risk. Additionally, profitability, leverage, size, and growth are employed as control variables. The empirical findings demonstrate that the level of working capital is associated with firm risk, with firms maintaining better cash positions experiencing lower volatility in stock returns. These results emphasize the significant implications of working capital management for firm risk.

Keywords: *Working Capital, Stock Returns, Firm Risk, Panel Data*

1. INTRODUCTION

Working capital management stands out as a part of financial management that aims to maximize shareholders' wealth and create firm value. Managers may choose conservative or aggressive strategies that affect the company's liquidity. Risk management is the process that tries and directs investors in the right direction to risk providing expected returns. In general dynamic business environment, understanding the factors that affect firm risk is crucial for both investors and managers. One such factor that has gained significant attention is working capital. Current assets represents the short-term financial health of a company and is a measure of its ability to meet its day-to-day operational requirements. There are two opposing management styles in the working capital management concept aggressive and conservative approaches. Given an aggressive approach to working capital management, it maintains a relatively lower proportion of its total assets in the form of current assets. Aggressive approach leads to higher expected profitability and higher risk. Although this approach has a profitability-increasing effect, it also carries the risk of liquidity trouble. On the other hand, according to the conservative approach, the company will have a large amount of current assets compared to its total assets. This approach provides lower expected profitability and lower risk. Such an approach will also increase the company's net working capital position. This causes the firm's profit to be low but does not lead to liquidity trouble. There are internal and external factors that affect the working capital of a business as a whole. Although internal factors can be controlled, financial managers generally cannot control external factors. Financial managers try to mitigate possible risks by deciding on working capital components. High levels of working capital reduce liquidity risk and profitability. Low working capital levels cause financial distress but also increase profitability. In this regard, working capital management refers to maintaining adequate working capital components such as liquidity and profitability, which enable companies to operate smoothly and fulfill firm's goals. In manufacturing companies, working capital management creates a long chain, starting with the rise in sales volume, expanding the production volume, increasing the raw material required for production, and the receivables from the products sold. Therefore, financial managers have to keep the firm's cash assets, stocks, receivables, and debts at an optimal level. This study aims to investigate the effect of working capital on firm risk. Specifically, it will investigate whether changes in working capital levels have a significant effect on a firm risk. In the model of study, the standard

deviation of stock returns is used as a proxy of firm risk. Understanding this relationship can provide valuable insights for investors, managers, and policymakers in making informed decisions and managing risk. In the study consists of four parts, following the introduction, the relevant literature is reviewed in the second part. In the third section, the data, variables, and methodology used in the analysis are introduced. The results and general evaluation are devoted in the fourth part.

2. LITERATURE

Studies in the literature often focus on the relationship between working capital and stock returns or firm performance. However, while trying to evaluate the rate of return and profitability, the relationship between working capital management and company risk, which is also important for financial managers, has been neglected. Therefore, the effects of the working capital levels on the volatility of firms' stock returns have been examined within the scope of this study. Some of the previous studies are mentioned below. Shin and Soenen (1998) examined the relationship between working capital and firms' profitability. They used the net trade cycle as an indicator of working capital and found a strong negative relationship between working capital and corporate profitability for a large sample of publicly traded American firms. They concluded that reducing the level of current assets reasonably increases the profitability of the firm. In their study, Şen and Oruç (2009) found a negative relationship between net working capital level and total asset return for a large sample of the Istanbul Stock Exchange. Aktaş et al. (2015) examined the impact of working capital management on firm value for a large sample of US companies. They concluded that companies approaching the optimal level by increasing or decreasing their working capital investments improve their stocks and operating performance. ALShubiri and Faris Nasif (2011) examined working capital management in a sample of 59 industrial firms and 14 banks listed on the Amman Stock Exchange. It has shown that there is a relationship between volatility (standard deviation of return on investment) and working capital operations in banks. Bolek and Monika (2013) studied companies listed on the Warsaw Stock Exchange to see whether balance sheet structure and risk associated with working capital strategy are associated with the profitability of non-financial companies. They concluded that there was no correlation between working capital strategies (and associated risk levels) and returns on assets and equity. Ben Le (2019) studied a panel data set with a large sample. The author found a significant negative relationship between net working capital and firm value, profitability and risk. The results show that firm managers need to strike a balance between profitability and risk control objectives when managing working capital. In Akbar et al.'s (2021) study, they found that higher levels of working capital were associated with lower volatility in firms' stock prices. This shows that shareholders prefer a conservative working capital policy. They also concluded that companies with a better cash position have less volatility in the stock market. Previous studies have generally examined the relationship between working capital levels and firm returns, profitability or value. Although firm risk has been employed as the dependent variable in some recent studies, it is not included here since there is no study investigating working capital and risk in Turkey. From this perspective, this study can be considered one of the pioneers in the Turkish sample.

3. METHODOLOGY

This study aims to evaluate the relationship between working capital management and firm risk by examining data from 83 Turkish manufacturing companies listed on Borsa Istanbul between 2015 and 2019. In this study, panel data method was used. Panel data consists of time series and cross-section data. According to Baltagi, panel data; It is defined as bringing together cross-sectional observations of units such as individuals, countries, firms and households over a

certain period of time. Panel data enables more consistent estimates to be obtained in the analyzes made because it includes variation according to both units and time (Baltagi, 2005:1). Raw data for the variables within the scope of the study were obtained from the audit reports and financial statements published on the official websites of manufacturing firms or the "Public Disclosure Platform". The variables used in the model are given in Table 1.

Table 1: Variables

VARIABLES		
(VOL)	Volatility	The Standard Deviation of Stock Returns
(NWC)	Net Working Capital	(Current Assets - Short Term Debt) / Total Assets
(ROA)	Profitability	Net Profit / Total Assets
(LEV)	Leverage	Long Term Debt / Total Assets
(SIZE)	Size	Natural logarithm of Total Assets
(GROW)	Growth	(Total Assets $_{t}$ / Total Assets $_{t-1}$) -1

In the model, the standard deviation of stock returns was used as the dependent variable representing the company risk. The model of the study is as follows.

Model:

$$Vol_i = \alpha + \beta_1 NWC_{1it} + \beta_2 ROA_{2it} + \beta_3 LEV_{3it} + \beta_4 SIZE_{4it} + \beta_5 GROW_{5it} + \varepsilon_i \quad (1)$$

Working capital and profitability are expected to have a negative impact on firm risk. Leverage is expected to have a positive impact on firm risk. However, there are no clear estimates of the effects of size and growth.

4. RESULTS

There are two approaches to estimating the panel data model: fixed effects and random effects. The Hausmann test statistic shows a chi-square distribution with k degrees of freedom under the null hypothesis "The random effects estimator is correct". If it occurs, it can be decided that the error term components of the random effects model are not related to the independent variables. In this case, the fixed effect model will be preferred. In the study, the Hausmann test was applied to decide whether the random effects model or the fixed effects model is valid.
The test results are presented in Table 2.

Table 2: The Results of the Hausmann Test

Models	Hausmann Test
Model 1	128.015734 (0.0000)***

****,** and * are statistically significant at %1 level, %5 levels, and %10 levels.*

Since the result of the Hausmann test statistics was a probability value below the critical value, fixed effects is a more effective model. The panel data analysis was performed according to the fixed effect model. One of the basic processes in time series analysis is the stationary probabilistic process. A stationary process is a process whose mean and variance do not change over time and where the covariance between two periods depends on the distance between the periods, not on the period examined. In other words, a stationary time series is one, which mean, variance and covariance are independent of time. In empirical studies conducted with time series, it is assumed that the data are *"stationary"*. However, a significant part of the time series is not stationary. For this reason, ADF unit root test was applied in this study and the data set included in the analysis was found to be stationary (Brooks, 2008).

The results of panel data analysis are presented in Table 3.

Table 3. The Results of Panel Data Analysis

	Dependent Variables
	Firm Risk (Volatility)
Independent Variables	**Model**
C	**2.658075***** (5.629925)
Net Working Capital	**-0,123021***** (-5.691775)
Profitability	**-0.054023** (1.455753)
Leverage	**0.021135***** (4.231340)
Size	**0.149963** (6.193240)
Growth	**0.051208**** (2.733284)
Observation	**415**
R^2	**0.906600**
Adjusted R^2	**0.872169**
F -statistics	**26.33069**
P-value	**0.000000**
Durbin Watson -statistics	**1.881558**

****,** and * are statistically significant at %1 level, %5 levels, and %10 levels.*

Whether the regression equation is compatible with the model or not is indicated by the coefficient of determination (R^2). The coefficient of determination indicates what percentage of the change in the dependent variable is explained by the independent variable. The adjusted r squared, which gives a more effective result, was calculated as 87%. The Durbin Watson statistic is a number used to test whether residual terms are correlated after a regression model has been estimated. The fact that this number is around 2 indicates that we cannot reject the null hypothesis of "there is no autocorrelation". Additionally, the model is statistically significant at a 1% level. According to the results, there is a significant relationship between working capital, leverage, growth and firm risk.

5. CONCLUSION

In this study, a total of 83 manufacturing companies traded on Borsa Istanbul between 2015 and 2019 were examined in 415 observations. According to the results, while leverage increases the firm risk, working capital reduces the firm risk. The results reveal strong evidence that working capital is negatively related to the volatility of the selected sample firms. It is concluded that firms with high levels of working capital have lower volatility in stock returns. Although there are many studies on financial performance in the literature, firm risk was applied as the dependent variable in this study in order to contribute to the working capital literature. In particular, it was examined how the volatility of stock returns affected the sample of manufacturing firms. It is concluded that working capital and firm risk are negatively related; this shows that, consistent with the managerial view, working capital investment has an impact on the volatility of stock returns. In addition, evidence shows that leverage, an indicator of a firm's debt risk, has negative effects on the volatility of stock returns.

The findings suggest that short-term asset management has significant consequences on firms' own activities as well as market risk. While the current study highlights the importance of working capital's impact on firm's market risk, future research can contribute to understanding its impact on other firm-specific risks.

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FINANCIAL EVALUATION OF STATE INVESTMENTS TO SUPPORT THE INCREASE OF ENERGY EFFICIENCY IN BULGARIA

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ABSTRACT

Investing in energy efficiency, especially in residential buildings, has significant potential for energy savings and greenhouse gas emissions reduction. Despite this potential, investments in energy efficiency have not yet reached the required scale and efficiency. Energy efficiency improvement programs provide subsidies for improvements, but often fail to reach low-income households and marginalized groups, which have higher energy costs per unit area. This unequal access to energy efficiency investments contributes to increasing energy poverty and energy inequalities. In order to improve energy efficiency and move closer to European environmental standards, a financial assessment of government investment is needed that takes into account consumer preferences. The results of the calculations show that the optimal degree of improvement in Bulgaria includes styrofoam renovation up to 30% and a price of 62 BGN/m2. This approach requires significant financial resources, estimated between BGN 3,257,103,091.38. and 3,329,304,884.04. The aim of this approach is to optimize energy efficiency investments in order to improve housing conditions and comply with environmental standards.

Keywords: *financial evaluation, state investment, energy efficiency, construction sector*

1. INTRODUCTION

Investing in energy efficiency is one of the fastest growing investment drivers in the construction, transport and industry sectors. The building sector (residential buildings) is among the sectors with the most significant cost-investment flow related to energy efficiency. The residential sector is rated as the most promising segment with energy saving potential among all building types in the United States (Higgins, Foliente, & McNamara, 2011). Energy efficiency is considered one of the most cost-effective methods to achieve global energy policies and limit greenhouse gas emissions (Rugova, 2023). Nevertheless, despite the economic potential and environmental benefits, investment in energy efficiency is still below policy objectives, mainly due to (Prodanov, S., 2009) heterogeneous barriers in the sector. Despite the potential for significant energy savings in residential buildings, limited actions to realise these savings are reported. Some reduction in energy consumption has been achieved through utilities-run discount programs where residents receive subsidies for energy efficiency investments. In addition, participation in utility discount programs tends to benefit wealthier households, leaving low-income households at a disadvantage.

Marginalized groups often pay more for utilities unit of living space, indicating that they live in less energy-efficient housing and do not benefit from investments in energy efficiency, exacerbating energy inequalities (Drehobl & Ross, 2016). The stagnation of growth in energy efficiency investment is currently largely considered as a result of increased investment in energy-efficient buildings, which limits the scope of measures. The overall global investment trend in recent years aimed at energy optimization reflects slower progress in terms of energy efficiency (International Energy Agency, 2019) improvement performance, with the pace of energy efficiency improvement slowing down over the past 10 years, contrary to expectations. There are various explanations for this – on the one hand, the explanation is in the conservative policy environment covering energy efficiency and relatively weak progress in implementation of existing and updating of available policies. Another explanation refers to the overestimated benefits or effects of energy efficiency measures. Although more and more policies and programs aim to increase investment in energy efficiency, it turns out that households do not absorb these investments, despite having positive returns and generating environmental benefits. This article reports on the results of an experimental evaluation of the nation's largest residential energy efficiency program-the Climate Support Program-conducted on a sample of approximately 30,000 households in Michigan. The findings show that initial investment costs are about twice as high as actual energy savings (Fowlie, Greenstone, & Wolfram, Do Energy Efficiency Investments Deliver? Evidence from the Weatherization Assistance Program, 2018). In addition, the savings predicted by the model are more than three times higher than the actual savings. Even when accounting for the wider benefits to society resulting from emission reductions, the costs still significantly outweigh the benefits and the average rate of return is negative, approximately −7.8% per year. Another study also shows that overestimated energy savings are the result of detailed energy models that are inaccurate (Al Tarhuni, et al., 2019). This may cause potential investors to hesitate to undertake energy efficiency improvements. The mentioned study uses an integrated approach based on data and physical models. It uses data relating to the characteristics of a residential building (such as insulation, appliances and heating and air conditioning systems), historical energy consumption and meteorological data to forecast monthly energy consumption and savings, resulting from individual energy saving measures. The approach focuses on using data related to the most promising energy saving opportunities that are easy to obtain. The machine learning derived model achieves a high level of accuracy with a mean square error of 0.00023 for cross-validation data on a single scale. The validation demonstrates a prediction accuracy of savings within 3.5% for most measures. The consistent adoption of the most cost-effective energy efficiency measures among these dwellings leads to an overall energy reduction of 36% and the practic results suggest that this integrated approach can be successfully implemented to achieve energy reduction in residential areas through the adoption of cost-effective energy saving measures. A study by Morrissey et al. discusses key factors influencing investment decisions in energy efficiency for both new and existing buildings. These factors include marginal costs ofenergy efficiency measures and limited knowledge among investors and architects about pricing, co-benefits and emerging technologies. The study focuses on Swiss residential sector and empirically determines the marginal costs associated with energy efficiency investments such as improved insulation, improved window systems, ventilation, heating systems and architectural innovations. In particular, the research highlights that in the private sector, benefits beyond energy savings, such as improved comfort, indoor air quality and noise reduction, may have similar economic value to the benefits associated with energy conservation. eecument sheds light on the often overlooked co-benefits and cost dynamics associated with energy efficiency investments in buildings. The importance of this information for decision-makers in the real estate sector (Prodanov, Angelov, & Zarkova, 2022), politics and administrations who may not be fully aware of these aspects is highlighted (Morrissey, Meyrick, Sivaraman, Horne, & Berry, 2013).

Foley, Greenstone and Wolfram see nonmonetary costs as a deterrent to participation in programmes for improved energy efficiency in residential buildings. Households participating in the program receive free energy auditing and home modernization, which typically includes improvements such as insulation, window replacement, furnace improvements, and reduction in penetration. The average of the considered modernization measures provided to participants is approximately $5,000 per home. Although there is no direct cash cost for households to join the program. The application process is difficult and time-consuming, partly designed to prevent fraudulent claims. Applicants are required to submit extensive documentation to prove they are eligible, including utility bills, income registers, social security numbers, and ownership documents. Eligible applicants are then prioritised on the basis of specific criteria, which may include factors such as the presence of elderly residents, people with disabilities, families with children, high energy loads (where energy costs are a significant part of income) or significant energy consumption in housing. Furthermore, the take-up of the measure increases to a small extent after significant efforts to inform households - through multiple channels about the significant benefits and zero monetary costs. These findings are consistent with the high non-monetary costs associated with participation in the household energy efficiency programme and/or energy efficiency investments. The high non-monetary costs associated with these investments suggest that the energy efficiency gap in the residential sector is smaller than it appears (Fowlie, Greenstone, & Wolfram, Are the Non-Monetary Costs of Energy Efficiency Investments Large? Understanding Low Take-up of a Free Energy Efficiency Program., 2015). The review of research in the field of improving the energy efficiency of housing shows the ambiguous perception of the target groups and the need to comply with a number of specifics to achieve the goals set for energy efficiency projects. In this paper the focus is precisely on consumer preferences, because often large-scale energy efficiency programs fail at the household level. The object of research in this paper is the construction sector and in particular the construction of residential buildings. The subject of study is energy efficiency in the construction sector in Bulgaria. The thesis is based as follows: for the purpose of increasing energy efficiency in the construction sector of the country and approaching European environmental standards, it is necessary to carry out a wide-ranging financial assessment of state investments supporting the process, consistent with the views and preferences of consumers. The aim of this work is to make an adequate assessment of the necessary state investments to support the improvement of energy efficiency in Bulgaria, based on consumer preferences. The data sources used to reach the main scientific and applied achievements are: data from the National Statistical Institute of the Republic of Bulgaria and field survey of the type of survey among individuals and legal entities. The results are processed professionally through IBM SPSS Statistics and MS Excel.

2. METHODOLOGY

From a methodological point of view, the survey refers to a survey carried out, structured in nine sections and including 70 questions. Nearly half of the questions posed are subjective assessments using the Likert scale, whose validity ranges from 1 (entirely false/strong disagreement) to 5 (entirely true/strong agreement) and where the correct statement should be marked for the correct answer. The Likert Rock itself dates back to 1932 (Jamieson, 2023) and it represents a system of evaluation designed to measure people's attitudes. In general, the scale presents respondent with a statement and asks him to assess the extent to which respondent agrees with it. Variations involve presenting the subject with a question rather than a statement. The response categories are mutually exclusive and usually cover the full range of opinions. Likert scales fall within the ordinal level of measurement: response categories have directionality, but the intervals between them cannot be taken as equal.

For the purposes of this work, the two sections covering insulation technology and ecology have been discussed in detail, involving the following six issues:

1) The investment in external insulation of a home through stone wool should be supported as a priority because it provides insulation efficiency in reducing electricity consumption, other things being equal, up to 60% and a price of 96 BGN/m^2? - the responses are grouped on the Likert scale with five levels of assessment.
2) The investment in external insulation of a dwelling through styrofoam (expanded polystyrene) should be supported as a priority because it provides insulation efficiency in reducing electricity consumption, other things being equal, up to 30% and a price of BGN 62/ m^2? - the responses are grouped on the Likert scale with five levels of assessment.
3) The investment in external insulation of a dwelling through fiber (extruded polystyrene) should be prioritized because it provides insulation efficiency in reducing electricity consumption, other things being equal, up to 45% and a price of 73 BGN/m^2? -responses are grouped on the Likert scale with five levels of assessment.
4) Investing in energy efficiency of the building stock should be a priority because of energy savings - the answers are grouped on the Likert scale with five levels of assessment.
5) Investing in energy efficiency of buildings should be a priority because of the reduced emissions of fine particulate matter and sulfur dioxide emitted by burning fossil fuels - the responses are grouped on the Likert scale with five levels of assessment.
6) Investing in energy efficiency in buildings should be a priority because of climate change - the responses are grouped on the Likert scale with five levels of assessment.

The results are processed in a professional way through IBM SPSS Statistics with the application of modules for descriptive statistics and the output of specific statistics: Mean, Std. Error of Mean, Median, Mode, Std. Deviation, Variance, Skewness, Std. Error of Skewness, Range, Minimum, Maximum, Sum. Each of the listed has its significant statistical value.

3. RESULTS OF THE SURVEY AND CALCULATIONS MADE

The comprehensive review of the theoretical foundations of investments in energy efficiency and the large-scale survey among a significant number of respondents clearly present the high level of national importance of taking actions on the prioritization of energy efficiency in the construction sector. With the advent of European directives on green transition, environmental friendliness and environmental protection, this is becoming an increasingly significant issue. At the same time, the availability of financing opportunities the transfer of energy efficiency makes the exploration of opportunities an extremely topical issue with a high degree of interdisciplinary importance. In this connection, tables 1 to 3 present part of the results concerning the investment in external insulation of a dwelling.

		Frequency	Percent	Validation percentage	Cumulative percent
Validated data	Strongly disagree	4	2,8	2,8	2,8
	Disagreement	2	1,4	1,4	4,2
	Neutral opinion	85	59,4	59,9	64,1
	Agreement	3	2,1	2,1	66,2
	Strong agreement	48	33,6	33,8	100,0
	Total	142	99,3	100,0	
Missing	System	1	0,7		
Total		143	100,0		

Table 1: Results of the survey on whether the investment in external insulation of a dwelling through stone wool should be supported, other things being equal, up to 60% and a price of BGN 96/m^2?

		Frequency	Percent	Validation percentage	Cumulative percent
Validated data	Strongly disagree	6	4,2	4,2	4,2
	Disagreement	30	21,0	21,1	25,4
	Neutral opinion	95	66,4	66,9	92,3
	Agreement	2	1,4	1,4	93,7
	Strong agreement	9	6,3	6,3	100,0
	Total	142	99,3	100,0	
Missing	System	1	0,7		
Total		143	100,0		

Table 2: Results of the survey on whether the investment in external insulation of a dwelling through Styrofoam should be supported, all other things being equal, up to 30% and a price of BGN 62/m^2?

		Frequency	Percent	Validation percentage	Cumulative percent
Validated data	Strongly disagree	5	3,5	3,5	3,5
	Disagreement	29	20,3	20,4	23,9
	Neutral opinion	93	65,0	65,5	89,4
	Agreement	2	1,4	1,4	90,8
	Strong agreement	13	9,1	9,2	100,0
	Total	142	99,3	100,0	
Missing	System	1	0,7		
Total		143	100,0		

Table 3: Results of the survey on whether the investment in external insulation of a home through fiber should be supported, other things being equal, up to 45% and a price of 73 BGN/m^2?

As a result of the results of the survey, it becomes clear that with the greatest interest on the part of the respondents is the opportunity to invest in external insulation of a home through stone wool, which should be prioritized because it provides insulation efficiency in reducing electricity consumption, other things being equal, "up to 60% and a price of BGN 96/m^2", Significantly fewer agree under the terms "up to 30% and a price of 62 BGN/m^2" and "up to 45% and a price of 73 BGN/m^2". The relative share of responses from the survey with the result "Strong agreement" varies in the amount of 40.60% and 41.50%. This, in turn, provides an opportunity to focus on the specific opportunities for increasing energy efficiency in housing in the country. Table 4 presents the three possible options and the results of the survey, based on priority funding opportunities due to the following factors: energy savings, climate change, reduction of emissions of fine particulate matter and sulfur dioxide.

Table following on the next page

Result of the questionnaire survey	Relative share of questionnaire survey responses	Potential opportunity for prioritisation and future funding
Percentage of respondents with "Strong agreement" that the energy efficiency of the building fund should be a priority because of **energy savings**	41,50%	Ability to prioritize to energy efficiency programs
Response rate with "Strong agreement" that energy efficiency of buildings should be a priority because **of climate change**	40,60%	Ability to prioritise towards climate change and environmental protection programmes
Percentage of respondents with "Strong agreement" that the energy efficiency of the building stock due to **reduced emissions of fine particulate matter and sulfur dioxide**	40,60%	

Table 4: Relative share of questionnaire survey responses

Referring to the responses received from the respondents, Table 5 includes the statistical measures of the survey results obtained. The data in detail represent the statistical significance of the responses received from the questionnaire survey, presenting numerically the averages of the responses received (strong disagreement – 1, disagreement – 2, neutral opinion – 3, agreement – 4, strong agreement – 5) and the low size of Std. Error of Mean. In this regard, questions 1, 5 and 6 show a general picture of predominant respondents with neutral opinion and agreement, while questions 2, 3 and 4 are mostly between disagreement and neutral opinion.

		1. The investment in external insulation of a home through stone wool should be supported, other things being equal, up to 60% and a price of 96 BGN/m^2? – (**Option 1)**	2. The investment in external insulation of a dwelling through Styrofoam to be supported, other things being equal, up to 30% and a price of 62 BGN/m^2? – (**Option 2)**	3. The investment in external insulation of a home through fiber to be supported, all other things being equal, up to 45% and a price of 73 BGN/m^2? – (**Option 3)**	4.Investing in energy efficiency of the building stock should be a priority because of energy savings:	5.The investment in energy efficiency of the building stock a priority due to reduced emissions of fine particulate matter and sulfur dioxide	6.Investing in energy efficiency in buildings should be a priority because of climate change:
N	Valid	142	142	142	142	142	142
	Missing	1	1	1	1	1	1
Mean		3,63	2,85	2,92	2,92	3,82	3,80
Std. Error of Mean		0,089	0,067	0,071	0,071	0,087	0,087
Median		3,51[a]	2,80[a]	2,84[a]	2,84[a]	3,73[a]	3,71[a]
Mode		3	3	3	3	3	3
Std. Deviation		1,056	0,793	0,851	0,851	1,036	1,033
Variance		1,115	0,628	0,724	0,724	1,073	1,067
Skewness		0,137	0,545	0,709	0,709	0,103	0,131
Std. Error of Skewness		0,203	0,203	0,203	0,203	0,203	0,203
Range		4	4	4	4	4	4
Minimum		1	1	1	1	1	1
Maximum		5	5	5	5	5	5
Sum		515	404	415	415	542	540
Percentiles	25	2,70[b]	2,23[b]	2,26[b]	2,84[b]	2,83[b]	2,78[b]
	50	3,51	2,80	2,84	3,73	3,71	3,69
	75	4,55	3,47	3,55	4,81	4,79	4,78
a. Calculated from grouped data.							
b. Percentiles are calculated from grouped data.							

Table 5: Statistical measures of the results obtained
(Source: Authors' calculations)

In view of the adequate calculation and the effective presentation of the results, the average values of the size of the living area of the external walls in some of the most widespread dwellings in the country were taken into account. The data from the calculations described in Table 6 are based on the results obtained from the survey and the prices for the three types of insulation materials – stone wool, styrofoam and fiber.

	Square meters of living area on exterior walls									
	25	45	65	85	100	125	150	175	200	**Average price**
	Small housing		**Average dwelling**			**Large dwelling**		**Very large dwelling**		
Option 1	BGN 1,440	BGN 2,592	BGN 3,744	BGN 4,896	BGN 5,760	BGN 7,200	BGN 8,640	BGN 10,080	BGN 11,520	BGN 6,208
Option 2	BGN 465	BGN 837	BGN 1,209	BGN 1,581	BGN 1,860	BGN 2,325	BGN 2,790	BGN 3,255	BGN 3,720	BGN 2,004.67
Option 3	BGN 821.25	BGN 1,478.25	BGN 2,135.25	BGN 2,792.25	BGN 3,285	BGN 4,106.25	BGN 4,927.50	BGN 5,748.75	BGN 6,570	BGN 3,540.50

Table 6: Average of bringing different types of housing into energy efficient (Source: Authors' calculations)

In view of this, a financial assessment of the state investments to support the improvement of energy efficiency in Bulgaria by statistical zones, regions and districts has been carried out in relation to current NSI data on the total number of dwellings. The concrete results by region, cities and villages is positioned in Tables 7-9. Financial assessment of state investments to support the energy efficiency of housing in Bulgaria – regionally derived data.

Statistical zones Statistical regions	**Total number of dwellings**	41,50%	40,60%
		Strong agreement that the energy efficiency of the building fund should be a priority because of energy savings	Strong agreement that energy efficiency of buildings should be a priority because of climate change or reduced emissions of fine particulate matter and sulphur dioxide
Total for the country	**4001873**	BGN 10,310,105,447.36	BGN 10,086,512,799.10
in the cities	**2672679**	BGN 6,885,676,361.28	BGN 6,736,348,440.19
in the villages	**1329194**	BGN 3,424,429,086.08	BGN 3,350,164,358.91
North and South-East Bulgaria	**2148521**	BGN 5,535,277,622.72	BGN 5,415,235,457.41
North-West Region	**511822**	BGN 1,318,617,255.04	BGN 1,290,020,736.26
North Central Region	**470760**	BGN 1,212,828,403.20	BGN 1,186,526,100.48
North-East region	**528290**	BGN 1,361,044,092.80	BGN 1,331,527,473.92
South-East region	**637649**	BGN 1,642,787,871.68	BGN 1,607,161,146.75
South-West and South Central Bulgaria	**1853352**	BGN 4,774,827,824.64	BGN 4,671,277,341.70
South –West Region	**1126389**	BGN 2,901,938,508.48	BGN 2,839,004,902.27
South Central Region	**726963**	BGN 1,872,889,316.16	BGN 1,832,272,439.42

Table 7: Financial assessment of state investments to support the energy efficiency of housing in Bulgaria through stone wool – regionally derived data - option 1 (Source: NSI data and authors' calculations)

Statistical zones Statistical regions	Total number of dwellings	41,50%	40,60%
		Strong agreement that the energy efficiency of the building fund should be a priority because of energy savings	Strong agreement that energy efficiency of buildings should be a priority because of climate change or reduced emissions of fine particulate matter and sulphur dioxide
Total for the country	**4001873**	BGN 3,329,304,884.04	BGN 3,257,103,091.38
in the cities	**2672679**	BGN 2,223,499,658.33	BGN 2,175,279,183.81
in the villages	**1329194**	BGN 1,105,805,225.71	BGN 1,081,823,907.57
North and South-East Bulgaria	**2148521**	BGN 1,787,433,399.00	BGN 1,748,669,783.12
North-West Region	**511822**	BGN 425,803,488.61	BGN 416,569,196.08
North Central Region	**470760**	BGN 391,642,505.20	BGN 383,149,053.28
North-East region	**528290**	BGN 439,503,821.63	BGN 429,972,413.45
South-East region	**637649**	BGN 530,483,583.56	BGN 518,979,120.31
South-West and South Central Bulgaria	**1853352**	BGN1,541,871,485.04	BGN 1,508,433,308.26
South –West Region	**1126389**	BGN 937,084,310.03	BGN 916,761,999.69
South Central Region	**726963**	BGN 604,787,175.01	BGN 591,671,308.56

Table 8: Financial assessment of state investments to support the improvement of energy efficiency of housing in Bulgaria through Styrofoam – regionally derived data - option 2 (Source: NSI data and authors' calculations)

Statistical zones Statistical regions	Total number of dwellings	41,50%	40,60%
		Strong agreement that the energy efficiency of the building fund should be a priority because of energy savings	Strong agreement that energy efficiency of buildings should be a priority because of climate change or reduced emissions of fine particulate matter and sulphur dioxide
Total for the country	**4001873**	BGN 5,879,982,012.95	BGN 5,752,464,330.74
in the cities	**2672679**	BGN 3,926,987,299.79	BGN 3,841,823,719.80
in the villages	**1329194**	BGN 1,952,994,713.16	BGN 1,910,640,610.94
North and South-East Bulgaria	**2148521**	BGN 3,156,838,019.21	BGN 3,088,376,471.80
North-West Region	**511822**	BGN 752,023,903.27	BGN 735,714,951.15
North Central Region	**470760**	BGN 691,691,198.70	BGN 676,690,666.68
North-East region	**528290**	BGN 776,220,459.18	BGN 759,386,762.47
South-East region	**637649**	BGN 936,902,458.07	BGN 916,584,091.51
South-West and South Central Bulgaria	**1853352**	BGN 2,723,143,993.74	BGN 2,664,087,858.94
South –West Region	**1126389**	BGN 1,655,011,805.62	BGN 1,619,119,983.33
South Central Region	**726963**	BGN 1,068,132,188.12	BGN 1,044,967,875.61

Table 9: Financial assessment of state investments to support the improvement of energy efficiency of housing in Bulgaria through fibran – regionally derived data - option 3 (Source: NSI data and authors' calculations)

As a result, under option 1 (up to 60% and a price of BGN 96/m^2), the average cost of state aid for stone wool renovation of a dwelling amounts to BGN 6,208. Cumulatively for the country the necessary funds amount to between BGN 10,086,512,799.10 and BGN 10,310,105,447.36,

the largest amount being needed for Northern and South-Eastern Bulgaria, South-West region and Sofia in particular. Under option 2 (up to 30% and a price of BGN 62/m^2), the average value of state aid for styrofoam renovation of an average home amounts to BGN 2,004, with a total value of between BGN 3,257,103,091.38 and 3,329,304,884.04. Under option 3 (up to 45% and a price of BGN 73/m^2) and renovation through fibran, the price amounts to BGN 3,540.50, and the required state aid varies between BGN 5,752,464,330.74 and 5,879,982,012.95

4. CONCLUSION

Based on the analysis, it is confirmed that in order to increase energy efficiency in the construction sector of the country, in the segment of housing construction and to get closer to European environmental standards, it is necessary to carry out a wide-ranging financial assessment of state investments supporting the process tailored to consumer preferences. As a result of the calculations, it is clear that in order to achieve an optimal amount of energy efficiency in Bulgaria, it is necessary to take adequate measures based on optimal values of percentage of styrofoam renovation up to 30% and a price of 62 BGN/m^2. This leads to determining the total amount of funds needed to subsidize efficiency energy measures in the country in the amount of between BGN 3,257,103,091.38 and BGN 3,329,304,884.04. The aim of this approach is to optimize investment in energy efficiency in order to improve housing conditions and comply with environmental standards, taking into account the public nature of resources and consumer preferences.

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BULGARIA'S CREDIT - DEBT VARIABLES IN THE CONTEXT OF MACROPRUDENTIAL POLICY IMPLEMENTATION

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ABSTRACT

The dynamic political and economic conditions of Bulgaria caused by global circumstances lead to significant changes in a number of variables related to public finances, in particular credit-debt variables. For the purpose of taking adequate reactions aimed at limiting the negative trends of a number of measures, macroprudential measures are required. The aim of the present work is to investigate the impact of socio-economic factors on the credit-debt variables of Bulgaria in the period from 2004 to 2022, which includes a number of key financial-economic events affecting the credit-debt processes. As a result of the analysis of the existing capital and liquidity situation of the country, it is necessary to introduce adjustments based on the current positions of financial institutions in Bulgaria. This, in turn, could contribute to stabilising macroprudential policies in the country and moving closer to European prudential objectives.

Keywords: *macroprudential policies, credit variables, debt variables, public finances, Bulgaria*

1. INTRODUCTION

This report attempts to analyze Bulgaria's credit-debt variables in the context of the implementation of macroprudential policies. Although debt has been extensively documented in recent years, the main focus of the current work is quarterly data relating to outstanding amounts at the end of each period on loans and securities, other than shares in financial, non-financial corporations and households, which are monitored for their performance within the scope of macroprudential policies. The aim of this work is to examine the impact of socio-economic factors on the credit-debt variables of Bulgaria in the period from 2004 to 2022. The data used in the development are based on a quarterly basis and are borrowed from the official database of the European Central Bank. It is generally accepted that variable financial and economic events are one of the reasons for the changes in credit and debt indicators in all financial spheres. The report tries to (Zarkova, Kostov, Angelov, Pavlov, & Zahariev, 2023) identify the factors influencing credit-debt processes and to discover the distinctive effect of each one in terms of the implementation of macroprudential policies.

2. CHANGES OF LOANS RATES

The level of domestic credit measures the financial resources provided to the private sector by banks and other financial entities (Anyanwui, Anthony; Gan, Christopher; Hu, Baiding;, 2017). Loans are considered to be the engine of the honest sector, therefore credit-debt variables should be closely monitored. It is considered that the higher the measure of credit in the private sector, the more developed the private sector becomes and the better the economy develops. Understanding and researching debt (Zahariev, et al., 2020a) is essential to derive outcomes related to financial well-being. The decisions that are made about when and how to borrow money can affect finances in the long run. Good debt is considered investment debt that could create value in the future. According to one of the ECB's latest analyses (Evropeiska Centralna Banka, 2023), there is a strong impact of rising interest rates on financing conditions and overall economic developments. At the same time, there is an increase in the cost of loans and a slowdown in their growth.

Conditions for the supply of credit by banks began to tighten in combination with declining demand and reduced the pace of credit growth. Weak bank lending leads to a further decline in the annual growth of the monetary aggregate M3 – the monetary aggregate M2, low-liquid financial instruments – issued government securities up to 2 years and repurchase transactions. At the same time, the resilience of the financial sector is also affected by the decline in real estate markets (Prodanov, Angelov, & Zarkova, Real Estate in Bulgaria from the global financial crisi to the COVID-19 crisis-effects of macroprudential policy: Evidence from Bulgaria., 2022b), mainly influenced by the growth in borrowing costs and unemployment. As a result of the many dynamic factors, macroprudential policy (Prodanov, Angelov, & Zarkova, Makroprudentsialnite politiki-faktor za finansova stabilnost v balkanskite darzhavi, April 2023) remains the main protective barrier against the accumulation of financial vulnerabilities. In this regard, Figures 1 to 5 reflect the rate of change of loans and securities other than shares in individual financial and economic sectors – financial corporations excluding MFIs and insurance corporations and pension funds; insurance corporations and pension funds; non-financial corporations and households; nonfinancial corporations and households and non-profit institutions serving households.

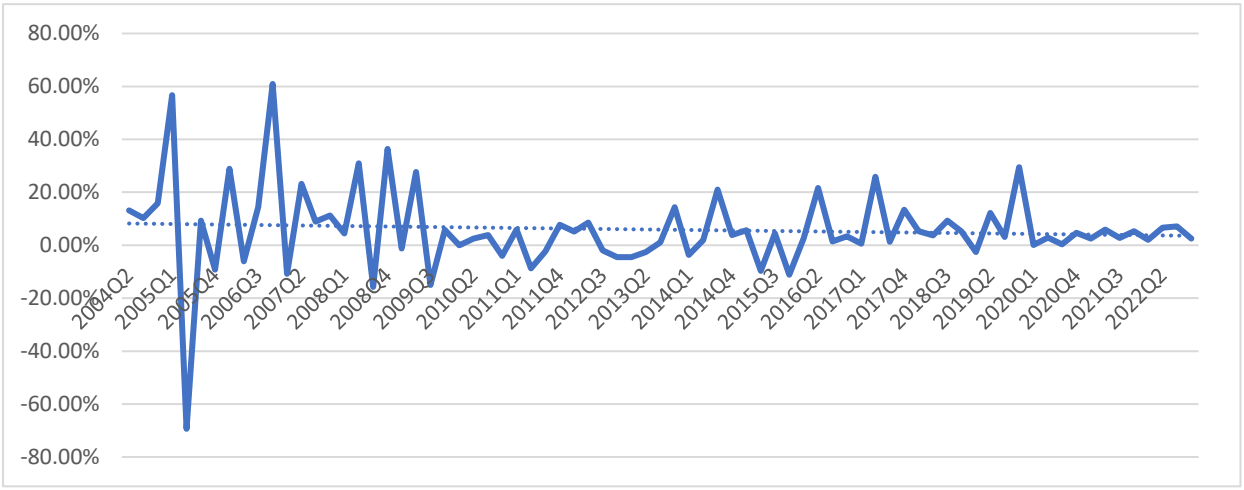

Figure 1: Rate of change of loans and securities other than shares of financial corporations with the exception of MFIs and insurance corporations and pension funds in Bulgaria for the period 2004-2022

(Source: author's calculations based on ECB data: https://sdw.ecb.europa.eu/)

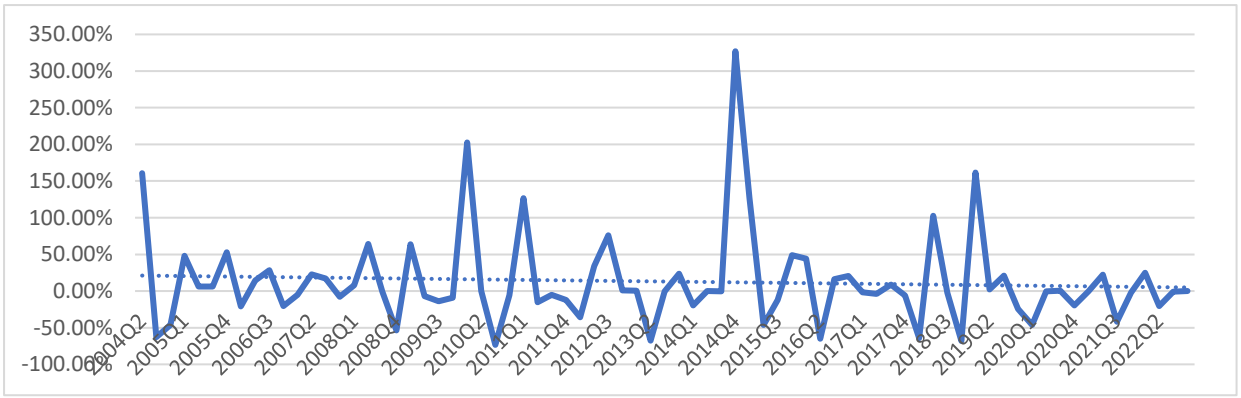

Figure 2: Rate of change of loans and securities other than shares of insurance corporations and pension funds in Bulgaria for the period 2004-2022

(Source: author's calculations based on ECB data: https://sdw.ecb.europa.eu/)

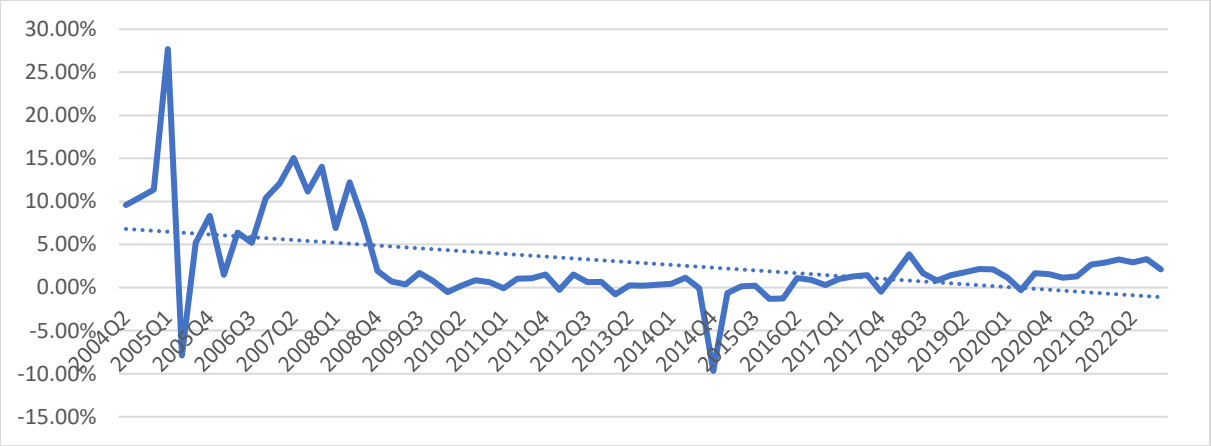

Figure 3: Rate of change of loans and securities other than shares of non-financial corporations and households in Bulgaria for the period 2004-2022
(Source: author's calculations based on ECB data: https://sdw.ecb.europa.eu/)

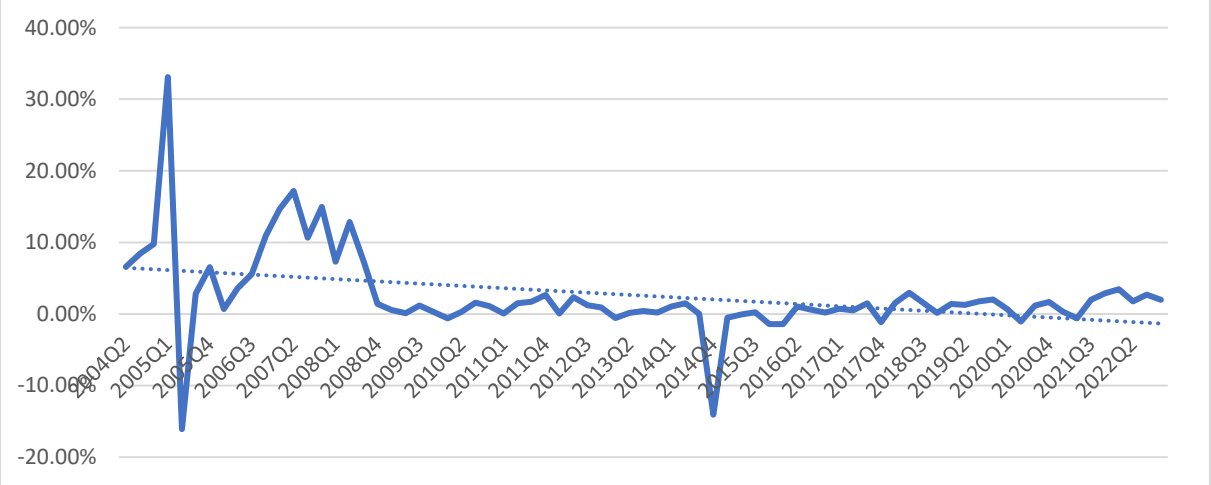

Figure 4: Rate of change of loans and securities other than shares of non-financial corporations in Bulgaria for the period 2004-2022
(Source: author's calculations based on ECB data: https://sdw.ecb.europa.eu/)

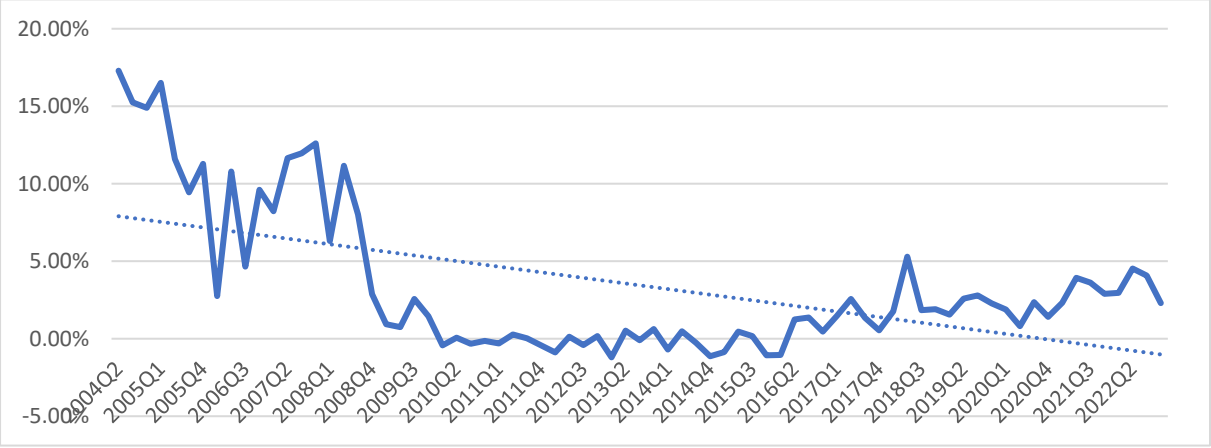

Figure 5: Rate of change of loans and securities other than shares of households and non-profit institutions serving households in Bulgaria for the period 2004-2022
(Source: author's calculations based on ECB data: https://sdw.ecb.europa.eu/)

As a result of the analytical data on the rate of change of loans and securities other than shares in different sectors for the period 2004 – 2022, studied on a quarterly basis, the following more important conclusions can be drawn:

- **First,** credit-debt processes lose their activity after 2009 in all sectors except financial corporations except the cumulative MFI sector, insurance corporations and pension funds and separately in each of them.
- **Second,** after 2020 there is a lull in the pace of change in loans and securities other than shares of financial corporations with the exception of MFIs and insurance corporations and pension funds in Bulgaria. At the same time, a similar process is observed in non-financial corporations and households.
- **Third**, a trend of strengthening credit-debt activity in recent years (after 2019).) is observed in the household sector and non-profit institutions serving households, as well as partial minor movements in the insurance corporations and pension funds sector in Bulgaria. This, in turn, is indicative of the targeted action of macroprudential policies undertaken and their positive impact in sectors.

3. CONCLUSION

The deterioration in corporate bond market conditions has implications for firms that do not issue bonds (European Central Bank, 2023). The deterioration of credit-debt markets may also contribute to the tightening of bank lending conditions for firms. Rising interest rates have caused both challenges and opportunities for banks over the past year. To reduce risks to liquidity, capital and profits from unrealized losses, financial institutions can take several steps, including diversification of contingent sources of funding (White, 2023). As a result, it is necessary to carefully analyze the existing capital and liquidity situation for possible adjustments based on the current positions of financial institutions in Bulgaria, as well as the likelihood of further financial and economic stress. This, in turn, could contribute to stabilising macroprudential policies in the country and moving closer to European prudential objectives.

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THE DAY-AHEAD ENERGY MARKET: CORRELATION ANALYSIS AND TRENDS FOR SELECTED CEE COUNTRIES

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ABSTRACT

A leading idea in the research is to compare the dynamics in megawatt-hour prices reported by energy exchanges in Central and Eastern Europe in the day-ahead segment. As part of the energy sector reform in the EU, the initial positive intentions in the stock market innovation suffered serious external pressure in 2022 with the start of the war in Ukraine. In the focus of research are databases for every hour for the last five years in the Czech Republic, Slovakia, Hungary, Romania, Slovenia and Bulgaria. Through descriptive statistics and correlation analysis, annual values of studied indicators are established, which confirm the strong effect of the 2022 crisis on the initial integrity of the stock exchange segment. In 2022, practically all markets studied by CEI registered peak values and market anomalies in the dynamics of price levels in Euro per megawatt hour. The main conclusion is that in conditions of force majeure and international transmission of economic disturbances, the energy market in selected CEE countries amplifies external pressure and becomes a pro-inflationary factor.

Keywords: *Day-Ahead Market, Energy Exchange, Correlation analysis, CEEC*

1. INTRODUCTION

European energy security regulations require member countries to develop transparent mechanisms for pricing and ensuring economic growth with sufficient energy. Among these mechanisms is the organization of electricity exchange trading in the "day-ahead" segment. With the liberalization and unification of the EU markets, an expectation of lower prices is formed based on the interconnections of the national electricity grids. In 2022, with the start of the war in Ukraine and the natural gas supply crisis, all the expected positives from the new regulatory mechanisms collided with the harsh market reality of sky-high electricity prices, which formed a critical mass for rising inflation across the EU. The described problem hit business electricity consumers particularly hard, where record electricity prices in EUR/MWh in the "day-ahead" segment were automatically passed on to the cost of the widest range of goods and services. The outlined range of problems is the basis for determining the purpose of the research to reveal the degree of price connectivity in the electricity markets in selected Central and Eastern European countries. Through descriptive statistics and correlation analysis, the focus of the study is on the prices in the "day-ahead" segment in the Czech Republic, Slovakia, Hungary, Romania, Slovenia and Bulgaria, followed by a multiple linear regression model with the dependent variable electricity day-ahead price BG (EUR /MWh) and predictors – the rest five markets. The main contribution of the research is the statistical testing of the correlation of six selected CEE countries energy markets under 2022 force majeure circumstances proving that international transmission of economic disturbances, the energy market in selected CEE countries amplifies external pressure and becomes a pro-inflationary factor reaching record ever level of 9.2% (Eurostat, 2023).

2. THE DAY-AHEAD ENERGY MARKET

The European "Day Ahead" market is based on basic pricing rules, taking into account the demand and supply of the relevant product. For the supply of electricity, the price is formed for each hour during the day. For each individual supply time interval (one astronomical hour), an aggregated electricity demand curve and an aggregated electricity supply curve expressed in EUR/MWh are constructed. At the crossing point, two key market parameters are determined - the traded quantities of electrical energy for the relevant hour and the trading price level. Based on a coordinate approach, these should be the coordinates of the intersection point, where the price is expressed on the "y" axis, and on the "x" axis - the amount of electricity supply in MWh provided with capacity. The exchange of information (ENTSOE, 2023) between individual electricity trading platforms allows to establish from individual EU member states to what extent markets are correlated in terms of price and to what extent prices in normally smaller economies are affected by neighbouring countries or leading EU economy. The Regulation on the internal market for electricity is based of three main regulations are:

- First. Capacity Allocation and Congestion Management (CACM) Regulation 2015/1222, covering the day-ahead and intraday timeframe (ACER, 2015).
- Second. Forward Capacity Allocation (FCA) Regulation 2016/1719, covering the forward timeframe (ACER, 2016).
- Third. Electricity Balancing (EB) Regulation 2017/2195, covering the balancing timeframe (ACER, 2017).

Together they implicate the purpose of the European Commission to regulate the European electricity market under the framework the transparent market rules supporting EU GDP growth. The supply chain (Laktionova, Dobrovolskyi, Karpova, & Zahariev, 2019) of electricity is classically organized and the national energy exchange body is intermediator between demand and supply entities. The system is organized as independent but the European Agency for the Cooperation of Energy Regulators (ACER) is providing methodologic support popular as “market code”. The market access of all energy producers is equally guaranteed and in favour with the new European Commission priorities known as a “green deal” and the influence of circular economy ecological standards (Roleders, Oriekhova, & Zaharieva, 2022).

3. METHODOLOGY AND MAIN RESULTS

3.1. Methodology and data description

The methodology of the research is based of following framework:

- Collecting 2022 electricity day-ahead price data for Czech Republic, Slovakia, Hungary, Romania, Slovenia and Bulgaria;
- Evaluating frequency distribution via graphical method compare to normal distribution line - Price CZ (EUR/MWh), Price SK (EUR/MWh), Price HU (EUR/MWh), Price RO (EUR/MWh), Price SLO (EUR/MWh) and Price BG (EUR/MWh).
- Evaluating collected date for the year 2022 on annual and quarterly bases with three instruments: average price level, standard deviation the mean level and coefficient of variation for each of the selected six CEE countries electricity market.
- Applying descriptive statistics and correlation analysis of the collected data set.
- Developing multiple regression analysis with a. Dependent Variable: Price BG (EUR/MWh); and b. Predictors: (Constant), Price RO (EUR/MWh), Price CZ (EUR/MWh), Price SLO (EUR/MWh), Price SK (EUR/MWh), Price HU (EUR/MWh) including: Collinearity Diagnostics, Residuals Statistics, histogram of the regression standardized residual, normal P-P plot of Regression standardized residual, scatterplots of dependant variable and regression standardized predicted value and five predictors electricity markets.

The methodology is based of similar research techniques for evaluation of market price data (Zahariev, Angelov, & Zarkova, 2022a), (Prodanov, Yaprakov, & Zarkova, 2022), (Zahariev, Angelov, & Zarkova, 2022a), (Zahariev, et al., 2020b), (Zahariev, et al., 2020a), (Zaharieva, Tarakchiyan, & Zahariev, 2022). The model consist collection of 52560 input prices of six national CEE countries day-ahead markets (See Figure 1).

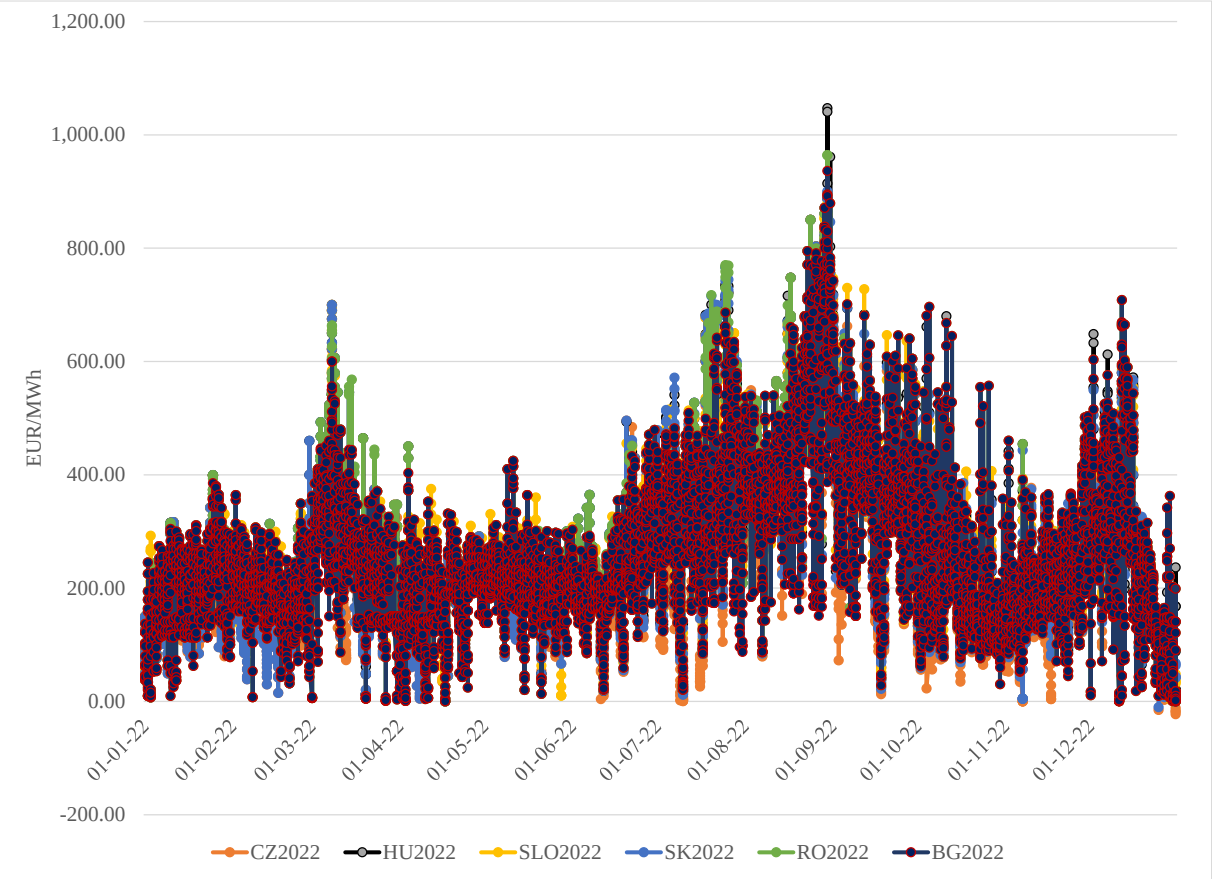

Figure 1: Data description for 2022, 6 CEE countries, 8760 observations per country, 52560 input electricity day-ahead prices data
(Source: Authors research via www.transperancy.entsoe.eu)

The six selected for the research purposes CEE markets are Czech Republic, Slovakia, Hungary, Romania, Slovenia and Bulgaria. The data are presented graphically regarding normal distribution line (See figure 2). Regarding the war in Ukraine as a force majeure and the EU natural gas supply problems the data are tested for price deviation on annual and quarterly bases (See Table 1). On annual bases the Czech republic represent the heist level of variation of day-ahead electricity prices towards the average for the year 2022 with 55.58%, followed by Romania with CV=53.90% and Slovakia with CV=53.75%. The most stable electricity price level is reported in Slovenia with CV = 49.90%. The highest average price level belong to Hungary with 274.46 EUR/MWh and lowest to Czech Republic with 247.43 EUR/MWh. The first quarter of 2002 the deviation analysis rank on first place the Czech Republic with CV=45.97% and to the last place (and the most stable) – Slovenia with CV=37.16%. Regarding price level, the top position belongs to Slovenia with 233.14 EUR/MWh. The lowest electricity prices for the first quarter of the 2022 are reported by Czech Republic – 199.65 EUR/MWh. The second quarter of 2022 the deviation analysis rank on first place bordering to Ukraine East European country Romania with CV=36.23% and to the last place – Slovenia with CV=32.15%. Regarding price level, the top position belongs to Slovenia with 213.33 EUR/MWh.

The lowest electricity prices for the second quarter of the 2022 are reported by Czech Republic – 195.86 EUR/MWh.

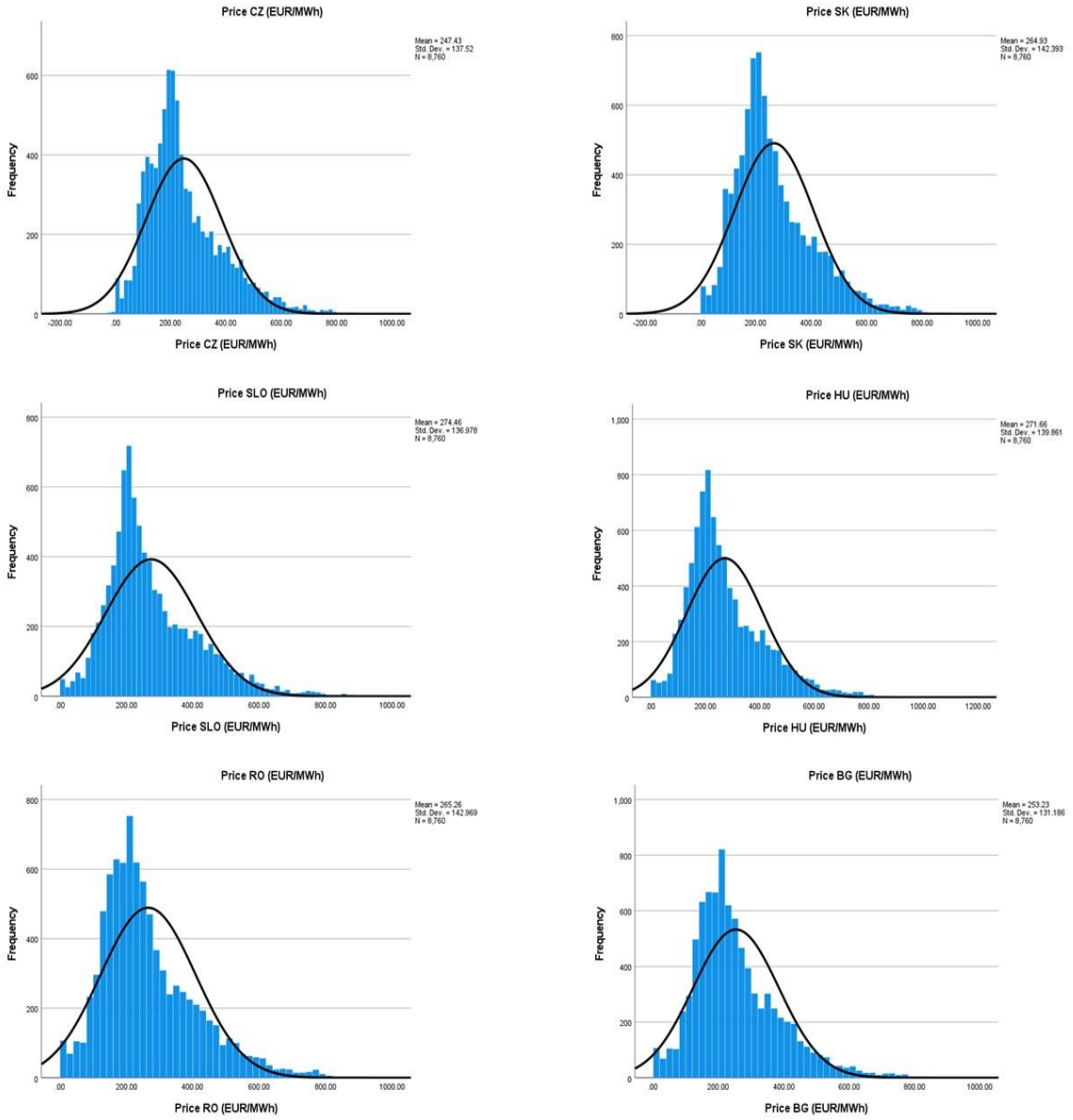

Figure 2: Frequency distribution of six CEE countries electricity day-ahead prices data for 2022 with normal distribution line
(Source: Authors research via www.transperancy.entsoe.eu)

The third quarter of 2022 the deviation analysis rank on first place Czech Republic with CV=38.38%, followed by Bulgaria with CV=37.76% and to the last place – Slovenia with CV=33.29%. Regarding price level, the top position belongs again to Slovenia with 421.77 EUR/MWh (or 97.7 percent higher compare to 2022Q2 analytical data). The lowest electricity prices for the third quarter of the 2022 are reported by Bulgaria – 377.41 EUR/MWh. The last quarter of 2022 the deviation analysis rank on first place again Czech Republic with CV=56.98%, followed by Bulgaria with CV=54.40% and to the last place – Slovenia with CV=50.94%. Regarding price level, the top position belongs again to Slovenia with 228.05 EUR/MWh. The lowest electricity prices for the third quarter of the 2022 are reported by Czech Republic – 205.28 EUR/MWh.

EUR/MWh	CZ2022	HU2022	SLO2022	SK2022	RO2022	BG2022
AVE	247.43	271.66	274.46	264.93	265.26	253.23
StDev	137.51	139.85	136.97	142.38	142.96	131.18
CV=	55.58%	51.48%	49.90%	53.75%	53.90%	51.80%
	CZ2022Q1	**HU2022Q1**	**SLO2022Q1**	**SK2022Q1**	**RO2022Q1**	**BG2022Q1**
AVE	199.65	229.31	233.14	216.57	219.27	210.10
StDev	91.77	88.79	86.64	96.04	96.33	85.32
CV=	45.97%	38.72%	37.16%	44.35%	43.93%	40.61%
	CZ2022Q2	**HU2022Q2**	**SLO2022Q2**	**SK2022Q2**	**RO2022Q2**	**BG2022Q2**
AVE	195.86	210.21	213.33	204.46	202.09	199.58
StDev	69.60	68.95	68.59	70.58	73.22	71.28
CV	35.53%	32.80%	32.15%	34.52%	36.23%	35.72%
	CZ2022Q3	**HU2022Q3**	**SLO2022Q3**	**SK2022Q4**	**RO2022Q3**	**BG2022Q3**
AVE	387.34	419.55	421.77	416.26	412.52	377.41
StDev	148.64	147.18	140.41	147.73	149.70	142.50
CV	38.38%	35.08%	33.29%	35.49%	36.29%	37.76%
	CZ2022Q4	**HU2022Q4**	**SLO2022Q4**	**SK2022Q4**	**RO2022Q4**	**BG2022Q4**
AVE	205.28	225.97	228.05	220.70	225.45	224.32
StDev	116.97	118.61	116.17	117.87	122.49	122.02
CV	56.98%	52.49%	50.94%	53.41%	54.33%	54.40%

Table 1: Annual and quarterly distribution of average and deviation data of Day-Ahead electricity prices in selected CEEC for 2022
(Source: Authors research via www.transperancy.entsoe.eu)

3.2. Main results of descriptive statistics and correlation analysis

The next stage of the analysis is the descriptive statistics.

Descriptive Statistics						
	N	Range	Minimum	Maximum	Mean	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Price CZ (EUR/MWh)	8760	893.45	-22.45	871.00	247.4336	1.46931
Price SK (EUR/MWh)	8760	910.23	-10.00	900.23	264.9259	1.52138
Price SLO (EUR/MWh)	8760	879.29	.00	879.29	274.4617	1.46352
Price HU (EUR/MWh)	8760	1047.10	.00	1047.10	271.6560	1.49432
Price RO (EUR/MWh)	8760	964.04	.17	964.21	265.2554	1.52753
Price BG (EUR/MWh)	8760	936.16	.17	936.33	253.2338	1.40164
Valid N	8760					
	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Price CZ (EUR/MWh)	137.51993	137.51993	1.032	.026	1.143	.052
Price SK (EUR/MWh)	142.39308	142.39308	1.010	.026	1.061	.052
Price SLO (EUR/MWh)	136.97774	136.97774	1.032	.026	1.235	.052
Price HU (EUR/MWh)	139.86089	139.86089	1.077	.026	1.361	.052
Price RO (EUR/MWh)	142.96923	142.96923	1.032	.026	1.205	.052
Price BG (EUR/MWh)	131.18648	131.18648	1.055	.026	1.581	.052

Table 2: Descriptive statistics of Day-Ahead electricity prices in selected CEEC for 2022
(Source: Authors research)

The obtained statistical results (see Table 2) show that the mean values for six variables, measured on a EUR/MWh, range from 253.23 (min) to 274.46 (max). The extreme values are observed for variables Slovenia Day-ahead electricity market where neighbouring markets of Italy and Austria are influencing internal prices via intersystem trade. The standard deviation falls within the range of 131.19 EUR/MWh (for BG) to 142.97 (for RO), followed by 142.39 (for SK).

The skewness values for all six Day-Ahead markets indicate acceptable positively skewed data. The kurtosis for Day-Ahead markets falls within the range of 1.061 (for SK) to 1.581 (for BG). All six market Kurtosis data indicates negative Kurtosis (Platykurtic distribution). From the values of the correlation coefficients presented in the correlation matrix, it was found that (See Table 3):

- At level 0.01 statistically significant (2-tailded) is the relationship between each of the observed markets.
- The Pearson correlation dependencies are statistically significant, as predictors in the analysis: Price CZ (EUR/MWh), Price SK (EUR/MWh), Price HU (EUR/MWh), Price RO (EUR/MWh), Price SLO (EUR/MWh) and Price BG (EUR/MWh).

Correlations							
		Price CZ (EUR/MWh)	Price SK (EUR/MWh)	Price SLO (EUR/MWh)	Price HU (EUR/MWh)	Price RO (EUR/MWh)	Price BG (EUR/MWh)
Price CZ (EUR/MWh)	Pearson Correlation	--					
	Sum of Squares and Cross-products	165647857.264					
	Covariance	18911.732					
	N	8760					
Price SK (EUR/MWh)	Pearson Correlation	.960**	--				
	Sig. (2-tailed)	.000					
	Sum of Squares and Cross-products	164688134.719	177595649.032				
	Covariance	18802.162	20275.791				
	N	8760	8760				
Price SLO (EUR/MWh)	Pearson Correlation	.946**	.975**	--			
	Sig. (2-tailed)	.000	.000				
	Sum of Squares and Cross-products	156069582.896	166546321.913	164344252.763			
	Covariance	17818.196	19014.308	18762.901			
	N	8760	8760	8760			
Price HU (EUR/MWh)	Pearson Correlation	.948**	.989**	.979**	--		
	Sig. (2-tailed)	.000	.000	.000			
	Sum of Squares and Cross-products	159734444.029	172508590.528	164260384.277	171335409.779		
	Covariance	18236.607	19695.010	18753.326	19561.070		
	N	8760	8760	8760	8760		
Price RO (EUR/MWh)	Pearson Correlation	.909**	.952**	.946**	.965**	--	
	Sig. (2-tailed)	.000	.000	.000	.000		
	Sum of Squares and Cross-products	156566581.136	169839628.642	162246405.175	169046766.323	179035706.622	
	Covariance	17874.938	19390.299	18523.394	19299.779	20440.199	
	N	8760	8760	8760	8760	8760	
Price BG (EUR/MWh)	Pearson Correlation	.862**	.895**	.890**	.909**	.945**	--
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	Sum of Squares and Cross-products	136238293.637	146443722.164	140074728.704	146035223.599	155215286.050	150741448.116
	Covariance	15554.092	16719.228	15992.091	16672.591	17720.663	17209.892
	N	8760	8760	8760	8760	8760	8760
**. Correlation is significant at the 0.01 level (2-tailed).							

Table 3: Pearson Correlation with 2-tailed significance of Day-Ahead electricity prices in selected CEEC for 2022
(Source: Authors research)

3.3. Main results of regression analysis

The regression analysis is focused on the Bulgarian energy market as a dependent variable and the rest five markets as predictors - Price RO (EUR/MWh), Price CZ (EUR/MWh), Price SLO (EUR/MWh), Price SK (EUR/MWh), Price HU (EUR/MWh).

Correlations							
		Price BG (EUR/MWh)	Price CZ (EUR/MWh)	Price SK (EUR/MWh)	Price SLO (EUR/MWh)	Price HU (EUR/MWh)	Price RO (EUR/MWh)
Pearson Correlation	Price BG (EUR/MWh)	**1.000**	.862	.895	.890	.909	.945
	Price CZ (EUR/MWh)	.862	**1.000**	.960	.946	.948	.909
	Price SK (EUR/MWh)	.895	.960	**1.000**	.975	.989	.952
	Price SLO (EUR/MWh)	.890	.946	.975	**1.000**	.979	.946
	Price HU (EUR/MWh)	.909	.948	.989	.979	**1.000**	.965
	Price RO (EUR/MWh)	.945	.909	.952	.946	.965	**1.000**
Sig. (1-tailed)	Price BG (EUR/MWh)	.	.000	.000	.000	.000	.000
	Price CZ (EUR/MWh)	.000	.	.000	.000	.000	.000
	Price SK (EUR/MWh)	.000	.000	.	.000	.000	.000
	Price SLO (EUR/MWh)	.000	.000	.000	.	.000	.000
	Price HU (EUR/MWh)	.000	.000	.000	.000	.	.000
	Price RO (EUR/MWh)	.000	.000	.000	.000	.000	.

Table 4: Regression model and Pearson Correlation with 1-tailed significance of Day-Ahead electricity prices for 2022 (a. Dependent Variable: Price BG (EUR/MWh); b. Predictors: (Constant), Price RO (EUR/MWh), Price CZ (EUR/MWh), Price SLO (EUR/MWh), Price SK (EUR/MWh), Price HU (EUR/MWh))
(Source: Authors research)

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change
1	.945[a]	.894	.894	42.75498	.894
	Change Statistics				
1	F Change	df1	df2	Sig. F Change	Durbin-Watson
	14741.806	5	8754	.000	.287
a. Dependent Variable: Price BG (EUR/MWh)					
b. Predictors: (Constant), Price RO (EUR/MWh), Price CZ (EUR/MWh), Price SLO (EUR/MWh), Price SK (EUR/MWh), Price HU (EUR/MWh)					

Table 5: Regression model summary of BG (EUR/MWh) Day-Ahead electricity prices for 2022
(Source: Authors research)

The regression output of Pearson Correlation with 1-tailed significance of Day-Ahead electricity prices for 2022 confirm the highest correlation between Price HU (EUR/MWh) and Price RO (EUR/MWh) with 0.965 positive correlation. The value of Durbin-Watson test indicate a positive autocorrelation between dependent variable and predictors. The meaning of the reported value of 0.287 confirm that the Day-ahead prices of CEE countries are displaying that if the five predictors prices are going down, the prices of the dependant market also will fell (See Table 5). The ANOVA test confirm significance of the model <0.000

Table following on the next page

ANOVA [a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	134739239.254	5	26947847.851	14741.806	.000 [b]
	Residual	16002208.861	8754	1827.988		
	Total	150741448.116	8759			
a. Dependent Variable: Price BG (EUR/MWh)						
b. Predictors: (Constant), Price RO (EUR/MWh), Price CZ (EUR/MWh), Price SLO (EUR/MWh), Price SK (EUR/MWh), Price HU (EUR/MWh)						

Table 6: Analysis of variation of BG (EUR/MWh) Day-Ahead electricity prices with five predictors for 2022
(Source: Authors research)

The regression coefficients (parameter estimates) for three predictors are positive and for two are negative. The significance of Price SLO (EUR/MWh) and Price HU (EUR/MWh) is under 0.95 (See Table 7). Collinearity test confirm high level of integration of price level of evaluated five predictors markets. The VIF date results in tolerance results that are typical for variables on value (commodity price) bases.

Coefficients [a]							
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
		B	Std. Error	Beta			
1	(Constant)	23.896	1.054		22.671	.000	
	Price CZ (EUR/MWh)	.104	.012	.109	8.582	.000	
	Price SK (EUR/MWh)	-.160	.025	-.174	-6.453	.000	
	Price SLO (EUR/MWh)	-.031	.017	-.033	-1.830	.067	
	Price HU (EUR/MWh)	.045	.028	.048	1.612	.107	
	Price RO (EUR/MWh)	.913	.012	.995	74.478	.000	
95.0% Confidence Interval for B		Correlations			Collinearity Statistics		
Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	
21.830	25.962						
.080	.128	.862	.091	.030	.075	13.380	
-.208	-.111	.895	-.069	-.022	.017	59.671	
-.065	.002	.890	-.020	-.006	.038	26.240	
-.010	.100	.909	.017	.006	.014	72.857	
.889	.937	.945	.623	.259	.068	14.730	
a. Dependent Variable: Price BG (EUR/MWh)							

Table 7: Coefficients analysis and Collinearity Statistics of BG (EUR/MWh) Day-Ahead electricity prices with five predictors for 2022
(Source: Authors research)

The analysis of coefficient correlation (See Table 8), collinearity diagnostics (See Table 9) and Residual Statistics (See Table 10, Figure 3, Figure 4 and Figure 5), are bases for a recommendation of further application of Stepwise method of Linear regression where leading predictor variable is expected to be neighbouring to Bulgaria Romanian electricity market.

Table following on the next page

Coefficient Correlations [a]							
Model			Price RO (EUR/MWh)	Price CZ (EUR/MWh)	Price SLO (EUR/MWh)	Price SK (EUR/MWh)	Price HU (EUR/MWh)
1	Correlations	Price RO (EUR/MWh)	1.000	.061	-.044	.026	-.456
		Price CZ (EUR/MWh)	.061	1.000	-.196	-.441	.078
		Price SLO (EUR/MWh)	-.044	-.196	1.000	-.112	-.389
		Price SK (EUR/MWh)	.026	-.441	-.112	1.000	-.661
		Price HU (EUR/MWh)	-.456	.078	-.389	-.661	1.000
	Covariances	Price RO (EUR/MWh)	0.000000	0.000009	-0.000009	0.000008	0.000000
		Price CZ (EUR/MWh)	0.000009	0.000000	-0.000041	0.000000	0.000026
		Price SLO (EUR/MWh)	-0.000009	-0.000041	0.000000	-0.000047	0.000000
		Price SK (EUR/MWh)	0.000008	0.000000	-0.000047	0.001000	0.000000
		Price HU (EUR/MWh)	0.000000	0.000026	0.000000	0.000000	0.001000
a. Dependent Variable: Price BG (EUR/MWh)							

Table 8: Coefficients Correlations and Covariance of BG (EUR/MWh) Day-Ahead electricity prices with five predictors for 2022
(Source: Authors research)

Collinearity Diagnostics [a]									
				Variance Proportions					
Model	Dimension	Eigenvalue	Condition Index	(Constant)	Price CZ (EUR/MWh)	Price SK (EUR/MWh)	Price SLO (EUR/MWh)	Price HU (EUR/MWh)	Price RO (EUR/MWh)
1	1	5.778	1.000	.00	.00	.00	.00	.00	.00
	2	.184	5.611	.87	.00	.00	.00	.00	.00
	3	.021	16.433	.01	.44	.00	.00	.00	.32
	4	.010	24.433	.04	.42	.02	.25	.02	.50
	5	.005	32.916	.05	.06	.26	.67	.06	.07
	6	.002	55.333	.03	.08	.72	.07	.91	.11
a. Dependent Variable: Price BG (EUR/MWh)									

Table 9: Collinearity Diagnostics of BG (EUR/MWh) Day-Ahead electricity prices with five predictors for 2022
(Source: Authors research)

Residuals Statistics [a]					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	8.3303	868.9109	253.2338	124.02801	8760
Residual	-509.15240	94.61987	.00000	42.74277	8760
Std. Predicted Value	-1.975	4.964	.000	1.000	8760
Std. Residual	-11.909	2.213	.000	1.000	8760
a. Dependent Variable: Price BG (EUR/MWh)					

Table 10: Residual Statistics of BG (EUR/MWh) Day-Ahead electricity prices with five predictors for 2022
(Source: Authors research)

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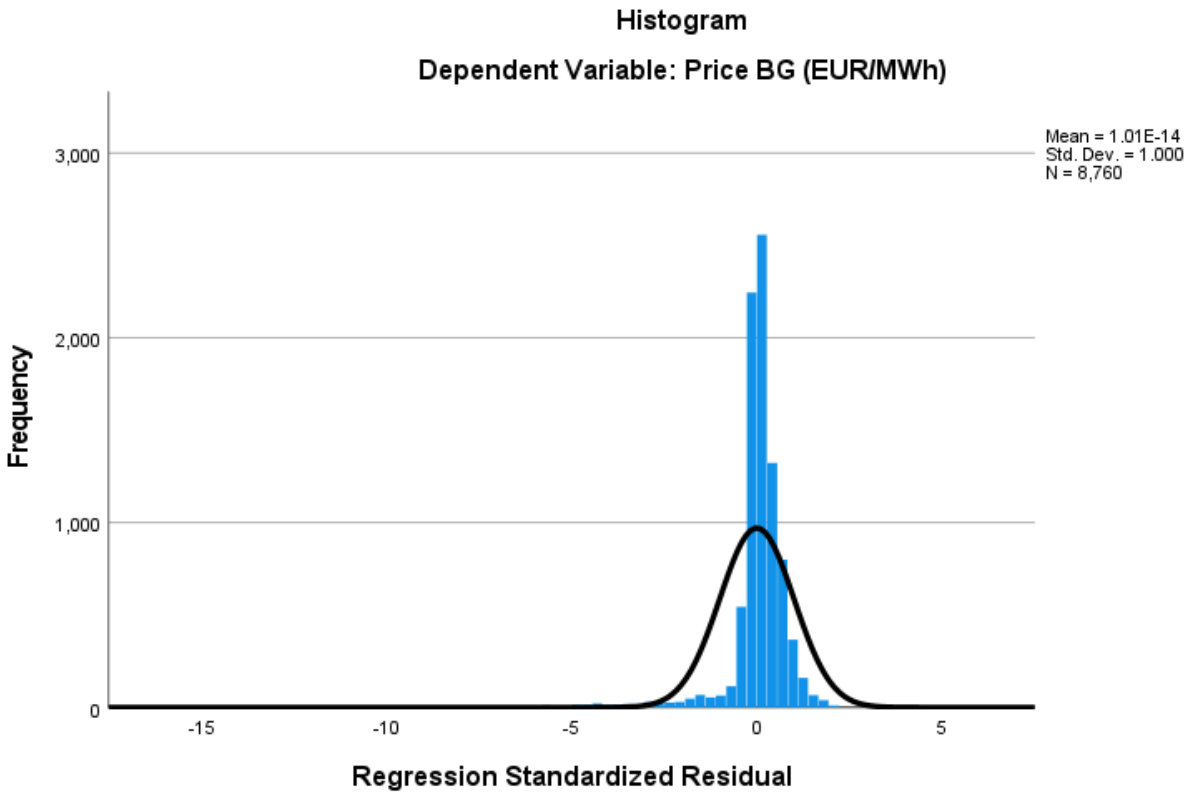

Figure 3: Histogram of dependant variable BG (EUR/MWh) Day-Ahead electricity prices for 2022

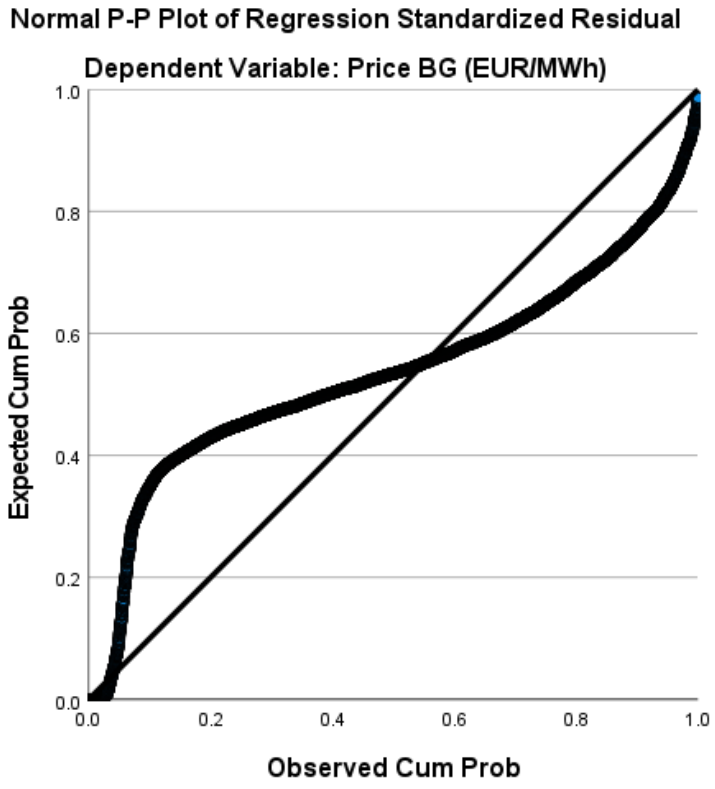

Figure 4: Normal P-P Plot of Regression Standardized Residual of dependant variable BG (EUR/MWh) Day-Ahead electricity prices for 2022

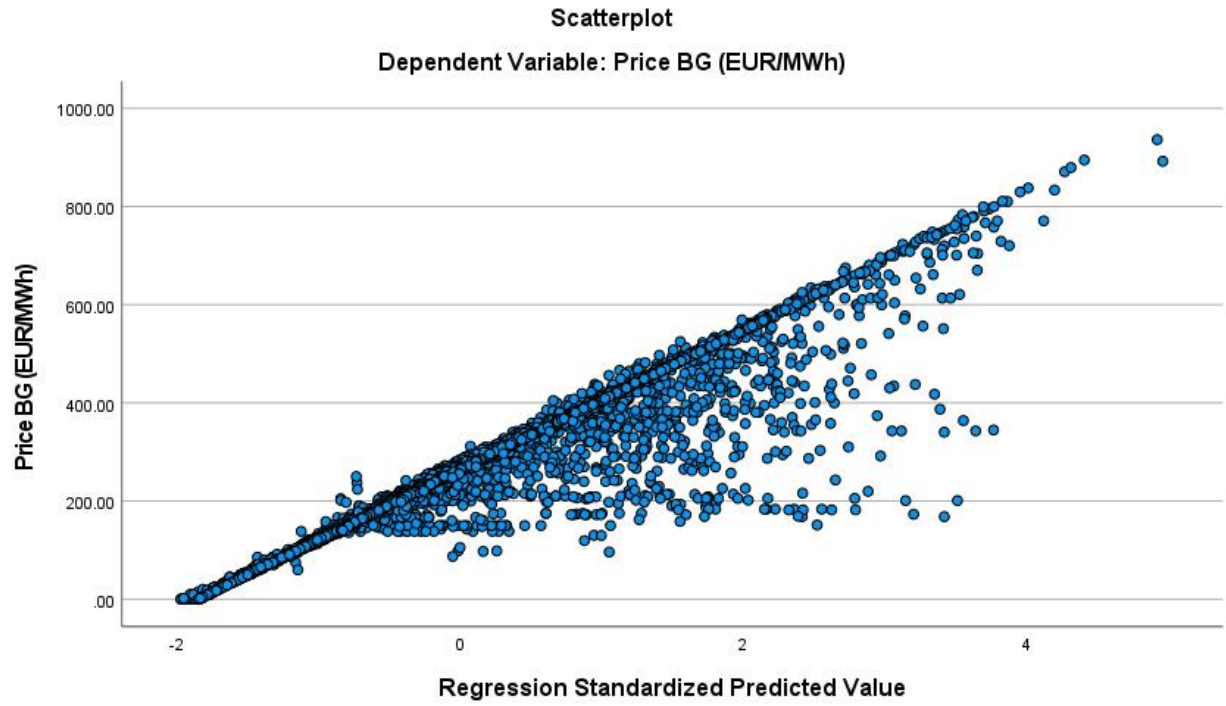

Figure 5: Normal P-P Plot of Regression Standardized Residual of dependant variable BG (EUR/MWh) Day-Ahead electricity prices for 2022

The final stage of the research mated visualise the relationship between dependant variable BG (EUR/MWh) Day-Ahead electricity prices and each of predictors (See Figure 6, 7, 8, 9 and 10).

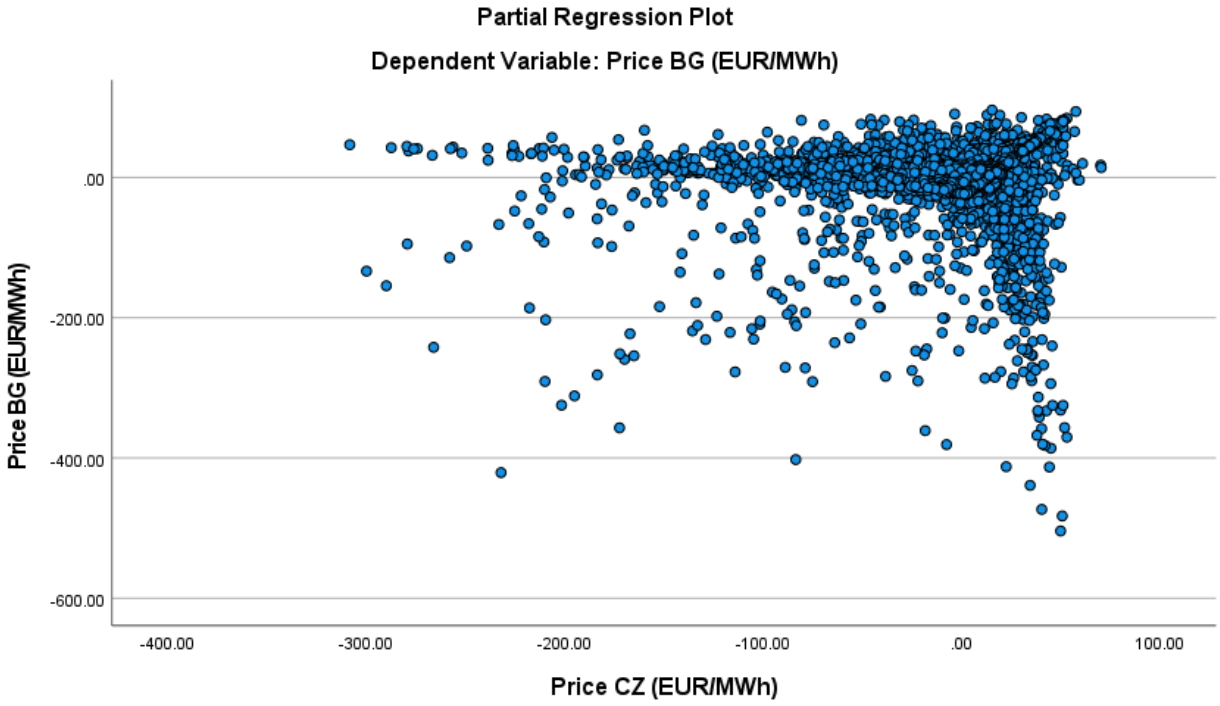

Figure 6: Partial Regression plot with dependant variable BG (EUR/MWh) Day-Ahead electricity prices for 2022 and predictor variable CZ (EUR/MWh)

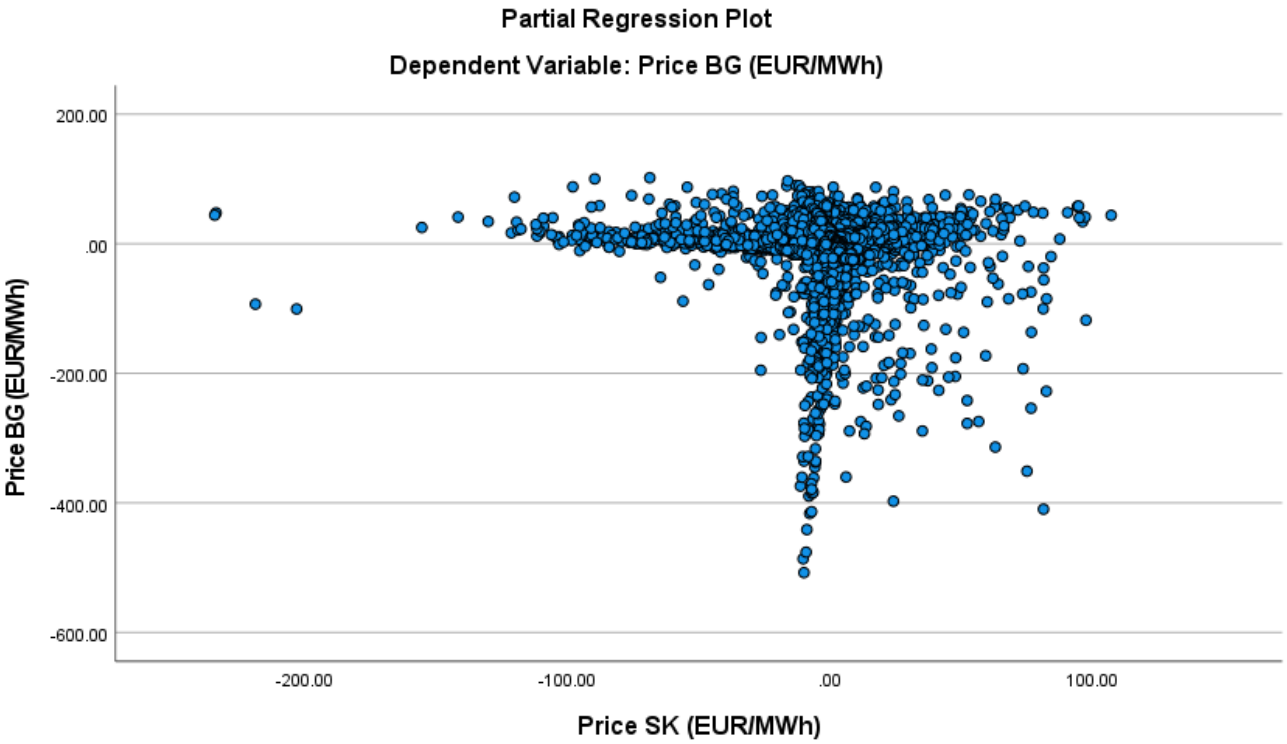

Figure 7: Partial Regression plot with dependant variable BG (EUR/MWh) Day-Ahead electricity prices for 2022 and predictor variable SK (EUR/MWh)

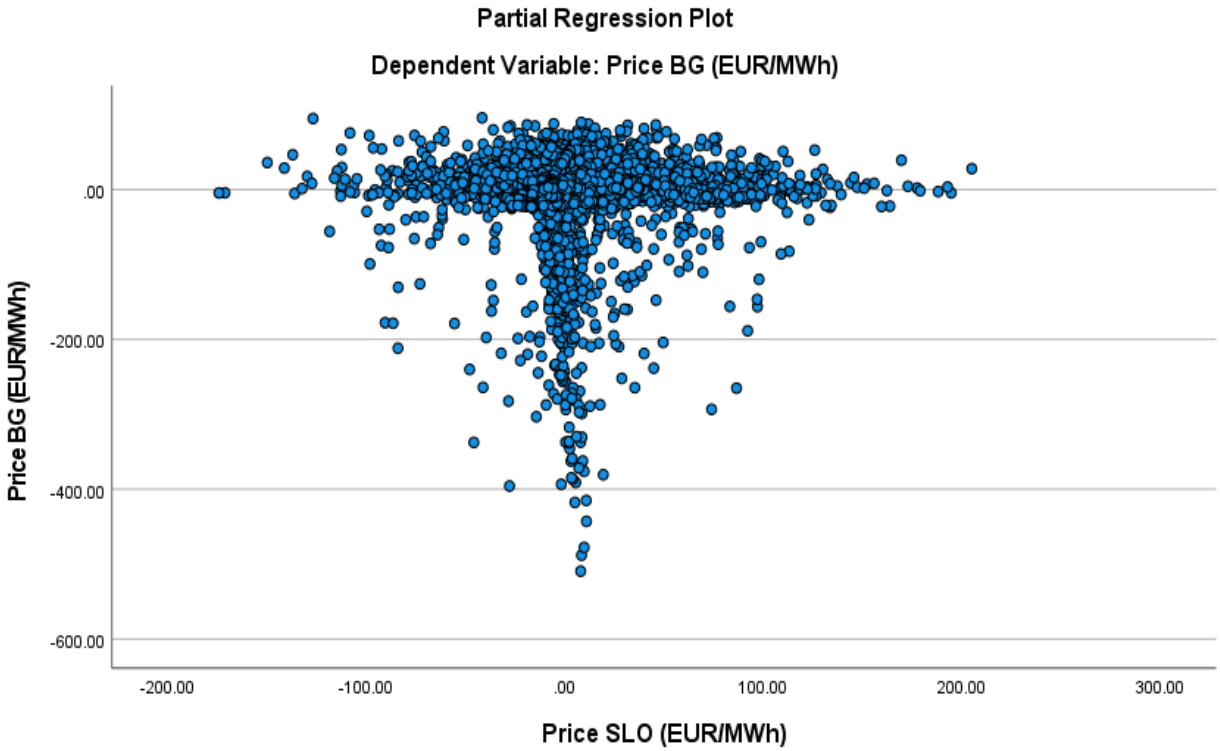

Figure 8: Partial Regression plot with dependant variable BG (EUR/MWh) Day-Ahead electricity prices for 2022 and predictor variable SLO (EUR/MWh)

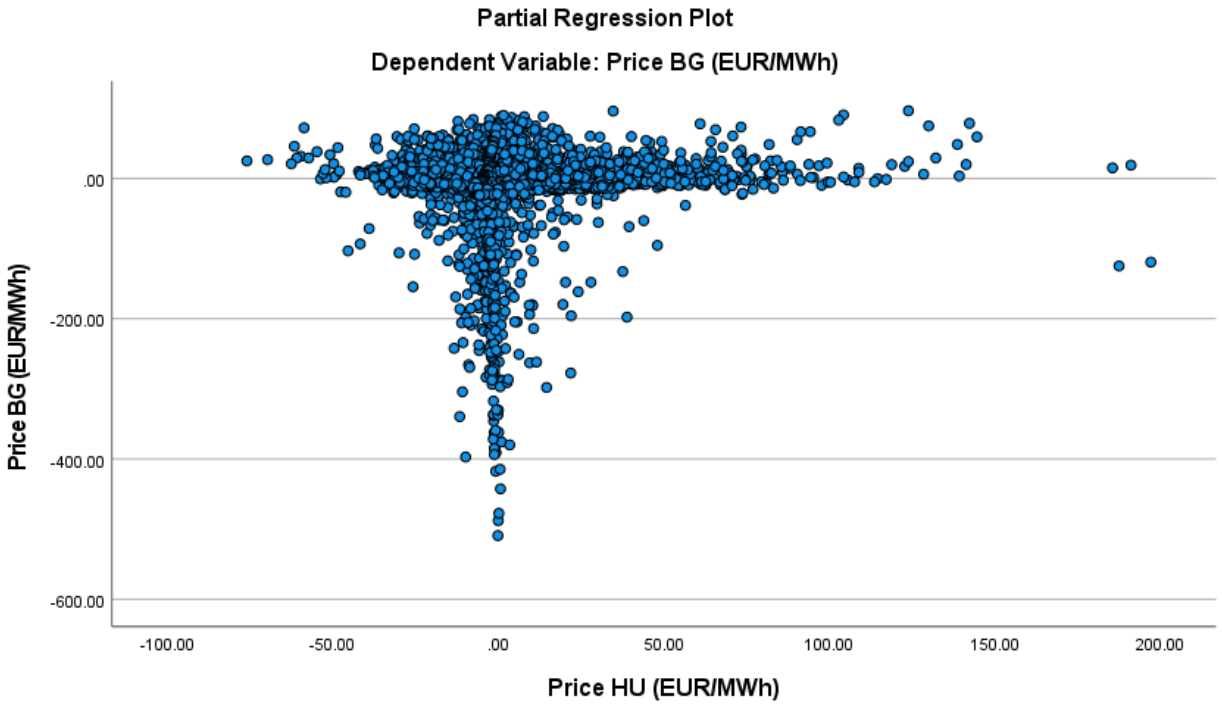

Figure 9: Partial Regression plot with dependant variable BG (EUR/MWh) Day-Ahead electricity prices for 2022 and predictor variable HU (EUR/MWh)

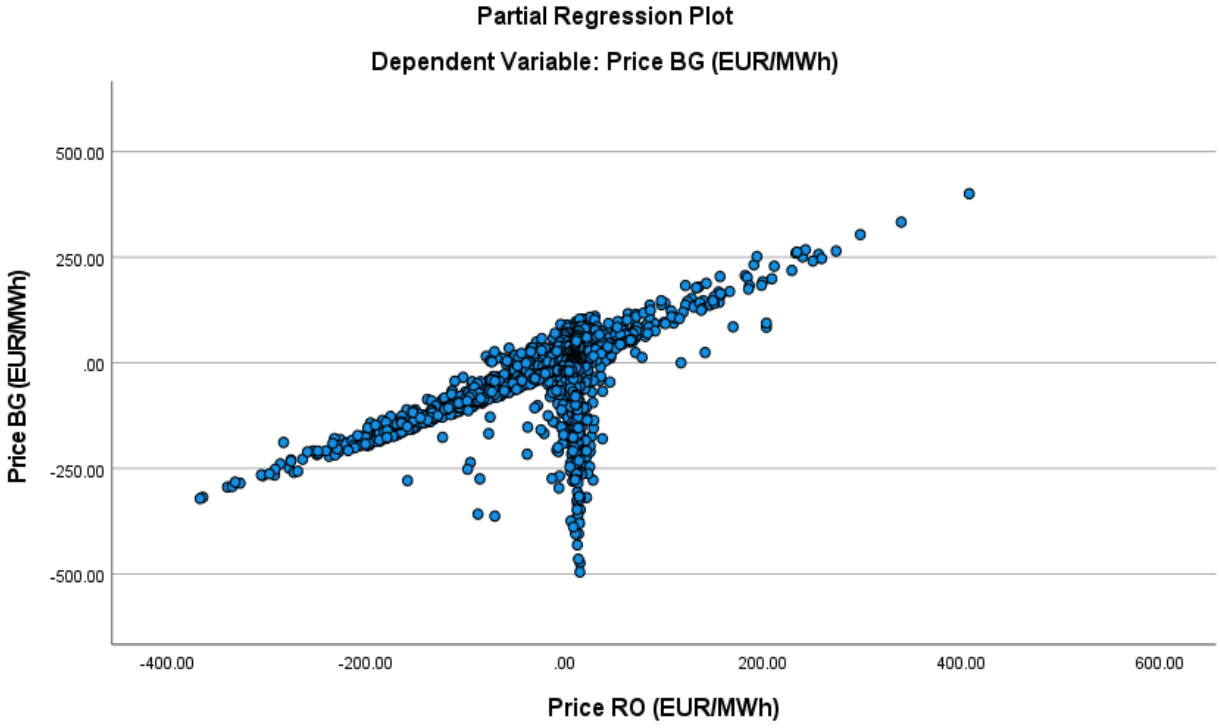

Figure 10: Partial Regression plot with dependant variable BG (EUR/MWh) Day-Ahead electricity prices for 2022 and predictor variable RO (EUR/MWh)

The graphical results confirm the most concentrated distribution of prices of the pair BG-RO (See Figure 10).

4. CONCLUSION

The study of the relation of day-ahead electricity market prices of six CEE countries confirm that in 2022 under force majeure circumstances and international transmission of economic disturbances, the energy market in EU and selected countries becomes a pro-inflationary factor. The developed model has potential (Zahariev, et al., 2023) for improving analytical capacity (Zarkova, Kostov, Angelov, Pavlov, & Zahariev, 2023). On the other hand, the estimated by Eurostat record inflation rates (Euronews, 2023) for 2022 of 9.2% (2021 base of 2.9%) and the six surveyed countries (Bulgaria with 8.2%, Romania with 5.7%, Hungary with 17.2%, Slovakia with 11.9%, the Czech Republic with 8.1% and Slovenia with 14%) clearly shows that CEE countries can easily absorb negative external economic shocks. In any case, the study of an array of 52560 input electricity day-ahead prices data from 6 CEE countries (8760 observations per country) for the year 2022 is a basis for expanding the study both historically (2019-2021) and forward in time (2023 and following years). The valuable lessons of 2022 clearly show that the directives written by the bureaucrats in Brussels, although backed by good intentions, can turn out to be the transmission of the worst inflationary shock in the EU since the introduction of the euro as the single European currency.

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EUROPEAN COOPERATION FOR ACHIEVING GLOBAL SUSTAINABILITY THROUGH THE CIRCULAR ECONOMY - STATUS AND PROSPECTS

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ABSTRACT
The circular economy has established itself as one of the European Union's most ambitious programmes for an innovative transition from the traditional-linear economy to the circular concept. The application of the basic principles of this type of economy in the Member States has its stimulating and increasing the sustainability of the European Community. In order to achieve global sustainability in the Member States of the European Union through the circular economy, it is necessary to integrate the principles of the circular economy through European cooperation, timely analysis of the progress of individual countries and minimize disparities between countries, which is a working thesis in the development. The main objective of this work is to derive a kind of assessment of the contribution of the countries in the implementation of the circular concept for the development of the economy within the European Union. The final framework resulting from the analysis underlines the need for more concentrated cooperation and the adoption of good practices between European countries in order to achieve global sustainability through the circular economy. The analytical review and evaluation of the implementation of the circular economy in the EU Member States show significant disproportions between EU countries, especially among the "newer" Member States, as well as in the countries of Eastern Europe. Two clusters of countries with low contribution to the transformation to a circular economy and countries with high and medium contributions are differentiated. Taking targeted actions to extend the life cycle of products in countries identified as countries with a low momentary contribution to the implementation of the circular economy can contribute to the development of a sustainable, low-carbon and competitive European United States.
Keywords: *European Union, global sustainability, circular economy, European cooperation*

1. INTRODUCTION

A major challenge facing countries in the new year is the achievement of global prosperity and sustainable development. The circular economy is gaining momentum as a way to reduce waste and increase resource efficiency for the transition to a more sustainable future. Global processes and considerations with European requirements contribute to progress towards the implementation of the principles of the circular economy, promoting sustainability and supporting environmental protection. The regeneration of resources and the minimization of waste are the main goals of the peculiar "closure" of production chains. The circular economy (Awan, 2022) removes valuable materials from waste streams by prioritizing the reuse and repair of products, creating industrial recovery systems. By integrating circular economy implementation processes into countries' strategic actions, adequate and timely solutions can be taken to reduce waste and contribute to a more sustainable European future. The identification of good practices and ineffective ones is of fundamental importance for assessing the development of the circular economy in the European Union. In this link, (Fura, Stec, & Mis, 2020) analyze progress in the circular economy in the EU-28 by applying a synthetic measure for the period 2010-2016. The results of the study confirm that the highly developed Benelux countries, i.e. Luxembourg, the Netherlands and Belgium, have the highest level of

progress, while Malta, Cyprus, Estonia and Greece are the least advanced in practice. The survey also presents significant disproportions between EU countries, especially among the "newer" member states. In this regard, the object of this paper is the circular economy. The subject of research is considered to be the circular economy in the EU Member States. The thesis on which the study focuses is related to the fact that in order to achieve global sustainability in the Member States of the European Union through the circular economy, it is necessary to integrate the principles of the circular economy through European cooperation, timely analysis of the progress of individual countries and minimize disparities between countries. The main objective of this work is to derive a kind of assessment of the contribution of the countries in the implementation of the circular concept for the development of the economy within the European Union.

2. THEORETICAL FOUNDATIONS OF THE CIRCULAR ECONOMY

The circular economy model goes through five distinct stages. It starts with the resource separateness, where resources are invested in the production process, after their processing the key stage of consumption and final consumption is reached. The concept of the circular economy (Roleders, Oriekhova, & Zaharieva, 2022) throws out of balance the linear model of the economy, adding the circular element building on the well-known model by reusing, repairing and recycling existing products. The circular process of economics can be represented as follows:

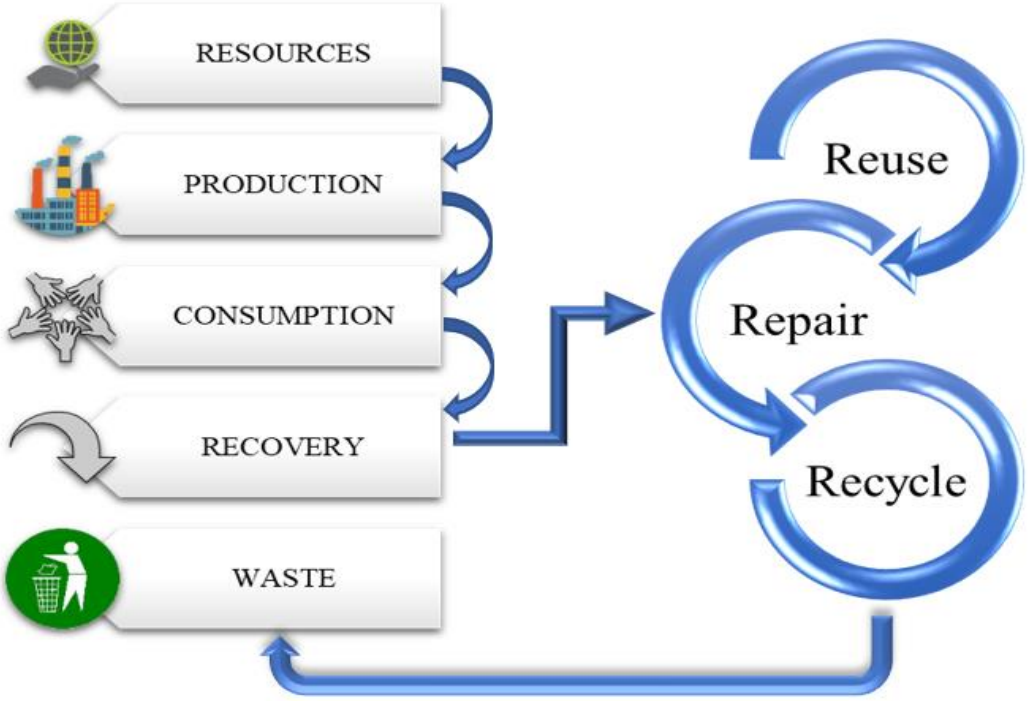

Figure 1: Circular economy
(Source: Author's adaptation based on (Jones, 2023))

The considerable attention that attracts the circular economy as an alternative model of production and consumption necessitates the search for informed and theoretically grounded ideas justifying the application of the circular economy. In this regard, Figure 2 draws attention to the advantages and disadvantages on which the implementation of the circular economy focuses. Many of the advantages are related to reducing the extraction of raw materials and fossil fuels, reducing carbon emissions and getting closer to European environmental directives,

as well as stimulating production, creating new jobs and further developing human resources (Zahariev, Zaharieva, Mihaylova, & Nikolova, 2022), updating logistics processes and strengthening interinstitutional cooperation. Within the scope of the shortcomings of the implementation of the circular economy concept. There are regulatory and logistical challenges for their implementation, as well as the significant need for additional investment for the purpose of an adequate transition process towards a circular economy.

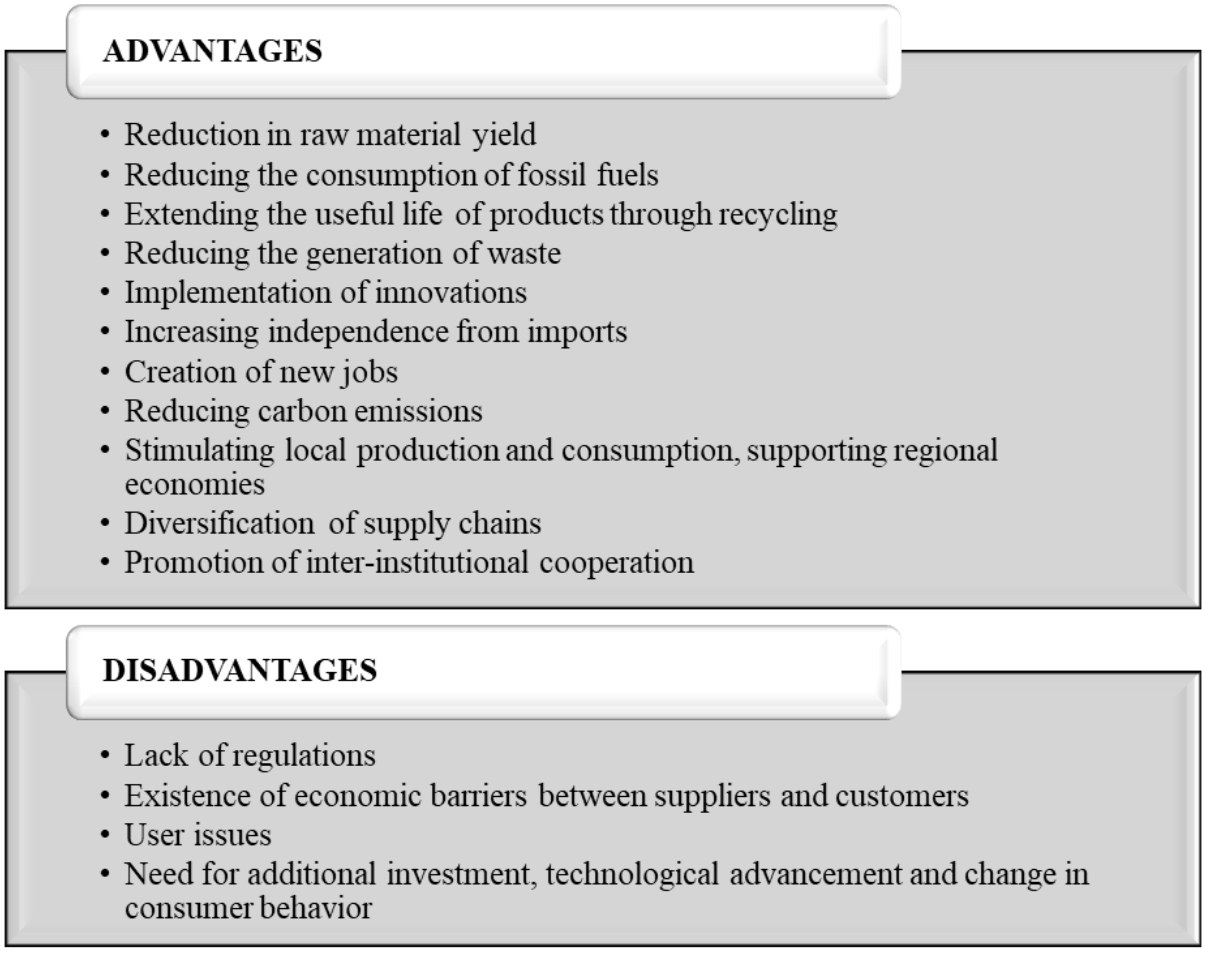

Figure 2: Advantages and disadvantages of implementing the circular economy (Source: Author's interpretation based on (Gil, 2021))

The advantages and disadvantages outlined do not exhaust them to the maximum extent, but provide a starting point for the high degree of applicability for the purposes of positivity of the state economy, regional development and environmental protection. This, in turn, makes it necessary to explore the application of the circular economy model in Europe, the implementation of training courses (Angelov, Petko; Mihaylova, Margarita, 2023) and cooperation between countries to achieve global sustainability by changing the economic model.

3. ANALYZING THE CONTRIBUTION OF THE STATES IN IMPLEMENTING THE CIRCULAR ECONOMY CONCEPT AT THE EUROPEAN UNION LEVEL

The analysis of EU (Institute European Environmental Policy, 2022) circular economy initiatives shows that the concept of a circular economy at EU level has been changing positively since the launch of the first EU Circular Economy Action Plan in 2015 and the new plan adopted in 2020.

In this regard, Figure 3 presents the circular rate of material use – percentage of total material use (average for the period 2010-2021).) of countries located in Europe.

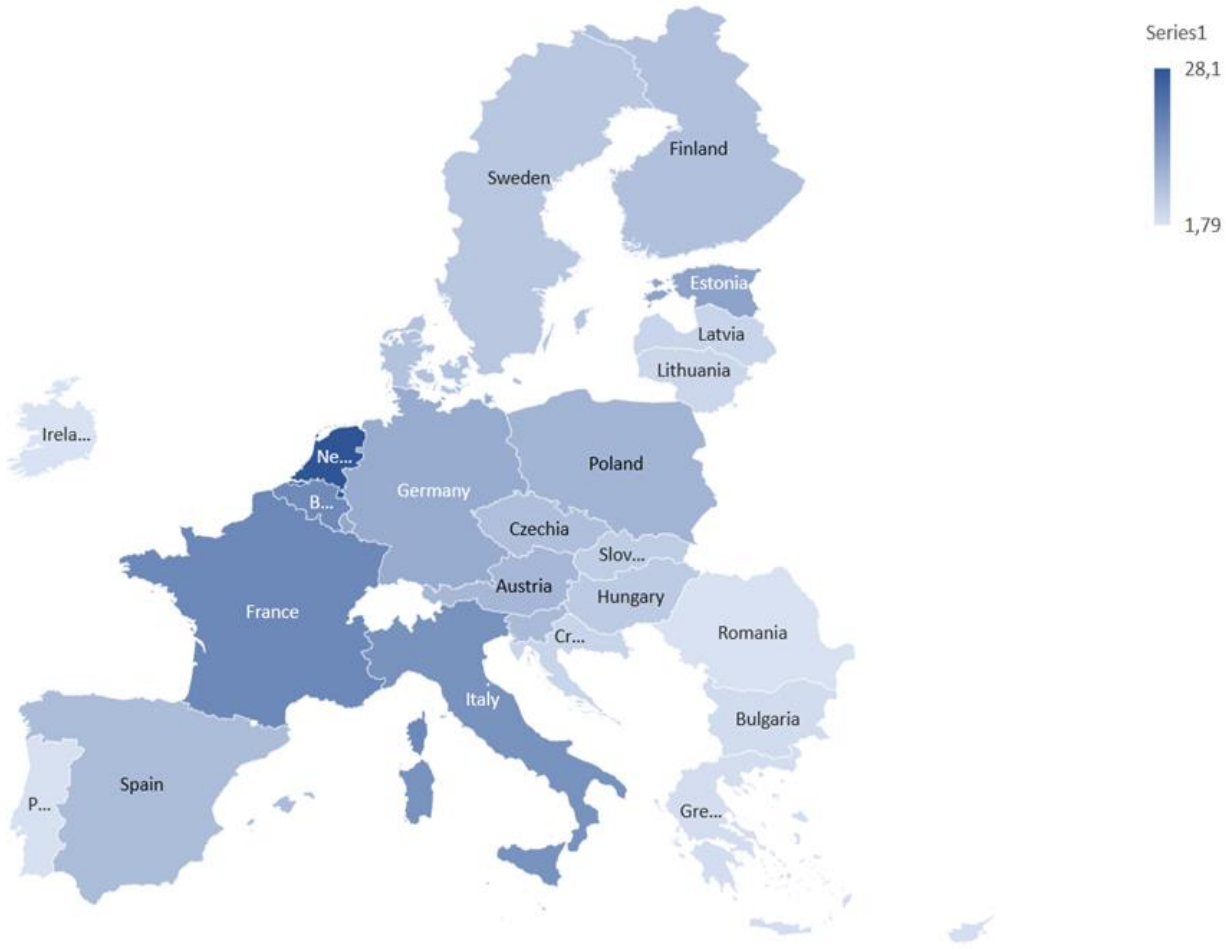

Figure 3: Circular rate of material use – percentage of total material use (average for the period 2010-2021))
(Source on Danny: Eurostat and Calculations on Cars)

Evident from the average data in Figure 3 is the in-depth application of the concept in the Western European countries – the Netherlands, Belgium, France, Italy, to a lesser extent in Germany, Poland and Austria. The listed countries hardly dispose of waste, but incinerate it as a recycling stage. At the same time, Lithuania, Latvia, Ireland, Italy, France, the Czech Republic, Slovakia and Poland (European Parliament, 2023) use incineration, landfilling and recycling of waste. Indicative is the transitional state of the Eastern European countries – Romania, Bulgaria (Angelov, Petko; Zarkova, Silvia, 2023), Greece, Croatia, as well as Portugal, which are evident from the figure at this stage apply to a lesser extent the alternative solution of the linear economy. From a contaminant perspective, Figure 4 brings out the contribution aspect of recycled materials to the demand for raw materials - end-of-life recycling rates (average over the period 2010-2021). It is evident from the data in Figure 4 that lead is the highest contributor to the demand for raw materials, which has a significant recycling rate – nearly 80%. It is followed by copper, iron, zinc, molybdenum, recyclable between 30% and 40%. With the lowest recycling rate at the end of their life are bismuth, gallium, lithium, dysprosions, gypsum, etc., which are not recycled or treated up to 1%.

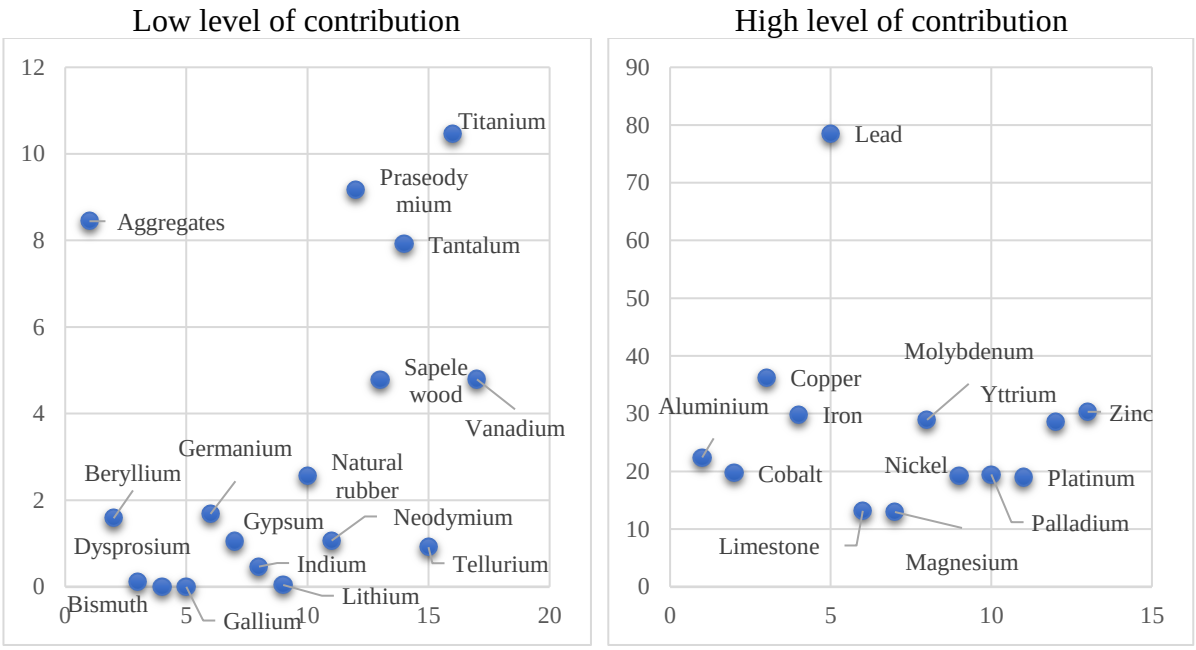

Figure 4: Contribution of recycled materials to the demand for raw materials - end-of-life recycling rates (average value for the period 2010-2021)
(Data source: Eurostat and author's calculations)

The indicators listed numerically in Figures 5, 6 and 7 are considered part of the framework for monitoring the implementation of the principles of the circular economy. Their analysis supports the overall monitoring of countries' progress from a linear to a circular economy. In this regard, figure 5 presents the EU Member States divided into two groups – countries with a low level of contribution and countries with a medium and high contribution to the import of recyclable materials. For the analyzed period 2010-2021, it is observed that Romania (Angelov & Zarkova, 2023), as a country that joined significantly later in the EU (in 2007).) is in the range of countries with medium and high contributions to imports of recyclable raw materials. The country with minimal imports of recyclable raw materials is Malta, followed by Slovakia, Luxembourg, Estonia and the Czech Republic. The countries with medium and high import contributions of recyclable raw materials are mainly countries with high economic activity and contribution in the EU related to production – the Netherlands, Spain, Germany, France and Italy (Zahariev, et al., 2020a). In parallel, Figure 6 presents a cluster distribution of EU Member States against the indicator "Trade in recyclable raw materials – exports (average for the period 2010-2021).)". The countries with the lowest level of contribution for the period 2010-2021 in this indicator are Luxembourg, Cyprus, Malta and the Czech Republic. In parallel, they rank the Netherlands, Germany and Belgium, which recorded the highest average exports for the period. It is evident from the indicators for imports and exports of recyclable raw materials that the countries with the lowest level of imports and exports in the EU are actually the countries that make up the G-9 – the small countries with less than one million inhabitants.

Figure following on the next page

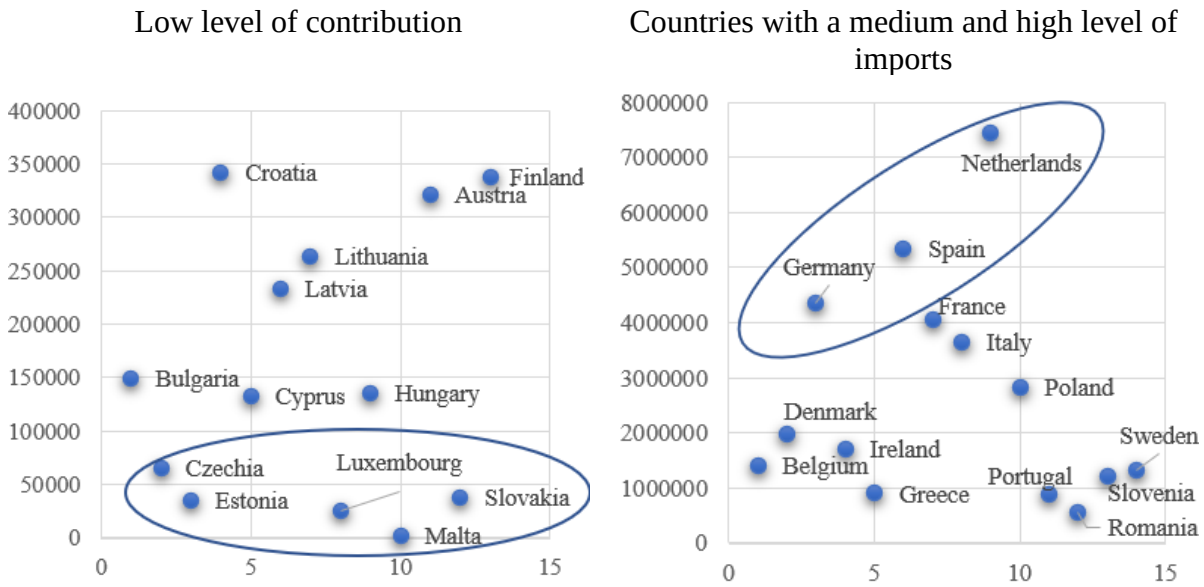

Figure 5: Trade in recyclable raw materials – imports (average value for the period 2010-2021)
(Data source: Eurostat and author's calculations)

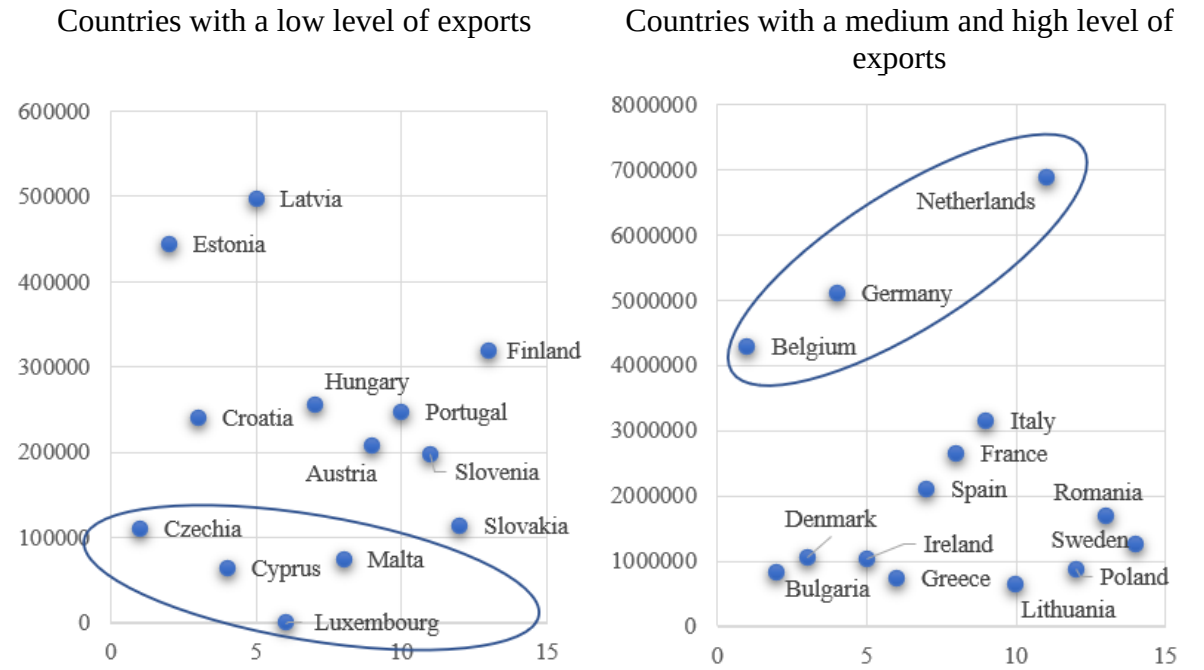

Figure 6: Trade in recyclable raw materials – exports (average value for the period 2010-2021)
(Data source: Eurostat and author's calculations)

Waste and secondary raw materials are recycled and restored within the scope of the economy in the form of new raw materials. The indicator itself (European Parliament Research Service, 2019) measures trade in materials that have the ability to recycle. Their scope includes plastic waste, paper, precious metals, iron and aluminum for scrap, etc. Among the countries with the weakest trade in recyclable materials within the EU are Malta, Cyprus and Estonia, with the average trade value for the countries with the latest accession within the Community – Bulgaria, Romania and Croatia – between EUR 441 150 thousand and EUR 632 295.5 thousand.

On an approximate medium scale is the trade in recyclable materials in Sweden, Slovakia, Slovenia, Portugal, Hungary, Denmark and the Czech Republic. The countries with the most significant intra-EU trade in recyclables for the period 2010-2021 are Germany, Belgium and the Netherlands, which rank among the most advanced countries following the principles of the circular economy within the European Community.

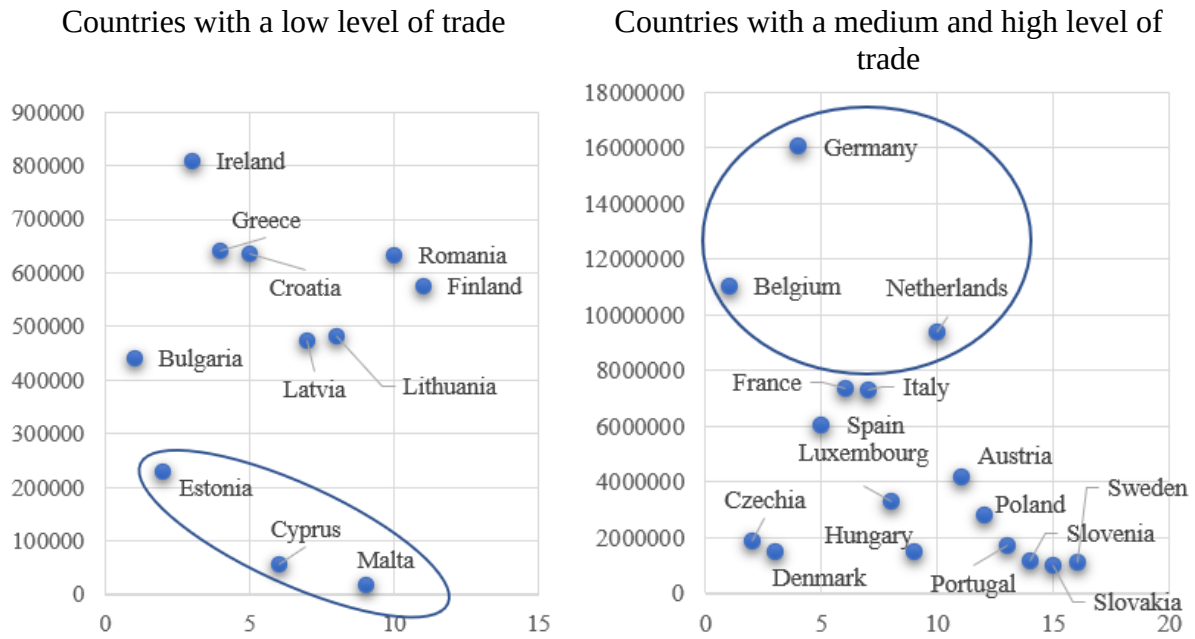

Figure 7: Intra-EU trade in recyclables (average 2010-2021)
Data source: Eurostat and author's calculations

The European Union itself, in its original form, was founded on the basis of the Schuman plan of 1951. (European Union, 2023) by the predecessor community, the European Coal and Steel Community established by Belgium, the Netherlands, Luxemburg, West Germany, France and Italy. It is evident from the assessment of the contribution of the countries in the implementation of the circular concept for economic development that 70 years later the same countries maintain their adequate development with care for the sustainable development of the EU and efficiency in meeting the new regulatory challenges. In order to develop the transition of the economies of a large part of the EU Member States to a circular one, it is necessary to "level the speed" between the countries. This applies both between Eastern and Western Europe and between the countries considered to be the founding members of the EU and the countries that joined at a later stage. This could contribute to the realization of the circular concept for the development of the economy within the European Union in line with the standards of the European Union.

4. CONCLUSION

The concept of circular economy in the European Union encompasses a compilation of several complementary sciences with an up-to-date entrepreneurial and economic outlook. The aim of its implementation is to achieve global sustainability and environmental protection as part of the EU's industrial strategy. There are significant advantages of applying the circular economic outlook within the Member States of the European Community, with disadvantages related to peculiar challenges to EU policy on which it needs to be focused. The analysis and evaluation of the implementation of the circular economy in the EU Member States show significant disproportions between EU countries, especially among the "newer" member states, as well as in the countries of Eastern Europe.

Two clusters of countries with low contribution to the transformation to a circular economy and countries with high and medium contributions are differentiated. As part of more in-depth actions on the implementation of the principles of the circular economy, the following countries should work: Malta, Slovakia, Luxembourg, Estonia, Cyprus and the Czech Republic. For the purpose of positive the state economy, regional development and environmental protection in line with European norms and concepts, it is necessary to undertake monitoring actions on the progress of the transition to a circular economy and to adapt their economic policies to the new standards. In this way, even action and progress could be achieved in achieving European cooperation to achieve global economic sustainability.

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ANALYSIS OF FUTURES ACTIVITY ON MAJOR COMMODITIES, AFFECTED BY THE WAR IN UKRAINE

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ABSTRACT

Russian aggression since February 2022 and the ongoing war in Ukraine has put grain and liquid fuel supplies in jeopardy for many economies that import these essential commodities. This raised the question of changes in investment behavior, which we investigate through the futures traded on two of the world's commodity exchanges - The Chicago Board of Trade and The New York Mercantile Exchange. The prices and trading volumes of futures contracts based on wheat, corn, soybeans, oats and rice, all due September 2023, that we examine here, do not show trading behavior dictated by the threat of global shortages, however short-term. Natural gas and crude oil futures saw a sharp rise in prices in the first months of the Russian invasion of Ukraine, but the last year has been dominated by a sustained and significant decline. The trading volumes of these futures follow a normal volatility without a trend change throughout the studied period. We apply Engle and Granger test of cointegration of price and volume time series of each particular futures contract. Through our analysis we conclude that there is a statistically significant relationship between the magnitude of price movements and volume changes in the futures observed in our study. According to our results bigger trading volumes result in higher price volatility of the futures. We do not find a clear statistical relationship between price increases and volume increases, and vice versa.

Keywords: *price movements, trading volume changes, grain futures, natural gas and crude oil futures, Engle and Granger Test of Cointegration*

1. INTRODUCTION

As one of the direct economic consequences of the Russian invasion in Ukraine on February 24, 2022, the problem of grain supplies appeared. The ongoing hostilities and the deliberate attack of Ukrainian port infrastructure and transport ships by Russia have raised the question of the security of these crops on international markets and the price levels they may reach. The same issue that Russia was counting on to create a problem for Europe also applies to natural gas and crude oil. Given that, the object of the present research is the prices of futures contracts on major exchange commodities affected by the war in Ukraine. The subject of the analysis are: parallel between the price dynamics of the various base assets; comparative analysis of activity (exchange volumes); the interrelationships between price dynamics and activity with the various futures contracts. More specific tasks are: 1) To determine whether there is an essential change in demand for the major exchange-traded grains, natural gas and crude oil by tracking the dynamics of the trading volumes of the futures based on them; 2) Ranking of the rates of price dynamics of the selected futures contracts; 3) Investigating the presence of dependencies between prices and activity (trade volumes) of particular futures contracts.

2. RESEARCH RELATED TO THE TOPIC

Aslam, Ferreira and Ali (Aslam, Ferreira, & Ali, 2022) analyze the impact of COVID-19 pandemic on the intraday efficiency of agricultural futures markets. Wang, Shao and Kim (Wang, Shao, & Kim, 2020) study the correlations between crude oil and agricultural futures. Narayan, Narayan and Zheng (Narayan, Narayan, & Zheng, 2010) similarly examine the relationships between gold and oil futures markets. Kumar, Managi and Matsuda (Kumar, Managi, & Matsuda, 2012) carry out research on relationships between stock prices of clean energy firms, oil and carbon markets.

3. SELECTION FOR THE EMPIRICAL STUDY

The dataset for our research contains daily closing prices of commodity futures for Wheat, Corn, Soybeans, Oats, Rough rice, Natural Gas and Crude Oil. The data is provided by Yahoo Finance and corresponds to future prices and trading volumes from the Chicago board of trade and New York Mercantile Exchange.

Ticker	Futures contract	Exchange
ZWU23	Chicago SRW Wheat Futures, Sep-2023	Chicago Board of Trade
ZCU23	Corn Futures, Sep-2023	Chicago Board of Trade
ZSU23	Soybean Futures, Sep-2023	Chicago Board of Trade
ZOU23	Oat Futures ,Sep-2023	Chicago Board of Trade
ZRU23	Rough Rice Futures, Sep-2023	Chicago Board of Trade
NG=F	Natural Gas, Sep-23	NY Mercantile Exchange
CL=F	Crude Oil, Sep-23	NY Mercantile Exchange

Table 1: Selection of Futures contracts

The time period covered begins on 01.01.2022 and ends at 01.07.2023. All contracts expire in September 2023. For the implementation of the set empirical tasks, we consider the rates of dynamics of both prices and stock exchange volumes on a daily basis. As of July 2023, almost 33 million tons of grain and other food products have been exported through the Black Sea Grain Initiative. 90% of the Ukrainian export is formed by corn (52%), wheat (28%) and 11% sunflower products. The parallel with the futures based on the other grain contracts that we examine here allow us to establish whether the behavior of wheat and corn was shaped by the influence of the war in Ukraine.[1]

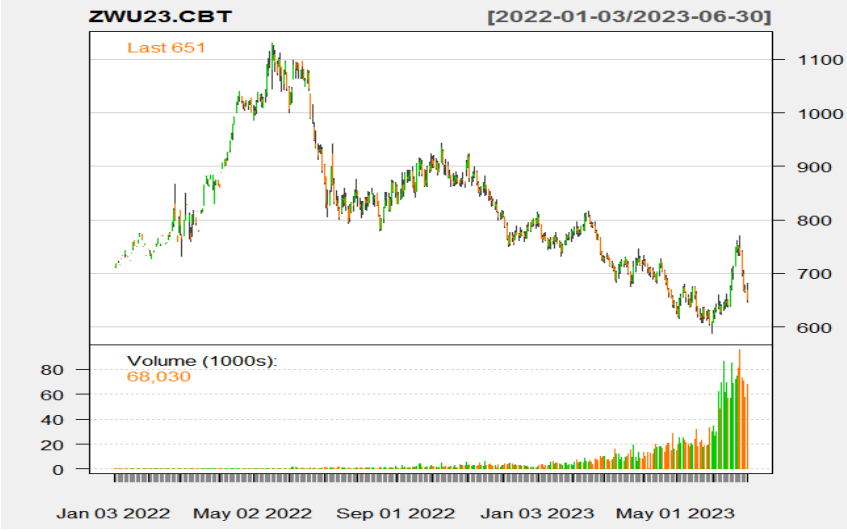

Figure 1: Chicago SRW Wheat Futures, Sep-2 (ZWU23.CBT)[2]

[1] https://www.consilium.europa.eu/en/infographics/ukrainian-grain-exports-explained/
[2] https://finance.yahoo.com/quote/ZWU23.CBT/

From the data shown graphically in Figure 1, it is clear that wheat futures trading throughout 2022 was relatively small, but from the beginning of 2023 it became progressively active, with trading volumes in April and May 2023 exceeding over 80 times those of the beginning of 2022. At the same time, the price of wheat futures (expiring in September 2023) from May 2022 shows a clear downward trend, losing almost 50% of its value in one year.

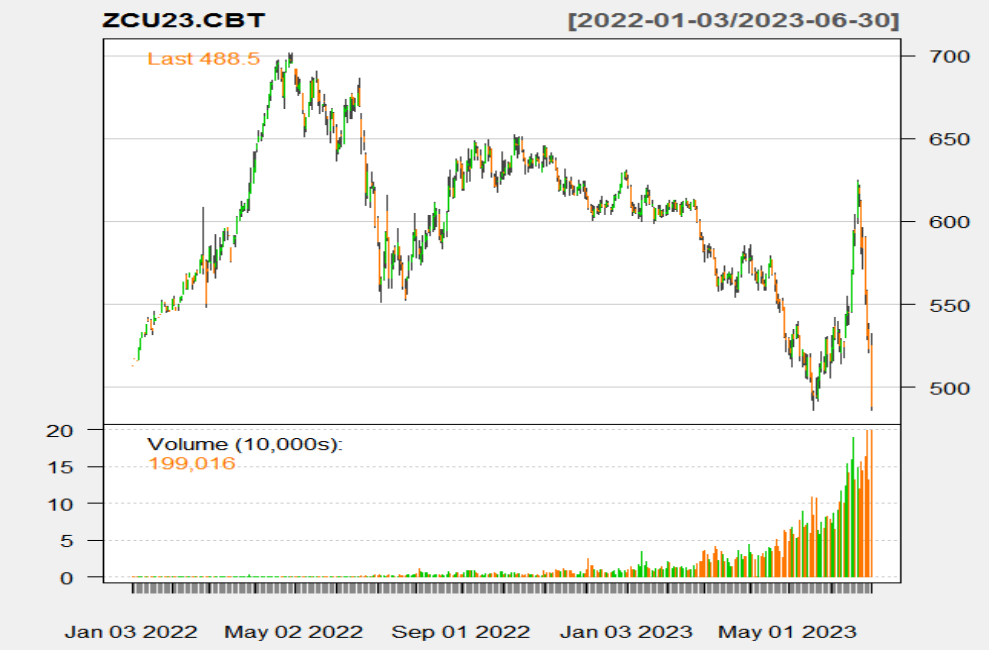

Figure 2: Corn Futures, Sep-2023 (ZCU23.CBT)[3]

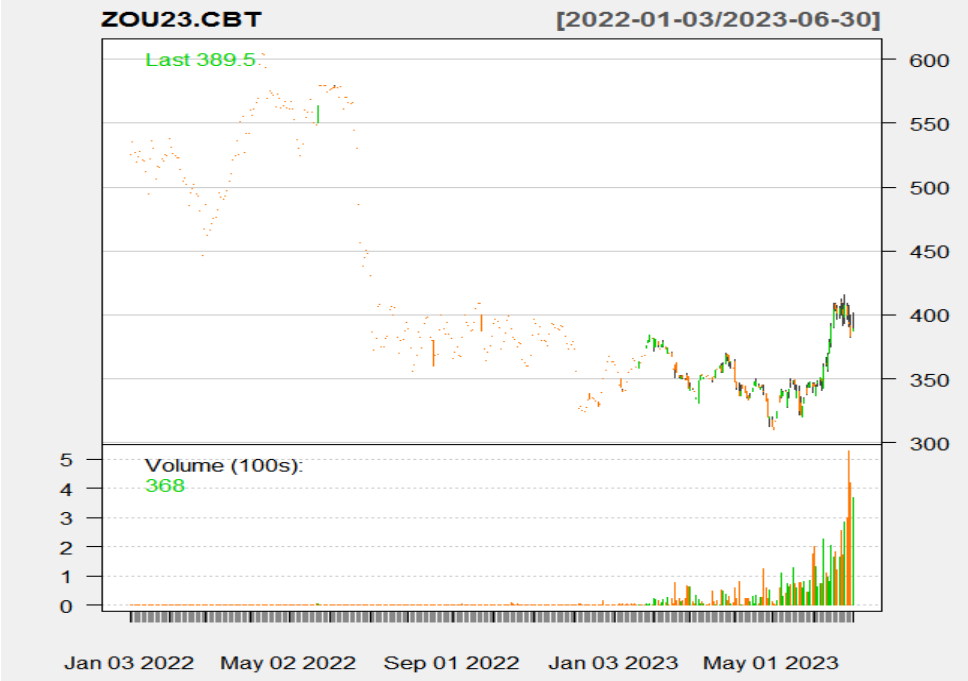

Figure 3: Oat Futures,Sep-2023 (ZOU23.CBT)[4]

[3] https://finance.yahoo.com/quote/ZCU23.CBT?p=ZCU23.CBT
[4] https://au.finance.yahoo.com/quote/ZOU23.CBT/futures/

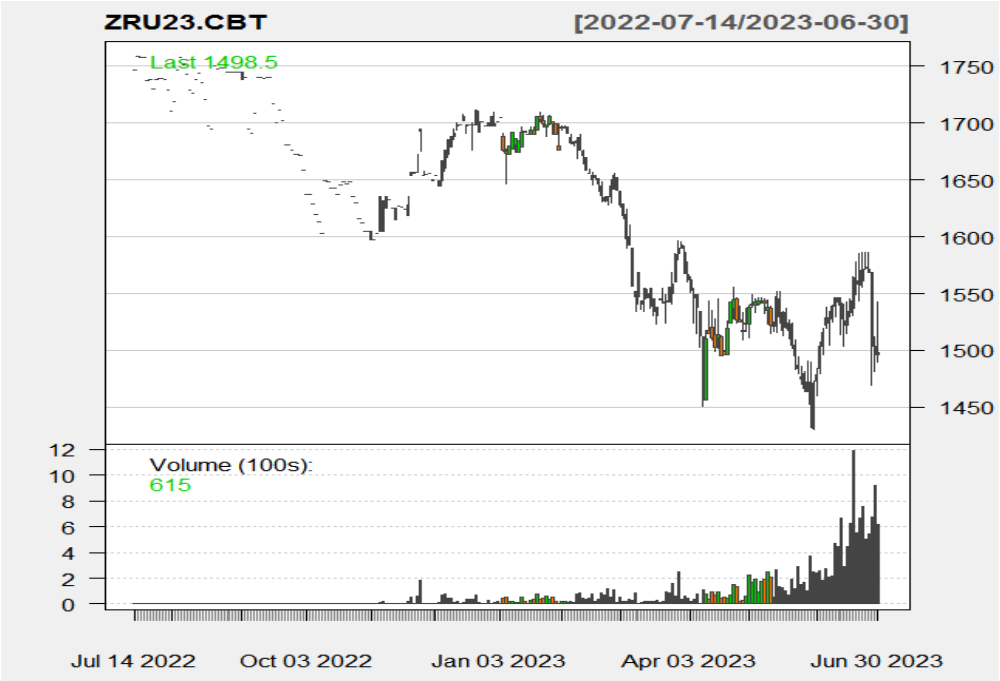

Figure 4: Rough Rice Futures,Sep-2023 (ZRU23.CBT)[5]

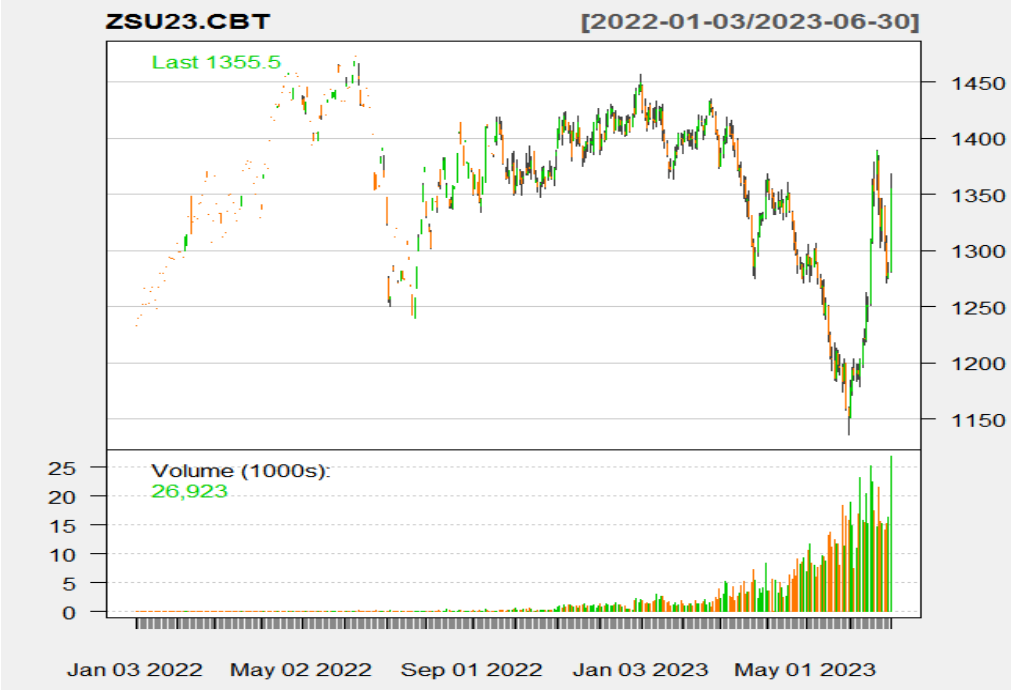

Figure 5: Soybean Futures, Sep-2023 (ZSU23.CBT)[6]

Corn, oat, rice, and soybean futures prices and trading volumes shown in Figures 2; 3; 4 and 5, mark similar dynamics and trend, as those commented on wheat. Given the normal dependence of increased trading activity as maturity approaches, generally valid for derivatives, the accompanying decline in prices indicates no threat of a global shortage of the underlying commodities. The observed increase in volumes and the parallel decrease in prices represent a definite increase in the market liquidity of the respective contracts.

[5] https://finance.yahoo.com/quote/ZRU23.CBT/
[6] https://finance.yahoo.com/quote/ZSU23.CBT/

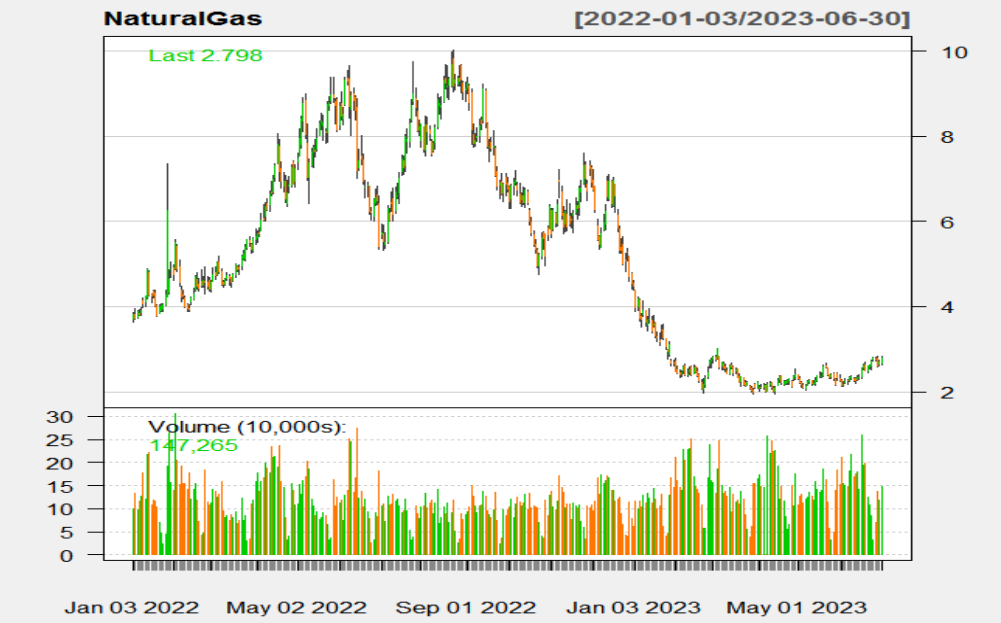

Figure 6: Natural Gas Sep 23 (NG=F)[7]

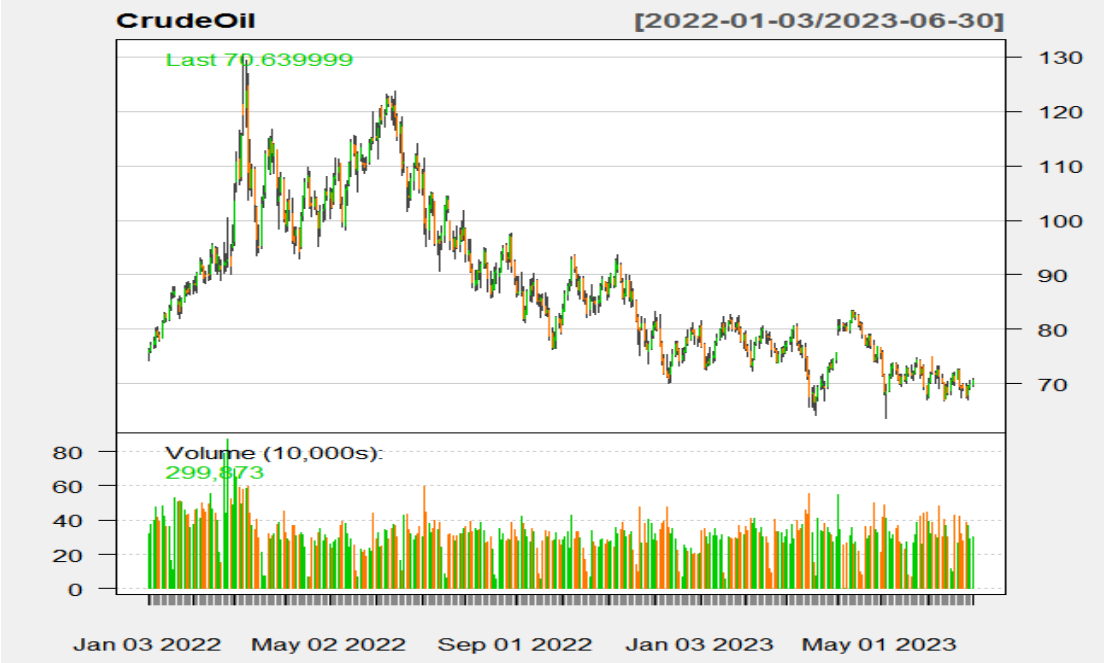

Figure 7: Crude Oil Sep 23 (CL=F)[8]

As can be seen from the behavior of the prices and trading volumes of the futures contracts, there is no difference in the behavior of the corn and wheat futures compared to the other cereals, which would indicate the influence of the military actions of Russia. The futures on natural gas and crude oil show a different development than that of the examined grain contracts with the same maturity (September 2023). The first impression is that their trading volumes remain without dramatic dynamics and with great activity throughout the period. Gas futures prices rise until September 2022, and oil futures peak in March 2022, after which they decline steadily and significantly, especially for gas.

[7] https://finance.yahoo.com/quote/NG%3DF/
[8] https://finance.yahoo.com/quote/CL=F/

	ZWU23	ZCU2	ZSU23	ZOU23	ZRU23	NG=F	CL=F
Min.	-0,05725	-0,06920	-0,05251	-0,04586	-0,04424	-0,30048	-0,12927
1st Qu.	-0,01393	-0,00578	-0,00673	-0,01051	-0,00391	-0,03796	-0,01743
Median	-0,00098	0,0000	0,00035	-0,00108	-0,00030	0,00400	0,00309
Mean	-0,00047	-0,00018	0,00006	0,00077	-0,00012	-0,00085	-0,00017
3rd Qu.	0,01191	0,00728	0,00772	0,01210	0,00400	0,03954	0,01879
Max.	0,05818	0,05015	0,05751	0,04471	0,03504	0,38173	0,08023
Sd	0,02066	0,01368	0,01265	0,01651	0,00855	0,05931	0,02826

Table 2: Summary statistics of daily returns

	ZWU23	ZCU2	ZSU23	ZOU23	ZRU23	NG=F	CL=F
Min.	-2,90042	-2,47616	-2,94444	-3,29584	-4,11632	-1,09667	-1,27439
1st Qu.	-0,29317	-0,28379	-0,34895	0,69315	-0,47582	0,21573	-0,17282
Median	0,0000	0,0000	0,00303	0,00000	0,05964	-0,02121	-0,04514
Mean	0,02479	0,02423	0,03510	0,06772	-0,00357	-0,00043	-0,00026
3rd Qu.	0,29317	0,3425	0,37001	0,69353	0,59824	0,17538	0,10661
Max.	2,49621	2,35138	4,33073	3,23868	4,14314	1,47389	1,79284
Sd	0,58375	0,62963	0,86212	1,15622	1,04669	0,39238	0,44379

Table 3: Summary statistics of daily log changes in volume

Tables 2 and 3 show the summary statistics of our data. We have represented the values of the futures returns and volume changes by calculating the minimum, maximum values, quantiles, mean, median and standard deviations.

4. METHODOLOGY USED

For the purposes of statistical modeling we use daily logarithmic returns and daily log changes in the time series of futures trading volumes. The data has been cleaned from missing values. In the modelling part, we have also omitted divide by zero cases in the calculation of daily log changes. To confirm the stationarity of the time series of the log change in volumes and prices of the selected futures contracts, we use the Augmented Dickey-Fuller (ADF) test (Said & Dickey, 1984) (Banerjee, Dolado, Galbraith, & Hendry, 1993). We define the test in the same way as Luitel and Mahar (Luitel & Mahar, 2017). We use the AR process:

$$y_t = \rho_1 y_{t-1} + \rho_2 y_{t-2} + \cdots + \rho_p y_{t-p} + \varepsilon_t \ ,$$

then we arrive at the linear transformation:

$$\Delta y_t = \delta y_{t-1} + \sum_{i=1}^{p} \gamma_i y_{i-1} + \varepsilon_t \ ,$$

Where:

y_t is the logarithmic change in the price or, respectively, the volume of the selected futures contract;

$\delta = \rho_1 + \rho_2 + \cdots + \rho_p - 1$ and ε_t is the error term.

To prove the null hypothesis, under which Δy_t follows a stationary time process, it is necessary to confirm that $\delta = 0$.

We follow Malliaris and Urrutia (Malliaris & Urrutia, 1998) by using the Engle and Granger (Engle & Granger, 1987) cointegration test. We construct the cointegration regression between the volume and price time series of each particular futures contract:

$$y_t = \alpha_0 x_t + \varepsilon_t$$

We then conduct an ADF test for stationarity of the ε_t term in the above regression. We start with the equation:

$$\varepsilon_t = \rho_1 \varepsilon_{t-1} + \rho_2 \varepsilon_{t-2} + \cdots + \rho_p \varepsilon_{t-p} + \mu_t$$

After the linear transformation we arrive at:

$$\Delta\varepsilon_t = \delta\varepsilon_{t-1} + \sum_{i=1}^{p} \gamma_i \varepsilon_{i-1} + \mu_t$$

Subject to the stationarity condition, $\delta = 0$, we reach the conclusion of cointegration between the time series.

5. RESULTS OF THE ANALYSIS OF FUTURES MARKET ACTIVITY

The tests performed show results for the Dickey-Fuller statistic presented in Table 4. The results of the ADF test show the presence of stationarity of all time series at probability p<0,01. Interestingly, the stationarity in futures volumes is even stronger than in prices. In the Lag Order column, the optimally chosen lags for stationarity of the time series are written. Without exception, the lag of prices stationarity coincides with the lag of stationarity of the change in volumes. For Wheat, Corn, Natural Gas and Crude Oil futures respectively, the optimal lag value is 7 months. For Soybean it is 6, for Rough rise it is 5 and for Oats it is 4 months.

	Price			*Volume*	
	Dickey-Fuller Stat.	*Lag order*		*Dickey-Fuller Stat.*	*Lag Order*
Wheat	*-5,6810*	*7*		*-10,3410*	*7*
Corn	*-5,5270*	*7*		*-9,5959*	*7*
Soybean	*-6,6910*	*6*		*-9,0590*	*6*
Oats	*-5,0900*	*4*		*-7,4019*	*4*
Rough rice	*-4,8247*	*5*		*-8,0901*	*5*
Natural Gas	*-7,2055*	*7*		*-9,4151*	*7*
Crude Oil	*-8,2624*	*7*		*-10,5870*	*7*

Table 4: Augmented Dickey-Fuller Tests of Stationarity

The direct interpretation of the results of the ADF test show constant volatility and the absence of a defined trend in the price movement of the selected futures contracts. We attribute this conclusion to the strong stationarity and high optimal Lag Order, which implies constant volatility and no moving average in the futures movement over periods of several months. In practice, this means that valuing futures for monthly trades using a methodology based on technical analysis or stochastic models would be better than interpreting fundamental price influences.

Commodity	Dependent variable (X)	Independent variable (Y)	Lag order	EG Stat.
Wheat	Price	Volume	5	-8,52
	Volume	Price	5	-12,42
Corn	Price	Volume	5	-6,81
	Volume	Price	5	-11,95
Soybean	Price	Volume	5	-7,91
	Volume	Price	5	-11,09
Oats	Price	Volume	4	-5,08
	Volume	Price	4	-7,52
Rough rice	Price	Volume	4	-5,24
	Volume	Price	4	-9,21
Natural Gas	Price	Volume	5	-8,46
	Volume	Price	5	-11,36
Crude Oil	Price	Volume	5	-9,41
	Volume	Price	5	-12,65

Table 5: Engle and Granger Test of Cointegration of Price and Volume

Table 5 shows the results of the conducted Engle and Granger test for cointegration between the movement in the time series of prices and volumes of particular futures. The tests were conducted in both directions, i.e. once the independent variable is the price and a second time with the stock volumes in place of the independent variable. The cointegration is optimally strong in the time range of 4 to 5 months, which we prove by the result for the optimal Lag Order of the tests. All values of the Engle and Granger statistics for the tests performed correspond to a p-value of less than 0,01. The evidenced cointegration from the tests shows a two-way influence between prices and volumes of the studied instruments. In practice, this means that the volatility of the change in volumes accompanies the volatility in the price. We see this dependency more evidently in the examples of less traded futures such as Oats, Rice and Soybeans, in which the trading activity increases closer to the expiration date. However, statistically we measure such dependencies across all of the examined futures contracts. An alternative interpretation of the study would be the hypothesis that volatility in the price of the underlying asset leads to more active futures trading. It follows, purely mechanically, that when the volatility of the underlying on a derivative rises and the price of the derivative becomes also more volatile. By further investigating the data we also find that the increase and decrease in trading volume does not correspond to a subsequent increase or decrease in price. Instead, we have further the hypothesis about a direct connection between trading volume and volatility. We have come to this conclusion by further testing with linear and quadratic trend cointegration tests and through general data and graph examination. In the course of the research, we rejected the hypotheses of the existence of a trend dependence between volumes and prices. We reached this conclusion by finding highly insignificant p-value coefficients in the conducted Engle and Granger tests for cointegration with the presence of a linear trend in the equation. The bottom line is that we do not find a clear statistical relationship between price increases and volume increases, and vice versa.

6. CONCLUSION

The prices and trading volumes of futures contracts based on wheat, corn, soybeans, oats and rice, all due September 2023, that we examine here, do not show trading behavior dictated by the threat of global shortages, however short-term. Investment behavior in relation to them does not directly reflect the threats resulting from Russian aggression and the ongoing war in Ukraine.

Natural gas and crude oil futures saw a sharp rise in prices in the first months of the Russian invasion of Ukraine, but the last year has been dominated by a sustained and significant decline. The trading volumes of these futures follow a normal volatility without a trend change throughout the studied period. Through our correlation analysis we conclude that there is a statistically significant relationship between the magnitude of price movements and volume changes in the futures observed in our study. According to our results bigger trading volumes result in higher price volatility of the futures. We do not find a clear statistical relationship between price increases and volume increases, and vice versa.

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ACADEMIC MOBILITY OF TEACHING AND NON-TEACHING STAFF AT THE JOSIP JURAJ STROSSMAYER UNIVERSITY OF OSIJEK

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ABSTRACT

The aim of this paper is to analyze the mobility of teaching and non teaching staff and students under the ERASMUS + programm at the Josip Juraj Strossmayer University of Osijek, Croatia. On a base of analysis autor(s) has been presented results regarding the academic (non) mobility of teaching and non-teaching staff for a period of academic year 2008/2009 to academic year 2020/2021. Special attention in the analysis of this work author(s) has been given to the academic year 2019/2020, 2020/2021 and the impact of the global pandemic COVID -19 on the academic mobility. Also, on a base of given results autor(s) has contribute the knowledge regarding mobility program and offer recommendations to achieve a higher degree of utilization of the available program at the Josip Juraj Strossmayer University of Osijek, Croatia. The author(s) used the following methods in this paper: descriptive research method, deductive research method, analysis method and compilation method. The author(s) used secondary data for the purpose of writing this paper. Expected / obtained results has been visible by the number of outgoing teaching and / or non-teaching staff, the number of total incoming teaching and / or non-teaching staff, the number of outgoing teaching staff and / or non-teaching staff depending on scientific-teaching components universities, countries of origin of teaching and / or non-teaching staff, programs to which teaching and / or non-teaching staff apply, duration of individual mobilities, etc. The author(s) also presented the rates of decline in incoming and outgoing mobility in the observed academic years 2019/2020 and 2020/2021.

Keywords: *academic mobility, ERASMUS + program, challenges, global pandemic COVID-19*

1. INTRODUCTION

Erasmus+ is the EU's programme to support education, training, youth and sport in Europe. It has an estimated budget of €26.2 billion. This is nearly double the funding compared to its predecessor programme (2014-2020). The 2021-2027 programme places a strong focus on social inclusion, the green and digital transitions, and promoting young people's participation in democratic life. It supports priorities and activities set out in the European Education Area, Digital Education Action Plan and the European Skills Agenda. The programme also supports the European Pillar of Social Rights implements the EU Youth Strategy 2019-2027 develops the European dimension in sport. Erasmus+ offers mobility and cooperation opportunities in: higher education, vocational education and training, school education (including early childhood education and care), adult education youth and sport (European Commission, 2022).

The way of participating in the ERASMUS depends on two factors: first factor is if you are applying by yourself or on behalf of an organization and second factor is in which country you or your organization is based. Participants usually apply through organizations such as first of all universities and after that training centers or companies. For most activities, the organization must be located in the program country. Program countries are primarily EU member states[1] and some other countries[2] associated with the program. Other activities are also open to groups from other countries not associated with the program. Erasmus + is divided into the following activities[3]:

- Key Activity 1 - Learning mobility for individuals[4]
- Key Activity 2 - Cooperation for Innovation and Exchange of Good Practice[5]
- Key Activity 3 - Support for policy reform
- Jean Monnet Program
- Sport

The aim of this paper is to analyze the mobility of teaching and non teaching staff and students from academic year 2008/2009 to academic year 2020/2021 under the ERASMUS + programm at the Josip Juraj Strossmayer Universtiy of Osijek, Croatia.

2. REASEARCH METHODOLOGY

2.1. Object of the research

The object of research of this paper is the academic mobility of the teaching staff and non-teaching staff at the Josip Juraj Strossmayer University of Osijek. In this paper, the author(s) will conceptually define academic mobility, its genesis and perspective.

2.2. Aim of the research

The aim of the paper is to determine the level of academic mobility of teaching and non teaching staff from all 16 constitents and departments at the Josip Juraj Strossmayer University of Osijek from the academic year 2008/2009 to 2020/2021.

2.3. Scientific methods

In writing this paper, the author(s) have used the inductive method, reasoning based on facts and knowledge, the deductive method, the method of analysis and synthesis, the method of compilation. The author(s) processed secondary data from internal reports at the Josip Juraj Strossmayer University of Osijek.

[1] EU member states (Austria, Belgium, Bulgaria, Czech Republic, Croatia, Cyprus, Denmark, Estonia, Finland, France, Greece, Germany,Hungry, Ireland, Italy, Latvia, Lithuania, Luxembourg, , Malta, Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia, Spain, Sweden).

[2] Other countries (Norway, Iceland, Liechtenstein, North Macedonia, Republic of Turkey and Republic of Serbia).

[3] https://www.mobilnost.hr/hr/sadrzaj/programi/erasmus/ (accessed 15.01.2023.)

[4] This Key Activity supports: mobility of pupils, students, trainees, young people, volunteers, teachers and non-teaching staff, people working with young people to gain experience abroad in learning, work, practice, training, etc.

[5] This key activity supports: transnational Strategic Partnerships (aimed at developing initiatives in one or more areas of education, training and youth and promoting innovation, exchange of experience and knowledge between different types of organizations involved in education, training and youth or in other relevant fields), knowledge exchange between higher education institutions and enterprises to promote innovation, entrepreneurship, creativity, employability, knowledge sharing and/or multidisciplinary teaching and learning, **s**ector skills clustering to support the development and delivery of common curricula, programs, and methods of learning and teaching for vocational education and training based on evidence of trends in a particular sector of the economy and the skills needed to work in one or more sectors of the economy, capacity building projects to support cooperation with partner countries in higher education and youth, IT support platform**s** such as e-Twinning, the European Platform for Adult Learning (EPALE) and the European Youth Portal.

3. WHAT IS ACADEMIC MOBILITY

The term "academic mobility" implies a period of study, teaching and/or research in a country other than a student's or academic staff member's country of residence (henceforth referred to as the "home country"). This period is of limited duration, and it is envisaged that the student or staff member return to his or her home country upon completion of the designated period. The term "academic mobility" is not intended to cover migration from one country to another. The present recommendation specifically concerns academic mobility between member states of the Council of Europe and other States Party to the European Cultural Convention. Academic mobility may be achieved through programmes set up for this purpose, through exchange agreements between governments, higher education institutions or their associations, or on the initiative of individual students and staff (free movers)[6]. Some research extends the category of 'academic' to students that include undergraduate, graduate, and particularly doctoral students. As Czaika and Toma (2017) argued, the international mobility of students and scholars are 'intrinsically related'[7]. Numerous studies have been conducted by scholars on the mobility of academic staff, especially from 1990 to the present. The authors Huang & Welch have certainly made an important contribution to the study of this topic. In the 'intellectual migration' conceptual framework proposed by geographers, student mobility and highly skilled migration were positioned as a continuous spectrum[8]. International student mobility is a global phenomenon that is influenced by economic, educational, and political factors. McMahon (1992) has presented a more in-depth explanation of these three dimensions, where individual choices are inextricably linked to national and global shifts in trade mode, domestic education emphasis and opportunities, and international relationships. Thus, the changes in worldwide study patterns reflect individual-level shifts in motivation[9]. International academic mobility is influenced by numerous factors such as educational, economic, social, political and extreme external factors, such as the pandemic COVID -19.

3.1. Academy mobility at the University of Josip Juraj Strossmayer of Osijek

In this chapter, the author(s) analyze the academic mobility of teaching staff and (non) teaching staff of all 16 components and departments at the Josip Juraj Strossmayer University of Osijek in the period from the 2008/2009 academic year to the 2020/2021 academic year. For teaching staff[10], the authors analyze incoming and outgoing mobility for the purpose of teaching and professional development, while for (non) teaching staff, they analyze the purpose of professional development.

Graph following on the next page

[6] Council of Europe Committee of Ministers - https: //rm. coe. Int (accessed 07.03.2023.)
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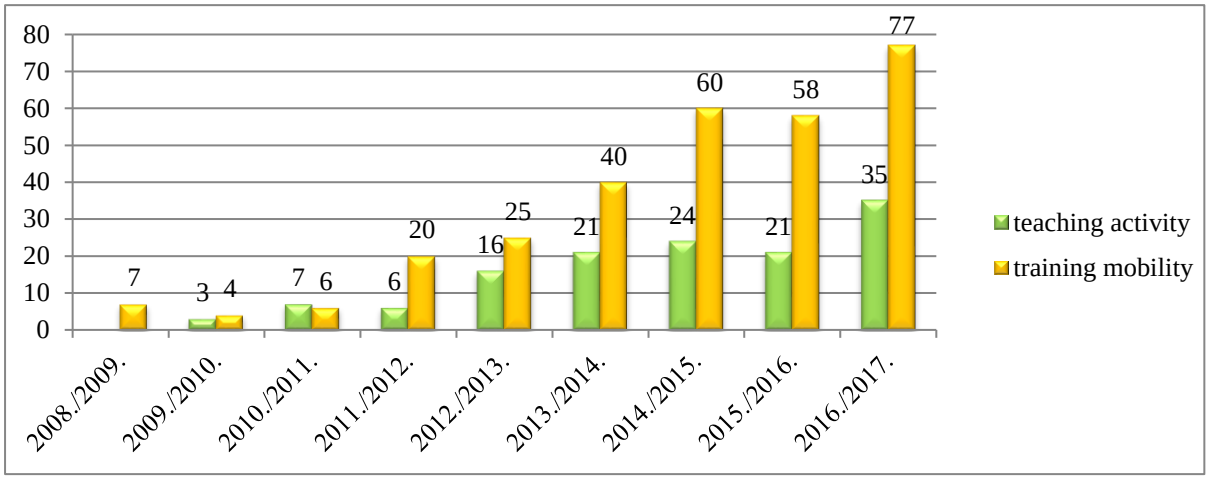
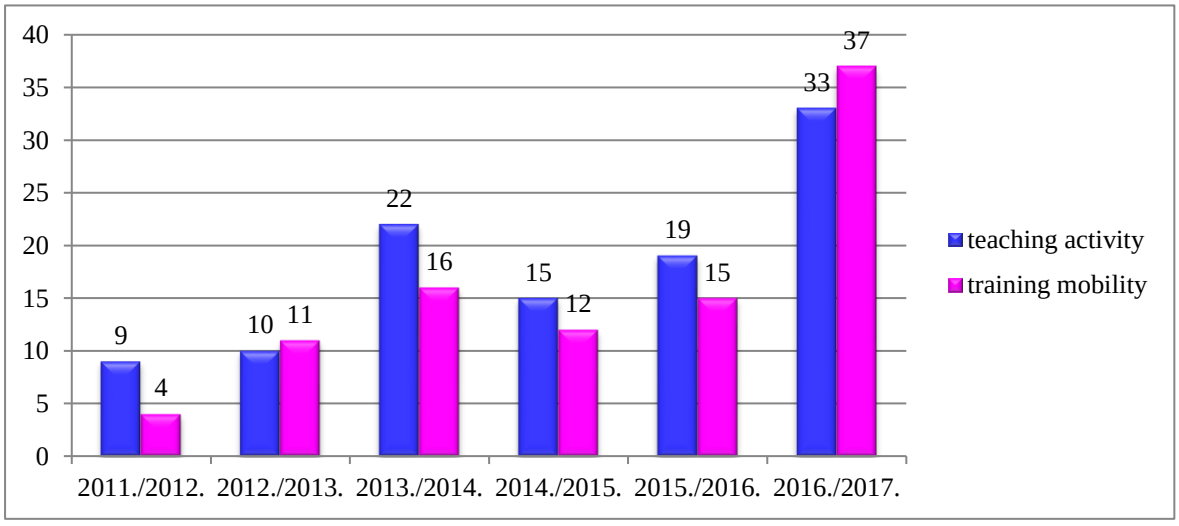
[10] Teaching and (non) teaching staff have the opportunity to participate in the Erasmus+ program for the purpose of teaching and professional development for a duration of two days to two months.



Graph 1: Outgoing staff (academic year 2008/2009 to 2016/2017)
(Source: Authors edited and adapted to internal data at the Josip Juraj Strossmayer University of Osijek)

According to the available data from Graph 1. Outgoing staff, there is a visible increase in outgoing staff in teaching activity in the academic years 2009/2010, 2010/2011, 2012/2013, 2013/2014, 2014/2015 and 2016/2017. There was a lower mobility in teaching activity of 1.16 outgoing staff in 2011/2012 compared to 2010/2011. There was also a lower mobility in teaching activity of 1.14 outgoing staff in the academic year 2015/2016 compared to the academic year 2014/2015. Graph 1 shows that the number of employees assigned to training mobility in the academic year 2011/2012, 2012/2013, 2013/2014 and 2016/2017 has increased compared to the year 2008/2009. At the same time, there is a decrease of 1.75 outgoing staff for training mobility in 2009/2010 and 1.16 outgoing staff for training mobility in 2010/2011 compared to 2008/2009 and a slight decrease of 1.03 outgoing staff for training mobility in 2015/2016 compared to 2014/2015.



Graph 2: Incoming staff (academic year 2008/2009 to 2016/2017)
(Source: Authors edited and adapted to internal data at the Josip Juraj Strossmayer University of Osijek)

According to the data available in Graph 2. there was no mobility of incoming staff in teaching activity and/or training mobility in academic year 2008/2009, 2009/2010, and 2010/2011. In teaching activity in the academic year 2011/2012 there were 9 arrivals, 2012/2013 there were

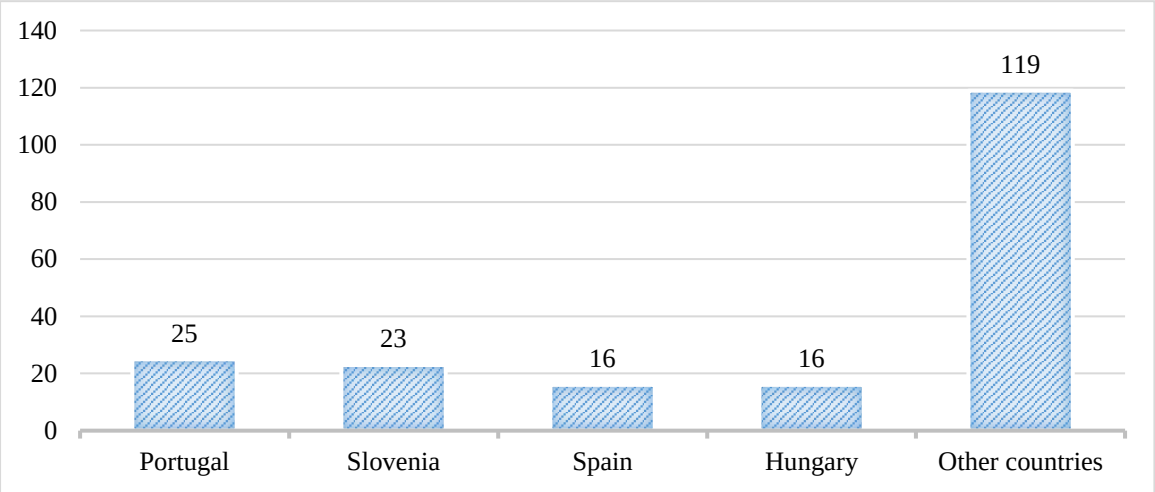
10 arrivals, 2013/2014 there were 22 arrivals and in the academic year 2016/2017 there were 33 arrivals. Compared to the year 2013/2014 there were 7 arrivals less realized in the year 2014/2015 and in the year 2015/2016 there were 3 arrivals less. The number of arrivals for training mobility was 4 in 2011/2012 academic year, 11 in 2012/2013, 16 in 2013/2104, and 37 in 2016/2017 academic year. A decrease in arrivals compared to the 2013/2014 academic year was recorded in 2014/2015 with 4 arrivals and in 2015/2016 with 1 arrival. A significant number of arrivals for training was achieved in 2016/2017.

UNIOS scientific-teaching; artistic-teaching component	**Academic year 2018/2019**		**Total**
	Teaching activity	**Training mobility**	
Faculty of Humanities and Social Sciences	12	20	32
Faculty of Agrobiotechnical Sciences	1	30	31
Faculty of Electrical Engineering, Computing and Information Technology	2	19	21
Faculty of Food Technology	3	16	19
Academy of Arts and Culture	4	13	17
Faculty of Civil Engineering and Architecture	1	15	16
Faculty of Education	2	13	15
Faculty of Economy	4	9	13
Faculty of Law	1	5	6
Mechanical Engineering Faculty in Slavonski Brod	5	1	6
Department of Chemistry	0	5	5
Department of Biology	1	4	5
Faculty of Medicine	0	4	4
Faculty of Dental Medicine and Health	0	3	3
Department of Physics	0	1	1
Department of Mathematics	0	1	1
Catholic Faculty of Theology in Đakovo	1	0	1
Rectorat	0	1	1
Student centar	0	1	1
Quality Assurance Center	0	1	1
Total	**37**	**162**	**199**

Table 1: Erasmus + outgoing mobility of (non) teaching staff in 2018/2019 (Source: Authors edited and adapted to internal data at the Josip Juraj Strossmayer University of Osijek)

According to the data in Table 1. in the academic year 2018/2019 there were 12 teaching activity and 20 training mobility from the Faculty of Humanities and Social Sciences, there were 1 teaching activity and 30 training mobility from the Faculty of Agrobiotechnical Sciences, there were 2 teaching activity and 19 training mobility from the Faculty of Electrical Engineering, Computing and Information Technology, there were 3 teaching activity and 16 training mobility from the Faculty of Food Technology, there were 4 teaching activity and 13 training mobility from the Academy of Arts and Culture, there were 1 teaching activity and 15 training mobility from the Faculty of Civil Engineering and Architecture, there were 2 teaching activity and 13 training mobility from the Faculty of Education, there were 4 teaching activity and 9 training mobility from the Faculty of Economy, there were 1 teaching activity and 5 training mobility from the Faculty of Law, there were 0 teaching activity and 4 training mobility from the Faculty of Medicine, there were 0 teaching activity and 3 training mobility from the Faculty of Dental

Medicine and Health, there were 0 teaching activity and 1 training mobility from the Department of Physics, there were 0 teaching activity and 1 training mobility from the Department of Mathematics, there were 1 teaching activity and 0 training mobility from the Catholic Faculty of Theology in Đakovo, there were teaching activity and training mobility, there were teaching activity and training mobility, there were 0 teaching activity and 1 training mobility from the Rectorat, there were 0 teaching activity and 1 training mobility from the Student centar, there were 0 teaching activity and 1 training mobility from the Quality Assurance Center.



Graph 3: Erasmus + outgoing mobility of (non) teaching staff by countries (academic year 2018/2019)

(Source: Authors edited and adapted to internal data at the Josip Juraj Strossmayer University of Osijek)

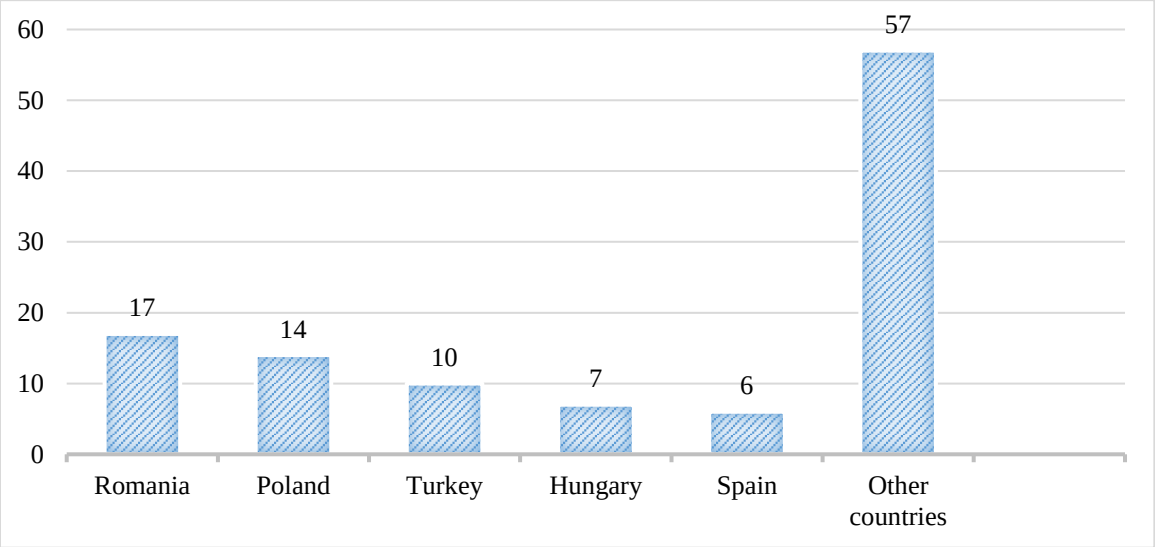
According to the data in Graph 3. in the academic year 2018/2019 there were 25 outgoings from the Portugal, 23 outgoings from the Slovenia, 16 outgoings from the Spain, 16 from the Hungary and 119 from the Other countries.

UNIOS scientific-teaching; artistic-teaching component	**Academic year 2018/2019**		**Total**
	Teaching activity	**Training mobility**	
Rectorat	0	26	26
Faculty of Agrobiotechnical Sciences	7	10	17
Faculty of Humanities and Social Sciences	14	2	16
Academy of Arts and Culture	10	1	11
Mechanical Engineering Faculty in Slavonski Brod	6	5	11
Faculty of Food Technology	7	2	9
Faculty of Economy	6	0	6
Faculty of Civil Engineering and Architecture	4	1	5
Faculty of Dental Medicine and Health	1	2	3
Faculty of Electrical Engineering, Computing and Information Technology	3	0	3
Faculty of Education	1	2	3
Catholic Faculty of Theology in Đakovo	0	1	1
Total	**59**	**52**	**111**

Table 2: Erasmus + incoming mobility of (non) teaching staff in 2018/2019

(Source: Authors edited and adapted to internal data at the Josip Juraj Strossmayer University of Osijek)

According to the data in Table 2. in the academic year 2018/2019 there were 0 teaching activity and 26 training mobility from the Rectorat, 7 teaching activity and 10 training mobility from the Faculty of Agrobiotechnical Sciences, 14 teaching activity and 2 training mobility from the Faculty of Humanities and Social Sciences, 10 teaching activity and 1 training mobility from the Academy of Arts and Culture, 6 teaching activity and 5 training mobility from the Mechanical Engineering Faculty in Slavonski Brod, 7 teaching activity and 2 training mobility from the Faculty of Food Technology, 6 teaching activity and 0 training mobility from the Faculty of Economy, 4 teaching activity and 1 training mobility from the Faculty of Civil Engineering and Architecture, 1 teaching activity and 2 training mobility from the Faculty of Dental Medicine and Health, 3 teaching activity and 0 training mobility from the Faculty of Electrical Engineering, Computing and Information Technology, 1 teaching activity and 2 training mobility from the Faculty of Education, 0 teaching activity and 1 training mobility from the Catholic Faculty of Theology in Đakovo.



Graph 4: Erasmus + incoming mobility of (non) teaching staff by countries in 2018/2019 (Source: Authors edited and adapted to internal data at the Josip Juraj Strossmayer University of Osijek)

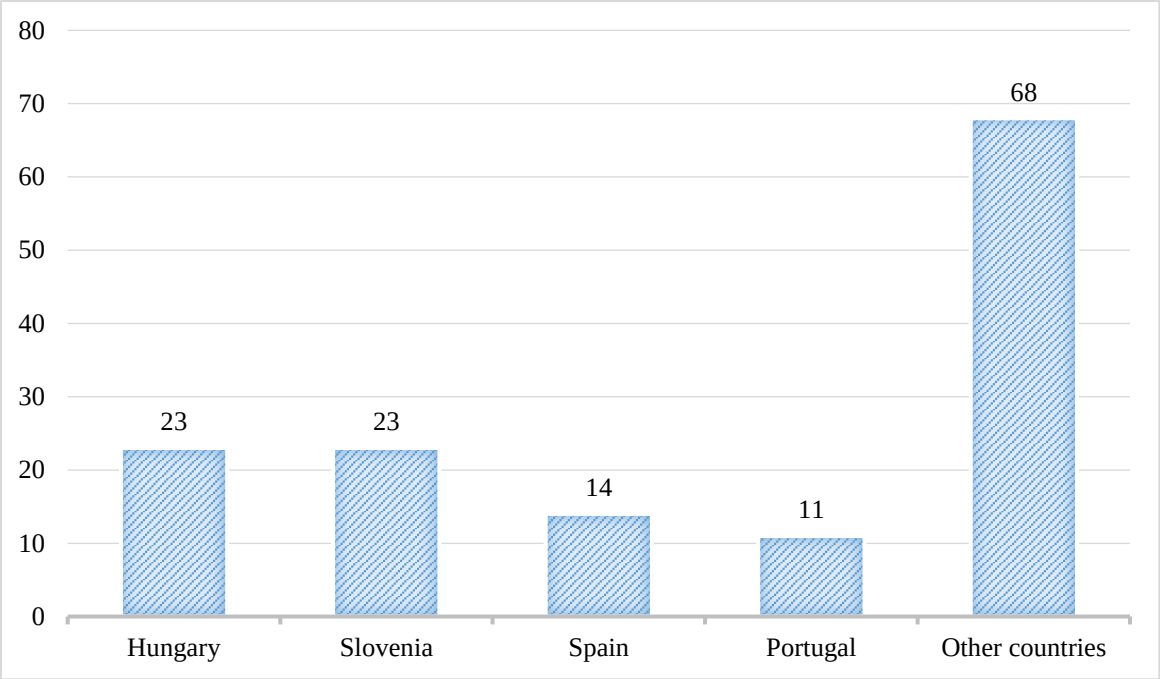
According to the data in Graph 4. in the academic year 2018/2019 there were 17 incoming from the Romania, 14 from the Poland, 10 from the Turkey, 7 from the Hungary, 6 from the Spain and 57 from the other countries.

Table following on the next page

UNIOS scientific-teaching; artistic-teaching component	Academic year 2019/2020		Total
	Teaching activity	Training mobility	
Faculty of Agrobiotechnical Sciences	0	21	21
Faculty of Humanities and Social Sciences	10	6	16
Faculty of Electrical Engineering, Computing and Information Technology	1	14	15
Academy of Arts and Culture	2	13	15
Faculty of Food Technology	2	11	13
Faculty of Civil Engineering and Architecture	2	6	8
Faculty of Medicine	2	6	8
Faculty of Economy	2	4	6
Department of Chemistry	0	6	6
Faculty of Education	2	3	5
Mechanical Engineering Faculty in Slavonski Brod	4	1	5
Department of Biology	0	5	5
Faculty of Dental Medicine and Health	0	5	5
Faculty of Low	1	3	4
Rectorat	0	2	2
City and University Library Osijek	0	2	2
Department of Physics	0	1	1
Department of Mathematics	0	1	1
Quality Assurance Center	0	1	1
Total	**28**	**111**	**139**

Table 3: Erasmus + outgoing mobility of (non) teaching staff in 2019/2020 (Source: Authors edited and adapted to internal data at the Josip Juraj Strossmayer University of Osijek)

According to the data in Table 3. in the academic year 2019/2020 there were 0 teaching activity and 21 training mobility from the Faculty of Agrobiotechnical Sciences, 10 teaching activity and 6 training mobility from the Faculty of Humanities and Social Sciences, 1 teaching activity and 14 training mobility from the Faculty of Electrical Engineering, Computing and Information Technology, 2 teaching activity and 13 training mobility from the, 2 teaching activity and 11 training mobility from the Faculty of Food Technology, 2 teaching activity and 6 training mobility from the Faculty of Civil Engineering and Architecture, 2 teaching activity and 6 training mobility from the Faculty of Medicine, 2 teaching activity and 4 training mobility from the Faculty of Economy, 0 teaching activity and 6 training mobility from the Department of Chemistry, 2 teaching activity and 3 training mobility from the Faculty of Education, 4 teaching activity and 1 training mobility from the Mechanical Engineering Faculty in Slavonski Brod, 0 teaching activity and 5 training mobility from the Department of Biology, 0 teaching activity and 5 training mobility from the Faculty of Dental Medicine and Health, 1 teaching activity and 3 training mobility from the Faculty of Low, 0 teaching activity and 2 training mobility from the Rectorat, 0 teaching activity and 2 training mobility from the City and University Library Osijek, 0 teaching activity and 1 training mobility from the Department of Physics, 0 teaching activity and 1 training mobility from the Department of Mathematics¸ 60 teaching activity and 1 training mobility from the Quality Assurance Center.



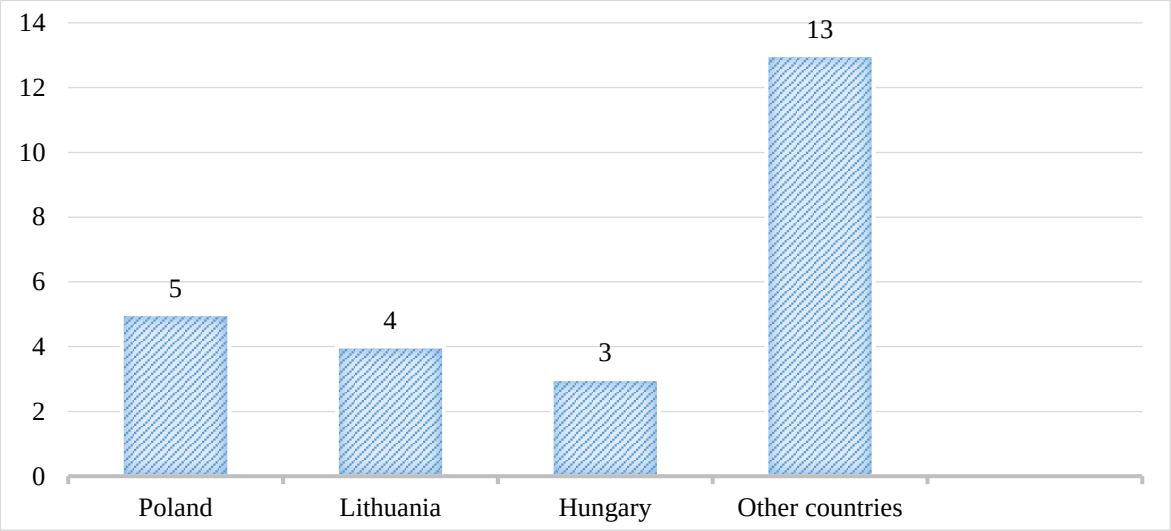
Graph 5: Erasmus + outgoing mobility of (non) teaching staff by countries 2019/2020 (Source: Authors edited and adapted to internal data at the Josip Juraj Strossmayer University of Osijek)

According to the data in Graph 5. in the academic year 2019/2020 there were 23 outgoings from Hungary, 23 from Slovenia, 14 from Spain, 11 from Portugal and 68 from Other countries.

UNIOS scientific-teaching; artistic-teaching component	**Academic year 2019/2020**		**Total**
	Teaching activity	**Training mobility**	
Faculty of Humanities and Social Sciences	8	0	8
Faculty of Agrobiotechnical Sciences	3	2	5
Academy of Arts and Culture	3	1	4
Faculty of Law	2	1	3
Faculty of Electrical Engineering, Computing and Information Technology	2	0	2
Faculty of Food Technology	0	1	1
Faculty of Education	0	1	1
Catholic Faculty of Theology in Đakovo	0	1	1
Total	**18**	**7**	**25**

Table 4: Erasmus + incoming mobility of (non) teaching staff in 2019/2020 (Source: Authors edited and adapted to internal data at the Josip Juraj Strossmayer University)

According to the data in Table 4. Erasmus + incoming mobility of (non) teaching staff in 2019/2020. there was 8 teaching activity and 0 training activity on the Faculty of Humanities and Social Sciences, 3 teaching activity and 2 training activity on the Faculty of Agrobiotechnical Sciences, 3 teaching activity and 1 training activity on the Academy of Arts and Culture, 2 teaching activity and 1 training activity on the Faculty of Law, 2 teaching activity and 0 training activity on the Faculty of Electrical Engineering, Computing and Information Technology, 0 teaching activity and 1 training activity on the Faculty of Food Technology, 0 teaching activity and 1 training activity on the Faculty of Education, 0 teaching activity and 1 training activity on the Catholic Faculty of Theology in Đakovo.



Graph 6: Erasmus + incoming mobility of (non) teaching staff in 2019/2020 by countries (Source: Authors edited and adapted to internal data at the Josip Juraj Strossmayer University of Osijek)

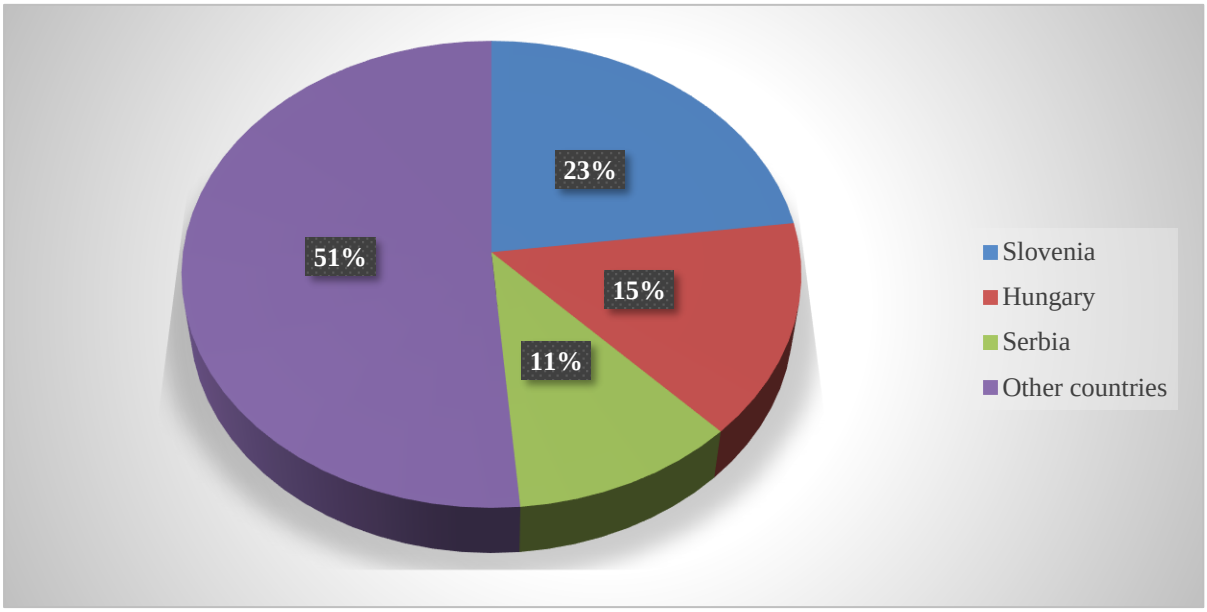
According to the data in Graph 6. in the academic year 2019/2020 there were 5 arrivals from Poland, 4 from Lithuania, 3 from Hungary and 13 from Other countries.

UNIOS scientific-teaching; artistic-teaching component	**Academic year 2020/2021**		**Total**
	Teaching activity	**Training mobility**	
Faculty of Agrobiotechnical Sciences	5	14	19
Faculty of Food Technology	1	14	15
Department of Chemistry	2	6	8
Faculty of Dental Medicine and Health	0	6	6
Academy of Arts and Culture	2	3	5
Faculty of Humanities and Social Sciences	2	3	5
Faculty of Electrical Engineering, Computing and Information Technology	0	3	3
Faculty of Education	1	2	3
Faculty of Medicine	0	3	3
Faculty of Civil Engineering and Architecture	0	2	2
Quality Assurance Center	0	1	1
Faculty of Economy	1	0	1
Rectorat	1	0	1
Department of Mathematics	0	1	1
Department of Physics	0	1	1
Total	**15**	**59**	**74**

Table 5: Erasmus + outgoing mobility of (non) teaching staff in 2020/2021 (Source: Authors edited and adapted to internal data at the Josip Juraj Strossmayer University of Osijek)

According to the data in Table 5. in the academic year 2020/2021 there were 5 teaching activity and 14 training mobility from the Faculty of Agrobiotechnical Sciences, 1 teaching activity and 14 training mobility from the Faculty of Food Technology, 2 teaching activity and 6 training mobility from the Department of Chemistry, 0 teaching activity and 6 training mobility from the Faculty of Dental Medicine and Health, 2 teaching activity and 3 training mobility from the

Academy of Arts and Culture, 2 teaching activity and 3 training mobility from the Faculty of Humanities and Social Sciences, 0 teaching activity and 3 training mobility from the Faculty of Electrical Engineering, Computing and Information Technology, 1 teaching activity and 2 training mobility from the Faculty of Education, 0 teaching activity and 3 training mobility from the Faculty of Medicine, 0 teaching activity and 2 training mobility from the Faculty of Civil Engineering and Architecture, 0 teaching activity and 1 training mobility from the Quality Assurance Center, 1 teaching activity and 0 training mobility from the Rectorat, 0 teaching activity and 1 training mobility from the Department of Mathematics, 0 teaching activity and 1 training mobility from the Department of Physics.



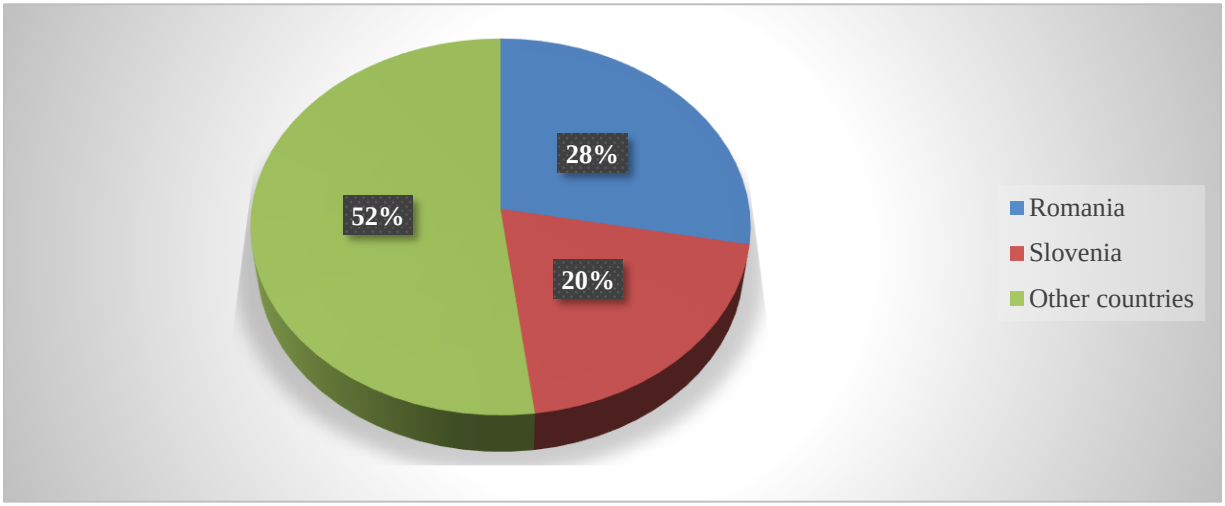
Graph 7: Erasmus + outgoing mobility of (non) teaching staff in 2020/2021 by countries (Source: Authors edited and adapted to internal data at the Josip Juraj Strossmayer University of Osijek)

According to the data in Graph 7. in the academic year 2020/2021 there were 51% outgoings from other countries, 23% from Slovenia, 15 % from Hungary and 11% from Serbia.

UNIOS scientific-teaching; artistic-teaching component	**Academic year 2020/2021**		**Total**
	Teaching activity	**Training mobility**	
Faculty of Law	6	0	6
Faculty of Economy	4	0	4
Faculty of Agrobiotechnical Sciences	2	2	4
Academy of Arts and Culture	2	1	3
Faculty of Civil Engineering and Architecture	2	0	2
Faculty of Education	1	1	2
Faculty of Electrical Engineering, Computing and Information Technology	0	1	1
Faculty of Humanities and Social Sciences	0	1	1
Faculty of Dental Medicine and Health	1	0	1
Department of Chemistry	1	0	1
Total	**19**	**6**	**25**

Table 6: Erasmus + incoming mobility of (non) teaching staff in 2020/2021 (Source: Authors edited and adapted to internal data of Josip Juraj Strossmayer University of Osijek)

According to the data in Table 6. in the academic year 2020/2021 there were 6 teaching activity and 0 training mobility from the Faculty of Low, 4 teaching activity and 0 training mobility from the Faculty of Economy, 2 teaching activity and 2 training mobility from the Faculty of Agrobiotechnical Sciences, 2 teaching activity and 1 training mobility from the Academy of Arts and Culture, 2 teaching activity and 0 training mobility from the Faculty of Civil Engineering and Architecture, 1 teaching activity and 1 training mobility from the Faculty of Education, 0 teaching activity and 1 training mobility from the Faculty of Electrical Engineering, Computing and Information Technology, 0 teaching activity and 1 training mobility from the Faculty of Humanities and Social Sciences, 1 teaching activity and 0 training mobility from the Faculty of Dental Medicine and Health, 1 teaching activity and 0 training mobility from the Department of Chemistry.



Graph 8: Erasmus + incoming mobility of (non) teaching staff in 2020/2021 by countries (Source: Authors edited and adapted to internal data of Josip Juraj Strossmayer University of Osijek)

According to the data in Graph 8. in the academic year 2020/2021 there were 52 % arrivals from other countries, 28% from Romania and 20% from Slovenia.

4. CONCLUSION

4.1. Research limitations

In this paper, the author(s) primarily researching the outcoming mobility of teaching and non-teaching staff from the Josip Juraj Strossmayer University of Osijek and incoming mobility of teaching and non-teaching staff on the Josip Juraj Strossmayer University of Osijek. For the purposes of this paper, the authors used secondary data obtained on the basis of internal university reports. Author(s) has been limited by their availability of reports data for the academic year 2021/2022. Also, author(s) has been limited for the availability of data Other countries in Graph 3. Erasmus + outgoing mobility of (non) teaching staff by countries (academic year 2018/2019), Graph 4. Erasmus + incoming mobility of (non) teaching staff by countries in 2018/2019, Graph 5. Erasmus + outgoing mobility of (non) teaching staff by countries 2019/2020.

4.2. Open questions

Throughout this paper, the author(s) raise the question of why the mobility (incoming and outgoing) of teaching and non-teaching staff is at a fairly low level, considering the size at the Josip Juraj Strossmayer University of Osijek and its components. Some recommendations

obtained on the basis of the analysis of all the data from this work were given by the authors in the conclusion of this work. The authors posed two research questions: To what extent did the pandemic COVID -19 affect the academic mobility of outcoming and incomingstaff at the Josip Juraj Strossmayer University of Osijek in the academic years 2020/2021 and in the part of academic year 2022/2023? Can we expect increased interest in academic mobility at the Josip Juraj Strossmayer University of Osijek in the academic year 2023/2024?

4.3. Suggestions for the future

The author(s) recommendations for the further increase of incoming mobility teaching and non-teaching staff lie in the number of visible and accessible courses on the official websites of the constituents and the web site of Josip Juraj Strossmayer University of Osijek, the alignment of the curriculum with other European faculties under Erasmus+ programm and the numbers of quality professional training programs. Activating the mentioned activities will certainly lead to key results: acquiring knowledge and specific knowledge from good practice abroad, develop competencies in one's own field and increase the relevance of teaching skills, strengthen cooperation with the partner institution and to create spin-off effects such as curriculum development, development of joint courses or modules, academic networks, research collaborations, etc.

4.4. Concluding remarks

In this paper the author(s) had been analyzed, according to constituents and countries in incoming or outgoing mobility, the academic mobility of teaching, non-teaching staff at the Josip Juraj Strossmayer University of Osijek from the period of academic year 2008/2009 to 2020/2021. In the first part of the concluding remarks the author(s) had been analyzed the total number of outgoing staff in teaching activity in the academic years 2009/2010, 2010/2011, 2012/2013, 2013/2014, 2014/2015 and 2016/2017. According the data in Graph 1. there was a lower mobility in teaching activity of 1.16 outgoing staff in 2011/2012 compared to 2010/2011. There was also a lower mobility in teaching activity of 1.14 outgoing staff in the academic year 2015/2016 compared to the academic year 2014/2015. Data from the Graph 1 shows that the number of employees assigned to training mobility in the academic year 2011/2012, 2012/2013, 2013/2014 and 2016/2017 has increased compared to the year 2008/2009. At the same time, there is a decrease of 1.75 outgoing staff for training mobility in 2009/2010. and 1.16 outgoing staff for training mobility in 2010/2011. compared to 2008/2009 and a slight decrease of 1.03 outgoing staff for training mobility in 2015/2016 compared to 2014/2015. In the second part of conclusion the author(s) has been analyzing the total number of outgoing staff in the academic year 2018/2019 by the there were 12 teaching activity and 20 training mobility from the Faculty of Humanities and Social Sciences, there were 1 teaching activity and 30 training mobility from the Faculty of Agrobiotechnical Sciences, there were 2 teaching activity and 19 training mobility from the Faculty of Electrical Engineering, Computing and Information Technology, there were 3 teaching activity and 16 training mobility from the Faculty of Food Technology, there were 4 teaching activity and 13 training mobility from the Academy of Arts and Culture, there were 1 teaching activity and 15 training mobility from the Faculty of Civil Engineering and Architecture, there were 2 teaching activity and 13 training mobility from the Faculty of Education, there were 4 teaching activity and 9 training mobility from the Faculty of Economy, there were 1 teaching activity and 5 training mobility from the Faculty of Law, there were 0 teaching activity and 4 training mobility from the Faculty of Medicine, there were 0 teaching activity and 3 training mobility from the Faculty of Dental Medicine and Health, there were 0 teaching activity and 1 training mobility from the Department of Physics, there were 0 teaching activity and 1 training mobility from the Department of Mathematics, there were 1 teaching activity and 0 training mobility from the Catholic Faculty of Theology in Đakovo, there were

teaching activity and training mobility, there were teaching activity and training mobility, there were 0 teaching activity and 1 training mobility from the Rectorat, there were 0 teaching activity and 1 training mobility from the Student centar, there were 0 teaching activity and 1 training mobility from the Quality Assurance Center. As in the previous academic year, the largest number of mobility in the academic year 2019/2020 it was achieved by the staff of the Faculty of Agrobiotechnical Sciences, the Faculty of Humanities, the Faculty of Electrical Engineering, Computer Science and Information Technologies and the Academy of Arts and Culture (48.20%). In the academic year 2019/2020, the (non) teaching staff at the Josip Juraj Strossmayer University of Osijek held courses under the Erasmus+ program and participated in continuing education programs in 23 countries, of which 56.34% of the mobility took place at higher education institutions in Hungary (23), Slovenia (23), Spain (14) and Portugal (11). The largest number of mobilities in the academic year 2020/2021 was achieved by employees of the Faculty of Agrobiotechnical Sciences and the Faculty of Food Technology (46%). In the academic year 2020/2021 the (non) teaching staff of the Josip Juraj Strossmayer University of Osijek held courses within the Erasmus+ program and participated in continuing education programs in 17 countries, with 49% of the mobility taking place at universities in Slovenia, Hungary and Serbia. Alao, in the academic year 2020/2021, teaching activity were held by 15 professors from eight components of the Josip Juraj Strossmayer University of Osijek. If we compered that data with the academic year 2019/2020 when 28 professors held teaching activity from ten constitents at the Josip Juraj Strossmayer University of Osijek. We can clearly conclude that the number of academic mobilities is been decreased for the 11 outgoings in the category of teaching activity and 52 outgoings in the category of the training mobility (Table 5. and Table 6.). The main reason of decreasing outgoing academic (non) mobility in 2020/2021 was pandemic COVID-19 pandemic and the epidemiological measures it brought, depending on the country.

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FINANCIAL LITERACY AS A FACTOR FOR WOMEN`S SUCCES IN SOCIETY

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ABSTRACT
Financial literacy is the knowledge, skills and attitudes that enable us to make informed and effective decisions about our finances. The goal of financial literacy is to improve the financial well-being of individuals and of the society as a whole by enabling them to participate in economic life. Women's financial literacy can help them better manage their finances, make informed investment decisions, and navigate financial systems and institutions with ease. Financial literacy is achieved through the process of financial education. It has been proven that increasing financial literacy and know-how can be realized through financial education policies and programs. Understanding the specific characteristics of financial literacy among women in a given country is essential for the effective development of policies and programs to increase their literacy.
Keywords: *financial literacy, financial education, gender gap*

1. INTRODUCTION

Financial literacy is the ability to effectively manage personal finances, budgeting and investing. Acquiring financial literacy empowers consumers to make sound financial decisions that lead to increased financial well-being. In a world of growing global inequality, women are particularly financially vulnerable. Women live longer, earn less and work harder than men to advance their careers, especially if they have been out of the workplace raising children. Adopting a targeted policy to increase women's financial literacy is an opportunity both to achieve equality and to harness the unrealized potential to increase economic efficiency in society. The subject of this report is financial literacy, the financial education and acquisition of financial literacy of women. The main objective of this report is to explore the possible correlation between financial literacy and the success of women in society as well as women's empowerment. The thesis of the report includes the proposition that financial literacy is a key factor, although not the only one, for the success of women in society. The assumptions are that higher financial literacy of women contributes to their successful realization, to the achievement of competitive business results in entrepreneurship and for favorable development, professional career and achievements in the public sphere. The tasks of the report include a review of the literature sources in the subject field, an overview of policies in different countries, focused at increasing women's financial literacy and a presentation of recommendations for improving the situation in this field. The methods used in the report are induction, deduction, comparison and method of references to other studies.

2. METHODOLOGY

2.1. Financial literacy definition

Financial literacy is the knowledge, skills and attitudes that enable us to make well-informed and effective decisions about our finances. It includes knowledge and understanding of financial concepts and risks, as well as some skills, motivation and confidence in applying that knowledge and understanding in different financial contexts. Financial literacy and confidence play a key role in building a person's financial wealth. Actual financial literacy refers to the understanding of financial concepts and the ability to make informed and effective financial

decisions. This means that basic financial concepts such as taxes, interest, inflation, investments and risk diversification must be understood. On the other hand, financial confidence refers to a person's belief in their own financial knowledge and abilities. This includes confidence in the ability to make financial decisions, manage personal finances and choose the right investment strategy. Financial confidence is just as important as financial literacy, as belief in one's financial knowledge and skills can influence the decisions a person makes about their finances and investments. Contrariwise, uncertainty is often a major factor in loss of profit and impossibility of decision making, which undermines people's ability to manage their personal finances. Decisions in the field of personal finance, themselves, depend on variety of factors - the determination of short-term and long-term personal financial goals; relationships in the household; personal income; risk acceptance or avoidance; the external economic environment (Radulova, 2011). The goal of financial literacy is to improve the financial well-being of individuals and society as a whole by enabling them to participate in economic life. The Organization for Economic Co-operation and Development (OECD) defines financial literacy as the combination of awareness, knowledge, skills, attitudes and behaviors that are necessary to make financial decisions and achieve individual financial well-being (OECD/INFE, 2009).

2.2. Specific characteristics of financial literacy among women

Women's financial literacy can help them better manage their finances, make well-informed investment decisions, and navigate financial systems and institutions with ease. Financial literacy can also help women assert their rights and importance in various social and professional roles. For example, it can enable them to negotiate better remuneration, benefits and working conditions, make well-informed decisions about major purchases or investments. It can also help women participate more fully in public life by understanding financial policies, tax laws and other economic issues that affect their communities and the society as a whole. Women's financial literacy is a critical factor in their success in the business environment as well, whether in their role as an entrepreneur, part of governing bodies or as an employee. Research shows that there are some distinctive features of financial literacy among women that differ from general financial literacy. Women's financial literacy is often shaped by their priorities, which may differ from men's. For example, women may prioritize long-term financial goals such as retirement and education for their children, while men may focus more on short-term financial goals such as business deals, increasing income, investing and saving. Women perform worse than men on a number of financial literacy tests. The lower financial confidence of women is also very characteristic. They often exhibit lower levels of confidence in their financial decision-making abilities than men, even when they have the same level of financial literacy. According to research by the Global Financial Literacy Excellence Center (GFLEC), a third of the gender gap in financial literacy scores can be explained by women's low self-esteem (Bucher-Koenen, 2021). This can lead to a lack of engagement in financial activities or a complete avoidance of financial decision-making (Hung, Yoong, & Brown, 2012). There are also gender-specific financial challenges: Women may face gender-specific financial challenges such as lower income levels, greater caregiving responsibilities and higher healthcare costs, which may affect their financial literacy and in decision making. When women are primarily responsible for childcare or are single parents, this can affect the early learning, financial literacy behaviors and attitudes of the next generation of consumers. Such differences are potentially compounded by feedback and the importance of experience, which may further reinforce and exacerbate other gender differences (Hung, Yoong, & Brown, 2012, p. 10). For many people, the differences in learning styles between the sexes are too significant. Research shows that women may have different learning styles when it comes to financial literacy. They may prefer experiential learning or peer learning to traditional classroom learning. There are also profound differences in communication.

Women tend to communicate about money and finances differently than men. They tend to prefer more collaborative and inclusive approaches to decision-making and are more likely to seek advice from others (Hung, Yoong, & Brown, 2012, p. 10). The relationship between financial literacy and women's success can be traced in different cuts, for example:

- When making more rational financial decisions. Women who are financially literate are better equipped to make informed decisions about their finances, including investments, savings and loans. This can help them build and grow their wealth over time.
- In facilitating access to financial resources. Women who are financially literate are more likely to have access to financial resources such as loans and investments. It helps them start and grow businesses, invest in education and plan for retirement.
- Women entrepreneurs who have financial expertise are more likely to have successful businesses. They are better equipped to manage their cash flow, understand financial statements and make informed decisions about market behavior, tax optimization, budgeting and investments.
- In gaining increased confidence, expressed in increased confidence in negotiation abilities, career advancement and financial management of personal finances. Financial literacy can help women feel more confident about managing their finances, which is likely to have a positive effect on other areas of their social lives.

All of the above leads to the conclusion that financial literacy is one of the main components contributing to the success of women in public life. This ability can help them make informed decisions, better manage their finances and access financial resources, which in turn can lead to improved well-being and increased confidence.

2.3. Review of the literature on the topic

The Organization for Economic Co-operation and Development (OECD) created the International Network for Financial Education (INFE) to help countries improve consumer financial literacy. The aim of the network is to ensure the exchange of information and good practices between countries to raise awareness of financial literacy and promote learning in this area. The International Network for Financial Education conducted research that found that the lack of financial literacy is one of the factors contributing to unfounded financial decisions with negative future consequences on individual well-being. This can include mismanagement of personal finances, careless selection of investments and loans, and lack of protection against fraud and financial fraud. It is therefore important to increase consumer financial literacy to reduce this risk and improve people's financial well-being (OECD/INFE, 2009). In 2012, the International Financial Education Network of the Organization for Economic Co-operation and Development (OECD) conducted a pilot study in 14 countries that aimed to examine differences in financial knowledge, behavior and attitude between and within countries by analyzing of socio-demographic data. The results of the study highlight that a significant part of the population in each of the countries studied has a lack of financial knowledge. In addition, the study showed considerable room for improvement in the financial behavior of individuals. This can include a mismatch between financial goals and chosen investments, lack of budgeting and savings, incorrect use of credit products and ignorance of fraud and financial fraud protection mechanisms (Atkinson, 2012). A number of studies have shown that poor family financial well-being is associated with poorer physical, mental, and emotional health outcomes for all household members, as well as lower educational achievement for children. Studies have demonstrated the validity of this relationship through various mechanisms such as family relationships (Conger, et al., 1990), the individual professional characteristics and the higher likelihood of shocks (Bosma, 1998).

Among the studies that highlight these connections are those of Marmot (Marmot, 2005), Kessler and Neighbors (Kessler & Neighbors, 1986), Lorant, Deliege et al. (Lorant, et al., 2003), Mackenbach, Stirbu et al. (Mackenbach, et al., 2008), McLoyd (McLoyd, 1989). These findings highlight the importance of financial literacy and financial status as crucial components of overall household well-being. Women and men may face different constraints, with professional and cultural norms often limiting women's personal finance learning (Hung, Yoong, & Brown, 2012).

2.4. Review of national policies aimed at increasing women's financial literacy

Financial education and financial literacy are related concepts, but there is a difference between them. Financial literacy is achieved through the process of financial education. It has been proven that increasing financial literacy and know-how can be realized through financial education policies and programs. According to the OECD, financial education is "the process by which financial consumers and investors improve their understanding of financial products, concepts and risks and through information, instruction and/or objective advice, to develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to turn for help and take other effective actions to improve their financial well-being" (OECD, 2005). Information provided to users includes facts, data and specific knowledge to inform them about financial opportunities; the learning includes ensuring that individuals acquire the skills and ability to understand financial terms and concepts through training and guidance; providing advices to consumers about general financial matters and products to help them make the best use of available financial information and instructions (Hung, Yoong, & Brown, 2012). There are countries where specific financial literacy policies designed for women have been developed and implemented. In India, for example, the Reserve Bank of India (Central Bank) and other financial regulators launched a National Strategy for Financial Education in 2012, which included specific targets for increasing financial literacy among women. The strategy aims to increase women's financial literacy by developing targeted financial education programs for women, establishing financial literacy centers in areas with a high concentration of women, and promoting the use of digital financial services to increase women's financial inclusion. The study of the results of the implementation of the strategy encourages the country to adopt a National Strategy for Financial Education (2020-2025), which again states that "despite the improvement over the period, further efforts are needed to improve financial literacy among women" (Technical Group on Financial Inclusion and Financial Literacy (TGFIFL), 2020). Similarly, in the United States, the Consumer Financial Protection Bureau has developed specific resources and programs aimed at increasing financial literacy among women. The bureau has developed a toolkit for women called Savings Fitness: A Guide to Your Money and Your Financial Future (U.S. Department of Labor, 2015), which gives women the tools they need to take control of their financial lives. The bureau also partners with organizations that serve women, such as the YWCA, to provide financial education programs to women. Other countries, such as Canada and Australia, have also developed financial literacy policies and programs that specifically target women. In Canada, the Financial Consumer Agency of Canada has developed a website aimed primarily on women, Your Financial Toolkit, which provides information and resources on a range of financial topics (FCA, n.d.). In Australia, the Australian Securities and Investments Commission has developed specific resources aimed at increasing financial literacy among women, such as the Women's Money Toolkit, and in New South Wells a popular Women's Financial Toolkit includes online resources, advices and services to help with managing personal finances, dealing with unexpected life events and financial planning for the future (NSW, n.d.).

Many countries now recognize the importance of increasing financial literacy among women and are developing specific policies and programs aimed at achieving this goal. These efforts are crucial for empowering women to take control of their financial lives, improve their financial well-being and contribute to the overall economic growth of their communities and countries.

3. RECOMMENDATIONS FOR IMPROVING WOMEN'S FINANCIAL LITERACY

Financial literacy can certainly be a factor in women's success in social life, as it can help them make informed decisions about their personal finances, investments, and overall financial well-being. When women have a good understanding of financial concepts such as budgeting, saving, investing and debt management, they can better navigate the financial challenges they may face in their personal and professional lives. In addition, financial literacy can empower women to take control of their financial future and pursue their goals, such as starting a business, buying a home, or obtaining a college degree. It can also help them advocate for themselves and negotiate for fair pay and benefits in the workplace. Financial literacy policies must take into account differences between female and male populations in preferences, demographic characteristics (e.g. life expectancy), risk attitudes, educational attainment to achieve the goals of women's financial inclusion and gender equality. However, it is important to note that financial literacy alone is not enough to ensure women's success in social life. Other factors, such as access to education and resources, social and cultural norms, and systemic barriers, can also play a significant role in shaping women's opportunities and outcomes.

4. CONCLUSION

Despite the finding that distinctive features of financial literacy and its acquisition among women are often observed, it is important to recognize that financial literacy is critical to societal adaptation and success for all individuals, regardless of gender, age or social status. Improving financial literacy among women can help address some of the unique financial challenges they face and empower them to make informed financial decisions that contribute to greater financial well-being and social success. This will also contribute to increasing economic efficiency in society, including more successfully and motivating women in economic life. Understanding of the specific characteristics of financial literacy among women in a given country is essential for the effective development of policies and programs to increase their literacy.

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A COUNTRY-COMPARATIVE ANALYSIS OF THE DYNAMICS OF KEY INDICATORS IN THE INSURANCE SECTOR IN EU

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ABSTRACT

This study is engaged in the analysis of the main indicators for the insurance sector in the EU countries for the period 2011-2021. It focuses on the single regime for the functioning of the insurance sector as well as the presentation of some national peculiarities. The present study initially describes the theoretical background of the insurance market and provides an overview of the research in this area. The main indicators in the insurance sector are clarified, the dynamics and structure of which are analyzed. Based on a descriptive statistical analysis, it was established that the development of the insurance sector is higher in economically developed countries, but at the same time there are asymmetries in the development of the insurance market both in the most developed and in the less developed EU countries. A comparative analysis of the shares of the countries in the EU insurance market was carried out, as well as the structure of the insurance market of the EU countries. The dynamics of the following indicators were monitored: insurance penetration rate, insurance density rate, relative share of premium income from life insurance, relative share of premium income from non-life insurance. During the studied period, significant changes were observed in these indicators both for individual countries and for the entire EU, and based on them, the countries were segmented into three main groups according to the degree of change - low, medium and high. The research used statistical and econometric methods for the analysis of the dynamics of indicators - rate of change, average rate of change, trend modeling, as well as variation analysis and statistical grouping.

Keywords: *insurance, insurance sector, insurance penetration ratio, insurance density ratio, insurance market analysis*

1. INTRODUCTION

Insured persons pay a premium and receive insurance coverage against certain risks. In the context of insurance, contingencies can be managed by distributing the negative consequences for individual insured persons among a community of multiple insured persons who are exposed

to the same risk. When events or conditions described in the insurance contract occur, the insurer is obliged to pay compensation or an amount. Mosin explains the process of transferring risks from economic agents who are risk averse to economic agents who are risk neutral, such as insurance companies. Insurance companies specialize in the selection and collection of various risks and in their effective management (Mossin, 1968). General insurance is a means of risk transfer and also helps to support market mechanisms for the selection and financing of contributing investment projects. In the realm of life insurance, this industry functions primarily as an institutional investor and successfully raises funds by pooling them into large investment flows. The inherent heterogeneity in estimated effects and the varying dataset sizes have created an opportunity for the synthesis of previously published results, aiming to derive a more precise estimation of this impact. Insurance market activity, functioning both as a mechanism for risk transfer and indemnification and as a significant institutional investor, possesses the potential to positively contribute to economic growth. It achieves this by mobilizing domestic savings, facilitating more efficient risk management, promoting the accumulation of fresh capital, enhancing financial stability, supporting trade and commerce, mitigating losses, and ultimately fostering a more effective allocation of domestic capital. As the discussion evolves and further research is conducted, a clearer picture of the intricate relationship between insurance market dynamics and economic growth will likely continue to emerge. The evaluation of the insurance market's performance relies on both quantitative and qualitative indicators. Two crucial metrics are insurance density and insurance penetration. Insurance density measures the average per capita insurance spending by comparing total direct gross premiums collected to the total population of a country. Insurance penetration, on the other hand, assesses the insurance sector's contribution to a country's GDP by comparing direct gross premiums to GDP. These indicators are typically used to gauge the effectiveness of the insurance industry as a whole. Insurance density and insurance penetration are important indicators that reflect the level of insurance activity within a particular country or region. Several factors can influence these measures: economic development, regulatory environment, income, financial literacy, population demographics, cultural and social factors, government policies, competition etc. These factors interact in complex ways, and their relative importance can vary from one country to another. Analyzing the interplay of these factors is essential for understanding and predicting insurance market dynamics in a particular region. Numerous studies have investigated the relationship between these indicators and various factors. These studies have yielded insights that can be valuable in assessing the performance of insurance companies and insurance sector within a given country as well as the benchmarking insurance markets in the European Union (EU).

2. REVIEW OF THE LITERATURE SOURCES ON THE TOPIC

The prolonged debate surrounding the influence of insurance market activity on economic growth has been the subject of extensive research, yielding diverse findings due to variations in methodologies and outcomes. The positive correlation between the development of the insurance sector and economic development has not been subjected to much research. Adams and his team conducted an analysis of the interrelationships between the banking sector, the insurance industry and economic growth in Sweden, taking into account a 170-year period (Adams, 2005). Heiss and Sumegy emphasize that institutional structure, legal and regulatory frameworks, market structure, and demographic and social characteristics of the population provide diverse opportunities for interactions between insurance and the economy (Haiss & Sümegi, 2008). Kugler & Ofoghi conduct a study of the relationship between insurance and economic development, using Great Britain as an example (Kugler & Ofoghi, 2005). Some studies have sought to identify the determinants of non-life insurance consumption, due to its importance to the economy both quantitatively and in terms of coverage for increasing risks and uncertainties.

Outreville conducted one of the early empirical studies of the impact of economic and financial development on non-life insurance consumption using data from 55 developing countries. He finds that the main determinant of the demand for non-life insurance is the economic development of the given country and highlights that countries with higher GDP per capita definitely spend more on insurance in absolute terms and there is also a positive correlation between the density of the insurance industry and GDP. However, in a comparison between two countries with roughly the same GDP per capita, the role of insurance may be different in relative terms. In addition, both life insurance and non-life insurance are influenced by the legal and fiscal context in each particular country (Outreville, 1990), (Outreville J, 2011). Prodanov and Stanimirov demonstrate the positive correlation between gross premium income growth in the non-life insurance sector in Bulgaria and economic growth, noting high levels of correlation and dependence for the period between 2009 and 2019 (Prodanov & Stanimirov, 2020). Density and penetration in the insurance sector are intriguing subjects that attract the attention of experts in this field. For instance, Enz (2000) proposed a relationship resembling an S-curve between per-capita income and insurance penetration. The complexities surrounding insurance penetration are addressed through its definition. Insurance penetration, defined as the ratio of premium volume to GDP, gauges insurance activity in proportion to the overall economic size. However, it's worth noting that this metric, being a product of quantity and price, is not a flawless measure of consumption. A higher premium volume could result from various factors like quantity, price, or variations in the mix of mortality risk, savings, and annuity elements purchased. Factors like limited competition and expensive regulations can raise the cost of insurance without necessarily increasing its consumption. Closely related to the concept of insurance penetration is another term known as insurance density, which is defined as the amount spent on insurance premiums per capita. This metric provides insight into the average expenditure on insurance per person within a country, expressed in constant currency. While both insurance penetration and insurance density involve the use of gross premiums, they differ significantly in their focus. Insurance penetration assesses insurance consumption in relation to the overall size of the economy, while insurance density compares insurance consumption among countries without accounting for income disparities. The growing significance of the life insurance market within the broader insurance industry is noteworthy. Researchers have conducted studies to explore the connection between the development of the life insurance market, as measured by penetration and density, and economic growth. This analysis is carried out within the context of various conditional factors that have the potential to exert an influence on this relationship. (Beck & Webb, 2003). The development of the life insurance market has assumed an increasingly significant role within the broader insurance industry. Researchers have delved into the correlation between the progression of the life insurance market, as measured by penetration and density, and its impact on economic growth. This examination is conducted within the context of various conditional factors that have the potential to exert influence on this relationship. (Chen, Lee, & Lee, 2012). The exploration of insurance-related issues through density and penetration metrics has also had implications for other countries. For instance, in the case of China's transition from a planned to a market economy, variables like population count, per capita GDP, total savings deposits, education attainment, telephone ownership per capita, social welfare expenditure, and young dependency ratio have been found to significantly influence life premium volumes written in a given city. Insurance density is similarly impacted by factors such as population size, per capita GDP, wage levels, private savings deposits, telephone ownership, and dependency ratios. Furthermore, in China's coastal, central, and western regions, insurance penetration is significantly influenced by market structure and social welfare expenditure (Zhang & Zhu, 2008). It is evident that, much like financial markets in general, the insurance market encompasses a wide range of activities. Numerous activities within the insurance market can provide insights into its extent and

condition. In particular, two crucial indicators are used to assess the state of the insurance market: insurance market density and insurance market penetration. These indicators are further divided into three categories: life insurance, non-life insurance, and total insurance (combining both life and non-life coverage). Dash et al. focuses specifically on insurance market penetration and their causal relationship with economic growth within the selected Eurozone countries. The primary objective of their study is to analyze the trends and regional variations in insurance market penetration within the Eurozone context (Dash, et al., 2018). The main focus is on determining the presence and direction of Granger causality between these variables, whether it's one-way, two-way, or nonexistent. The empirical findings reveal the existence of both one-way and two-way causality between insurance market penetration and per capita economic growth. However, it's important to note that these outcomes exhibit considerable variation among Eurozone countries during the specified time frame.

3. METHODOLOGY

The research used statistical and econometric methods for the analysis of the dynamics of indicators - rate of change, average rate of change, trend modeling, as well as variation analysis and statistical grouping. Analyzing indicator dynamics through the rate of change quantifies the percentage shift in values between successive time periods, helping identify the direction and pace of change. The average rate of change smooths out short-term fluctuations, offering a stable measure of trends over a specified period. Trend modeling employs mathematical techniques to uncover underlying patterns and forecast future indicator behavior, enabling data-driven decision-making and predictions based on historical data. Variation analysis examines the variability or differences in data points within a dataset. It helps identify patterns, trends, or anomalies in the data by measuring how values deviate from a central measure like the mean or median. Statistical grouping involves categorizing data points into distinct groups or categories based on certain criteria or characteristics. It's a technique used to simplify and summarize complex datasets, making it easier to analyze and draw insights from large amounts of information. Statistical grouping can reveal patterns and relationships within the data that might not be apparent when examining individual data points.

4. EMPIRICAL ANALYSIS

Over the period 2011-2022, gross premium income for EU countries has a general upward trend. The largest increase in gross premium income was registered for Malta, with an increase of 8.2 times compared to 2011, with an average annual increase of EUR 693.4 million and an average annual growth rate of 21%. Second in terms of growth rate of gross premium income is Sweden - in 2022 compared to 2011, gross premium income increased 4.3 times, with an average annual growth rate of 14.2% (Table 1). Bulgaria ranks third in terms of increase in BPA in the EU for 2022 compared to 2011 – the increase is 3.2 times, with an increase of 1814 million. the average annual absolute growth rate for the period was EUR 164.9 million. the average annual growth rate was 11.3%. For most of the other EU countries, the change in BPA for the period 2011-2022 is increasing – the rate of development for 2022 compared to 2011 is between 1.1 and 2.9. Only three countries have a decrease in BPA in 2022 compared to 2011 – Austria (the decrease in 2022 compared to 2011 is by BGN -3,733.9 million, and the rate of development is for 2022 compared to 2011 is 0.8); Greece (the decrease in 2022 compared to 2011 is by BGN 469.4 million, and the rate of development is 0.9 for 2022 compared to 2011); Slovakia (the decrease in 2022 compared to 2011 is BGN 469.4 million, and the growth rate is 0.9 in 2022 compared to 2011).

Countries	absolute growth rate 2022/2011 growth (EUR million)	Average absolute increment Million. euro	Pace of development 2022/2011	Average growth rate %
Belgium	13715,3	1246,8	1,5	3,5
Bulgaria	1814,4	164,9	3,2	11,3
Czechia	4672,1	424,7	2,7	9,4
Denmark	10045,6	913,2	1,4	3,2
Germany	156636,8	14239,7	1,9	6,0
Estonia	512,5	46,6	2,3	7,9
Ireland	33006,1	3000,6	1,8	5,4
Greece	-469,4	-42,7	0,9	-0,9
Spain	2045,8	186,0	1,0	0,3
France	106798,3	9708,9	1,6	4,2
Croatia	238,3	21,7	1,2	2,0
Italy	23798,0	2163,5	1,2	1,8
Cyprus	238,3	21,7	1,2	2,0
Latvia	84,3	7,7	1,2	2,0
Lithuania	541,1	49,2	2,9	10,0
Luxembourg	24219,3	2201,8	2,5	8,6
Hungary	569,7	51,8	1,2	1,6
Malta	7627,3	693,4	8,2	21,0
Netherlands	3986,9	362,4	1,1	0,5
Austria	-3733,9	-339,4	0,8	-2,3
Poland	853,4	77,6	1,1	0,5
Portugal	5802,4	527,5	2,0	6,3
Romania	674,2	61,3	1,4	2,9
Slovenia	1101,3	100,1	1,6	4,2
Slovakia	-178,1	-16,2	0,9	-0,8
Finland	1358,6	123,5	1,2	1,6
Sweden	29788,4	2708,0	4,3	14,2

Table 1: Summary indicators of the dynamics of gross premium income (Source: EIOPA and author's calculations)

In order to identify the trends and ongoing processes in the insurance sector of the EU countries, as well as to carry out a comparative analysis between them, summarizing indicators for characterizing the insurance sector - the coefficient of insurance density (ratio of BOP to the population of the country) and the coefficient of insurance penetration (the ratio between gross premium income and gross domestic product) have been studied. For the period 2011-2022, the insurance coefficient is growing, but the variation in its change is less pronounced compared to the insurance density ratio (Figure 1). The highest average annual growth rate of the indicator was found for Malta, followed by Sweden, the next places are the Czech Republic and Bulgaria, and the lowest is the growth rate for Austria, Slovenia, Ireland, Poland, etc., with less than 1% increase for the period having 15 countries.

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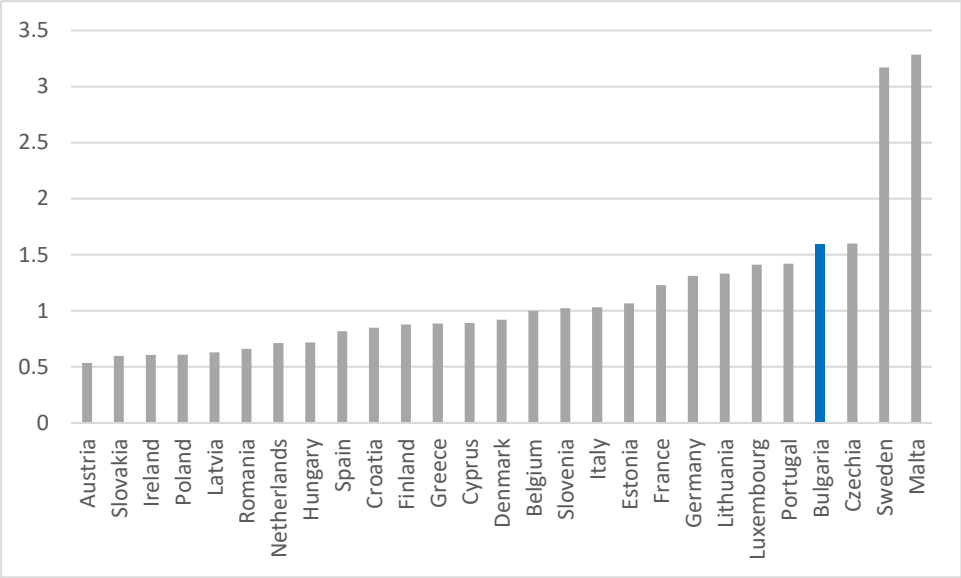

Figure 1: Distribution of countries according to the average annual growth rate of the insurance penetration rate for the period 2011-2022
(Source: EIOPA, Eurostat and author's calculations)

The insurance density ratio shows the average amount that each citizen devotes to insurance – for the majority of EU countries, there is a tendency to increase funds (Table 2). In 2022 compared to 2011, the BMP, which is accounted for per capita, increased 6.2 times for Malta, 3.9 times for Sweden and 3.7 times for Bulgaria, 3 times for Lithuania, and only for Austria the Netherlands, Slovakia and Greece there was a decrease in the funds allocated for insurance – for them the growth rates are below 1 - the funds allocated for insurance in 2022 are less than the funds allocated in 2011. the COVID-19 pandemic, the "insurance density" indicator for most countries registered weaker rates of growth, and for some countries there was a decrease in the funds allocated to insurance.

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Countries	absolute growth rate 2022/2011 growth (EUR million)	Average absolute increment Million. euro	Pace of development 2022/2011	Average growth rate %
Austria	-559,8	-50,9	0,7	-3,0
Netherlands	-60,3	-5,5	1,0	-0,1
Slovakia	-34,5	-3,1	0,9	-0,9
Greece	-14,8	-1,3	1,0	-0,3
Spain	9,5	0,9	1,0	0,1
Poland	36,4	3,3	1,1	0,9
Romania	40,5	3,7	1,4	3,4
Latvia	59,2	5,4	1,4	2,8
Hungary	69,6	6,3	1,2	1,9
Croatia	86,8	7,9	1,4	3,0
Cyprus	187,5	17,0	1,2	1,4
Lithuania	194,3	17,7	3,0	10,5
Finland	205,9	18,7	1,2	1,3
Bulgaria	296,4	26,9	3,7	12,6
Estonia	366,4	33,3	2,2	7,6
Italy	421,4	38,3	1,2	1,9
Czechia	423,6	38,5	2,6	9,1
Slovenia	493,2	44,8	1,5	3,9
Portugal	558,5	50,8	2,0	6,4
Belgium	1012,8	92,1	1,4	3,0
Denmark	1433,9	130,4	1,3	2,6
France	1452,1	132,0	1,5	3,8
Germany	1752,0	159,3	1,8	5,5
Sweden	2737,8	248,9	3,9	13,2
Ireland	5295,5	481,4	1,6	4,3
Malta	13485,4	1225,9	6,3	18,2
Luxembourg	30198,5	2745,3	2,0	6,3

Table 2: Summary indicators of the dynamics of the insurance density ratio (Source: EIOPA, Eurostat and author's calculations)

The annual average rate of change in the insurance density ratio for the EU countries is in the range of -3% to 118.2% (Figure 2). The distribution of countries in the coefficient of insurance density and the tendency to increase the indicator during the studied period is clearly visible, as the average annual growth of the indicator has positive values.

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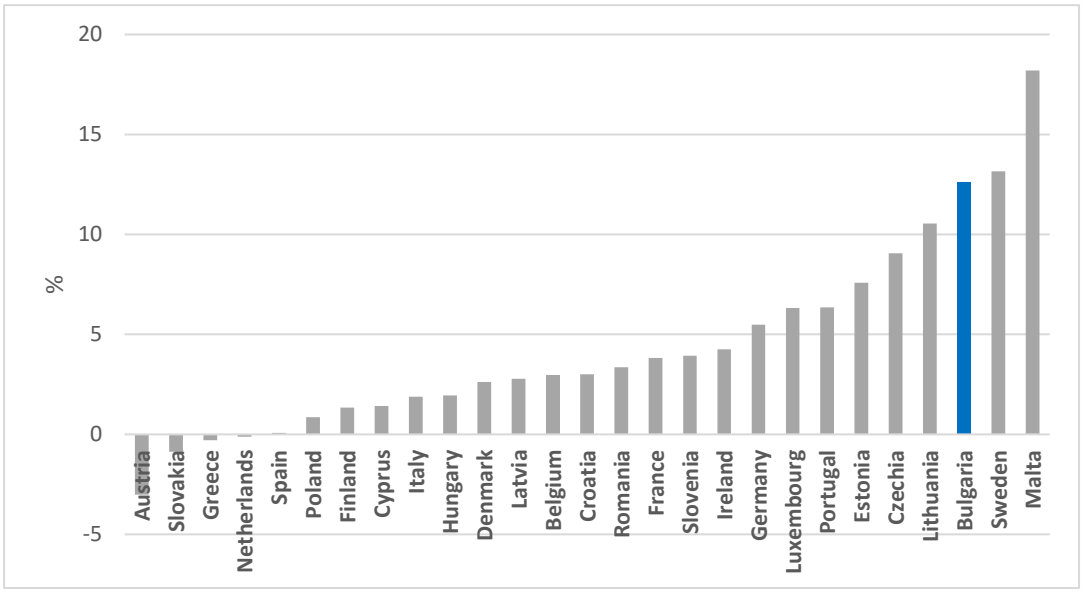

Figure 2: Distribution of countries according to the average annual growth rate of the insurance density ratio for the period 2011-2022
(Source: EIOPA, Eurostat and author's calculations)

According to the magnitude of the indicator "coefficient of insurance density" for 2011 and 2022, segmentation of countries was carried out, and for this purpose the following groups were formed:

- over 0 to 1000 euros;
- over 1000 euros to 2000 euros;
- over 2000 euros to 5000 euros
- over 5000 euros.

The obtained results of the segmentation of the countries are visualized in Figure 3. From the presented distributions of the countries in the indicated intervals according to the coefficient of insurance density, it is clear that 13 countries fall into the first group up to 1000 euros per capita for insurance in 2011, the lowest value is for Romania, followed by Lithuania and Bulgaria, and the closest to the upper limit are Slovenia and Sweden. In 2011, in five countries, the insurance density ratio was between EUR 1,000 and EUR 2,000 and this includes the following countries: Cyprus, Spain, Finland, Italy and Austria. The third group over 2,000 euros to 5,000 euros includes 6 countries – Germany, Malta, Belgium, France, Denmark and the Netherlands. Only in two countries is the insurance density ratio above 5000 – Ireland and Luxembourg, and here the value many times exceeds the lower limit of this group. The conclusion that can be drawn is that in 2011 the countries of Central and Eastern Europe fell into the group where per capita for insurance accounted for up to 1000 euros, and the variation within this group is significant. The third and fourth groups include countries with highly developed and stable economies, which are leading in almost all economic and social indicators in the EU.

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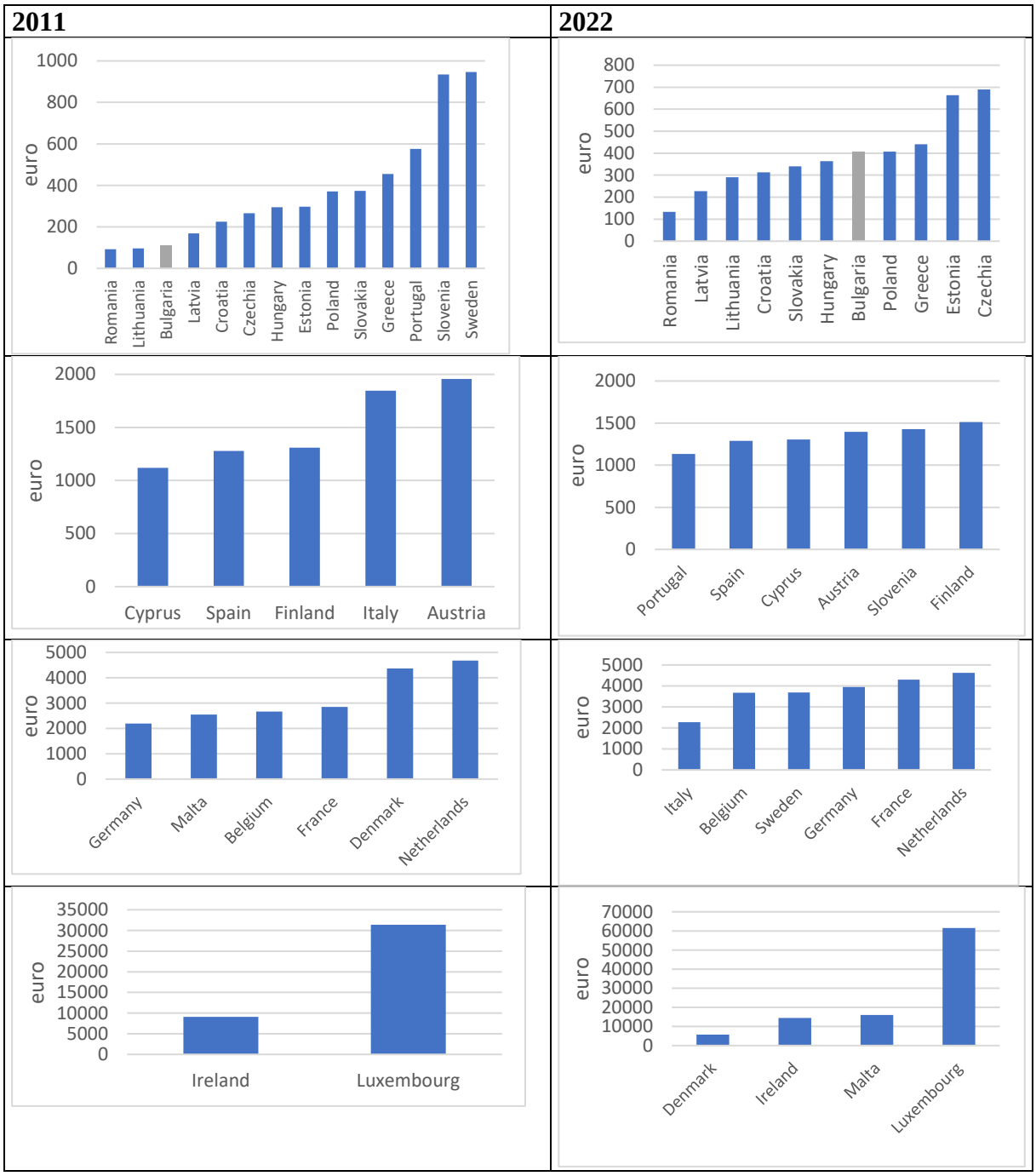

Figure 3: Segmentation of countries according to the insurance density ratio (Source: EIOPA, Eurostat and author's calculations)

There are changes in the distribution of countries according to the coefficient of insurance density – there is a transition from one group to another in the period 2011-2022. In 2022, 11 countries fall into the first group up to 1,000 euros per capita for insurance, with the lowest figure again for Romania, despite the increase it registers on this indicator, followed by Latvia, Lithuania and others. and Bulgaria has positioned itself in the middle, but it is quite far from the upper limit of 1,000 euros. Here the closest to the upper limit are Estonia and the Czech Republic, and of the countries that in 2011 are in this transition group make Slovenia, which already has in the range between 1000 and 2000 euros and Sweden, which falls into the third group with the coefficient of insurance density between 2 and 5000 euros. In 2022, for six countries, the insurance density ratio is between EUR 1,000 and EUR 2,000, and this includes

Portugal, Spain, Cyprus, Austria, Slovenia and Finland. The insurance density ratio for six countries falls into the group above EUR 2000 to EUR 5000 and these are Italy, Belgium, Sweden, Germany, France and the Netherlands. The group with an insurance density ratio of 5,000 euros already includes 4 countries – Denmark, Ireland, Malta and Luxembourg, and here the value many times exceeds the lower limit of this group, but the value of the indicator has also increased twice the value for 2011. that the countries of Central and Eastern Europe fall into the first group, in which per capita for insurance account for up to 1000 euros, with the variation within this group continuing to be significant, and in the third and fourth groups are again the developed EU countries.

5. CONCLUSION

Based on a descriptive statistical analysis, it was established that the development of the insurance sector is higher in economically developed countries, but at the same time there are asymmetries in the development of the insurance market both in the most developed and in the less developed EU countries. A comparative analysis of the shares of the countries in the EU insurance market was carried out, as well as the structure of the insurance market of the EU countries. The establishment of a robust financial system, especially concerning the functioning of the insurance market, has the potential to facilitate increased investments and offer more accessible channels for capital generation in support of economic endeavors. Acknowledging the likelihood of reciprocal causality or bidirectional relationships in specific scenarios, it is advisable for policymakers to implement measures aimed at enhancing economic growth, such as initiatives to boost investments, to further expand the influence of the insurance market. It is advisable for governments to take on a more proactive role in nurturing the insurance market and seamlessly integrating it with economic growth efforts. In the current dynamic global landscape, numerous nations have recognized the pivotal role of financial markets in driving robust economic growth. Focusing on strengthening the insurance market involves addressing hindrances in the relationship between the insurance market and economic growth, such as regulatory and tax frameworks.

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ENTREPRENEURSHIP EDUCATION AS A FACTOR INFLUENCING YOUNG PEOPLE'S ENTREPRENEURIAL ATTITUDES

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ABSTRACT

The aim of this study is to highlight the significance of entrepreneurship education as one of the most important factors influencing young people's attitudes toward entrepreneurship and entrepreneurial behavior. Data from various studies conducted among students in Bulgarian and foreign higher education institutions were examined, analyzed, and used for this purpose, revealing that entrepreneurial education plays a vital role in fostering the development of essential skills and attitudes that are required for success in entrepreneurship and is designed to help young people develop an entrepreneurial mindset, learn about starting and running a business, and gain practical experience in entrepreneurship.

Keywords: *Entrepreneurship, Entrepreneurship Education, Entrepreneurial attitudes, Entrepreneurial behavior, Entrepreneurial activity*

1. INTRODUCTION

Entrepreneurship is a key component of a country's social and economic development and a means of solving various problems related to unemployment, inequality, competitiveness, innovation, job creation, and personal and career development. Because of its significance, entrepreneurship is still embedded in many local, national, and international plans and programs aimed at encouraging entrepreneurial activities, particularly among young people. As a result, many researchers and scientific institutions are paying attention to people's entrepreneurial intentions and attitudes by conducting scientific and practical research aimed at gathering information about the factors that influence these attitudes and, taking appropriate actions to promote entrepreneurial initiatives. One of these elements is entrepreneurship education, which has a dichotomous effect on young people’s entrepreneurial intentions. On the one hand, it improves the amount of ambition, self-efficacy, confidence, and abilities required for entrepreneurs; on the other hand, it attracts individuals to entrepreneurial ventures and provides the ability to analyze entrepreneurial risk and make the right business decisions (Kar, Mishra, & Mohanty, 2014). Entrepreneurship education also helps young people to develop a more entrepreneurial mindset, which is characterized by qualities such as risk-taking, creativity, adaptability, and persistence. This mindset is critical for success in entrepreneurship, and it is developed through hands-on experience and exposure to entrepreneurial role models. That is why entrepreneurship education as a factor is also influenced by other factors at the individual level that are related to entrepreneurial activity among young people – family and social environment, internal locus of control, and need for achievements (motivation). Despite the numerous benefits of entrepreneurship education, it is still not widely available to young people in many countries. This is a significant concern, as it limits the potential of young people to contribute to the growth and development of their communities and economies.

2. ENTREPRENEURIAL ATTITUDES AND ENTREPRENEURIAL INTENTIONS – A BRIEF OVERVIEW

Entrepreneurial attitudes and intentions include a person's desire and ambition to become an entrepreneur, to start and succeed in their own business. In other words, entrepreneurial intention is a state of mind that directs individual behaviors in order to build and expand a business (Vodă & Florea, 2019).

Individual entrepreneurial behavior and actions can also be predicted using entrepreneurial attitudes and intents. Two theories are primarily used to clarify the essence of entrepreneurial attitudes and intentions – Fishbein and Ajzen's theory of planned behavior (TPB) and Shapero's theory of entrepreneurial event (EET).

2.1. Theory of Planned Behavior

According to Fishbein and Ajzen's theory of planned behavior (Ajzen & Fishbein, 1977), human conduct is planned and so preceded by the intention to behave (Fig. 1). In other words, entrepreneurial intention predicts entrepreneurial behavior and activity (Anjum, Farrukh, Heidler, & Tautiva, 2021), which suggests that entrepreneurial activity may be exactly predicted by examining intentions and attitudes.

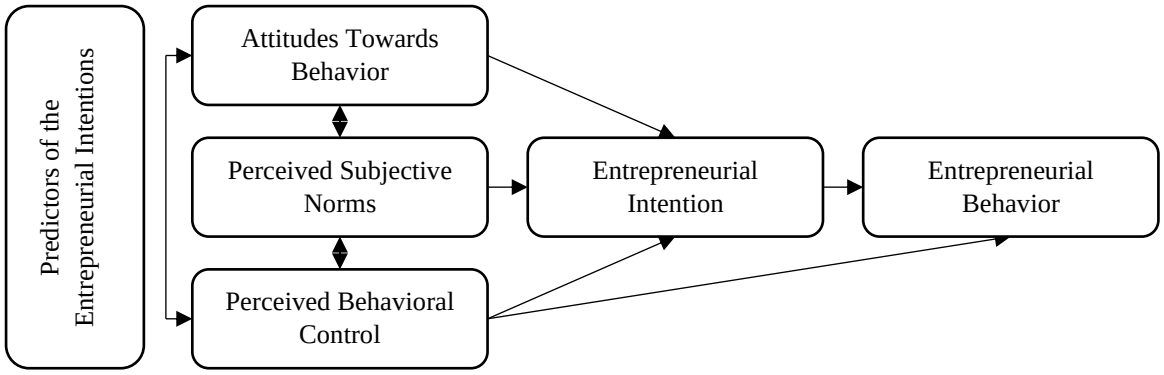

Figure 1: Fishbein and Ajzen's Theory of Planned Behavior Model
(Source: Adapted from Ajzen & Fishbein, Attitude-behavior relations: A theoretical analysis and review of empirical research, 1977.)

According to the theory of planned behavior, entrepreneurial intents can be predicted by three sets of factors: attitudes toward the conduct, subjective norms, and perceived behavioral control (Ajzen, Psychological Bulletin, 1991). Attitudes are characterized as beliefs and perceptions about one's motivation to engage in entrepreneurial action, which is tied to expectations about the personal influence of the consequences of that conduct. Individuals' judgments of the values, attitudes, and norms held by individuals they respect or consider significant, as well as their willingness to conform to such rules, are referred to as subjective norms or perceived social norms. It is argued that social standards are less predictive of the intentions of people who have a high internal locus of control. Perceived behavioral control is defined as a personal belief in one's ability to perform a planned behavior, as well as the perception that the behavior is under the decision maker's control (Ajzen, Perceived Behavioral Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behavior, 2006). In general, the theory of planned behavior in the context of entrepreneurship holds that entrepreneurial intention is determined by an individual's attitude toward their desire for an entrepreneurial career, subjective norms such as perceived family expectations, and perceived ability to carry out the planned behavior of starting an entrepreneurial venture. Therefore, entrepreneurial intentions are a variable that mediates the relationship between potential external influences and business creation action.

2.2. Entrepreneurial Event Theory

Entrepreneurial intentions, according to Shapero, are the psychological processes that contribute to an individual's decision to become an entrepreneur and start a new business (Shapero & Sokol, 1982). These intentions are a key aspect in determining whether or not an individual will begin an entrepreneurial activity.

Several elements influence an individual's entrepreneurial inclinations, according to Shapero's model:

- Entrepreneurial experience. If an individual has prior experience starting and operating a business, his entrepreneurial goals may be strengthened.
- Education and qualifications. An individual's education and qualifications can influence whether or not they intend to start a business. People with a higher level of education and specialized certifications are more likely to want to start their businesses.
- Social networks. Social networks can impact an individual's entrepreneurial goals by giving them information, advice, and resources for business development from other entrepreneurs.
- Personality traits such as creativity, risk-taking, assertiveness, persistence, and creative thinking can all impact an individual's entrepreneurial goals.

Shapero's model (Fig. 2) is valuable for understanding the psychological aspects that influence an individual's entrepreneurial goals and can assist individuals in assessing their talents and business creation chances.

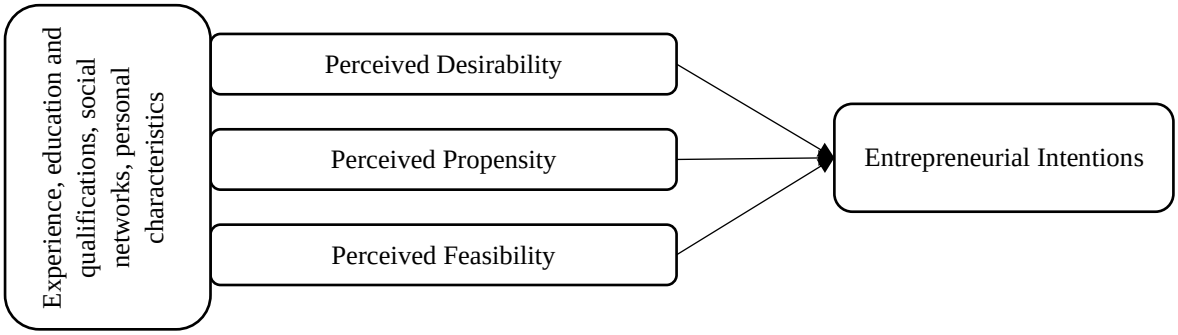

Figure 2: Entrepreneurial Intentions model according to Shapero's Entrepreneurial Event Theory

(Source: Adopted from Vodă, A., & Florea, N. (2019). Impact of Personality Traits and Entrepreneurship Education on Entrepreneurial Intentions of Business and Engineering Students. Sustainability 2019.)

Summarizing, we can say that entrepreneurial behavior refers to the actions, decisions, and mindset of individuals who engage in entrepreneurial activity. Entrepreneurial activity involves the creation and management of a new business venture to generate profit and growth. This can include identifying and evaluating business opportunities, developing, and implementing a business plan, and managing financial and operational risks. Entrepreneurial behavior is characterized by qualities such as innovation, risk-taking, adaptability, and persistence. The study of entrepreneurial behavior and activity is important for understanding the drivers and outcomes of entrepreneurship and its impact on economies and society.

3. ENTREPRENEURSHIP EDUCATION AND OTHER RELATED FACTORS

3.1. Entrepreneurship education and the family and social environment

As the basic social unit, the family plays an essential role in starting a business or managing an existing one. The family also serves as a foundation for the development of an individual's entrepreneurial abilities and attitudes. Family history, support, and encouragement from family, friends, and relatives have been highlighted as major elements influencing entrepreneurship, and a suitable socio-cultural context is required for entrepreneurial activities. The fact that in 1996, 75% of slightly over 27 million enterprises in the United States were classified as family

businesses (by 2022, they are 90%), and the European Commission anticipates that family businesses in the countries of the European Union will be between 70% and 90%, is indicative of this. The data for the Asia-Pacific region's countries is no less conclusive. In Singapore, between 80% and 90% of enterprises are family-owned, while in China, over 85% of private businesses are family-owned. In Latin America, however, this percentage ranges between 65% and 98% (Kelley, Gartner, & Allen, 2020)**.** In a study conducted in 2007 in several cities in Brazil, Djankov and his team concluded that the social environment – family, relatives, and friends, has a very strong influence on the transformation of an individual into an entrepreneur (Djankov, Qian, Roland, & Zhuravskaya, 2007). According to the authors' publication, 81% of Brazilian entrepreneurs polled had family or acquaintances that work for themselves, own their own business, or manage 5 or more subordinates. Surprisingly, the figures show that more than 70% of these entrepreneurs' best buddies from high school or university have also started a firm. A Malaysian study published in 2011 listed the most critical characteristics influencing students' entrepreneurial behavior (Thresiamma & Adil, 2012). The findings unambiguously demonstrate the importance of the family as a role model that influences young people's entrepreneurial inclinations. In the academic setting, Gottner et al. stress the clear importance of family, friends, or coworkers as subjective determinants in determining university graduates' entrepreneurial goals (Goethner, Silbereisen, Obschkonka, & Cantner, 2012). According to their research, students have positive attitudes toward entrepreneurial ideas and see entrepreneurship as a good option for growth if the anticipated opportunities are professionally interesting and provide adequate financial incentives. The results of a study in 2020 covering three Bulgarian economic universities are no different (Panteleeva & et. al., 2021). According to it, the factors that stand out and have the strongest influence on students' desire to develop as entrepreneurs are close and familiar entrepreneurs, parents, friends, and university professors (Figure 3).

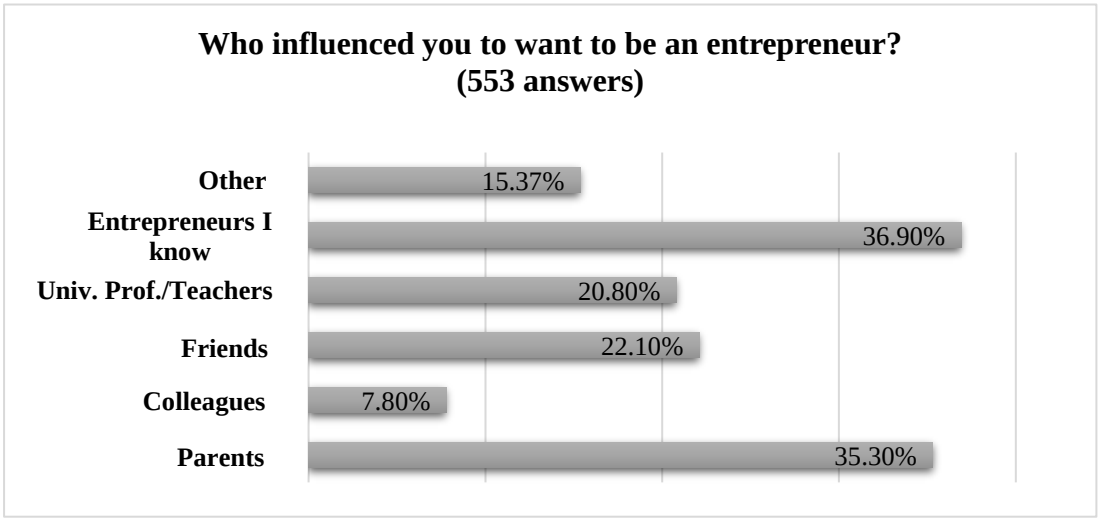

Figure 3: Who influenced you to want to be an entrepreneur?
(Source: Panteleeva, I., et. al. (2021, May 03). Research of the Attitude Towards Entrepreneurship and the Attitude to Start Own Business of the Students From D. A. Tsenov Academy of Economics (Svishtov), UNWE (Sofia) and EU (Varna). Scientific Research Almanac, Volume 29, pp. 48-81.)

3.2. Entrepreneurship education and the internal locus of control

The locus of control indicates an individual's belief or perspective about who is in charge of their life and surroundings, or the extent to which people believe that what occurs to them is under their control or beyond their control (Vodă & Florea, 2019).

Thus, internal locus of control refers to the recognition that one's abilities, skills, efforts, decisions, and actions underpin entrepreneurial initiative (Kerr, Kerr, & Xu, 2017). Rother proposed in 1989 that locus of control is a factor that influences a person's decision to become an entrepreneur and that persons who have a greater internal locus of control are more likely to become entrepreneurs (Thresiamma & Adil, 2012). Several researches have shown that locus of control is a culturally dependent feature. The internal locus of control is more evident in countries with a higher degree of individualism (Mueller & Thomas, 2000). According to a 2006 research of Turkish students, individuals who were more inclined to start an entrepreneurial enterprise had a greater internal locus of control, were more willing to take risks, needed to achieve more, and were more innovative (Kerr, Kerr, & Xu, 2017). The subjective norms and individual perspectives of 719 students in Central and Eastern European nations, such as Poland, were found to significantly influence their decision on entrepreneurial activities (Wach & Wojciechowski, 2016). According to Rauch and Frese, the internal locus of control is also closely tied to the growth and profitability of businesses (Rauch & Frese, 2007). We can conclude that entrepreneurship education plays a direct role in locus of control. In other words, adequate entrepreneurial training helps young people increase their internal locus of control.

3.3. Entrepreneurship education and the need (motivation) for achievement

One of the characteristics of people with entrepreneurial attitudes and intentions is the need (motivation) for success. This urge relates to a person's drive for major achievement, skill mastery, and achievement of challenging goals. It is related to the locus of control aspect stated previously, because entrepreneurs' drive for excellence displays abilities, knowledge, and skills that are more pronounced than those of the average person (Kerr, Kerr, & Xu, 2017). A research of 600 Romanian students revealed definitively that the need for achievement is an important personality attribute that influences the possibility of beginning a business in the future (Popescu, Robu, Maxim, & Diaconu, 2016). Achievement motivation is also a culturally determined trait. Countries with higher levels of entrepreneurial activity and economic growth have higher levels of need for achievement (Kerr, Kerr, & Xu, 2017). People with high achievement motivation are more likely to engage in innovative activities that involve subsequent planning, taking responsibility for results, a strong desire to solve various problems on their own, are enthusiastic, enjoy receiving feedback on their achievers, constantly try to improve their performance, and thus have a better chance of success in their business (Korunka, Frank, Lueger, & Mugler, 2003). In this regard, categorical data from a study of Bulgarian students (94% of respondents) show that the dominant impact of three elements – knowledge, abilities, and experience – shapes successful entrepreneurs (Panteleeva & et. al., 2021).

4. IMPORTANCE OF ENTREPRENEURSHIP EDUCATION

Entrepreneurship education has a substantial impact on young people's motivation and ambition to start an entrepreneurial activity. It can help:

- in providing the knowledge, skills, and attitudes needed to start and run a successful business. This includes understanding the entrepreneurial process, developing business skills, and learning how to identify and evaluate business opportunities;
- to build the entrepreneurial mindset, which is defined by attributes such as risk-taking, innovation, adaptability, and persistence;
- to increase entrepreneurs' ambition, self-efficacy, confidence, and abilities.
- to encourage people to pursue entrepreneurial endeavors and teaches them how to analyze entrepreneurial risk and make sound business decisions.in creating a supportive network of peers and mentors. This network can provide valuable guidance, feedback, and encouragement to young entrepreneurs as they embark on their entrepreneurial journey.

That is why many researchers and studies at various universities focus their attention on it specifically, providing data and results that contribute to the improvement of entrepreneurship courses and curricula and/or the creation of ones that are appropriate to the desires of young people and the needs of the real entrepreneurial environment. According to Packham et al. (Packham, Jones, Miller, Pickernell, & Brychan, 2010), entrepreneurship education improves young people's motivation and intent for entrepreneurial efforts and is one of the most important chances for professional growth. The execution of a short course on entrepreneurship serves as the foundation for their research, intending to determine the entrepreneurial attitudes of students before and after the course, as well as the differences between countries. For this purpose, the team conducts a comparative analysis of 237 students aged 18 to 24 from France, Germany, and Poland, because entrepreneurship education in these countries is a mechanism for stimulating entrepreneurial activity, but the socioeconomic, cultural, and national contexts of each country differ significantly, providing interesting potential for comparison. The research team concluded, using a five-point Likert scale, that entrepreneurship education had a favorable impact on the entrepreneurial attitudes of French and Polish students but a negative impact on the mostly male German students. Packham and colleagues conclude that gender, cultural, and industrial background are elements that can influence entrepreneurial attitudes and should thus be considered when building an entrepreneurship curriculum. Entrepreneurship education is critical for nations from the former Soviet bloc, including Bulgaria, where it was previously nonexistent or limited to specialized educational institutions. As a result, to foster a positive attitude toward entrepreneurship, training should begin in secondary schools, and higher education institutions should then build on and facilitate the acquisition of specific knowledge, skills, and competencies through specific and appropriate curricula and programs. It is no accident that Bulgarian students agree that the combination of knowledge, abilities, and competencies is the foundation of company preparation, startup, and management (Panteleeva & et. al., 2021). Panteleeva and her colleagues' research focuses on the student's knowledge and skills, as well as the relevant subjects learned in entrepreneurship. The demand for new, adequate, and practically applicable information and abilities corresponds to the low percentage (24.1%) of individuals who believe that what they are studying is adequate to establish and operate their businesses. As a result, it is not unexpected that 60% of Bulgarian students believe that the information, skills, and abilities obtained are only a portion of what is required to carry out entrepreneurial activity. They do not believe they are sufficiently equipped to start their own business. Therefore, it is understandable that more than 90% of them are interested in taking courses and education programs to expand their knowledge and practical abilities in the field of entrepreneurship. In this sense, the figure of entrepreneurship professors, who must mix academic and practical teaching approaches, is also a key part of the overall process. This indicates that the teacher should be able to play multiple roles, including leader, coordinator, and facilitator (Allahar, 2021). As a result, the focus of entrepreneurship education should, on the one hand, be on the study of entrepreneurship theories, business creation, and factors of success and failure, and on the other, be aimed at current and potential entrepreneurs, stimulate the entrepreneurial process, and provide knowledge and skills for starting a new enterprise, and on the third – be aimed at gaining experience and developing key relationships through interaction with practice and engagement.

5. CONCLUSION

The data presented above suggest that entrepreneurship programs and courses are not adequately appropriate to the requirements of today's dynamic world and do not fully satisfy the expectations of the learners. In times of uncertainty and virtualization and digital transformation of education, a new, modern, and innovative approach to developing the necessary knowledge, competencies, and practical skills in the field of entrepreneurship and

encouraging young people to take entrepreneurial initiatives should be sought. Such an approach should be focused on improving entrepreneurial education, specifically:

1) Teachers' integration of academic and practical methods to learning. The hard realities (theory) of starting and running a firm should not be overemphasized.
2) Restructuring curricula to emphasize soft skills such as creativity, proactivity, leadership, proclivity to take chances and develop entrepreneurial thinking, encouragement of creative and inventive behavior, and so on.
3) The emphasis of the curriculum should be on adding value by providing creative (alternative) learning paradigms.
4) Strengthen the trainees' relationship (socialization) with genuine entrepreneurs and introduce them to an entrepreneurial environment, for example, through seminars and meetings between them or mentoring given by local entrepreneurs.

A possible approach is to follow some entrepreneurship education model (Fig. 4) such as the experiential model proposed in 2014 by Thomas Pittz (Pittz, 2014).

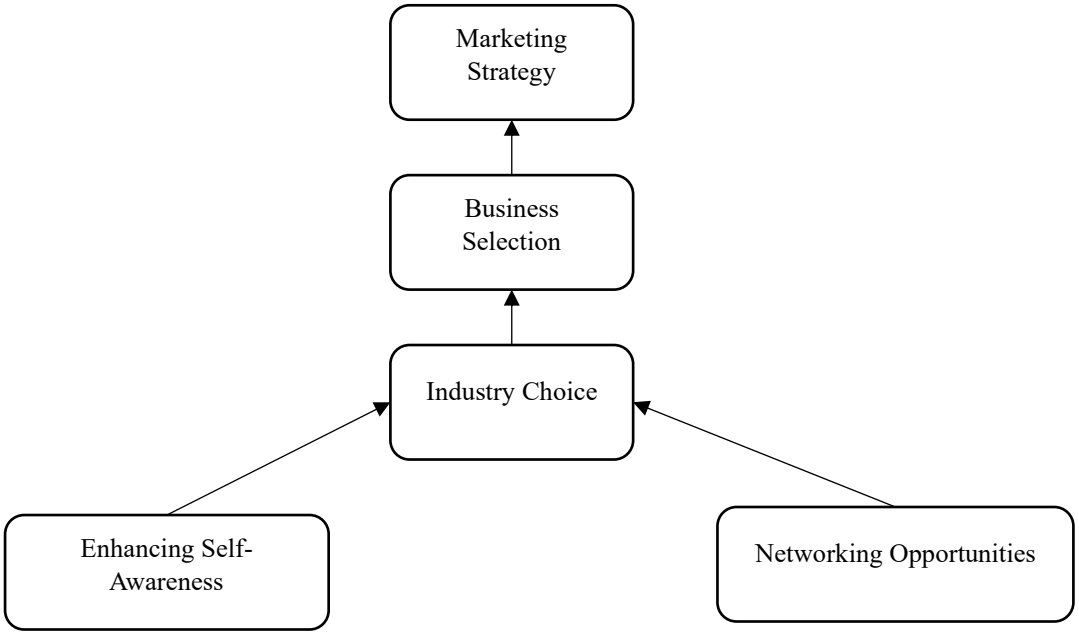

Figure 4: Experiential Entrepreneurship Education Model
(Source: Pittz, T. (2014). A Model for Experiential Entrepreneurship Education. Journal of Business and Entrepreneurship, Vol. 26-1, 179-192.)

The model's five elements are built on two of the most frequently neglected features of experiential learning: a holistic individual approach and engagement with the environment. This entrepreneurship education model offers a method that prepares students for the stress, competitiveness, and danger associated with entrepreneurship while also providing them with a realistic grasp of the effort required to launch a business. Although some prospective entrepreneurs may be put off by a dose of reality, most students indicate that recognizing their intrinsic aptitude for creativity and problem-solving improves their enthusiasm for the endeavor. In conclusion, entrepreneurial education is a critical factor in shaping the entrepreneurial behavior and activity of young people. It provides them with the knowledge, skills, and support that they need to succeed as entrepreneurs. By investing in entrepreneurial education, governments and organizations can help to unlock the entrepreneurial potential of young people and support the growth of new businesses and economies.

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INFLUENCE OF BRANDS ON MARKET COMPETITIVENESS

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ABSTRACT

A brand can be described as a product with additional dimensions and characteristics which help differentiate it from other products that satisfy the same needs. These differences can be rational and material, depending on the product's performances, as well as symbolic, emotional, and immaterial (i.e., what the brand stands for). Given the fierce competition on the brand market, brand owners have found themselves under constant pressure. They keep asking themselves the same questions: who will be better, who will be more innovative, who will be the first to launch a certain product? This article provides results of research carried out on the company Lesnina XXXL. Lesnina's mission is to keep following the path they've defined as their strategy for success, concentrate on building partner relationships and encourage professionality of their XXXLutz teams. Lesnina believes this is the only way to provide the very important, professional service and support to their clients. This company places their customers into the very centre of the business. Research results have shown that furniture quality (i.e., product quality) and the quality services provided by employees count among the biggest advantages of the Lesnina XXXL company, whereas high prices of certain products can be singled out as their biggest disadvantage.

Keywords: *brand identity, market competitiveness, brand management, brand value*

1. INTRODUCTION

A brand represents a recognizable set of elements, i.e., a name, logo, symbol, design, or message that identify and differentiate organizations, products, services, places, persons, and ideas as well as create unique rational and emotional associations, beliefs, and expectations in consumers. 'A trademark is a name, term, sign, symbol, design, or some combination thereof, which identifies the manufacturer of a product or service' (Kotler at all, 2006). The American Marketing Association (AMA) defines a brand (or a trademark) as a name, sign, term, symbol, design, or some combination thereof that identifies one manufacturer's (or a group of manufacturers') products or services as distinct from those of other sellers. First and foremost, a trademark serves to differentiate the product in the minds of the consumers' (Kotler, Gertner (2004). Brands are the key component to achievement of competitive advantage on the market. When making a purchase, they have significant influence on the decision-making process, as they reduce risks to consumers. To consumers, risk reduction represents an element of value intimately tied with the brand's role of a quality guarantee (Kotler, 2011). Consumers face various types of risks on the market. These risks primarily have a psychological and emotional basis, whereby risk reduction represents significant benefit to the consumers and thus causes an increase in the created value. Research has shown that brands have the most significant role on markets that require an extensive search for product characteristics, as well as with products

that carry a greater financial, emotional, and social significance. Consumers tend to grow close with certain brands by buying their products and using their services, which is why they often purchase other items from the same brand too. A sustainable brand is a brand that has successfully integrated environmental, economic, and social matters into their business. However, many companies consider themselves 'sustainable' even though they have only incorporated one third of the aforementioned definition into their activities. As a result, many companies have included sustainability into their business programmes, with the objective of both contributing to society and achieving financial profit and advantage over their competitors. Sustainability can add deeper meaning to the brand image and thus contribute to stronger emotional bonds and differentiation. Moreover, it increases public recognition and competitive advantage, ensures future financial stability, and decreases various potential risks. Sellers pose a threat to manufacturers of branded products, as they have increased the quality of their products up to the manufacturers' quality level, but said products are sold at much lower prices. A company's biggest profit from global brand management arises from its ability to coordinate innovation activities related to products, trademarks and markets and thus amortize investments, whereby the age-old question emerges: can an innovation really be globally applicable, given the different needs for certain brands and differences between markets?

2. BRANDS AND MARKET COMPETITIVENESS

From 1994 to present, Lesnina continually invested into their business spaces, remodelled their shops, and increased their storage rooms. Today it has a branched-out network of over 40 shops and over 170.000 m2 of business and storage space within the region. It currently employs 1.600 persons within the region, and over 900 persons in Croatia. Their largest sales centres in Zagreb (Lesnina Zagreb East and Lesnina Zagreb West with 73.000 m2 of business and storage space), Split (25.000 m2), Rijeka (17.000m2), Varaždin (25.000 m2), Zadar (20.000 m2), and Pula (20.000 m2) offer various products according to the catchphrase 'Everything for your home.' This also includes some smaller items that are just as important as the larger ones. Sales centres in Osijek (3.000 m2) and Čakovec (6.000 m2) are somewhat smaller and don't offer the 'Everything for your home' assortment of products, but they still make for a key piece of the Lesnina network due to their attractive offers and new furniture trends. A brand is synonymous with conceptual development on a globalized market. Nowadays, in a world of never-ending supply and demand, services and ideas have become the very subject of marketing. This potentially refers to marketing management and its most important component: brand management. Companies are connected to a recognizable entity, a category that symbolizes them, and a brand that makes them noticeable on the market and recognized as an entity that provides consumers with value. Large brands and the marketing revolution (which started in the late 20th century) were the results of this very process. Furthermore, a brand, along with its cognitive and behavioural elements, signifies attitude. The added value is defined by the additional rational and emotional value of marketing. This results in a higher price that can be slapped onto a generic product due to the value of the brand. Characteristics of the brand are defined by (Vranešević, 2007):

- functionality of the brand,
- uniqueness of the brand,
- added value of the brand,
- the balance between the rational and emotional reasons for putting one's trust in the brand.

Creating a brand in the contemporary business world is an extremely demanding, complicated, and long-lasting process. The brand must reflect product quality – this is the fundamental prerequisite. Bad quality products cannot make it on the market, regardless of the brand. Brand ownership counts as intellectual property and is protected by the law.

Brand registration reduces the potential risk of counterfeiting. To managers, brand identity is the result of competitive struggle on the market. The brand's identity must provide intense external communication on the target market. The brand's representation among the company employees is very important too (for example, a BMW manager driving a Mercedes would simply be in bad taste). This is extremely important to brand communication – both within and outside the company and its employees. Markets do not necessarily always have to be competitive or effective – as institutions, markets can be imperfect too. Appropriate knowledge and understanding of competitive trends on the market is necessary, as the competition makes for a very important element of the marketing environment (Camilleri, 2018). Marketing managers must take into accounts their competitors' activities due to their shared objective – a satisfied consumer (Dhara, 2020). Competitive forces can determine whether the potential to generate profit exists in a certain industry. The first step in competition analysis is to identify your competitors (Camilleri, 2018). When building competitive advantage, it is necessary to define all activities that make up the value chain of the company. Furthermore, when defining important values, it is absolutely necessary to isolate all activities with discreet economies and technologies. Wider functions such as production or marketing can be divided into certain activities. The aforementioned division results in narrowly defined activities (Porter, 2008). Sustainable competitiveness is extremely different from temporary competitiveness. If the company doesn't maintain their competitiveness, their market position might weaken. The weakened position could be a result of imitating their competitors, altered or substitute products, or changes in the business conditions (Vrdoljak, Raguž, Jelenc, Podrug, 2013).

3. RESEARCH AND RESULTATS

The primary research has been conducted in November of 2019. The sample was comprised of 100 anonymous respondents of different ages and professions who made a purchase at Lesnina. The survey was delivered to respondents via email on November 1st, 2021. The respondents answered questions about their satisfaction with the inward and outward appearance of the Lesnina XXXL building compared to their competitors, the main advantages and disadvantages of Lesnina XXXL compared to the competition, their opinions on what they find the most important when it comes to Lesnina XXXL, their opinions on Lesnina's main competitors, and their ranking of Lesnina XXXL's business success. The objectives of this article are as follows:

1) To determine the factors of brand influence on market competitiveness.
2) What are Lesnina XXXL's advantages and disadvantages compared to their competitors?
3) To determine customer satisfaction with the service provided by Lesnina XXXL and the inward and outward appearance of the company's buildings.

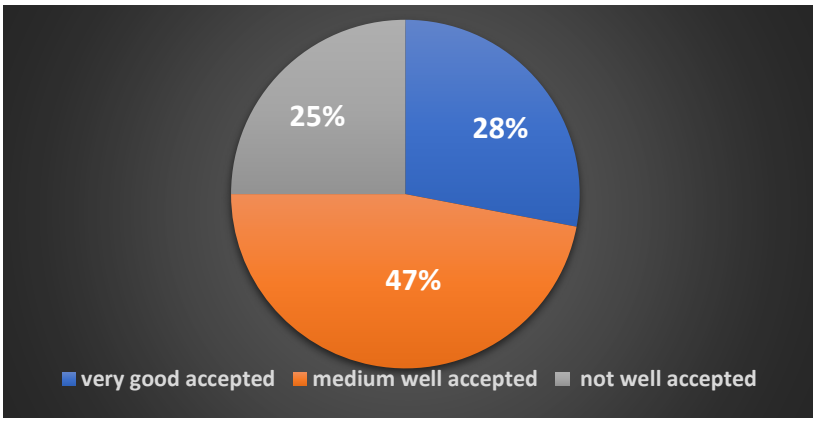

Figure 1: Satisfaction with the outward appearance of the Lesnina XXXL buildings compared to their competitors
(Source: Author's work)

External stimuli are stimuli controlled by the marketing experts in an attempt at enticing the customers to shop. Shop environment includes the size of the store, its ambiance and design, whereas marketing environment encompasses various sales- and promotional activities. Different stimuli inside the store affect the customer directly or indirectly (Muruganantham, Shankar Bhakat, 2013). The image of the store interior counts among external stimuli. Given the increasing competition, store image is also often used to differentiate the company in the eyes of the consumers. Some stores differ from the others, whereas some blend in with the crowd. Certain shops have a very distinct image, whereby some customers brand them as 'pleasant' or 'acceptable,' and others avoid them completely.

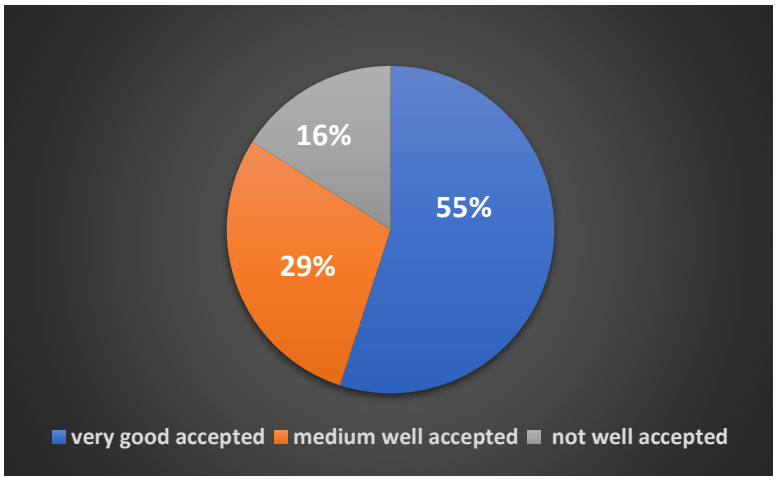

Figure 2: Satisfaction with the inward appearance of the Lesnina XXXL building compared to its competitors
(Source: Author's work)

The ambiance inside the shop is connected to the shop image. It depends on the lighting, appearance, merchandize presentation, colours, sounds, smells, and employee behaviour. Product presentation and background music also influence the buyers, i.e., they affect their emotional state, which can, consequently, cause an impulse purchase (Solomon, et. al., 2015). Within the aforementioned context, every individual prefers certain shops over others. It is more likely that the customers will visit the shops they prefer more often, spend more time inside, and probably buy more products.

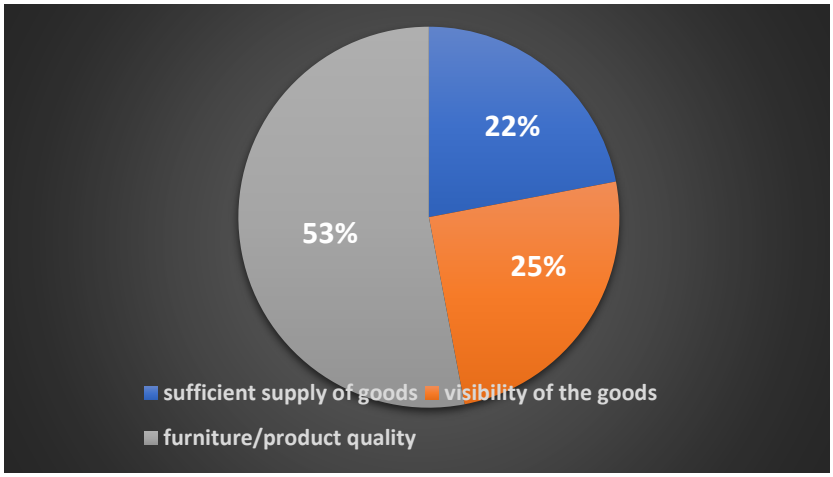

Figure 3: The biggest advantages of Lesnina XXXL compared to their competitors
(Source: Author's work)

Product or service quality refers to the perception of the degree to which said product or service fulfils the customers' expectations. Customer satisfaction degree directly influences the evaluation of the product or service quality. Quality has become a strategic objective of almost every company. The demands of the market regarding the quality of products and services, manufacturing and business processes, and the reliability of the entire quality system have increased dramatically. Quality has become the primary and strategic goal of almost all business entities (Lazibat (2003).

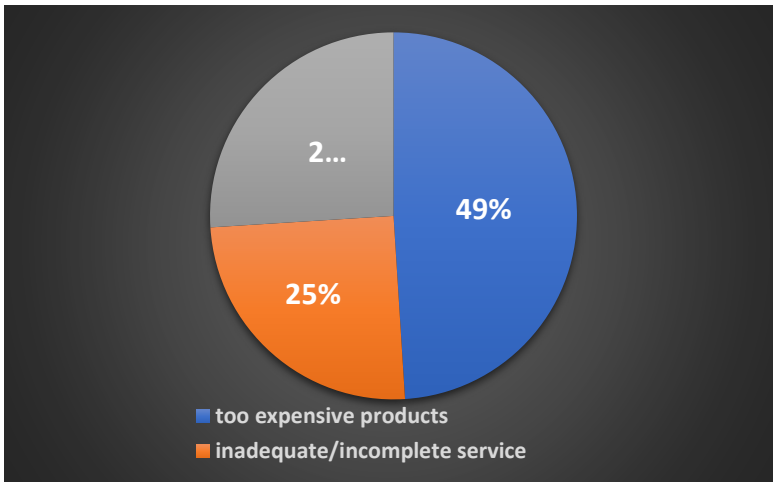

Chart 4: The biggest disadvantages of the Lesnina XXXL company compared to their competitors.
(Source: Author's work)

Customers review individual characteristics of the products they consider buying before making a final decision. One of the characteristics that significantly affects consumer behaviour (Han et all, 2001.) is the price. The price can be perceived in two ways and can therefore be used as a decision-making criterion. To consumers, price is the primary monetary expense that occurs during the process of shopping and can therefore represent a limiting variable (Bender, 1964.). The aforementioned limiting variable can influence the possibility of making a purchase in a negative way, as paying a higher price reduces the levels of the consumers' discretionary income (Erickson, Johansson, 1985.).

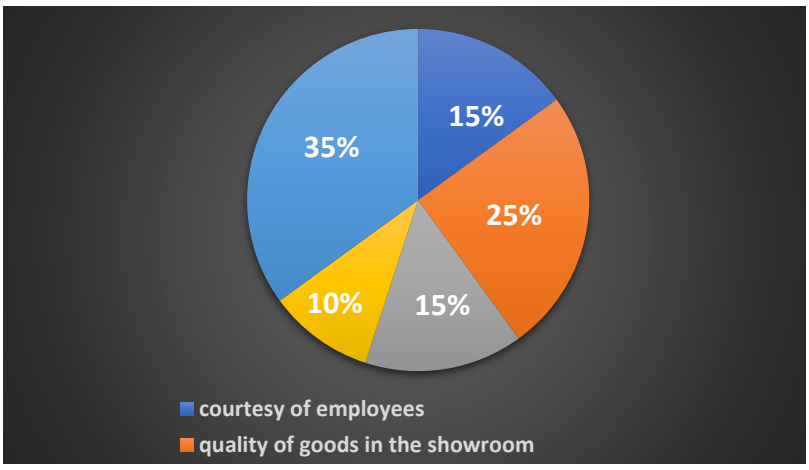

Figure 5: The most important factors in the Lesnina XXXL company compared to the competition
(Source: Author's work)

Product quality has a very significant influence on business success. Low quality items tend to destroy the company's reputation on social media, whereas quality improvement builds consumer trust and serves to differentiate the business from their competitors. If companies choose to take additional steps toward continuous improvement, they are demonstrating not only that they are confident about their business, but also that they are investing into high-quality products. Consumers appreciate brands that are able to improve their business and their products. If customers believe they are receiving a top-quality product by a trusted brand, they are willing to pay more money for it. Customers can find information about the price whilst window-shopping, which might prompt them to enter the store (and consequently buy something). The shop windows contain information about the brands, styles, prices, etc. Likewise, the shops often advertise promotional prices in their windows, which attracts consumers. The fact that the consumers don't even have to enter the shop to obtain all the necessary information is particularly appealing (Sen et all 2002). Goods displayed in shop windows provide the consumers with all the relevant product information. When it comes to clothes, shop windows display the newest, most prestigious clothing lines. Consumers who wish to keep up with the trends can use shop windows as a source of information. Visualization can be crucial when shopping for clothes – prior to making a purchase, mannequins in shop windows and store interior help consumers visualize the clothing items, styles, and colours they wish to wear. This also helps consumers imagine how the clothes will fit them. Consumers use information from shop windows as important input that contributes to the decision to enter the store. Shoppers can enter the store based on the shop window for several reasons. For example, they can enter the shop to obtain additional information on certain clothing lines or items they've seen in the window even if they don't plan on buying them. Likewise, they can enter the shop to enjoy additional benefits of the sale that was advertised in the window. Consumers can decide to enter if the shop intrigues them or if they like the overall image that has been presented in the store window. Shop window information can influence the sales in two ways. The information gained by looking at the store window can make for relevant input when the consumer decides whether to make a purchase or not (Kesić, 2006).

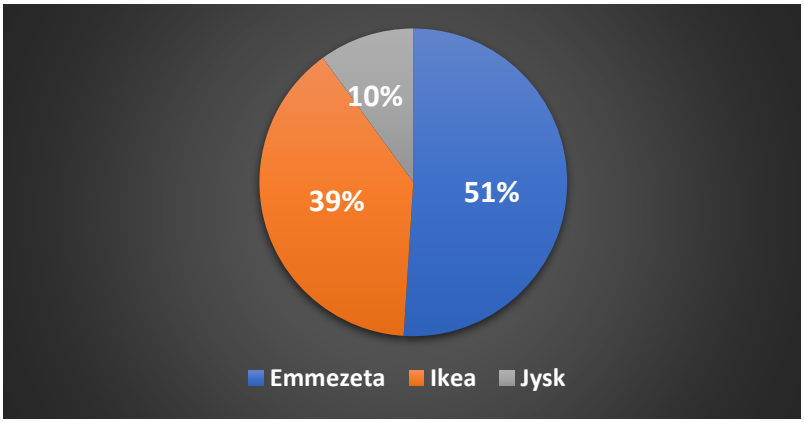

Figure 6: Lesnina XXXL's biggest competitors
(Source: Author's work)

Assessment of market value and one's own market share are important factors when it comes to planning sales activities. Many things depend on the results of this analysis – what price politics to use, how to optimize the product offer, how to plan marketing costs, etc. These assessments are often made with estimated values (due to lack of data), but even as such, these numbers can show us whether we are fighting for success on the right market and whether we should consider some changes. If we continually keep up with the trends and market development, we will be able to react on time and offer the product the market has been

demanding. The objective of such assessments isn't to smother business ideas or lose morals if we figure out that our competitors have bested us in a certain segment. The objective is to create a realistic image of our own market position and maximally correct our supply in order to be able to offer the best possible product or service to the market. However, there exists a challenge all companies must learn to resist – copying the competition. Falling into this trap can cause the destruction of the company's own brand identity. When copying the competition, the company loses its authenticity, and customers are quick to recognize it. Lesnina's tradition and quality have been known to Croatian shoppers for the past 70 years. Knowledge, experience, and appreciation of the company's mission have helped Lesnina become the leading home furnishing business in Croatia and the entire region. Due to serious and dedicated work and successful business policies, Lesnina has been the number one trendsetter in this this area for a number of years. In 2010, Lesnina joined the large concern XXXL, which has been constantly developing in a positive direction since its establishment back in 1945. Thousands of jobs have been created thanks to its excellent work. With economic growth, the responsibility toward employees, environment and society also grows.

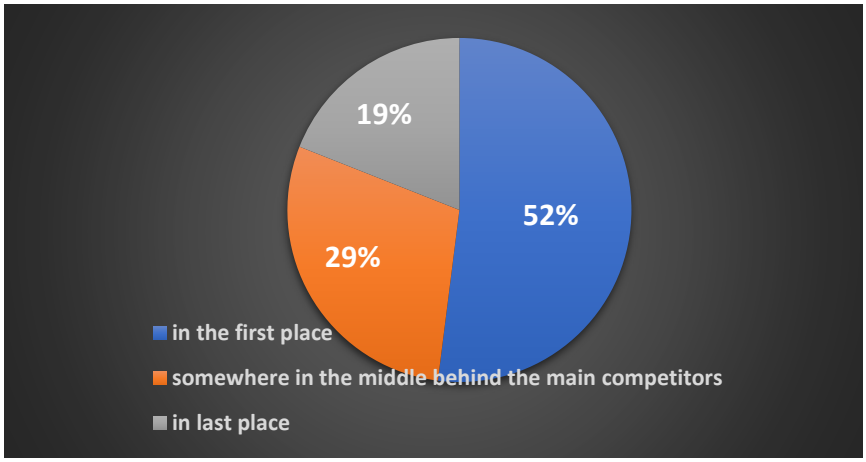

Figure 7: Lesnina XXXL's business success compared to its competitors (Source: Author's work)

Lesnina's tradition and quality have been known to Croatian shoppers for the past 70 years. Knowledge, experience, and appreciation of the company's mission have helped Lesnina become the leading home furnishing business in Croatia and the entire region. Due to serious and dedicated work and successful business policies, Lesnina has been the number one trendsetter in this this area for a number of years. In 2010, Lesnina joined the large concern XXXL, which has been constantly developing in a positive direction since its establishment back in 1945. Thousands of jobs have been created thanks to its excellent work. With economic growth, the responsibility toward employees, environment and society also grows.

4. CONCLUSION

Brands are the key component to achievement of competitive advantage on the market. When making a purchase, they have significant influence on the decision-making process, as they reduce risks to consumers. To consumers, risk reduction represents an element of value intimately tied with the brand's role of a quality guarantee. Consumers face various types of risks on the market. These risks primarily have a psychological and emotional basis, whereby risk reduction represents significant benefit to the consumers and thus causes an increase in the created value. Research has shown that brands have the most significant role on markets that require an extensive search for product characteristics, as well as with products that carry a greater financial, emotional, and social significance.

Consumers tend to grow close with certain brands by buying their products and using their services, which is why they often purchase other items from the same brand too. A sustainable brand is a brand that has successfully integrated environmental, economic, and social matters into their business. However, many companies consider themselves 'sustainable' even though they have only incorporated one third of the aforementioned definition into their activities. As a result, many companies have included sustainability into their business programmes, with the objective of both contributing to society and achieving financial profit and advantage over their competitors. Sustainability can add deeper meaning to the brand image and thus contribute to stronger emotional bonds and differentiation. Moreover, it increases public recognition and competitive advantage, ensures future financial stability, and decreases various potential risks. The competition on the brand market is fierce and has evolved into a real 'brand war' – who will be better, who will be more innovative, who will be first to launch a certain product on the market? These are only some of the very important questions brand owners are left to ponder. Sellers pose a threat to manufacturers of branded products, as they have increased the quality of their products up to the manufacturers' quality level, but said products are sold at much lower prices. A company's biggest profit from global brand management arises from its ability to coordinate innovation activities related to products, trademarks and markets and thus amortize investments, whereby the age-old question emerges: can an innovation really be globally applicable, given the different needs for certain brands and differences between markets? From 1994 to present, Lesnina has continually invested into their business spaces, remodelled their shops, and increased their storage rooms. Today it has a branched-out network of over 40 shops and over 170.000 m2 of business and storage space within the region. It currently employs 1.600 persons in the region, and over 900 persons in Croatia. Lesnina's mission is to keep following the path they've defined as their strategy for success, concentrate on building partner relationships and encourage professionality of their XXXLutz teams. Lesnina believes this is the only way to provide the crucial professional service and support to their clients. This company places their customers into the very centre of the business. Apart from this, their ambition is to continuously create new jobs both in Croatia and abroad in order to secure and strengthen their position of the largest furniture store in the world. The primary research has been conducted in November of 2021. The sample was comprised of 100 anonymous respondents of different ages and professions who made a purchase at Lesnina. The survey was delivered to respondents via email on November 1st, 2021. The respondents answered questions about their satisfaction with the inward and outward appearance of the Lesnina XXXL building compared to their competitors, the main advantages and disadvantages of Lesnina XXXL compared to the competition, their opinions on what they find the most important when it comes to Lesnina XXXL, their opinions on Lesnina's main competitors, and their ranking of Lesnina XXXL's business success. Research results have shown that furniture quality (i.e., product quality) counts among the biggest advantages of the Lesnina XXXL company, whereas high prices of certain products can be singled out as their biggest disadvantage. According to the respondents, a good price-quality ratio is the most important benefit of shopping at Lesnina XXXL, Lesnina's biggest competitor is Emmezeta. and compared to their competitors, Lesnina can be considered the market leader.

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