Varazdin Development and Entrepreneurship Agency and **University North, Croatia**
in cooperation with

Faculty of Management University of Warsaw, Poland
Faculty of Law, Economics and Social Sciences Sale - Mohammed V University in Rabat, Morocco
Ecole Nationale de Commerce et de Gestion de Tanger - Abdelmalek Essaadi University, Morocco
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Harnessing Networks to Drive Innovation and Achieve Sustanable Development Goals (SDGs)

Editors:
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CONTENTS

ANALYSIS OF THE IMPORTANCE OF SUPPLY CHAIN MANAGEMENT FACTORS WITHIN THE CONTEXT OF SMALL HOTELS IN CROATIA – LITERATURE REVIEW

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ABSTRACT

Small hotels in the Republic of Croatia are always seeking for new and inventive ways to improve their operations and increase their profitability. The hospitality industry is a significant sector in the country. It is possible for hotels to enhance their business indicators by implementing supply chain management (SCM), which has become an essential component of every hotel operation. SCM encompasses the acquisition, production, and distribution of goods and services. This is one concept that hotels can utilize to improve their business indicators. In order to achieve a competitive advantage the following recommended supply chain management factors are identified in the hotel industry: information and communication technology, supplier collaboration, customer cooperation, and value-added processes. The purpose of this study is to determine how important it is to implement these factors in small hotels in the Republic of Croatia. A review of the existing body of literature is carried out in order to accomplish the goal of the research process.

Keywords: *Small hotels, hospitality, supply chain management factors, Republic of Croatia*

1. INTRODUCTION

Tourism in the Republic of Croatia is of enormous significance to the economy since it consistently has a favorable impact on a wide variety of other economic sectors, including fishing, shipping, fish processing, construction, and many more. The previously described growth pattern has been observable ever since the conclusion of the Croatian war of independence, and it has been consistently recording better and better tourism results, with the exception of the years 2020 and 2021, which are plagued by a pandemic scenario. At the end of the year 2022, tourism was responsible for around 19.3 percent of the country's gross domestic product (CNB, 2023). Because of the result that was attained, the Croatian economy is heavily dependent on multiple sorts of economic distortions and is especially vulnerable to these distortions. There is a positive correlation between tourism and employment, which is a reflection of the favorable economic ramifications of tourism. Despite the fact that Croatia's trade balance is in deficit, the income generated from tourism is a significant contributor to the reduction of this deficit. The tourist industry emerged as the primary export commodity for Croatia, as stated by Stipetić (2012). New jobs are created as a result of the employment function, largely in the tourism industry but also in a variety of other ancillary branches and activities that are associated with tourism supply chains.

According to Eurostat (2023), the percentage of workers employed in the tourism industry reached 37.6% in the year 2021. According to the Ministry of Tourism's projections for the year 2020, 8.2% of the workforce was employed in the activities of providing services related to the preparation of food and the provision of lodging. The hospitality sector and the hotel industry are both significant components of the tourist offer, and the future growth of tourism is heavily dependent on the condition of the accommodation industry. There are many different types of accommodations that fall under the umbrella of the hotel sector, which is a subset of the hospitality industry. These accommodations include hotels, apartments, motels, and vacation homes. It has been said that one of the categories that is becoming increasingly important for tourism is the small family hotel, which is becoming an increasingly well-known form of hotel accommodation on a global scale. The existing situation of the hotel industry in Croatia is not satisfactory since the proportion of small hotels, which, by virtue of their offerings and the ways in which they differentiate themselves from larger hotels, would generate additional value for the tourism industry in Croatia, is insufficient. Despite the fact that small hotels have a customized approach to their customers and are a representation of the tradition of a location, they also have their own deficiencies, which are shown in the knowledge and abilities of their management. The importance of small hotels is essential. Small hotels are required to keep up with the ever-changing trends in tourist demand. They can accomplish this by broadening the range of services they provide and specializing in particular reasons that draw travelers to a particular location. Many businesses in a variety of industries, including the film industry, construction, and forestry, have been effectively adopting the concept of supply chain management in their operations for a considerable amount of time. This is done with the intention of satisfying the ever-increasing demands of their clients. In addition, the hospitality industry has acknowledged supply chain management as a concept that successfully contributes to consumer happiness by means of the personalization and differentiation of its products and services. The notion is also utilized for forecasting, planning, and the implementation of various phases of the value chain, with the ultimate objective of optimizing customer satisfaction with regard to the quality, availability, and price of the service. Small hotels, in contrast to major hotels, are constrained by the availability of their resources, which are mostly human and financial. As a result, participation in the activity of supply chains can prove to be an effective positioning strategy in the market. As a result of the limited resources available to small hotels, it is possible to substitute informational, financial, material, and human resources by participating in the supply chain. This makes it possible to establish the conditions necessary to achieve a future competitive advantage. A shorter customer satisfaction cycle can be achieved by the implementation of integrated supply chain management, which involves flow management of all partners within the chain. The purpose of this study is to ascertain the degree to which the aspects of supply chain management, which include information and communication technology (ICT), the collaboration with customers and suppliers, and the value-added process, are present in the existing body of literature. The contents of the article are organized as follows. The first section of the essay is an introduction, and the second section follows that with a presentation of the theoretical basis and the past research. During the third section, the methodology is presented, and in the fourth chapter, the conclusion summarizes the most important aspects of the research, as well as the limitations of the study and some recommendations for further research on the subject.

2. THEORETICAL BACKGROUND AND PREVIOUS RESEARCH

Research on the application of the concept of supply chain management in the catering and hotel industry is not as numerous as research in some other industries (military, trade, film). In support of this, the research conducted by Jenkins et al. (2015) according to which there is a lack of supply chain management research in the field of catering and hospitality.

One of the main reasons is the fact that supply chains in the hotel industry do not have a large number of stages, so they differ from classic supply chains, in which suppliers, manufacturers, representatives, and retail outlets are the most common. Analyses of classic supply chains, in which products are produced and delivered, include material, information, and financial flows. As hoteliers are primarily engaged in providing services, their supply chains do not include products, which eliminates the need for material flow analyses. The supply chain is a concept that was primarily created to optimize the flow of products, first in the food industry and later in other industries, so it should not be surprising that the largest amount of supply chain research focuses on industries that have established material flows. As a result of continuous research and progress, numerous methods were introduced to optimize the material flow, such as Just-in-time, Kanban, Materials Requirement Planning (MRP), Cross-Docking and Vendor-Managed Inventory (VMI), while the supply chain of services is applicable in a smaller number of industries, such as the hotel industry, which resulted in a smaller number conducted research. The increasingly competitive environment of the hotel industry forces hotels to find new ways to gain a competitive advantage. According to Moberg (2002), supply chain management is an effective strategy that hotel managers can use to improve their competitive advantage. The reason for this is the fact that the hotel supply chain is a complex system that includes different stakeholders, strategies, phases, and processes. The complexity is reflected in the fact that it is necessary to harmonize the related processes between the participants, regarding the management of services, information, goods, supplies, or finances. The success of each hotel in the supply chain is conditioned by the performance of other organizations with which it enters into some kind of business relationship in order to deliver products, information, or services. The increasing level of awareness about the possibilities of applying the concept of supply chain management has resulted in numerous research studies on the implications of its factors that positively contribute to service quality, communication, technology, relationship with suppliers, and financial results (Fantazy, et al., 2010). The mentioned research covers large hotel chains, while research in small hotels is not so represented in the literature. One of the reasons is the fact that small hotels do not have a compositive management system, therefore they are not suitable for analyzing various factors of supply chain management. Unlike large hotels, which have access to more resources, small hotels must interconnect in order to create and offer a recognizable and competitive product on the tourist market through cooperation and networking. The aim of the strategic alliance is to create additional value for the customer, which is realized through information and communication technology (ICT), value-added processes or cooperation with customers or suppliers. Listed below are the supply chain management factors of information-communication technology, value-added processes, cooperation with customers, and cooperation with suppliers, which significantly contribute to competitive advantage in large hotel chains. ICT is of great importance in the hotel supply chain because it helps to improve efficiency, communication, flexibility, and cost reduction, which ultimately leads to a strengthening of competitive advantage (Milovanović, et al., 2022). The development of ICT has accelerated the process of supply chain integration (Chizzo, 1998). At the same time, it contributes to lowering transaction costs and the speed of information processing between organizations (Clark and Lee, 2000). In addition, technology facilitates mutual cooperation between members of the supply chain, enabling real-time communication with customers and suppliers, which contributes to faster execution of business functions such as sending and responding to inquiries, payments, processing orders, booking accommodation, and leaving reviews. Shortening business processes between members of the supply chain, technology minimizes operational costs, improves supply chain performance, and increases the speed and quality of information exchange between partners, which contributes to the efficiency and effectiveness of the system.

In the last decade, technology has drastically changed the dynamics of supply chains, with the introduction of applications such as booking.com or Airbnb, which enable the instant exchange of information with customers. The aforementioned services are increasingly assuming the role of modern ERP software solutions that include an increasing number of business functions, such as financial flow coordination. Current trends indicate that IT will continue to play a key role in the digital transformation of hotel supply chains in the future, with technologies such as robotics, blockchain, artificial intelligence,e and advanced predictive analytics providing tools to redesign and transform various aspects of the supply chain. Research by Chevers (2015) also emphasizes the importance of applying ICT technology in hotels in Jamaica. Customer cooperation is defined as the practice of managing customer complaints, building long-term customer relationships, and improving customer satisfaction (Tan et al., 1998). Noble (1997) and Tan (1998) consider the relationship with customers as the most important factor within the concept of supply chain management. Mogire (2011) and Sanchez-Gomez (2011) clarify the application of both the factor of cooperation with customers and the factor of cooperation with suppliers. The increase in the number of personalized products and services has led to a time when the relationship with customers is crucial to the financial success of a company (Wines, 1996). In the hotel supply chain, customer relations help retain existing guests, identify and attract new guests, increase customer satisfaction, and ultimately have a positive impact on future revenue. By cultivating personalized relationships with current and past customers, hotels can create a sense of uniqueness and special attention, making customers feel valued and increasing their loyalty (Muahammad, 2022). CRM is cited as the most frequently used tool for customer relationship management. CRM enables hotel companies to identify potential customers and to effectively respond to the wishes of existing customers. The goal of the CRM system is to develop a personalized relationship with existing customers, because it is more profitable to satisfy the needs of an existing client than to acquire a new one. Furthermore, an approach oriented towards guest satisfaction in the entire value chain can contribute to greater engagement of all interest-influenced groups that help co-create new value. In general, customer relationship management plays a key role in optimizing opportunities, meeting customer needs, and ensuring the success and competitiveness of hotel businesses (Wahyuningtyas, 2021). Regarding supplier relationship management, it is possible to say that it owes its theoretical as well as empirical development to the great popularization brought about by the concept of customer relationship management (Vučetić, 2021). A strong cooperation with suppliers is important in the hotel supply chain for several reasons. First, a good relationship with suppliers can improve supply chain performance by improving process efficiency and strengthening mutual relationships. Key suppliers ensure fast and efficient execution of operations within the system, thus making business processes more efficient (Samaržija, 2014). For example, trust is extremely important in the business world, so partners who trust each other can plan long-term cooperation. Second, supplier relationship management and quality information exchange activities can increase system efficiency, which is ultimately reflected in customer satisfaction. In general, a good relationship with suppliers promotes supply chain integration and ultimately improves supply chain quality in the hospitality industry (Shanghong, L., et al., 2021). The value-added processes are important in the hospitality supply chain because they increase efficiency, reduce costs, and improve customer satisfaction. Incorporating specialized logistics services such as product delivery and packaging, transportation, and value-added processes helps streamline the flow of goods and information (Ling, 2011). Also, the value-adding process includes technology that improves hotel operations in various ways, for example, business programs improve inventory management and the ordering process, which leads to better integration and modernization of the material flow. In addition, technology is essential for the operational functioning of hotels, so hotels invest in technological solutions that measure energy consumption, predict the weather, or monitor vehicle movements.

Basically, the goal is to turn devices into "smart objects" that are able to both send and receive data and communicate with each other. In this way, the collection of important data can be improved, the level of automation can be increased, and multiple devices can be managed or monitored from one centralized location, such as a phone or tablet (Perojević, 2019). Nowadays, technology offers numerous advantages that are important for hotels.

3. CONSTRUCTION OF A RESEARCH LITERATURE REVIEW MODEL

This research is related to the theoretical review of SCM factors in the hotel industry. This is precisely how the importance of its implementation in the small hotels of the Republic of Croatia comes to the fore. Scheme 1 presents a compilation of supply chain management parameters whose impact must be assessed to ascertain their effect on the competitive advantage of small hotels in the Adriatic region.

Scheme 1.: Presentation of recommended factors of SCM in the hotel industry of Croatia
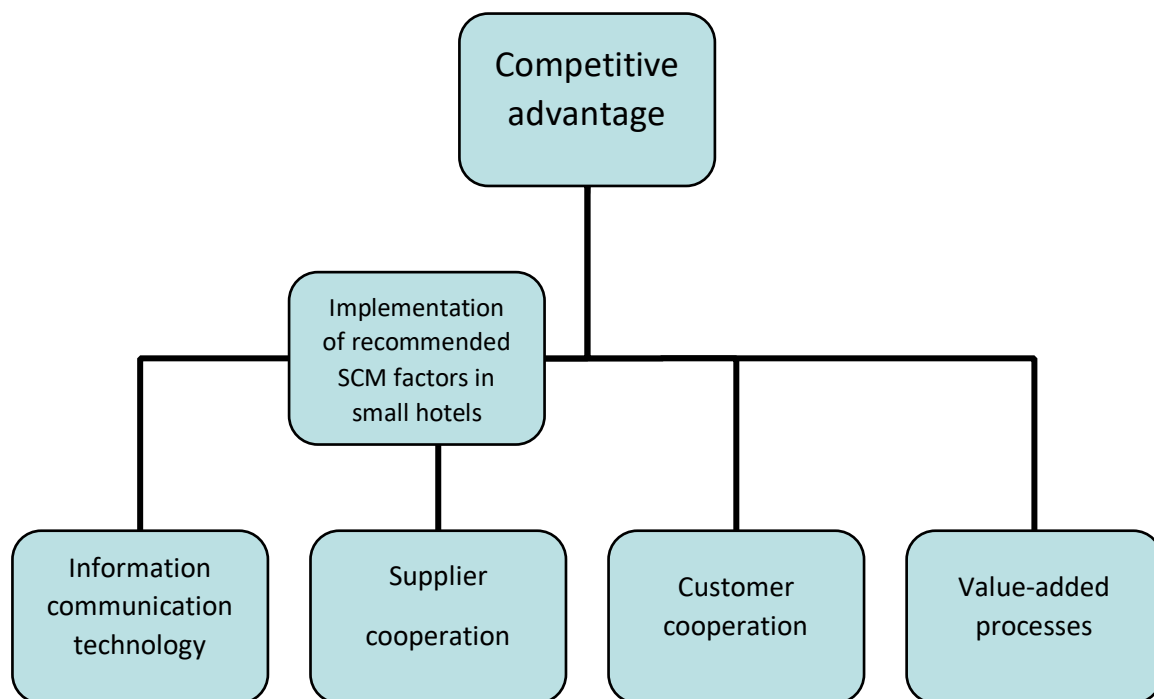
Source: Author's construction according to Vučetić (2021).

A primary challenge in business management is generating or enhancing value for stakeholders, such as consumers, employees, and owners. To generate supplementary value for all stakeholders, each company must secure a competitive advantage over its rivals by initially adapting to an unstable and uncertain environment, subsequently comprehending shifts in customer needs, and being capable of responding to new market entrants (Kim and Oh, 2004). Porter (1990) asserts that the primary objective of every organization and enterprise is to attain competitive advantage. Despite extensive research on competitive advantage across organizations of varying sizes and business orientations, identifying the determinants of competitive advantage remains a challenging endeavor (Mukerjee, 2016). While not readily identifiable, it is essential to examine multiple facets of the organization to ascertain its drivers. Furthermore, by sustaining elevated levels of organizational efficiency, one can ascertain the factors linked to attaining competitive advantage (Powell, 2001).

It is crucial to underscore that the attainment of competitive advantage cannot be realized with the adoption of a singular element; instead, it necessitates a confluence of several factors to reach such an advantage (Mukerjee, 2016). According to Mentzer et al. (2000), the concept of competitive advantage refers to the notion that a firm or organization can have only one or more factors that differentiate it from its competitors. These variables can include a lower price, higher quality, higher reliability, and shorter delivery time, all of which are examples of competitive advantages. As stated by Hosseini et al. (2018) in their research, a company has the ability to establish and maintain a competitive advantage by focusing on superior efficiency, quality, innovation, and customer responsibility. Samaržija (2014), on the other hand, emphasizes that from the perspective of supply chain management, a company can base its differentiation strategy on the following factors: quality, delivery reliability, production innovations, and delivery time to market. Price/cost, quality, delivery dependability, product innovation, and delivery time to market are some of the aspects that Li et al. (2006) emphasize as factors of competitive advantage in their research on the role of supply chain management factors on competitive advantage and organizational effects. In order for the hotel industry in Croatia to make a significant step forward, it is necessary to implement supply chain management factors, information and communication technology, supplier relations, customer relations, and the value-added process. These are the means by which the level of competitiveness will be increased in the turbulent and unpredictable international market that is subject to global trends when these factors are implemented. Taking this into consideration, it is essential to conduct research into whether or not the variables of supply chain management have an impact on the establishment of a competitive advantage in small hotels located in the Republic of Croatia.

4.   CONCLUSION

The objective of this study is to determine the significance of incorporating particular aspects of supply chain management into the operations of smaller hotels located in the Republic of Croatia. Hotel management, which is one of the most essential branches, is of great significance for the tourism industry's overall offer. Small hotels, which are distinguished by their individualized customer service, have become increasingly important in recent times. This is despite the fact that large hotel companies are responsible for the most significant economic effects (revenues from accommodations and tourist tax). This is because large hotels offer a wide variety of services to their guests and offer a wide variety of accommodations. As a result of the examples that have been provided from different industries, it has been decided that supply chain management is a concept that primarily focuses on the demands of customers, and as a result, it assists in meeting the individualized requirements of customers. The limitations of this study are reflected in the fact that it is based on theoretical research and solely on a limited number of factors. However, as a recommendation for future research, it is suggested that a significant number of research samples be taken from small hotels in Croatia and the EU. Furthermore, in addition to the aforementioned, it is necessary to carry out an empirical study. In addition to this, it is essential to incorporate a greater number of SCM factors in order to achieve a competitive advantage for small hotels in the Republic of Croatia.

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DOES SIZE MATTER? UNDERSTANDING THE EFFICIENCY DYNAMICS OF CROATIAN BANKS

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ABSTRACT
The European banking sector is facing challenges related to inflation and geopolitical uncertainties, with digitalization, competitiveness, and regulatory compliance among the main concerns. This consolidation of the banking sector leads to a reduction in the number of banks and raises the question of the efficiency of smaller banks compared to larger banks. This trend is particularly pronounced in the Republic of Croatia, where banks are the main financial institutions. The aim of this study is to assess the efficiency of 17 Croatian commercial banks using Window Data Envelopment Analysis (WDEA) for the period from 2013 to 2022 and to examine efficiency as a function of bank size, identifying differences between large, medium, and small banks. This distinction is important to understand how size affects operational efficiency in the banking sector, as larger banks often benefit from economies of scale. In addition to assessing and tracking efficiency trends, the study also identifies the causes of inefficiency for banks operating below the efficiency frontier. The analysis shows that Croatian banks have generally achieved a high level of efficiency during the observed period and manage their resources efficiently in a way that contributes to their market stability and competitiveness. The results show differences in efficiency between banks, with larger banks being more efficient on average than smaller banks. Technical efficiency (TE) peaked in 2020 during the COVID-19 pandemic, confirming that Croatian banks are resilient to external shocks. The main source of inefficiency during the observed period was primarily pure technical efficiency (PTE), which provides information on management and other exogenous sources. The results of this study can be useful for bank management to identify areas for improvement and make strategic decisions. Regulators can use the results to monitor the stability and efficiency of the banking sector, and investors can assess the investment potential of individual banks.
Keywords: *Banks, Efficiency, Size, Window Data Envelopment Analysis (WDEA)*

1. INTRODUCTION

The role of banks in the Croatian financial system, which is bank-centered, is complex and of crucial importance for the country's economic development, as they are essential for the stability of any economy. In a bank-centered system, banks play a key role in financing the economy, as they are the main source of credit for companies and individuals and provide them with the funds they need to operate. Banks in Croatia play an important role in promoting financial inclusion by offering a wide range of banking products and services to individuals and companies, thus improving access to financial resources and promoting economic growth.

This approach provides companies with a more stable source of financing, but the cost of borrowing is higher. Central banks carry out strict supervision to ensure the stability of the banking system and protect citizens' deposits. As intermediaries, commercial banks facilitate the flow of money between savers and borrowers and offer important financial services such as loans, deposits, and payment transactions. Recent research on the banking systems of European countries reveals that the sector continues to face challenges stemming from inflation, geopolitical uncertainties, and post-pandemic recovery. Banks are under pressure to balance profitability with the need for modernization and regulatory compliance (ECB, 2024). Key findings show that banks are grappling with non-performing loans, which are strongly influenced by economic cycles (Tomas Žiković et al. 2015) and a complex regulatory framework, particularly in countries like Italy and Spain, which can significantly influence bank performance (Fallah et al., 2011). Digitalization is reshaping the industry, increasing competition from fintech and non-bank lenders, but also exposing banks to heightened cyber risks and operational vulnerabilities. The ongoing shift from quantitative easing to tightening has also raised funding costs, further straining bank profitability.

As seen in countries like France and Germany, rising interest rates have helped some institutions improve margins, but others struggle with refinancing and capital market access (S&P Global, 2023). In response to these challenges, Croatian banks must focus on maintaining operational efficiency, particularly in light of increasing inflation and interest rate fluctuations. Croatian financial institutions are also facing heightened scrutiny due to stricter regulatory requirements tied to the European Union's financial oversight, which has further complicated their operations. Studies on European banking efficiency, such as Fiordelisi et al. (2010), reveal that periods of financial instability tend to exacerbate inefficiencies, a finding that holds true for Croatia as well, where regulatory compliance adds significant pressure on banks' operational frameworks. According to the Croatian National Bank (2023), the total assets of credit institutions increased in 2023 by 2.97% compared to the end of 2022 and reached a value of 78.19 billion euros. Most credit institutions recorded asset growth.

Despite challenges such as non-performing loans and regulatory requirements, Croatian banks have proven their resilience and adaptability. In addition, it is important for banks to further improve their risk management practices, drive digitalization and innovation, and maintain high corporate governance standards to ensure long-term sustainability and contribute to the overall development of the country's financial system. In the modern banking sector, the issue of bank consolidation is increasingly coming to the fore, with smaller banks tending to disappear through mergers and acquisitions by larger, more efficient banks. This consolidation of the banking sector leads to a reduction in the number of banks and raises the question of the efficiency of smaller banks compared to larger banks. Although the number of credit institutions has decreased significantly after the 1990s and is 19 in 2024 after the merger of Nova Hrvatska Banka with Hrvatska Poštanska Banka in 2023, the total assets of banks have increased significantly. This trend is particularly notable in the Republic of Croatia, where banks are the most important financial institutions. Smaller banks often face the challenge of maintaining their competitiveness due to their limited resources, weaker market position, and less access to modern technologies. It is therefore important to examine how the size of banks affects their efficiency and whether smaller banks are actually less efficient compared to larger ones. The aim of this study is to assess the efficiency of Croatian commercial banks between 2013 and 2022 using DEA window analysis, a method that enables the examination of efficiency trends over time. The analysis focuses on identifying inefficiencies that may be due to both internal processes and external influences, such as economic fluctuations and regulatory changes.

One of the main objectives of Croatian banks is to remain profitable in an increasingly volatile economic environment while achieving an efficient allocation of resources. Identifying efficient institutions can serve as a benchmark for best practices and guide less efficient banks to perform better. The paper is structured as follows. After the introduction, the second chapter provides an overview of previous studies on the evaluation of the efficiency of commercial banks using the DEA and WDEA methods. The third part presents the methodology used, and the fourth part evaluates the efficiency of 17 commercial banks in Croatia, presenting and discussing the results. The last part of the paper, the conclusion, summarizes the results.

2. LITERATURE REVIEW

Evaluating the efficiency of banks has become an important area of research in the financial sector. Given the essential role that banks play in a country's economic development, assessing their efficiency is crucial for all stakeholders. The consolidation of banks has improved their ability to absorb financial shocks and deal with economic uncertainties. In Croatia, several factors affect the efficiency of banks, in particular the introduction of technologies that can streamline processes and increase productivity. In stable times, banks contribute significantly to economic growth and financial stability, while in times of crisis, their ability to maintain liquidity and stability is crucial for effective government and monetary policy interventions and ensures the resilience of the economy (Balcerzal et al., 2017). Research suggests that more efficient banks are better able to withstand crises as they manage their resources more effectively and reduce the likelihood of failure. Efficient banks also provide greater job security for employees during economic turmoil and are better suited for long-term sustainability as regulators often grant them greater autonomy (Altunbas et al., 2007).

Previous studies have shown that larger banks tend to be more efficient than smaller banks due to economies of scale, which reduce costs by spreading fixed costs over a wider range of services (Rose & Hudgins, 2012). This conclusion is supported by studies such as those by Hughes et al. (2001), Jemrić & Vujčić (2002) and Kordić & Višković (2018). However, some studies, such as Řepková (2014), argue that smaller banks can be more efficient in certain contexts, depending on the environment. Řepková (2014) used the WDEA to analyze 11 Czech banks from 2003 to 2012 and concluded that smaller banks are generally more efficient, probably due to the negative impact of excess deposits in larger banks on net interest income. The study also found lower scale efficiency in large banks due to inefficient operational bandwidth. Tuškan and Stojanović (2016) assessed the efficiency of 28 European banking systems and found that average efficiency was lowest in 2012, with significant fluctuations in subsequent years, while Jurčević & Žaja (2013) found that the efficiency of Croatian banks had been declining since 2007. Another analysis by Visković et al. (2022) focused on Croatian banks in the period 2013 to 2020 and used the input-oriented Malmquist DEA model under the VRS assumption. They found an average increase in total factor productivity of 2.2, mainly due to technological advances. The study also analyzed the impact of the COVID-19 pandemic and showed different effects on banking efficiency depending on size, with large banks improving their productivity while medium-sized banks experienced declines.

Other studies, such as that by Jemrić & Vujčić (2002), examined efficiency trends from 1995 to 2000 and found that foreign banks were generally more efficient than domestic banks. Conversely, Kordić & Višković (2018) found no significant differences in efficiency depending on bank ownership, although larger banks consistently performed better than smaller ones. Similarly, Fotova Čiković & Cvetkovska (2022) found that Croatian banks achieved an average efficiency of 92% between 2009 and 2019 and suggested strategies to improve lagging institutions.

The influence of regulatory frameworks such as Basel II and Basel III on the efficiency of banks was also examined. Gržeta et al. (2023) found that regulation benefits larger banks but poses a challenge for smaller banks. Učkar & Petrović (2021), using the DEA, found that Croatian banks were very efficient between 2014 and 2019, especially the largest institutions. Finally, the studies by Pavković et al. (2018) and Davidović et al. (2019) confirmed that large banks are the most efficient and profitable, especially after Croatia's accession to the EU. To summarise, although the efficiency of Croatian banks has been extensively studied, most research has been based on basic models such as CCR and BCC. In this study, the WDEA model is used, which allows for a more dynamic assessment of bank efficiency over time and allows for the examination of the impact of macroeconomic shocks such as the COVID-19 pandemic on bank performance.

3. METHODOLOGY

Evaluation of the efficiency of commercial banks is usually carried out using methods such as Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA) to gain insight into the relative efficiency of business activities. While SFA distinguishes between random noise and inefficiencies by estimating a production or cost frontier, DEA is a non-parametric approach that compares Decision Making Units (DMUs), in this case commercial banks, with the most efficient peers by using linear programming to determine the best practice frontiers without assuming a particular functional form. The DEA is a valuable tool for assessing the relative efficiency of different DMUs involved in a variety of activities. It has proven to be particularly useful in situations where other methods were not suitable due to the complexity of the processes and the often unclear input-output relationships. DMU is any unit whose ability to transform inputs into outputs is to be assessed (Cooper et al., 2004). This method can be applied in different sectors such as health (Buljan & Šimović, 2022; Bohmer (2020) Dukić Samaržija et al., 2018,), education (Andersson & Sund,2022; Arbula Blecich, 2024a, 2020; De Jorge Moreno et al. (2019), R&D (Arbula Blecich, 2021; Du and Seo, 2022), tourism (Arbula Blecich et al. 2025; Doğanalp & Arslan (2021); Lozano-Ramírez et al.,2023; Marcikic Horvat & Radovanov (2020), in our case commercial banks in Croatia. The DEA evaluates efficiency by determining the ratio of weighted inputs to weighted outputs for each DMU. The efficiency score ranges from 0 to 1, with a score of 1 indicating a fully efficient DMU, while a score below 1 indicates a relatively inefficient DMU.

DMUs that are categorized as relatively inefficient are compared with those that are relatively efficient. Relatively efficient DMUs are not able to increase an output without either increasing an input or decreasing another output. Similarly, they cannot decrease an input without decreasing an output or increasing another input. The advantages of DEA lie in its ability to handle multiple inputs and outputs, regardless of the units in which they are measured. However, in addition to its advantages, this method also has its limitations. The ratio between the number of DMUs and the sum of inputs and outputs, which must be at least 3-4, must be taken into account. With dynamic variants of the method, such as the WDEA, this is no longer a problem, as each DMU is regarded as a different DMU value at a different point in time. This paper uses a WDEA analysis with a window length of 3 years.

The analysis was conducted from 2013 to 2022 and covers a total of 10 years, resulting in a total of 8 windows. On this basis, the number of data points (number of DMUs* length of window* number of windows) can be calculated, which is 408. Since the sum of the in-pits and out-pits is 5, there are more than enough data points. Furthermore, since the results depend on the choice of inputs and outputs, only the most important variables should be used for a set of analyses.

When assessing efficiency, three key concepts should be distinguished (Al-Refaie et al., 2016): technical efficiency (TE), pure technical efficiency (PTE), and scale efficiency (SE). TE, also referred to as overall efficiency, indicates how well resources are utilized and allocated to individual DMUs and provides an indication of a DMU's ability to convert inputs into outputs at maximum potential. The TE is made up of two main components: PTE and SE, which help to identify the specific sources of inefficiency. The CCR and BCC models are the two basic DEA models. The CCR model assumes constant returns to scale (CRS), which means that outputs increase in direct proportion to inputs, while the BCC model is based on the premise of variable returns to scale (VRS), which means that outputs may not increase in proportion to the increase in inputs (Arbula Blecich, 2024b). The mathematical formulation of the CCR model is presented below (Charnes, Cooper and Rhodes,1978):

$$\theta = \frac{\sum_{r=1}^{s} u_r y_{r0}}{\sum_{i=1}^{m} v_r x_{i0}}$$

$$Subject\ to\ \frac{\sum_{r=1}^{s} u_r y_{r0}}{\sum_{i=1}^{m} v_r x_{i0}} \leq 1, \quad j = 1, \dots, n;\ with$$

$$u_r, v_i > 0, \quad i = 1 \dots, m; \quad r = 1, \dots s$$

$y_{rj}, x_{ij} > 0$ represent the outputs and inputs for DMUj, θ denotes relative efficiency, $(x_{1j}, \dots, x_{mj})$ is the input vector for DMUj with input weights $(v_1, \dots, v_m)$, and $(y_{1j}, \dots, y_{qj}$ is the output vector for DMUj with output weights $(u_1, \dots, u_q)$

The BCC model (Banker, Charnes, Cooper, 1984) is an extension of the CCR model, which is based on VRS. The mathematical formulation of the BCC model is presented below:

$$\theta = \frac{\sum_{r=1}^{s} u_r y_{r0} - u_0}{\sum_{i=1}^{m} v_r x_{i0}}$$

$$Subject\ to\ \frac{\sum_{r=1}^{s} u_r y_{r0} - u_0}{\sum_{i=1}^{m} v_r x_{i0}} \leq 1, \quad j = 1, \dots, n;\ u_r, v_i \geq 0$$

$$with\ u_0\ \text{unrestricted in sign}$$

The DEA enables commercial banks to analyze their efficiency, identify areas for improvement, and implement strategies to better allocate resources and increase the overall efficiency of the company. In contrast to traditional DEA models, which evaluate relative efficiency within a single time period, WDEA is an extension of the DEA method that takes a dynamic component into account. This approach uses "windows" that span multiple time periods so that changes in efficiency can be tracked over time (Arbula Blecich, 2024a). Assuming the window begins at time k (1 ≤ k ≤ T) and the window length is p (1 ≤ w ≤ T-k), the input (Xkw) and output (Ykw) matrices for each window (kw) are defined as presented below (Jia & Yuan, 2017):

$$X_{kw} = \begin{bmatrix} x_1^k\ x_2^k\ \dots\ x_N^k\ x_1^{k+1}\ x_2^{k+1}\ \dots\ x_N^{k+1}\ \vdots\ \vdots\ \ddots\ \vdots\ x_1^{k+w}\ x_2^{k+w}\ \dots\ x_N^{k+w} \end{bmatrix}\ Y_{kw} = \begin{bmatrix} y_1^k\ y_2^k\ \dots\ y_N^k\ y_1^{k+1}\ y_2^{k+1}\ \dots\ y_N^{k+1}\ \vdots\ \vdots\ \ddots\ \vdots\ y_1^{k+w}\ y_2^{k+w}\ \dots\ y_N^{k+w} \end{bmatrix}$$

By substituting the inputs and outputs of DMU_n^t into the CCR and BCC models, the results of the WDEA can be derived.

4. EMPIRICAL DATA AND ANALYSIS

Two main approaches to assessing the efficiency of banks are the intermediation approach and the operating approach. The intermediation approach determines input and output variables based on a bank's intermediation functions, which consist of transferring funds from those who have excess money to those who need it. In contrast, the operating approach links the input and output variables to the banks' operational activities (Učkar & Petrović, 2021). Deposits play a crucial role as input resources in this context, as banks use customer deposits to create additional value through lending and other financial activities. The greatest disagreement among scholars exists with respect to deposits. Some authors argue that deposits should be considered as inputs, while others believe that they should be considered as outputs (Radojičić et al., 2018). Berger & Humphrey (1997) concluded that neither approach is ideal as neither fully captures the dual role of banks. They believe that the operation approach is better suited to evaluate the efficiency of bank branches, while the intermediation approach is better suited to evaluate banking activities as a whole. The intermediation approach is the most commonly used method for variable selection (Akdeniz et al., 2023) and is also used in this paper, as the banks' activities were evaluated as a whole.

4.1. Variable and model selection

This paper evaluates the efficiency of 17 Croatian commercial banks using the WDEA based on the intermediation approach for the period from 2013 to 2022. The data is taken from the Bureau van Dijk (BvD) Orbis Europe database. However, the data for BKS Bank AG, OTP Banka, and Samoborska banka were not available in the database. In addition, the data for Slatinska banka from 2013 to 2015 was missing. As the DEA cannot take missing data into account, these banks were excluded from the analysis. The variables used for the analysis are presented in the following table.

Inputs	Outputs
Number of employees	Loans
Total deposits in th. EUR	Securities and investments
Fixed assets in th. EUR	

Table 1: Inputs and outputs
(Source: Authors)

An important prerequisite for the application of DEA is that the variables must fulfil the isotonic condition, which requires a positive correlation between inputs and outputs (Avkiran, 1999). In this analysis, all variables show positive and strong correlations over the observed years, so that this condition is fulfilled. When conducting the analysis, it is also important to choose the orientation of the model, which can be either input or output, depending on whether the objective of the DMU is to minimize inputs while keeping outputs constant or to maximize outputs while keeping inputs constant. Since banks usually aim to maximize their output, an output orientation is used in this paper.

4.2. Results

The analysis was carried out over a period of ten years, from 2013 to 2022. To monitor efficiency over this decade, a window DEA analysis was performed. The table shows the results of the average relative efficiency for each bank. A score of 1 means that the DMU is 100% efficient, while a score of less than 1 means that the DMUs are relatively inefficient.

BANKS	C-Average-TE	C-Average - PTE	C-Average - SE
ZAGREBACKA BANKA DD	0.9493	0.9975	0.9517
PRIVREDNA BANKA ZAGREB DD	0.9233	0.9673	0.9545
ERSTE & STEIERMARKISCHE BANK DD	0.9826	0.9951	0.9875
RAIFFEISENBANK AUSTRIA DD	0.8521	0.9765	0.8726
HRVATSKA POSTANSKA BANK DD	0.9397	0.9862	0.9528
Average - large	**0.9294**	**0.9845**	**0.9438**
ADDIKO BANK DD ZAGREB	0.9362	0.9635	0.9717
NOVA HRVATSKA BANKA DD	0.9606	0.9644	0.9961
Average - medium	**0.9484**	**0.9639**	**0.9839**
AGRAM BANKA DD ZAGREB	0.9639	0.9707	0.9929
KENTBANK DD	0.8632	0.9076	0.9511
PODRAVSKA BANKA DD	0.8575	0.8660	0.9901
ISTARSKA KREDITNA BANK UMAG DD	0.7566	0.7616	0.9933
KARLOVACKA BANKA DD	0.7329	0.7537	0.9722
BANKA KOVANICA DD VARAZDIN	0.7972	0.9765	0.8164
PARTNER BANKA DD	0.8700	0.9439	0.9216
CROATIA BANKA DD	0.9833	0.9915	0.9917
IMEX BANKA DD	0.7133	0.7843	0.9093
J&T BANKA DD	0.8156	0.9362	0.8712
Average - small	**0.8353723**	**0.889243**	**0.941033**

Table 2: C-averages for TE, PTE and SE
(Source: Authors)

An average efficiency was calculated for large, medium, and small banks. Although size can influence the efficiency of a bank, it is not the only determinant. Efficiency depends on various factors, such as capital, technology, management, market conditions, and others. The results show that large banks have an average technical efficiency of 93%, medium-sized banks of 95% and small banks of 84%. It should be noted that only two medium-sized banks are included in the sample, so it is difficult to draw definitive conclusions about their performance. A comparison between large and small banks, which have a larger sample size, shows that large banks achieve significantly higher efficiency on average, confirming that larger banks often benefit from economies of scale. Three components of efficiency (TE, PTE, and SE) were analyzed to gain insights into the sources of inefficiency within each bank. The PTE provides a more detailed assessment of resource management efficiency, regardless of the size of the organization, and is influenced by management practices, technology, and other external factors. Using the PTE in combination with the SE, which indicates whether a DMU is operating at an appropriate size, can provide a more comprehensive picture of DMU efficiency. Examination of the results shows that for large and medium-sized banks, the causes of inefficiency are equally attributable to PTE and SE, while for small banks, PTE is the main cause of inefficiency, which is related to management, technology and other exogenous factors.

The dynamics of TE for Croatian commercial banks depending on their size are shown in the figure below.
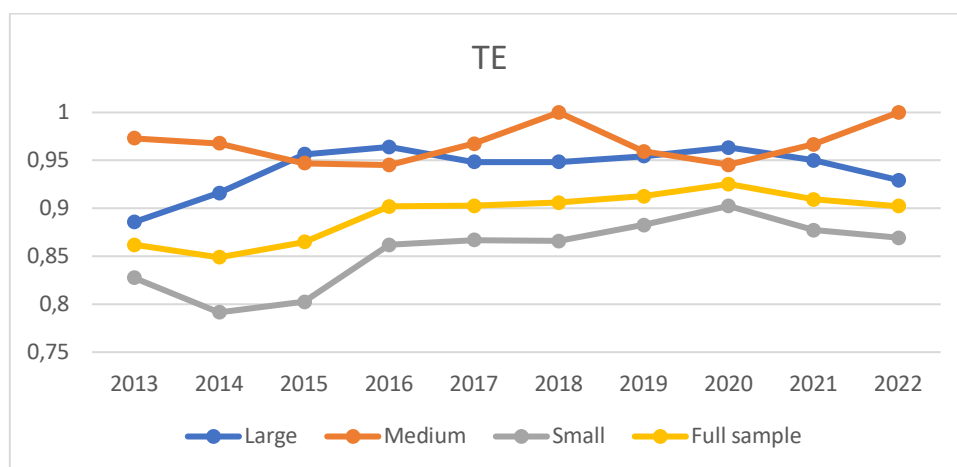
Figure 1: Dynamics of TE of Croatian banks by size
(Source: Authors)

Looking at Figure 1, it is clear that medium-sized and large banks achieve a higher level of efficiency on average than small banks. It can also be seen that, unlike many other sectors that suffered a significant drop in efficiency due to the COVID-19 pandemic, the banking system was not negatively affected. In fact, 2020 recorded the highest level of technical efficiency (TE) when considering all banks together. To identify the causes of inefficiency at the system level, the following figure shows the aggregated results of PTE and SE.
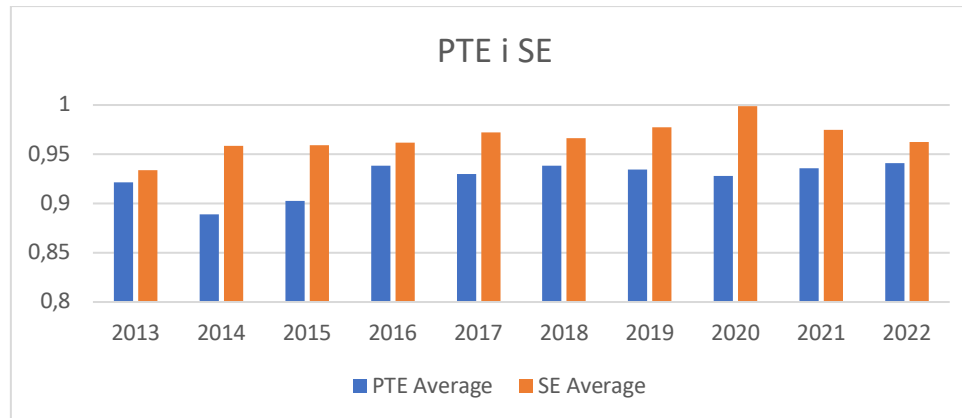
Figure 2: Dynamics of PTE and SE of Croatian banks – full sample
(Source: Authors)

Figure 2 shows the results of PTE and SE as key components of TE, which shed light on the causes of inefficiency. The results show that efficiency varies between banks and over time, with PTE peaking in 2022. The SE results show fluctuations, with the highest values recorded in 2020, followed by a decline in 2021 and 2022. When analyzing the causes of inefficiency, it becomes clear that the PTE, which is influenced by management, technology, and other external factors, is generally lower than the SE, which provides information about the optimal resource size. This suggests that management, technology, and other exogenous factors are the main causes of inefficiency.

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5. DISCUSSION

Our empirical analysis of 17 Croatian commercial banks in the period from 2013 to 2022, using the window DEA (WDEA) based on the intermediation approach, provides important insights into the efficiency of banks. The results underline the importance of bank size, with large banks showing a higher average technical efficiency (TE) of 93%, medium banks 95% and small banks 84%. This result is consistent with the existing literature, which supports the notion that larger banks generally achieve higher efficiency due to economies of scale. Studies by Altunbas et al. (2007) and Hughes et al. (2001) also report that larger banks benefit from spreading fixed costs over a larger volume of services, resulting in lower unit costs and higher efficiency. The analysis of the efficiency components - pure technical efficiency (PTE) and scale efficiency (SE) - sheds light on the specific factors that contribute to inefficiency. The results show that for large and medium-sized banks, inefficiencies arise from both PTE and SE, meaning that both resource management and optimal scaling are a challenge. In contrast, inefficiencies in small banks are primarily due to PTE, suggesting internal factors such as management practices, use of technology, and other external factors. This observation is consistent with Řepková (2014), who found that small banks, especially in a less competitive environment, are often less efficient due to management and technology constraints rather than size. Furthermore, the results on the efficiency of small banks show that although size plays a role, external and management factors also play a decisive role. Earlier research by Berger & Mester (1997) emphasizes that inefficiencies in small banks are often due to limited technological investments, higher costs per unit of output, and less efficient management practices. Research by Fotova Čiković & Cvetkovska (2022) also suggests that technological advances and sound management practices can significantly increase the efficiency of small banks. The implications of these findings for Croatian banks are clear: small banks need to invest more in improving their internal processes and adopting cutting-edge technologies in order to remain competitive. One of the most remarkable findings of this study is the resilience of Croatian banks during the COVID-19 pandemic. In contrast to many other sectors of the economy, which suffered efficiency losses due to the economic disruption caused by the pandemic, the Croatian banking sector experienced an increase in efficiency in 2020, with the highest level of technical efficiency achieved in that year. This result contrasts with findings from other banking sectors around the world, where the pandemic led to significant operational and financial challenges (Mateev et al., 2024). For example, in a study of the banking sector, Demirguc-Kunt, et al. (2020) found widespread efficiency losses due to COVID-19, highlighting the remarkable resilience of Croatian banks. The improved performance during the pandemic could be attributed to several factors, including a strong capital position already in place, effective regulatory frameworks, and accelerated digitalization of banking services. The rapid adoption of digital banking tools and focus on remote banking services have been highlighted in various studies as key factors for maintaining operational efficiency in times of crisis (van Zeeland et al., 2024; Zhu & Shanyue, 2023; Ozili, 2020). The ability of Croatian banks to quickly adapt to these changes suggests that digital transformation has played a crucial role in their resilience and provides a model for other banking systems facing similar external shocks. A closer look at the components of efficiency over time reveals a more differentiated picture. While pure technical efficiency (PTE), which is influenced by management practices, technology, and other external factors, showed steady improvement throughout the study period, scale efficiency (SE) was more volatile, peaking in 2020 and declining in subsequent years. This suggests that while banks have improved their internal processes, optimizing their business scale remains a challenge, especially in the face of external economic volatility and regulatory pressure. Another important factor contributing to the overall efficiency of banks in Croatia is their regulatory environment.

The literature supports these findings, as studies by Gržeta et al. (2023) show that regulatory frameworks such as Basel III have different effects depending on the size of banks, with smaller banks often facing higher compliance costs, which can undermine their scale efficiency. The findings are consistent with previous research emphasizing the importance of a sound regulatory framework for banking sector stability. According to Barth et al. (2021), Basel III regulations, which aim to improve risk management and capital adequacy, have had a positive impact on the efficiency of larger banks in Europe, enabling them to better withstand financial crises. Croatian banks appear to have similarly benefited from these regulations, as they have maintained their efficiency during the pandemic while adhering to strict capital and liquidity requirements. Overall, the results suggest that Croatian banks, especially the larger institutions, have benefited from economies of scale, strong regulatory support and effective crisis management during the COVID-19 pandemic. For smaller banks, the key challenge remains to improve purely technical efficiency through better management and technology, as Řepková (2014) and Jemrić & Vujčić (2002) suggest. To further increase the efficiency of smaller banks in particular, efforts should focus on improving management capabilities, leveraging technological advances and optimizing operational processes. Policy makers and bank executives should consider these factors when developing strategies to improve bank performance, especially in light of external economic challenges and changing market conditions. Continuous monitoring of efficiency trends, especially after the COVID-19 pandemic, will be essential for maintaining the stability and competitiveness of the Croatian banking sector.

6. CONCLUSION

This study provides valuable insights into the efficiency of Croatian commercial banks over a ten-year period, using Window Data Envelopment Analysis (WDEA) within the intermediation approach. The results show that larger banks have higher efficiency on average, likely due to economies of scale, while smaller banks face challenges related to management and external factors, such as technology adoption. Notably, the COVID-19 pandemic did not have a negative impact on banking efficiency; instead, 2020 saw the highest level of technical efficiency across the sector, highlighting the resilience of Croatian banks to global economic shocks. This study makes several important scientific contributions. First, it enriches the existing literature on banking efficiency in Croatia by applying the WDEA methodology, which allows for the study of efficiency dynamics over time rather than providing a single static measure. This approach is particularly useful to assess the impact of external shocks such as the COVID-19 pandemic, which enriches the broader discourse on banks' resilience in times of crisis. Second, the study fills a gap in regional studies by focusing on Croatian banks and providing a comparative perspective on the efficiency of banks in smaller economies with a developing banking sector. Third, by applying the intermediation approach, this study contributes to the ongoing debate on the appropriate method for assessing banking efficiency, joining the recent literature that emphasizes the holistic assessment of banking activities. Despite its contribution, the study has some limitations. One limitation is the exclusion of certain banks due to missing data, which somewhat limits the completeness of the analysis. In addition, the sample of medium-sized banks is relatively small, which may limit the robustness of the results for this category. Although the intermediation approach provides a useful perspective, future studies could incorporate a comparison with the operational approach to provide a more nuanced understanding of banking efficiency. Finally, the study focuses primarily on technical efficiency without looking in depth at qualitative factors such as customer service or risk management practices which could influence banks' overall performance.

Future research could build on these findings by incorporating a broader data set and comparing different methodological approaches to provide an even more comprehensive analysis of banking efficiency in the region.

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ALGORITHMIC PERSONALISATION, AI NETWORKS, AND SUSTAINABLE DEVELOPMENT – ETHICAL CHALLENGES AND POLICY FRAMEWORKS

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ABSTRACT

This study examines the intersection of algorithmic personalisation, AI-driven networks, and sustainable development, emphasising ethical challenges, policy implications, and governance models. As digital platforms increasingly curate personalised content, cognitive resonance— the psychological alignment between individuals and algorithmically selected information— plays a crucial role in shaping public perception, electoral behaviour, and policy debates. While personalisation enhances efficiency in education, healthcare, and strategic communication, it raises critical concerns about ideological polarisation, misinformation, and bias reinforcement. Using a qualitative research design that integrates discourse, content, and semiotic analysis, this study investigates how algorithmic reinforcement influences strategic communication, public policy, and digital governance. Case studies on political microtargeting, military recruitment, and crisis communication highlight the risks of data privacy erosion, information asymmetry, and epistemic closure, necessitating more substantial regulatory interventions. To address these challenges, this paper introduces the Sustainable AI Index (SAI)—a structured governance framework that integrates algorithmic transparency, ethical oversight, and sustainability metrics into AI evaluation. The SAI model enables quantifiable AI assessments, bridging the gap between qualitative ethical principles and empirical governance strategies. It advocates interdisciplinary collaboration among policymakers, AI developers, and civil society to align AI regulation with global sustainable development goals (SDGs). Future research should focus on empirically validating AI sustainability frameworks and enhancing algorithmic resilience through media literacy, exposure to diversity, and computational modelling. By integrating insights from AI ethics, cognitive psychology, and governance studies, this study contributes to ongoing policy debates on harmonising technological innovation with democratic integrity and social equity.
***Keywords*:** *Algorithmic personalisation, AI governance, Cognitive resonance, Ethical AI, Sustainable AI*

1. INTRODUCTION

Integrating artificial intelligence (AI) into digital ecosystems has significantly transformed how individuals engage with information, shaping decision-making processes across various domains, including education, healthcare, and governance (Moor, 2006; Mittelstadt & Floridi, 2016; Bostrom, 2014). Algorithmic personalisation, a key driver of AI-driven content curation, enhances efficiency by tailoring information delivery to individual preferences. However, its widespread application raises pressing ethical concerns, particularly about ideological polarisation, misinformation, and systemic bias (Pasquale, 2015; O'Neil, 2016; Noble, 2018). Crawford (2021) highlights that AI-driven personalisation is profoundly shaped by economic and political interests, often reinforcing existing power structures and reducing content diversity.

The ability of AI to reinforce existing cognitive biases and shape public perception necessitates a structured governance model that ensures transparency, accountability, and sustainability in AI-driven decision-making (Ananny & Crawford, 2018; Binns, 2018; Fjeld et al., 2020). Current AI governance frameworks, including the *Ethics Guidelines for Trustworthy AI* (High-Level Expert Group on Artificial Intelligence, 2019) and the *OECD Recommendation on AI* (OECD, 2019), provide broad ethical principles but lack standardised, quantifiable evaluation mechanisms (Jobin, Ienca & Vayena, 2019; European Commission, 2019; Whittaker et al., 2018). The absence of a universal metric to assess AI sustainability and fairness has led to inconsistencies in regulatory approaches, highlighting the need for a more comprehensive and measurable assessment framework (Floridi & Cowls, 2019; Coeckelbergh, 2020; Russell, 2019). This paper introduces the Sustainable AI Index (SAI), a governance model designed to quantify AI systems' ethical and sustainability performance to address this gap. By integrating environmental impact, algorithmic transparency, social fairness, and ethical compliance into a structured evaluation metric, SAI provides a novel approach to AI assessment, ensuring AI-driven innovation aligns with democratic integrity, environmental responsibility, and social equity.

2. METHODOLOGY

This study employs a qualitative research design to examine algorithmic personalisation's ethical and sustainability implications in AI-driven networks. Dignum (2019) emphasises that responsible AI development requires balancing technological efficiency with ethical constraints, ensuring that AI models align with societal values and governance principles. Given the interdisciplinary nature of AI governance, a multi-method approach is used to assess the Sustainable AI Index (SAI) comprehensively. First, *content analysis* is applied to policy documents, ethical guidelines, and regulatory frameworks to identify gaps in existing AI governance models (Moor, 2006; Mittelstadt & Floridi, 2016; OECD, 2019). This method enables a systematic review of current AI policies and their effectiveness in addressing transparency, fairness, and sustainability concerns. Second, a *comparative analysis* evaluates the differences between AI ethical frameworks and the proposed SAI model (O'Neil, 2016; Jobin, Ienca & Vayena, 2019; Coeckelbergh, 2020). This analysis contrasts qualitative principles with the structured, quantifiable metrics introduced in SAI, highlighting its potential as a standardised evaluation tool. Additionally, the study incorporates a *case study approach*, analysing algorithmic personalisation in political microtargeting, military recruitment, and crisis communication (Pasquale, 2015; Ananny & Crawford, 2018; Eubanks, 2018). These case studies highlight the societal risks of AI-driven decision-making and underscore the necessity of an empirical AI assessment framework. Finally, the research applies *conceptual modelling* to develop the Sustainable AI Index, integrating dimensions of environmental impact, algorithmic transparency, social fairness, and ethical compliance (Floridi & Cowls, 2019; Russell, 2019; Lehuede, 2024). This structured approach systematically evaluates AI systems based on measurable criteria, ensuring alignment with democratic integrity and sustainability principles. Combining these methodologies, the study bridges the gap between qualitative AI ethics frameworks and empirical governance models, laying the foundation for a structured, accountable, and sustainable AI assessment.

3. RESULTS

Artificial intelligence (AI) governance requires structured evaluation frameworks integrating ethical oversight with sustainability metrics. Current AI policies provide general principles but lack mechanisms for quantitative assessment. This research introduces the Sustainable AI Index (SAI) as a comprehensive evaluation model that bridges this gap by incorporating measurable parameters into AI governance.

The model applies a multidimensional approach to assess AI systems based on four interdependent criteria: environmental impact, algorithmic transparency, social fairness, and ethical compliance.

1. Environmental sustainability reflects AI technologies' energy consumption and resource efficiency. Given the increasing computational demands of AI models, assessing carbon footprints and sustainable data usage is critical for responsible innovation.
2. Algorithmic transparency evaluates the explainability and accessibility of AI decision-making processes. Ensuring that AI systems are interpretable enhances trust and mitigates risks associated with opaque or biased decision-making structures.
3. Social fairness examines how AI models address bias mitigation and representational diversity. AI-driven decision-making has historically reinforced systemic inequities, necessitating continuous auditing mechanisms. Rahwan et al. (2019) propose viewing AI as a behavioural system, where algorithmic decisions are influenced by data inputs and interactions with human users, complicating bias mitigation efforts.
4. Ethical compliance determines whether AI applications align with human rights standards and legal frameworks. This includes adherence to data privacy regulations and preventing exploitative uses of AI in high-risk areas such as surveillance and automated decision-making.

The SAI score is derived from a weighted aggregation of these factors, allowing policymakers, regulators, and industry leaders to measure AI performance against sustainability benchmarks. To enhance its practical applicability, future research should incorporate empirical analyses of existing AI systems using the proposed SAI criteria and simulations demonstrating how scores fluctuate across different regulatory environments. AI systems that score below acceptable thresholds may require enhanced oversight or compliance measures. Integrating SAI into governance strategies can provide a structured approach to AI risk assessment while aligning digital transformation initiatives with sustainable development goals.
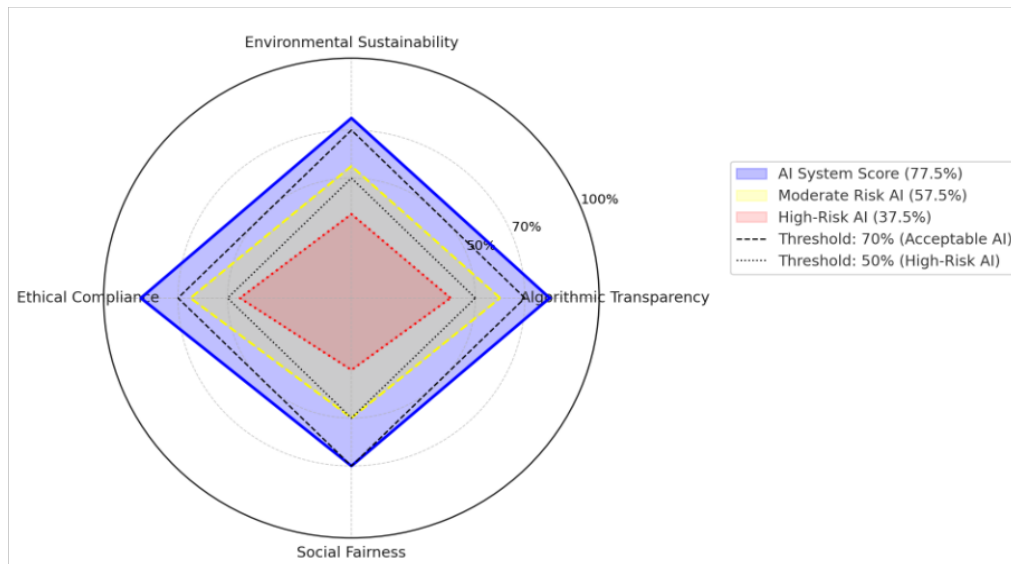
Figure 1: Sustainable AI Index (SAI) Model - Risk Assessment

The Sustainable AI Index (SAI) provides an assessment framework and a strategic tool for AI policymakers, industry leaders, and regulatory bodies. By establishing quantifiable performance metrics, the model enables data-driven decision-making in AI governance, ensuring that ethical considerations are integrated into AI lifecycle management.

Unlike existing governance models that rely on qualitative principles, SAI introduces a standardised, measurable approach to AI evaluation, ensuring alignment with regulatory frameworks and sustainability goals. Following the structure of global AI governance efforts, the model incorporates environmental sustainability, algorithmic transparency, social fairness, and ethical compliance. These dimensions form the foundation for responsible AI development, aligning with international regulatory initiatives and supporting the ethical deployment of AI-driven technologies. Moreover, the adaptability of SAI across diverse AI applications allows for sector-specific governance approaches. High-risk AI systems deployed in public administration, finance, and healthcare require stricter regulatory thresholds, whereas AI applications in lower-risk environments may follow more flexible compliance pathways. This differentiation ensures that AI sustainability is not treated as a one-size-fits-all concept but as a dynamic framework that adjusts to technological advancements and societal needs. SAI provides a structured basis for AI accountability by incorporating measurable risk levels and regulatory thresholds. The model uses a weighted scoring formula (Equation 1) to evaluate AI systems across four dimensions—environmental sustainability, algorithmic transparency, social fairness, and ethical compliance—ensuring consistency with governance objectives. Future policy development can leverage SAI to establish internationally recognised standards, ensuring that AI technologies align with democratic values, human rights principles, and environmental sustainability. Key methodological challenges include data availability for AI system assessment, standardisation of evaluation metrics, and the need for transparent criteria that enable comparability across AI applications in political and industrial settings. To quantify AI performance, the SAI model applies an aggregated scoring approach:

$$SAI = w_1 \cdot ES + w_2 \cdot AT + w_3 \cdot SF + w_4 \cdot EC$$
$$(1)$$

Figure 2: Sustainable AI Index (SAI) Scoring Formula

Where:

- ES (*Environmental Sustainability*) assesses AI energy consumption, carbon footprint, and resource efficiency.
- AT (*Algorithmic Transparency*) evaluates explainability, accountability, and potential for bias mitigation.
- SF (*Social Fairness*) ensures diversity in AI decision-making and prevents systemic discrimination.
- EC (*Ethical Compliance*) verifies adherence to regulatory and human rights standards.
- w_1, w_2, w_3, w_4 are weighted coefficients reflecting AI impact levels across domains.

AI systems are categorised based on their SAI score:

- Below 50 → High-risk AI requiring regulatory intervention.
- 50–70 → Moderate-risk AI requiring improved transparency and monitoring.
- Above 70 → Ethically and sustainably aligned AI, serving as a governance benchmark.

By applying this model, policymakers can establish transparent compliance standards, ensuring AI aligns with global sustainability efforts while fostering public trust in digital governance. The SAI index offers a scalable evaluation framework adaptable to sector-specific AI applications such as finance, healthcare, and digital governance.

4. DISCUSSION

Artificial intelligence (AI) governance has emerged as a fundamental challenge in shaping the regulatory landscape of digital ecosystems. With AI-driven personalisation influencing strategic decision-making, economic stability, and public trust, ensuring transparency and accountability in AI models has become a policy imperative (Bryson, 2018; Coeckelbergh, 2020). However, current governance structures often rely on broad ethical principles rather than measurable, enforceable evaluation metrics. The Sustainable AI Index (SAI) seeks to address this gap by introducing a structured approach to assessing AI sustainability, aligning with global AI governance frameworks and sustainable development goals (European Commission, 2019; OECD, 2019). The implementation of SAI may vary depending on national regulatory frameworks and technological development. Further adaptations are necessary to ensure its practical application across different sectors. The role of AI in reinforcing information asymmetry and ideological segmentation has been widely discussed in the context of algorithmic bias, political microtargeting, and crisis communication (Binns, 2018b; Cath et al., 2018; Noble, 2018). The ability of AI to amplify cognitive resonance necessitates empirical oversight mechanisms that extend beyond voluntary industry standards (Pasquale, 2015; O'Neil, 2016). Regulatory efforts such as the EU AI Act and OECD's Recommendation on AI attempt to standardise ethical AI deployment, yet enforcement remains fragmented across different jurisdictions (High-Level Expert Group on Artificial Intelligence, 2019; European Parliament, 2020). Kroll et al. (2017) argue that algorithmic decision-making remains opaque despite regulatory frameworks, as many AI models function as 'black boxes', limiting accountability and oversight. The thematic structure of the ESD conference, mainly its focus on digital innovation, collaborative networks, and sustainable development, underscores the need for a governance approach that integrates ethical AI evaluation with structured accountability measures. The SAI model offers a quantifiable benchmark that can be adapted across various AI applications, ensuring compliance with regulatory objectives while fostering responsible technological advancement (Floridi & Cowls, 2019; Lehuede, 2024). Several existing frameworks attempt to assess AI sustainability, yet they primarily focus on either environmental impact **or** ethical considerations in isolation, lacking an integrated and quantifiable evaluation approach. For instance, the SustAIn project focuses on defining sustainability indicators for AI models, particularly regarding energy efficiency and carbon footprint management (AlgorithmWatch, 2023). While this approach is valuable for assessing AI's ecological impact, it does not incorporate social fairness, transparency, or ethical oversight, limiting its applicability in governance and regulatory decision-making. Similarly, Stanford's AI Index provides quantitative insights into AI development trends, tracking progress in various AI capabilities and societal applications (Stanford Institute for Human-Centered Artificial Intelligence, 2024). However, its evaluation primarily serves as an analytical tool rather than a regulatory framework, lacking enforceable compliance metrics that could be integrated into policy structures. Moreover, existing AI impact assessments, such as those developed by the OECD and the European Commission, remain largely principle-based rather than outcome-driven, making them insufficient for addressing AI risks in high-stakes decision-making environments (OECD, 2019; European Commission, 2019). Wachter, Mittelstadt, and Floridi (2017) contend that even the GDPR does not provide an explicit right to explain automated decision-making, raising concerns about legal transparency in AI governance. In contrast, the Sustainable AI Index (SAI) introduces a holistic, multidimensional assessment framework that evaluates AI sustainability through four interdependent dimensions: environmental sustainability, algorithmic transparency, social fairness, and ethical compliance. By integrating these elements into a single, quantifiable index, SAI provides both a risk assessment tool and a regulatory mechanism, ensuring AI governance is adaptable to sector-specific requirements.

Unlike prior models, which primarily serve as monitoring tools or conceptual guidelines, SAI establishes a structured, enforceable benchmarking system, allowing regulators, policymakers, and industry leaders to align AI development with sustainable development goals and democratic accountability principles. One of the key challenges in AI regulation is the environmental and economic impact of large-scale computational models. AI-driven decision-making, particularly in deep learning and predictive analytics, requires substantial energy consumption and computational power, raising sustainability concerns (Bostrom, 2014; Mittelstadt & Floridi, 2016). The inclusion of environmental sustainability as a fundamental metric in the SAI model aligns with emerging global efforts to evaluate AI's carbon footprint and long-term ecological consequences (Rehak, 2023; Thelisson et al., 2023). AI sustainability must be considered within the broader digital economy framework, recognising that unchecked computational expansion may exacerbate environmental degradation. By incorporating sustainability into AI evaluation models, policymakers can ensure that AI innovations are aligned with sustainable development objectives rather than operating as extractive technological systems (Future of Life Institute, 2017; Fjeld et al., 2020). AI governance cannot operate in isolation but must account for networked effects, ensuring interoperability between regulatory frameworks across different geopolitical and economic contexts. While national AI policies establish foundational governance structures, the absence of an overarching international framework limits regulatory coherence (Jobin, Ienca & Vayena, 2019; Russell, 2019). The networked nature of AI-driven platforms necessitates collaborative policymaking, where AI ethics is integrated into private and public sector governance strategies (Brännström, Theodorou & Dignum, 2022; Whittaker et al., 2018). The SAI model contributes to this effort by providing a structured, adaptable approach to AI oversight, ensuring that AI governance is scalable and contextually relevant. Future regulatory approaches must also incorporate empirical validation techniques to assess AI's long-term societal impact. Computational modelling, regulatory sandboxing, and sentiment analysis offer potential pathways for evaluating algorithmic fairness and sustainability across diverse applications (Moor, 2006; Mataija, 2023; Zuboff, 2019). The increasing integration of AI within governance, healthcare, and security sectors reinforces the urgency of establishing robust accountability mechanisms beyond voluntary ethical codes (Dastin, 2018; Eubanks, 2018). Addressing these challenges requires a multi-stakeholder approach, where policymakers, AI developers, and civil society collaboratively design governance frameworks that balance technological innovation with democratic integrity and social equity (Ananny & Crawford, 2018; Fjeld et al., 2020).

5. CONCLUSION

As artificial intelligence continues to shape digital ecosystems, its governance requires a structured, transparent, and sustainable approach. This study presents the Sustainable AI Index (SAI) as an empirical governance model to quantify AI's ethical and sustainability dimensions. Unlike traditional regulatory frameworks that emphasise broad ethical principles, SAI offers a measurable benchmark for AI compliance, ensuring that technological advancements align with societal values and environmental responsibility. The SAI model establishes a scalable governance tool applicable across diverse AI applications by integrating ecological sustainability, algorithmic transparency, social fairness, and ethical compliance into a unified framework. The results highlight the necessity to move beyond voluntary AI ethics codes towards enforceable regulatory mechanisms incorporating standardised risk assessment. AI systems that fail to meet sustainability and fairness thresholds pose technological risks and societal and economic challenges, reinforcing the urgency of structured evaluation models. The study's methodological approach, combining qualitative content analysis, comparative evaluation, case studies, and conceptual modelling, ensures a comprehensive examination of AI governance challenges.

By adopting a networked approach to AI oversight, policymakers can align regulatory efforts across jurisdictions, reducing governance fragmentation and improving policy coherence. The findings demonstrate that interdisciplinary collaboration between policymakers, AI developers, and global governance institutions is essential to mitigating algorithmic risks while maintaining innovation-driven digital transformation. Looking ahead, future AI governance strategies must embrace adaptive regulatory models capable of responding to the dynamic nature of AI systems. Sustainable AI governance should prevent harm and proactively shape AI's role in advancing democratic integrity, economic stability, and environmental resilience. This study contributes to ongoing policy dialogues by providing a structured foundation for AI sustainability assessment, reinforcing the need for transparent, ethical, and human-centric AI governance models in a rapidly evolving digital landscape.

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INTERCULTURAL COMMUNICATION AS A FACTOR OF CULTURAL AND CITIZEN DIPLOMACY: A REVIEW

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ABSTRACT
Intercultural communication is pivotal in fostering cultural and citizen diplomacy, promoting mutual understanding, and reducing conflicts in an increasingly interconnected world. This review examines the significance of intercultural communication as an element of diplomatic efforts, analyzing its impact on international relations, cultural exchanges, and grassroots diplomatic initiatives.
Keywords: *international relations, cultural diplomacy, citizen diplomacy, intercultural communication, soft power*

1. INTRODUCTION

In the era of globalization, effective communication across cultures has become essential for fostering diplomatic relations. Intercultural communication bridges diverse communities, enabling cultural diplomacy through exchange programs, public relations, and media outreach. Additionally, citizen diplomacy, where individuals engage in cross-cultural interactions, relies heavily on communication competence to build meaningful relationships and advance diplomatic goals. International relations as a discipline of political science primarily researches interstate relations, relations between subjects of international relations, and factors that influence the behaviour of interstate subjects.

They also research the interconnectedness of subjects of international relations, the conditionality of international events and processes that become an integral and relatively permanent part of the behaviour of such actors on the international level. According to Vukadinović, in the study of international relations, we distinguish several approaches – historical, systemic, normative, eclectic, and political scientific (Vukadinović 1998: 25-53). The historical approach places the focus of observation on diplomatic history as a discipline and the material it provides. Consequently, it follows that "international relations are largely conditioned by events and views inherited from the past." (Vukadinović 1998: 27-29). The systemic approach states that in "international relations there is a certain agreement on some regularities that appear in different phases of the development of international contact and do not depend on the time of their concretization. There are three directions of presenting international relations: a balance of power, bipolarity, and universality (Vukadinović 1998: 29-36). Vukadinović states that "the normative approach claims that in international relations there are a certain number of standards, norms, and rules of international behaviour, and two concepts of researching the world – idealistic and realistic." (Vukadinović 1998: 36-44).

The combination of different academic disciplines and techniques has led to the political science approach "which uses behavioural analysis, game theory, analysis of systems and subsystems and political decision-making as different ways of observing and analyzing international relations." (Vukadinović 1998: 44-52). "The key to the functioning of international relations are bodies, by which we mean all relevant factors that have a specific function about foreign (international) subjects. These key bodies are usually the head of state, the Ministry of Foreign Affairs, and diplomatic and consular missions." (Berković 2006: 63-64). The development of international relations, improving the position of one's country, and preventing war conflicts are important political goals that have been pursued throughout history and today, and remain at the top of the list of diplomatic tasks (Vukadinović 1994: 5).

2. DIPLOMACY: DEFINITIONS AND EXPLANATIONS OF KEY TERMS
According to the Croatian Encyclopaedia, diplomacy is: (French *diplomatie*, from Greek δίπλωμα: folded in two; charter, document, charter), interstate relations, conducting foreign policy; a set of rules for establishing interstate relations; competent state services and persons whose calling is to represent the foreign policy interests of a state; the ability, knowledge and skill of conducting negotiations with other states. Colloquially speaking, diplomacy is the skill of implementing one's will in a beautiful way, cunning, and tactician ship. Diplomacy is usually comprised of negotiations to reach an agreed solution, sometimes accompanied by pressure and threats. Diplomacy is opposed to the violent resolution of disputes between states, and the severance of diplomatic relations is a sign of a serious crisis in their relations. According to many theorists, diplomacy is as old as human civilization. "Regulating relations between states, their mutual official relations, negotiations, agreements, and various other forms of relations and cooperation have long indicated the need to create certain rules in the interaction and behaviour between states." (Berković 2006: 13). Diplomacy is the skill of negotiating and developing international relations, and its most common goal is to improve and develop the mutual relationship between two or more states, and often resolve challenges, problems, or conflicts. (Nick 1997: 13-25) Diplomacy is fundamentally concerned with maintaining friendly relations between two states, resolving possible contentious issues, and reaching agreements (to mutual satisfaction and benefit). Hans Morgenthau, one of the founders of the science of international relations, says that "Diplomacy is the formulation and implementation of foreign policy". (Vukadinović 1994: 122). The foundations of modern diplomacy date back to the beginning of the 19th century, when the Vienna Congress summarized all existing customs and everything that has become a fundamental part of the performance of diplomatic duties in the Rules of Diplomatic Conduct throughout history (Vukadinović 1994: 17). Today, diplomatic law is mainly and most importantly codified in the Vienna Convention on Diplomatic Relations, from 1961 (Berković 2006: 56). Diplomacy is important for the theory of international relations because it represents a set of practices key elements of world politics, from multilateral governance to international rights until war (Sending, Pouliot and Neumann, 2015). And while the diplomats are not prone to theory, scientists love it because it offers a better understanding and explanation of the world (Kos-Stanišić, Domjančić, 2021: 283). Diplomacy is carried out by diplomats who carry out their work in the country and/or abroad, and who become diplomatic personnel when they carry out their work in diplomatic missions abroad. A diplomatic mission includes embassies, consulates general, consulates, or permanent missions to international organizations. Their basic role is to represent and to protect the interests of their country abroad, maintain bilateral relations with the receiving country, and aid their country's citizens abroad. An ambassador is the highest representative of one country in another country. He or she is responsible for running the embassy and maintaining relations between the sending and receiving countries.

Consular staff are diplomats who specialize in aiding their country's citizens abroad, such as issuing passports, aiding in emergencies, protecting the rights of citizens abroad, and performing other consular functions. Political and economic advisors are diplomats who monitor the political and economic situation in the receiving country and report on it to the relevant sending countries. Cultural advisors are diplomats who work to promote cultural, educational, and scientific ties between their country and the receiving country. They are often also media advisors, and in addition to monitoring cultural events, they organize cultural events to represent their country in the receiving country, promote, and encourage cooperation in their field of work. Part of every diplomatic and consular mission is the administrative staff that supports the work of the diplomatic mission in operational and administrative matters, which includes event organization, human resources management, finance, accounting, and more. They may or may not have diplomatic status, or they may be locally employed staff. Military attachés (attaches) also work in embassies. These are diplomats who represent the military sphere of the state and work on issues of military cooperation between two countries. All members of the diplomatic staff enjoy certain privileges and immunities under the Vienna Convention on Diplomatic Relations of 1961, which allows them to perform their duties abroad without hindrance.

3. PUBLIC DIPLOMACY AND ROLE OF INTERCULTURAL COMMUNICATION

Public diplomacy is a term that refers to international relations and communication between states through public channels and international institutions. It includes the use of various forms of communication, such as the media, cultural exchange, public events, and more recently, digital channels, in order to improve perception, understanding, and relations between the two countries. Public diplomacy aims to promote national interests, improve international reputation, and create a favourable environment for achieving political goals. It helps build bridges between cultures, peoples, and governments, facilitates the exchange of ideas and values , and encourages dialogue and cooperation. It aims to address not only individuals and heads of state but also the general population of a foreign country. Today, in the era of (too) rapid digitalization, this is easy to achieve and happens every day (Kurečić and Haluga 2021: 170). Joseph Nye, one of the leading theorists of international relations, says that public diplomacy consists of three basic elements: communication, strategic planning, and cultural exchange (Glavaš Kovačić 2013: 61-64). Communication takes place through the media, social networks, public speeches, and other channels to present positions, policies, and ideas. Strategic planning involves setting goals and strategies to promote the interests of a country and improve its image in the world. The Ministry of Foreign and European Affairs of the Republic of Croatia, for example, also has an annual work plan that can be found on the Ministry's official website. Cultural exchange involves the promotion of art, culture, education, and other aspects that can contribute to international understanding and cooperation. Public diplomacy can take many forms and use a variety of tools. Examples include diplomatic statements and media communications, the organization of conferences and summits, cultural exchanges such as exhibitions, concerts, and festivals, the use of social media and digital platforms for communication and promotion, and public diplomats who engage in direct contact with citizens and foreign publics. Public diplomacy traditionally means government communication directed at foreign publics in order to achieve changes in the "hearts or minds" of the people. However, public diplomacy can also be addressed to the domestic public in two ways: either as domestic input from citizens in the formulation of foreign policy (engaged approach) or by explaining the goals of foreign policy and diplomacy to the domestic public (explanatory approach) (Szondi 2008: 6). It is important to emphasize that public diplomacy is not just one-way communication, but also involves listening to and understanding the opinions and perspectives of other nations and cultures. It is based on dialogue, information exchange, and trust-building.

Public diplomacy is of increasing importance in the modern world, especially with the growth of globalization, rapid technological advancements, and widespread digitalization. Through its application, countries can shape their image in the international arena, enhance their international reputation, and create fertile ground for achieving their goals. The term citizen diplomacy is attributed to the American documentary filmmaker David Hoffman and dates back to 1981. It is based on the idea that average citizens have the right or even the responsibility to promote their country to the world, in a positive light, as a contribution to the development of the global community. Citizen or people's diplomats can include students, teachers, artists, athletes, travellers, and volunteers, who, as individuals, participate in international relations in an unofficial capacity. All of them can have an impact on cross-cultural understanding and can build bridges between people and societies (Chakraborty 2013: 23). Citizen diplomacy refers to the idea that all citizens, regardless of their professional position, can act as representatives of their nation in the world. A citizen diplomat can include any citizen who seeks an audience abroad and aims to represent their homeland, including business people, students, athletes, and artists (Cottrell, Doherty, 2024). People's diplomacy includes any form and method of direct communication between the Government of a country and the foreign public. Broadly defined, public diplomacy is based on the idea that citizens as private individuals can make a difference in international relations and also be representatives of their state (nation) in the world. Interpersonal contact between citizens can have multiple benefits, including the formation of deep and lasting connections that are understood as authentic and independent of government. Citizen diplomacy is ultimately an alternative to traditional, official diplomacy, which is formal and can therefore be defined as exclusive. Citizen diplomacy is inclusive because it, directly and indirectly, represents action at a personal level, and thus the establishment of more personal connections between people, and consequently cultures. Citizen or public diplomacy is a powerful tool for promoting peace and cooperation, and many organizations around the world promote citizen diplomacy through a range of programs and activities. It is through such platforms that encourage cooperation and strengthen partnerships that the sharing of knowledge, resources, and examples of good practices is facilitated, which indirectly facilitates the work of official diplomatic representatives and affects the success of achieving the foreign policy goals of the state. Citizen diplomacy refers to efforts by individuals and non-governmental entities to engage in international relations. Effective intercultural communication enhances people-to-people initiatives, such as grassroots movements, tourism, and volunteer programs, and creates connections that transcend political boundaries. In business and economic diplomacy, multinational corporations and entrepreneurs rely on cultural competence to navigate international markets. In the end, conflict resolution and peacebuilding are based on dialogue initiatives. Also, reconciliation programs depend on cross-cultural communication to bridge divides and foster peace.

4. CULTURAL DIPLOMACY AND THE ROLE OF INTERCULTURAL COMMUNICATION

Cultural diplomacy today is part of the modern diplomatic profession. Culture has always been a part of international politics and diplomacy (Tarle 2005:149, according to: Skoko and Kovačić 2009: 38), and German Chancellor Willy Brandt said that culture, along with economy and politics, is the third pillar of foreign policy (Pičuljan 2007: 14). Despite this, the field and activity of cultural diplomacy has often been neglected in diplomatic practice, but also in science (Jurišić and Keller 2007: 152; Gienow-Hecht and Donfried, 2010: 62–63, Kurečić and Haluga 2021: 173-176). Cultural diplomacy is part of the identity of every nation and state since, through its activities, it strengthens interstate relations and contributes to resolving any open issues through more casual and informal forms of communication and action.

Territorially smaller states, such as the Republic of Croatia, which do not have great economic strength, political power, and influence, use culture and cultural exchange as part of their diplomatic strategy and thus strengthen their international position. Although informal forms of action and communication are most often used in cultural diplomacy, in addition to benefiting foreign policy, they can also have an impact on the country's internal policy. "International cultural exchange programs do not only result in pleasant socializing and personal friendships but also represent an incentive for the development of art in the homeland." (Jurišić and Keller 2007: 146). Cultural diplomacy is a branch of public diplomacy that focuses on the promotion of culture, cultural exchanges, arts, language, education, and other cultural elements to improve international relations and understanding between nations. This type of diplomacy uses cultural activities and initiatives to build bridges between different cultures and to encourage mutual communication and the exchange of ideas. According to the definition of UNESCO, cultural diplomacy is "the practice by which culture and art are used as a means of strengthening international ties, dialogue, and understanding between nations and cultures". This practice includes the organization of cultural events, exhibitions, concerts, film festivals, literary events, and other cultural activities that promote cultural diversity and dialogue. Stanko Nick, in the Diplomatic Lexicon, defines cultural diplomacy as "the action of a diplomatic or consular mission to popularize the culture of the sending country in the receiving country, its presentation and dissemination, connecting cultural workers and institutions of the two countries, joint appearances in the world, etc." (Nick 2010: 124). Cultural diplomacy uses the resource of culture in building soft power, but it also intertwines the resources of foreign and domestic policy (Gotal 2015: 143). Contacts made in the field of culture can play a very important role in international political relations. They provide a safe and hospitable environment for building bilateral relations, open the door for negotiations, and shaping or redefining future relations with other countries (Jurišić and Keller 2007: 145). Cultural diplomacy has several goals. One of them is to promote international understanding and tolerance through art, literature, music, and other forms of cultural expression. Cultural diplomacy helps build a positive reputation and image of a country in the international community, attracting tourists, investments, and foreign students. It can also serve as a platform for dialogue on sensitive issues, such as human rights, peace, and sustainable development. Sustainable development is a framework for shaping policies and strategies for continued economic and social progress, without harming the environment and natural resources essential for human activities in the future. It is based on the ambitious idea that development must not endanger the future of future generations by consuming non-renewable resources and by long-term devastation and pollution of the environment. The main goal is to ensure the sustainable use of natural resources at the national and international levels (Pavić Korošić L, 2010). Key elements of cultural diplomacy include cultural institutions such as museums, theatres, galleries, libraries, and scientific and educational institutions that play an important role in promoting cultural values. and help establish dialogue, especially if countries have open issues. Cultural ambassadors (attaches), artists, and intellectuals who travel abroad to represent their culture and exchange ideas are also used. Prominent figures from cultural, artistic, or scientific life are often appointed to the position of cultural attaché (Branka Šomen, film critic, Daša Bradičić, former HRT journalist, Krunoslav Cigoj, opera singer and composer, etc.). "The job of cultural attaché is certainly the most elegant and charming job in diplomacy, which requires the most educated and cultured people." (Nick, 1997: 84). The job of cultural attaché involves presenting and connecting the culture and art of one's country with the recipient country. This job requires a high level of education, exceptional eloquence, diplomatic skills, and a deep understanding of one's own culture, but also openness to other traditions and customs. It is also necessary to develop good relationships with cultural institutions, artists, and organizations to successfully implement international cultural projects.

A cultural attaché must be a person with broad interests, a love of art and literature, and the ability to adapt to different cultural environments. It is also important to have a sense of detail and a passion for promoting one's own country on a global scale. The elegance and charm of this job lie precisely in its essence - connecting people through culture and art. Cultural diplomacy involves the exchange of ideas, values, traditions, and other cultural aspects to foster mutual understanding and cooperation among nations. Intercultural communication facilitates are also educational and cultural exchange programs. Initiatives like Fulbright Scholarships and UNESCO programs enable students and professionals to immerse themselves in different cultures, enhancing mutual appreciation. Also, through media and public diplomacy, international broadcasting services and digital platforms serve as tools to promote a country's cultural narrative, requiring skilful intercultural communication. In the end, art and heritage exchanges like exhibitions, performances, and literary translations contribute to cross-cultural appreciation and dialogue. "Soft power" is one of the fundamental determinants of contemporary diplomacy and diplomatic practice, and the creator of the term, Joseph Nye, defines it as "the ability to achieve desired foreign policy goals by creating political attractiveness, persuasion, and setting a media and public agenda with the aim of reshaping the preferences of other countries, implementing them, and agreeing with the desired action" (Nye and Owens, 1996: 21). "Soft power" can be viewed as a tool in the implementation of international policy (Kurečić and Haluga 2021: 170). Nye defined soft power as a power that is "based on the invisible and indirect influence of resources such as culture, different values, and ideologies, the ability to use culture to influence the thinking, behaviour, and interests of other participants on the international scene." (Jurišić and Keller, 2007: 145). "Soft power" is a key concept in contemporary international politics and diplomacy. It represents the ability of a state to achieve its goals and influence other countries through the appeal of its culture, values, ideology and foreign policy, rather than through coercion or economic power, which is a priority in the modern world of the rule of law and respect for human rights because it is not just a tool but also a strategy that allows states to shape international relations in an unobtrusive but effective manner.

5. CONCLUSION

Intercultural communication is a crucial factor in both cultural and citizen diplomacy, influencing international relations and grassroots exchanges. By improving communication skills and cultural awareness, nations and individuals can build stronger diplomatic ties and promote global harmony. Future research should explore digital advancements and new strategies to enhance intercultural communication in diplomacy. Intercultural communication is more important than ever in today's world because of globalization, technology, and increasing diversity because intercultural communication promotes understanding and respect. With people from different cultures interacting more often, effective communication helps break stereotypes, reduces misunderstandings, and fosters mutual respect. Intercultural communication is also essential for global business. Companies operate across borders, and employees from different cultural backgrounds must work together. Understanding different communication styles improves teamwork, negotiation, and customer relations. Generally speaking, communities are becoming more diverse, and intercultural communication helps people coexist peacefully, appreciate different traditions, and prevent conflicts. Engaging with different cultures broadens perspectives, enhances problem-solving skills, and makes people more adaptable to new situations boosting personal growth. Students study abroad, and tourists visit new countries. Understanding different cultures makes learning and traveling more enriching and enjoyable. And last but not least intercultural communication perfectly supports digital communication. The internet connects people worldwide.

Whether on social media or in virtual workplaces, knowing how to communicate with different cultures avoids misinterpretations and strengthens global connections. Intercultural communication is therefore a key to a more connected, peaceful, and successful world.

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THE EMOTIONAL DIMENSION OF CONSUMERISM AND ITS PSYCHOLOGICAL IMPACT ON CONSUMER BEHAVIOUR

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ABSTRACT

Consumerism strongly shapes contemporary society and the way individuals perceive their own worth, happiness, and success. Driven by economic, social, and cultural factors, it influences consumer psychology and creates new challenges in modern life. At the heart of consumer behaviour are material goods as key indicators of social status and personal satisfaction. Focusing on materialism, as a central aspect of the consumerist lifestyle, often leads to deep dissatisfaction, emotional emptiness, and impaired mental health. The emphasis on constant comparison with others and the search for social validation through material goods undermines interpersonal relationships, reducing the sense of connection and togetherness. The constant need to compare leads to the assessment of one's own worth based on material goods, resulting in pressure to continue spending and creating a sense of satisfaction that we are better and more successful. Such satisfaction is never permanent, but always depends on and leads to the next purchase. The purpose and objective of this paper is to understand the impact of consumerism on consumer psychology and behaviour, consumer habits, and emotional reactions related to shopping. After the theoretical part and literature review, the paper presents and analyses the results of a survey conducted with the aim of gaining a deeper understanding of consumer habits and the impact of consumerism in the daily lives of the respondents. 105 respondents participated in the research. The results of the research indicate that the respondents occasionally indulge in impulsive shopping and that they feel a certain level of happiness when doing so, they rarely experience stress or anxiety due to excessive consumption, and most of the respondents have a balanced attitude towards consumption, are aware of its limitations, and do not rely exclusively on material things.
Keywords: consumerism, consumer behaviour, feeling of satisfaction, psychological processes

1. INTRODUCTION

Consumerism emphasizes consumption as a means of satisfying psychological, emotional, and social needs. For this reason, excessive shopping can result in the creation of a superficial or even false identity of the consumer, as material goods are increasingly used as a means of building an image and status symbol. It can also lead to the emergence of consumer hedonism, which is achieved by the immediate satisfaction of buying and owning goods, ignoring the long-term consequences or real benefits of the product. Consumerism has become an indispensable part of modern life, permeating all aspects of social existence. The way we consume, the reasons why we do it, and the frameworks within which consumption is possible have become key factors in shaping everyday life. Understanding these processes and dynamic changes helps us understand how consumerism affects psychology and behaviour, providing a basis for critical thinking and developing effective strategies for a healthier approach to consumption. The constant need to compare leads to an assessment of one's self-worth based on material goods, which results in pressure to continuously consume in order to feel better and more successful.

This way of thinking creates a vicious circle in which satisfaction is never permanent, but always depends on the next purchase. According to psychoanalytic research, human beings have deep-seated emotional needs and desires that they try to satisfy by acquiring material goods. When we feel empty or dissatisfied in our lives, we often turn to buying new things as a way to fill these gaps. Consumption addiction creates a vicious circle in which individuals spend more than they earn, trying to follow trends and maintain a certain social status. The main goal of this paper was to explore the views of the respondents on the impact of consumerism on their emotions and feelings after making a purchase. The next chapter provides an overview of the literature and previous research that is the starting point for the research in this paper. The third chapter of the paper explains the methodology of the research conducted and the data collected. The fourth chapter presents the results of the research conducted through analysis and review. The fifth chapter of the paper refers to the concluding remarks, research limitations, and recommendations for further research.

2. THEORETICAL BASIS AND LITERATURE REVIEW

The concept of consumerism reaches far back in history. As far back as 1776, Adam Smith said that consumerism's sole goal and purpose is production (Duda, 2005:21). It is viewed as a social phenomenon based on consumption and attachment to the purchase of material goods and services with the belief that the possession and consumption of these goods contribute to the happiness of the individual, although they are not necessary for basic life needs. Some authors believe that the identity of a consumer is most often built on the basis of their habits and preferences because, while consumers buy, they exist (Hromadžić, 2008). According to Swagler (1994), consumerism is interpreted as excessive materialism. Excessive materialism in the context of consumerism can cause consumers to constantly desire new products or services, thus creating a dependence on consumption as the primary source of personal fulfillment. Štažić (2013) points out that modern consumerism began as a consumer culture and that, due to its wide distribution and intensity among different social classes, it has existed for about three hundred years. Consumerism shapes the ways in which we perceive happiness, success, and identity, and has a significant impact on our decisions and interactions. Ignoring this aspect would mean neglecting a key element that shapes contemporary society and the way people live and act within it. Miliša and Nikolić (2013) point out that modern man, in his search for his own identity, increasingly neglects books and direct communication, becoming a commodity of media propaganda that promotes a consumerist-hedonistic lifestyle. This trend leads to a superficial lifestyle, where identity and self-confidence are based on the possession of things. In the long run, such a lifestyle can lead to a feeling of emptiness and dissatisfaction, because consumerism offers only temporary fulfillment. Bauman (2007) believes that consumerism grows out of our desire to consume goods that satisfy us immediately, although this feeling is fleeting. This form of consumption requires the constant renewal of material goods in order to maintain a sense of happiness and prevent feelings of inferiority compared to others who possess more luxurious products than we do. A similar perspective is offered by James (2007), who argues that consumer society constantly encourages us to compare ourselves with others. According to Johnson (2016), advertising plays a key role in shaping consumer behavior by manipulating perceptions of needs and encouraging conformity in product choices. In particular, it relies on unconscious processes to stimulate our desire to consume, using the principle of mere exposure and conditioning us to become automatic, rather than deliberate, buyers (Kanner and Kasser, 2003). At the heart of consumerism lies a paradox: although it promises fulfillment and joy, it often leaves a trail of dissatisfaction and a constant longing for more. Feelings of dissatisfaction and the constant search for new products only deepen this emptiness, making individuals even more susceptible to the influence of consumption.

Payne (2010) argues that if there are an infinite number of ways in which people can be unhappy, then there are also an infinite number of opportunities to create new products that will satisfy their desires. Consumerism uses basic human desires to encourage constant consumption, creating the illusion that material things can fulfill emotional and psychological needs. Featherstone (1990) points out that although increased choice and availability of material goods allow for a certain freedom of identity, social mobility, and satisfaction, consumerism has placed excessive pressure on individuals to achieve material wealth. When it comes to emotions, Dlačić et al. (2016) state that they are an integral part of the decision-making process and consumer behavior, regardless of whether they are generated post-purchase or are the result of consumers' exposure to a communication message as a stimulus for the previous act of purchase. Emotions can never be wrong. Consumers can have false beliefs about a product, but they cannot be mistaken about their emotional reaction to a product or advertisement (Chaudhuri, 2006). Emotions, on the other hand, represent our true experience at a particular moment. When discussing the role of emotions in shaping consumer behavior, research has focused specifically on a phenomenon known as "shopping therapy", which refers to the regulation of negative emotions through shopping. Shopping therapy is an attempt to improve mood by purchasing things that make us happy. However, the negative states that lead to shopping therapy are often associated with impulsivity and a lack of behavioral control (Atalay and Meloy, 2011). According to Stanca and Veenhoven (2015), in economics, happiness and consumption are often identified under the term "utility", but not all happiness necessarily leads to life satisfaction. Often, it is precisely the lack of happiness that motivates consumers to buy. To reduce feelings of emptiness and regain a sense of happiness, consumers often turn to emotionally motivated shopping. Schulreich et al. (2016) state that certain purchases can indeed increase feelings of happiness, but they also point out that people with higher intrinsic levels of happiness have a greater propensity to shop. One possible explanation they offer is that having financial resources, as well as access to transportation and stores, in themselves contribute to feelings of happiness, suggesting that the positive relationship between happiness and shopping is partly a result of these factors. Another explanation lies in the idea of positive feedback: consumers, through experience, realize that shopping can increase their happiness (probably due to socialization and new experiences that stores provide) and therefore learn to seek happiness through shopping. Park and Kim (2008) point out that consumers are more likely to indulge in impulsive decisions when they are in a positive emotional state. Mihić and Kursan (2010) describe impulsive shopping behavior as a process that is not characterized by careful consideration of the purchase or evaluation of the product, the reasons for it, or the consequences of the purchase. Impulsive buying is often associated with hedonism, or the enjoyment of shopping and the use of shopping as a pastime. Grgić (2013) argues that consumers who shop for hedonistic reasons see shopping as a form of therapy, trying to escape from everyday problems, relieve stress, and feel excitement or a sense of freedom. This is why impulsive buying driven by emotional states and hedonistic motives plays a key role in maintaining a consumerist society. Children are inevitably exposed to the influence of ubiquitous consumerism, which significantly shapes their lives. Oroz Štancl (2014) points out that research into children's consumer behavior began in the mid-20th century, when the first studies were published that examined the influence of parents and peers on children's consumer habits, children's loyalty to certain brands, and their influence on parents' purchasing decisions. Calvert (2008) states that influencing children means influencing the purchasing decisions of the entire family. Children recognize logos as early as eighteen months of age, and before their second birthday, they begin to search for products by brand names (Schor, 2004). Burić (2010) describes how children today are often exposed to media messages that imperatively demand that they "must" collect all the figurines or toys by buying certain products.

Slogans such as "Collect them all!" or "You must have them!" have become aggressive and dominant in the market, creating pressure on children to own certain things. Such strategies are used to encourage consumerist habits from an early age, where consumerism becomes an inevitable part of growing up, shaping values and consumption habits in a way that favors materialism and constant consumption, shaping consumption habits and values for a lifetime. Although the primary goal of consumerism should be to achieve happiness and satisfaction through the acquisition of new products, its actual effects have numerous negative consequences that shape consumer behavior because most people strive for what they do not own and thus become slaves to the very things they want to have and acquire (Roberts, 2011). The pursuit of what we don't have can trap us in a vicious cycle of dissatisfaction, where we constantly chase after something new, thinking that it will make us happy. Instead, we should reevaluate our priorities and find satisfaction in what we already have. Materialism and consumerism are often used synonymously, but there is a key difference between them that is important to understand. Denniss (2017) states that consumerism refers to the love of buying things, while materialism refers to the love of things themselves. A person who feels insecure or lacks a sense of belonging in their social environment may try to compensate for this feeling by acquiring material goods or status symbols. Materialism becomes a substitute for deeper, unfulfilled psychological needs. However, materialism can only further exacerbate feelings of insecurity and dissatisfaction because material goods cannot permanently fill these psychological gaps. This creates a vicious cycle in which the lack of fulfillment of basic needs leads to materialism, and materialism in turn cannot provide lasting satisfaction, which further deepens the feeling of insecurity and frustration. Roberts (2011) states that materialism is associated with higher levels of negative emotions, increased social anxiety (and anxiety in general), self-criticism, and increased time spent in sadness and/or depression, which ultimately affects the overall quality of life. A critical attitude towards consumerism and materialism is also highlighted by the famous saying "The things you own, eventually own you". It is a warning that excessive focus on acquiring and possessing material goods can enslave, limit freedom, and define personal identity in a superficial way. The more we own, the more time, energy, and resources we devote to maintaining these things. In the end, instead of these things serving us, we begin to serve them. In a society that constantly imposes new standards and ideals through the media and marketing campaigns, it is important to remain aware of your true needs and desires, to reexamine your values and priorities, to free yourself from the shackles of materialism, and to live a more authentic and fulfilling life.

3. METHODOLOGY
The research on the impact of consumerism on consumer psychology was conducted via a questionnaire in the period of one month, from 15.07. to 15.08. 2024, as part of Petra Gredelj Kovačić's final thesis. The questionnaire was conducted online, on the Google Forms platform, and 105 (N=105) respondents participated in the research. The questionnaire was distributed via social networks and e-mail by sharing a link to the form. It contained 12 questions that related to the respondents' consumer habits, their emotional reactions to shopping, and the influence of marketing campaigns on purchasing decisions. The questionnaire was created based on the results of the literature review from the previous part of the paper. It consisted of two parts: In the first part of the questionnaire, the questions related to the socio-demographic characteristics of the respondents: gender, age, level of education, and monthly income. The second part of the survey questionnaire related to questions about consumer shopping habits, emotional reactions, and the influence of marketing campaigns, and making a purchase decision. The questions were closed-ended.

Based on a theoretical literature review, the following research questions were asked:
- IP1: How often do consumers make impulsive decisions?
- IP2: Do consumers feel happy and satisfied when buying new products, and how long does this feeling last?
- IP3: Do consumers feel stress, anxiety, or dissatisfaction after buying?
- IP4. Do consumers buy to feel better after a bad day?
- IP5: Do marketing campaigns affect consumer behavior and their emotions when buying?

The results of the research were analyzed using descriptive statistics and presented graphically and in tables, followed by an interpretation of the results and a discussion. After analyzing the results, research limitations, recommendations for further research, and a conclusion were presented.

4. RESEARCH RESULTS AND ANALYSIS

105 respondents participated in the research, of which 75.2% were women and 24.8% were men. According to the age of the respondents, the largest proportion of respondents was under 55 years old. The largest number of respondents was in the age group of 45 to 55 years (22.86%), followed by respondents in the age group of 35 to 44 years old (20.95%), 20% of respondents are between 25 and 34 years old, 18.1% are under 24 years old, and 18.1% are over 55 years old. In terms of education, the largest number of respondents have completed university (70.5%), while a doctorate, with 2.9% of respondents, makes up the smallest share in this characteristic. It is visible that the largest share of respondents, 30.5%, earns a monthly income between 1000 and 1500 euros, and only 13.3% earn a monthly income of more than 2000 euros per month. The profile of the respondents is shown in Table 1.

Sociodemographic characteristics	Frequency (N)	Percentage (%)
Age		
< 18	3	2,86 %
18 – 24	16	15,24 %
25 – 34	21	20 %
35 – 44	22	20,95 %
45-55	24	22,86 %
> 55	19	18,1 %
Gender		
male	26	24,8 %
female	79	75,2 %
Education level		
Elementary school	0	0 %
High school	28	26,7 %
Faculty	74	70,5 %
Doctorate	3	2,9 %
Monthly income		
< €500	16	15,2 %
€500-€1000	22	21 %
€1000-€1500	32	30,5 %
€1500-€2000	21	20 %
> €2000	14	13,3 %

Table 1. Socio-demographic characteristics of respondents

According to the frequency of purchasing products that they do not need, 52.4% of respondents occasionally buy such products, and 25.7% of respondents rarely. 17.1% of respondents often and very often buy products that they do not need.

The data indicate that the majority of respondents occasionally indulge in impulsive purchases, while a smaller number of them show a more pronounced tendency towards frequent purchases of products that they do not need. Buying new products has a largely positive effect on the emotions of the respondents.

The majority of respondents often feel happy when purchasing new products (40%), while 19% of them feel this way very often. 32.4% of respondents sometimes experience a feeling of happiness, while 8.6% rarely feel happy in this situation. No respondent stated that they never feel happy when purchasing new products. The structure of the responses is shown in Figure 1.
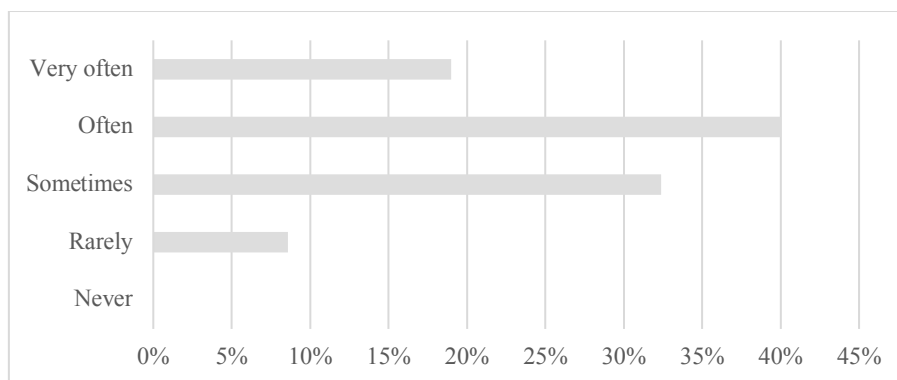
Figure 1. Frequency of respondents' feelings of happiness when purchasing new products
(Source: author's research)

Most respondents experience relatively short-term satisfaction after purchasing a new product, although they are emotionally happy at that moment. For 46.7%, the feeling of satisfaction lasts for several days, while for 22.9%, the feeling of satisfaction lasts for several hours and several weeks. Only 7.6% of respondents feel a sense of satisfaction for several months. According to the results of the survey, it is evident that the majority of respondents feel short-term satisfaction after purchasing, which may indicate the transient nature of material goods in the context of personal satisfaction. Also, the results of the survey show that a large percentage of respondents actually rarely feel stress or anxiety due to excessive consumption (40%). A slightly smaller share of respondents, 38.1%, sometimes feel such negative emotions. Only 12.4% of respondents have never experienced such feelings, while a smaller percentage of them (a total of 9.5%) often or very often feel stress due to excessive consumption. The structure of the responses is shown in Figure 2.
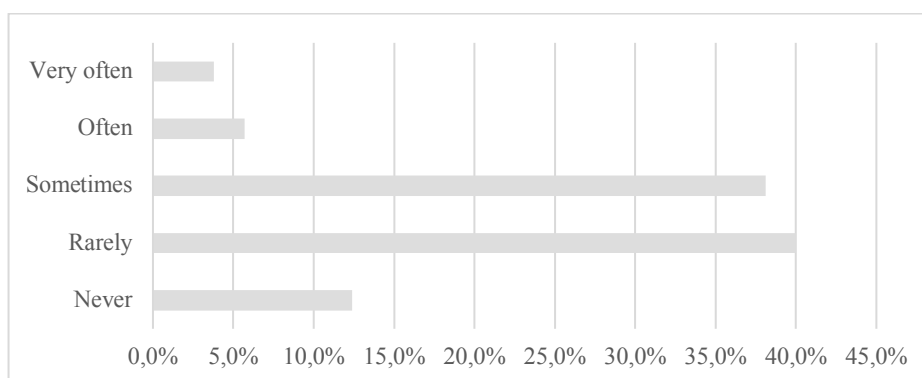
Figure 2. Frequency of respondents feeling stressed or anxious due to excessive consumption
(Source: author's research)

When asked, "How often do you buy new products to feel better after a bad day?", it is evident that 35.2% of respondents rarely buy new products in such situations, while 27.6% of respondents never use shopping as a strategy to improve their mood. 25.7% of respondents do it sometimes, and 11.4% of respondents do it often or very often. The results indicate that most respondents do not use shopping as a primary way of coping with negative emotions, although there is a certain group that occasionally resorts to this activity. The structure of the responses is shown in Figure 3.
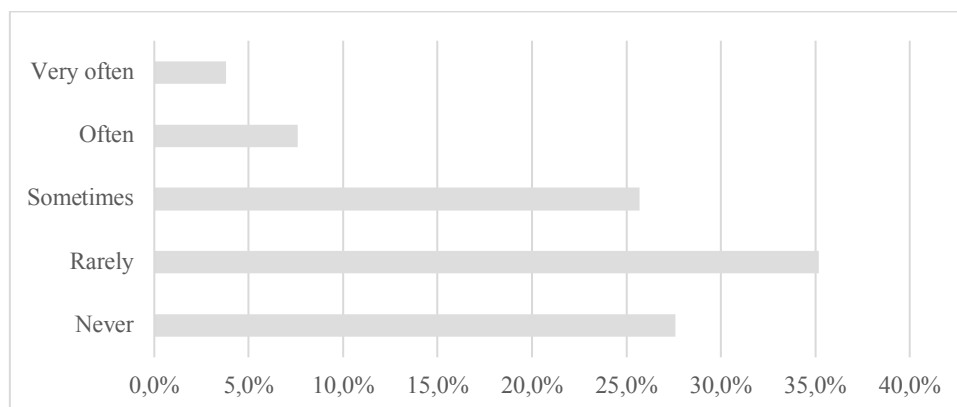
Figure 3. Frequency of respondents purchasing new products to feel better after a bad day (Source: author's research)

Most respondents do not believe that material things bring them long-term satisfaction. More than half of the respondents, 57.1%, stated that material things never or rarely bring them long-term satisfaction. A much smaller percentage of 13.3% of respondents claimed that material things often bring them long-term satisfaction, and only 1% very often. The results suggest that material things, although they can bring temporary happiness, rarely provide long-term satisfaction for the majority of respondents. The structure of the responses is shown in Figure 4.
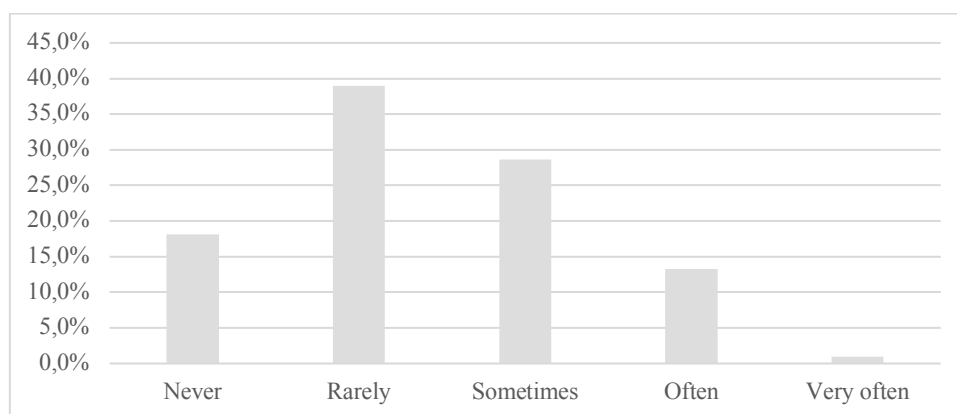
Figure 4. The frequency with which respondents feel that material things bring them long-term satisfaction (Source: author's research)

When asked about using shopping as a reward, it is evident that respondents are divided in their attitudes towards using shopping as a way of rewarding themselves for achievements or hard work. While the majority of respondents, 34.3%, sometimes use shopping as a form of reward, an almost equal share of respondents, 30.5%, rarely resort to this form of reward.

On the other hand, 18.1% of respondents often use shopping to reward themselves, while 15.2% of respondents never use shopping for this purpose. The structure of the responses is shown in Figure 5.
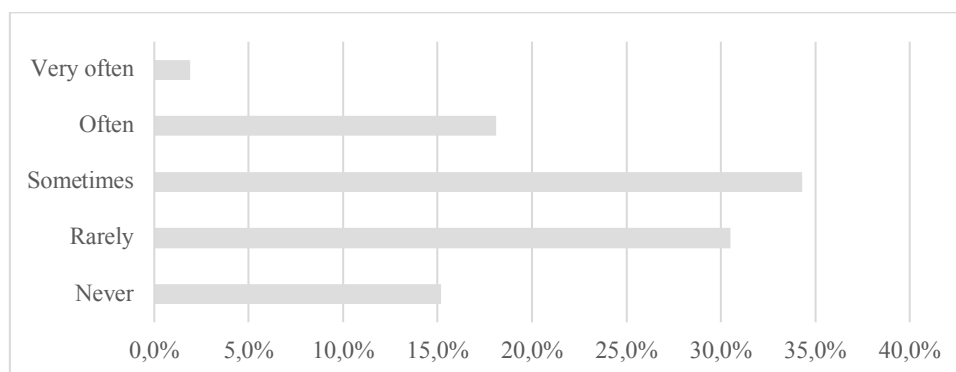
Figure 5. The frequency with which respondents use shopping as
a way to reward themselves for achievements or hard work
(Source: author's research)

The results of the study show that advertisements and marketing campaigns have a varying, but mostly minor, influence on the respondents' purchasing decisions. The largest share of respondents, 42.9%, stated that advertisements and marketing campaigns have a small influence on their purchasing decisions. Almost the same share of respondents, 41.9%, believe that advertisements have a moderate influence on their purchases. A smaller percentage of respondents (11.4%) believe that advertisements and marketing campaigns have no influence on their purchasing decisions. A very small percentage of respondents feel that marketing activities have a large (2.9%) or very large (1%) influence on their purchasing decisions. The results indicate that, although advertisements and marketing campaigns play a certain role in the purchasing decision-making process, the majority of respondents still perceive them as a secondary factor that is not decisive in their decisions.

4. 1. Discussion of results

Based on the conducted research in which 105 respondents participated, insights were obtained into the respondents' consumer habits and emotional reactions related to shopping, which allows for a deeper understanding of the interaction with consumerism in everyday life. According to the results of the research, it is evident that the respondents occasionally indulge in impulsive purchases and that they feel a certain level of happiness, especially when they buy new products. This phenomenon reflects the broader social tendencies of consumerism, where consumption becomes not only an economic activity but also a means of achieving emotional satisfaction. Most respondents do not buy new products to feel better after a bad day, which confirms that they rarely use consumption as a primary mechanism for coping with negative emotions. These data suggest that, although consumerism has a strong impact on everyday life, most respondents have a balanced attitude towards consumption, are aware of their limitations, and do not rely exclusively on material things. Respondents rarely experience stress or anxiety due to excessive consumption, which indicates that most of them are mindful of their own consumption habits and do not fall into the traps of overspending. Material things, although they can provide a momentary sense of satisfaction, do not bring long-term fulfillment to most respondents, which further confirms the limited impact of consumerism on their overall life happiness. Given that advertisements and marketing campaigns play a role in consumer behavior, most respondents recognize them but perceive them as a secondary factor in making purchasing decisions.

This suggests that despite the omnipresence and influence of marketing strategies, respondents retain a certain level of autonomy and critical thinking when making consumer decisions. Ultimately, the results of the research indicate that although consumerism is deeply rooted in modern society, most respondents approach consumption with a degree of caution and awareness of its limitations.

5. CONCLUSION

Consumerism has fundamentally changed our everyday patterns of behavior, increasing the focus on material goods as key indicators of social status and personal satisfaction. The focus on materialism, as a central aspect of a consumerist lifestyle, often leads to deep dissatisfaction, emotional emptiness, and impaired mental health. In addition, the emphasis on constant comparison with others and the search for social validation through material goods can damage interpersonal relationships, reducing the sense of connection and community. After conducting the research, the main conclusions based on the research questions were formed:

- consumers occasionally indulge in impulsive purchases
- when buying new products, a feeling of happiness and satisfaction sometimes occurs that is short-lived (a few days)
- most respondents do not buy new products to feel better after a bad day, which confirms that they rarely use consumption as a primary mechanism for coping with negative emotions
- respondents rarely experience stress or anxiety due to excessive consumption, which indicates that most of them are mindful of their own consumption habits and do not fall into the traps of excessive spending, and believe that marketing campaigns have a moderate influence on their decisions

In a world dominated by excessive consumption, a shift away from consumerist culture allows individuals to find meaning beyond buying and owning material goods. By changing the way of thinking and lifestyle, it is possible to create a society in which material goods are not the main indicator of success, but one of many aspects that contribute to the quality of life. Thus, we can strive for a more fulfilling, sustainable, and harmonious life, free from the pressure of constant consumption, in which true happiness is found in what is immaterial, authentic, and lasting. When interpreting the research, the limitations of the research should be taken into account, given that the research included 105 respondents who completed a survey questionnaire. The paper used descriptive statistics, and the research was conducted once. In order for the research to be representative, it is necessary to increase the sample of respondents and conduct the research in more and longer time series so that certain changes can be correlated and further examined and analyzed using more complex statistical methods. This research can be the basis for future repeated research using appropriate variables and appropriate statistical methods. Different generations of consumers and their purchasing decisions and group behavior can be monitored and analyzed by various sociodemographic characteristics (gender, age, education of the respondents, monthly income, etc.)

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COMPUTER HUMAN INTERACTION (CHI) IN EDUCATION PROCESSES: THE EVOLUTION OF HUMAN-COMPUTER INTERACTION

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ABSTRACT

Artificial intelligence (AI) is becoming increasingly integrated into user-facing technology, but public understanding of these technologies is often limited. There is a need for more HCI research that explores what competencies users need to effectively interact with and critically evaluate AI, and how to design student-centered AI technologies that foster better user understanding of AI. The growing interest in data and analytics in education, teaching, and learning raises the priority for increased, high-quality research into the models, methods, technologies, and impacts of analytics. This work addressed a wide range of questions about what people experience and how they behave when interacting with computers. This paper explores teachers' attitudes toward artificial intelligence and how these attitudes influence their educational decision-making. By exploring these perspectives, this research aims to provide insights into the design of AI-integrated teacher education programs that prepare future teachers to navigate the complexities of AI in education.

Keywords: *AI, Information communication technology, HCI-CHI- Computer Human Interaction, Education*

1. INTRODUCTION

Many case studies (Albrecht, P., S. Burandt, and S. Schaltegger. 2007; Boeve-de Pauw, J., N. Gericke, D. Olsson, and T. Berglund. 2015; Dasgupta, H., and S. K. Pawar. 2021; Ferrer-Balas, D., H. Buckland, and M. de Mingo. 2009) have found that professors have more positive attitudes towards AI, with higher levels of knowledge about AI contributing to these attitudes. Negative attitudes, however, were independent of gender, academic discipline, or knowledge of AI. Findings also reveal that AI tools, especially Chat GPT, are primarily used as specific advisors, and beginning professors often adapt AI suggestions to their preferences. AI is overwhelmingly preferred for assignments, reports, projects, and presentations. In the acceptance of artificial intelligence, time and effort savings, innovative suggestions, and unbiased recommendations are cited as key factors. However, there are ongoing concerns about trust that emphasize the necessity of keeping final decisions under human control. Based on these findings, comprehensive training of professors and students in higher education in artificial intelligence is proposed. In particular, we would like to highlight the education of students at art academies, the Academy of Fine Arts, and the Academy of Music. Human-computer interaction (HCI) is a multidisciplinary field of study that focuses on the design of computer technology and, in particular, the interaction between people (users) and computers.

Although we all deal with computers at the beginning, HCI is a broader term and has expanded to almost all forms of information and communication technology design. Human-computer interaction (HCI) is an academic discipline dedicated to understanding how people interact with technology. Since technologies play such a prominent role in our daily lives, it is more important than ever to ensure that they are designed to reflect the full spectrum of human abilities, skills, and experiences. Between HCI courses, increasingly offered in higher education degrees, and UX training programs geared toward practitioners, there are more opportunities than ever to teach and learn HCI, but HCI can be taught from a variety of disciplinary perspectives at different academic levels, in different modalities, and in different institutional contexts. So, what does it mean for educators to teach HCI? For students, what are the most impactful and effective ways to learn HCI? To answer these questions, we will offer some practices that have been developed over the past few years, focused on HCI education. A related effort was the special HCI edition of the Engage CSEdu repository of open educational resources (OERs) published in 2022 (St-Cyr and Mac Donald, 2022). This research topic should be further expanded and aimed at providing a dedicated platform for professors and educators to explore, analyze, and critique current and emerging best practices for teaching HCI from a global and interdisciplinary perspective. To this end, this topic necessarily needs the involvement of scholars from various academic disciplines, including computer science and information technology, digital media, information science, interaction design, industrial design, architecture, and communication studies.

Figure 1. The Multidisciplinary Field of HCI

Interaction Design Foundation
interaction-design.org
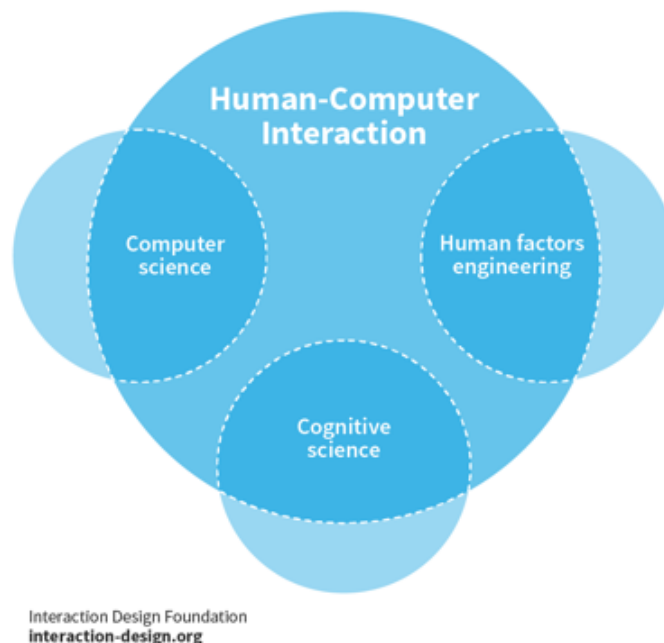
2. NEW EDUCATION STRATEGIES

It all comes down to making a good strategy. Without a good strategy, there is nothing. Without a good website, there is no good online marketing. And without a good web strategy, there is no good website. How to set up an effective web strategy based on user experience. The fundamental task of every website is to provide its readers with a good user experience. When we have achieved that, our website provides a good user experience (UX), and the chances of conversions and purchases through it are much higher. But what is it that we call and consider user experience?

User experience or user experience (UX) implies and includes behaviors, attitudes, and emotions that the user experiences during the use of a certain product, system, or service. The user experience of interactive products, websites, or applications is today measured and described using a number of methods - questionnaires, focus groups, usability testing, and other methods. This is dealt with by user experience design, which includes planning, creating, and distributing solutions. At each stage of the design process, special attention is paid to the needs, wishes, and limitations of the end user of the product or service. The designed educational strategy, based on the knowledge-based society ("the knowledge-based society") is fully implemented even now in developing European countries. The basic basis for the development of this program is made and provided by globally available and applied information technologies.

a) Today, science is capable of deriving functional models that exist in the processes of experimental research at the same time by applying methods of constructive induction; through which he constructs models of functioning, models of attention, models of perception, audiovisual perceptions, models of memory, models of metal representations, models of speaking subjects, models of thinking, models of learning and cognitive models of problem solving and decision making. Scientific modules and models already show and construct a satisfactory description of how we see and perceive the world, how we store shapes, colors, characters, symbols, events, sentences, and the like, how we can reuse them, how language works, how it all works for signal receivers, how to solve a problem, and how thinking works.

b) The macroanatomical architecture of the human brain, what we know about the anatomy of neuronal cells in the brain, the action of receptors in the brain, and the action of neurotransmitters. All this helps us today in the research of mental processes and the mental state of the brain itself. Cognitive psychologists help us in this, e.g. John R. Anderson (1995), and cognitive philosophers of language e.g. John R. Searle (1992) neuropsychologists such as Richard E. Cytowic (1996), and computational neurobiologists such as Paul Churcland (1989).

c) The search for discovering the structure and functions of the human mind has expanded from people to systems. The development of artificial language accelerated all processes. Discovering a satisfactory type of algorithm, which means a proper and mechanical process of operating symbols and controlling this procedure (modern logic=algorithm + control), on which natural (human) cognitive processes rest, is not possible without the analysis and construction of different types of languages in which the algorithm is expressed.

d) And the most important segment, the change in the concept of learning, which takes place with the application of information and communication technologies in the processing of content and data.

2.1. Education, upbringing, training

Education and upbringing are integral components of the culture of a people. Cultus, Colere, in the broadest sense of these words, upbringing and education, are universal human phenomena, mutually and inseparably connected and active. Anthropology, however, generally speaking, is a holistic science about man, about his nature and culture, so its approach and insights are always current and indispensable in the scientific, pedagogical treatment of education and upbringing and in its application. So, education (Greek: morfé, haraktér, trópos), means, namely, the founding, composition, creation, shaping of man. Education is the process of spiritual formation of man, his person, the cultivation of his self-awareness, and social consciousness.

That is why we say that teaching is a complex, but unique educational process. Education and upbringing (paodeia) as a system, in a philosophical and humanistic (not ideological) sense, means that they are and should be a kind of causa sui, i.e. a whole conditioned by man and the people, by the measure of man and his sociality, conceived by a philosophical concept, since man is by his essence and nature a social and spiritual being (zoon politikon, ehon logon), a being of free development, progress (anth), creativity and overcoming his natural and merely empirical (ana-tras-ops). Pedagogy, which claims to deal with all of the above as a science, is directed towards anthropology as the science of the whole man, or rather, towards the philosophical discourse on man as a totality and its understandings and assumptions about the nature, essence, and meaning of human being and survival. Humanistic and holistic anthropology should, beyond any ideologisation, thoroughly theoretically and empirically examine all forms of human natural, spiritual, social, economic, political, and cultural activities and achievements, especially with complex contacts with AI. From all of the above, it follows that education is an interactive process that is no longer a spatial-temporal phenomenon, because it can always take place. All these new givens, activities, and achievements, of course, do not exist outside the cultural-historical-social framework, but neither outside man. They are in man's possession, in the possession of the Croatian man as the sum and continuity of all his positive human achievements, so true values and goods transcend their time and space and are at the same time lighthouses and signposts for future generations in their human and civilized endeavors and aspirations towards, for now, uncertain success, communication with CHI and AI. A growing body of research is investigating the effectiveness of AI in education, particularly in improving learning outcomes and teaching practices. For example, Chen et al. (2020) reviewed 45 studies and found a growing interest in AI. However, the application of advanced deep learning technologies in educational settings remains limited. Drinovac, Topalović, Valčić, Herceg (2024) investigated the applications of AI in adaptive learning, instructional evaluation, and virtual classrooms. They highlighted the need to provide customized content and improve the process of teaching evaluation, examined the broad impact of AI across disciplines, and emphasized the importance of systematically integrating AI ethics into educational curricula and proposed strategies for AI ethics training. We have seen many benefits of introducing AI as a basic tool in learning and teaching, but many authors have also highlighted the challenges associated with integrating AI into education. Holmes and Tuomi (2022) categorized the pedagogical assumptions and shortcomings inherent in AI-enabled learning environments. Harry (2023) identified significant barriers such as privacy concerns, trust issues, and bias in a study of the impact of AI on education. These findings highlighted the need for careful and ethical integration of AI tools into educational contexts. Su and Yang (2023) focused on AI chatbots such as ChatGPT and proposed a theoretical framework for harnessing their transformative potential, in addition to addressing ethical considerations relevant to their use. Building on this, Wang, Wang, and Su (2024) conducted a systematic review and urged educators to adopt AI responsibly to maximize its benefits while mitigating the associated risks. This is both the general and basic meaning of culture in the broadest sense of the word as a universal human phenomenon. Culture is by definition a historical, social category that changes with changes in social conditions, which it itself influences. Therefore, definitions and theories of culture must encompass, in addition to relatively constant elements of culture, dynamic cultural processes (acculturation, enculturation, innovation), or their mutual conditioning and interpenetration. Education is no longer the passive adoption of the offered content, but education today is the ability to find the right information and amalgamate it, then, using the information in the right way and securing better positions because of it. This, at the same time, changed the very nature of the work of educators and those we educate.

2.2. Diffusion of Innovation (DOI) Theory.

The integration of AI into education not only improves existing systems but also fosters innovation. Generative AI, with its advanced capabilities in natural language processing and contextual interpretation, is increasingly influencing human decision-making processes (Bozkurt and Sharma 2024). According to the DOI theory, the adoption of innovations involves a process in which individuals seek and process information to reduce uncertainties about their advantages and disadvantages. This process occurs in five stages: knowledge, persuasion, decision, implementation, and confirmation (Rogers 1995). Understanding the adoption of innovations is crucial for accelerating diffusion (Zanello et al. 2016). DOI theory categorizes adopters into five groups: innovators, early adopters, early majority, late majority, and laggards. Innovators are those who take risks and embrace new ideas, while early adopters serve as influential role models. The early majority cautiously adopts innovations, aligning them with practical reality, while the late majority is skeptical and requires broad adoption before acceptance. Laggards, on the other hand, are resistant to change and prefer traditional methods (Rogers 1995). In the context of artificial intelligence, innovative educators are expected to adapt quickly to new technologies. As AI advances and permeates various aspects of life, its ability to facilitate human-machine communication accelerates the adoption process. For example, Generation Z perceives ChatGPT as an innovative, easy-to-use tool that supports independent learning opportunities and motivates faster integration into educational practices (Raman et al. 2024). AI in education encompasses a diverse range of technological advancements that aim to revolutionize the learning and teaching process (Adiguzel, Kaya, and Cansu 2023; Chaudhry and Kazim 2022; Rahiman and Kodikal 2024). These technologies not only enhance traditional methods, but also introduce innovative and interactive learning experiences that go beyond conventional classrooms. By adapting to individual needs, preferences, and learning styles, AI supports student motivation, engagement, and personalized learning (Chiu et al. 2023; Gligorea et al. 2023; Rizvi 2023). Furthermore, by leveraging data-driven insights, AI is reshaping educational paradigms to optimize learning outcomes in new ways (Kamalov et al. 2023).

3. EDUCATION AND COGNITIVE SCIENCES

Cognitive science is an interdisciplinary research group (discipline) that seeks to describe intelligent action, whether it is manifested by living organisms (especially adults) or machines." (The Cambridge Dictionary of Philosophy. Cambridge: Cambridge University Press, p.128)

The Latin noun "cognitio" has several meanings (knowledge, acquaintance, cognition, acquaintance, theoretical or sensory knowledge; idea, thought, concept of something), or if we adopt the Latin verb co-gnosco (to know, to know, to find out, to hear, to feel). From this came the term cognito, which we find in the structure of many terms such as memory, recognition, understanding, connection. With the term cognito we talk about the very content and origin of human consciousness, and even animal consciousness, we talk and name the content of hardware. Cognitive science, after the 1970s, is united as a multidisciplinary project that includes linguistics, anthropology, philosophy, psychology, and informatics. A prominent principle of cognitive science was that effective multidisciplinary science should be able to support applications and benefit from them. Many domains were explored, including mechanics, radiology, and algebra. HCI has become one of the original fields of cognitive science. The initial vision of HCI, on software development, as an applied science, was about how to approach the methods and theories of cognitive science. Most ambitiously, they hoped that cognitive science theory could predict content guidance at very early stages of the software development process. These guidelines would come from general principles of perception and motor activities, problem solving, language use, communication, and group behavior, and so on. It would also involve developing a domain of theories.

At the University of Zagreb (Faculty of Electrical Engineering and Computing and Faculty of Philosophy), Master's degrees in Applied Cognitive Science have been launched and can be pursued in the fields of artificial intelligence, data analysis, language analysis, cognitive robotics, visualization, digital communication, educational technologies, game design, multimedia design, product design and development, human resources, project management, software development, user experience, research and development, and innovation in a broader sense.

Figure 1. Applied Cognitive Science Study Program,
Faculty of Electrical Engineering and Computing, Zagreb
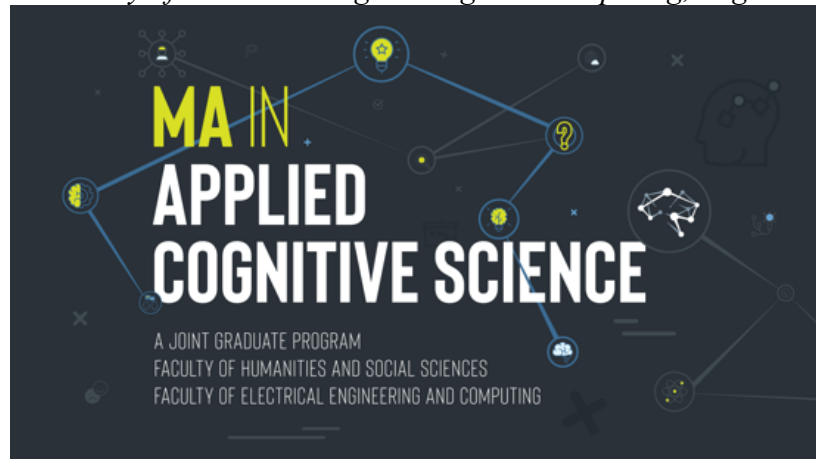
Today, cognitive research is based on the paradigm of the functioning of the brain as a system for which functional models of perception, attention, memory, thinking, reasoning, decision making, problem solving, and learning are created under experimental conditions, in clinical research, and computer simulations. Cognitive science is an interdisciplinary field in which philosophy of language and linguistics, philosophy of mind and cognitive psychology, neurobiology and neuropsychology collaborate, and computational science to answer the questions: How does the mind work? What causes mental states? What are the mechanisms of mental processes? Can a machine imitate them? Rationality is a biological phenomenon. Rationality in action is a property that enables organisms with brains, large and sufficiently complex, to have self-awareness, to coordinate their intentional contents so that they produce better actions than they would produce by random behavior, instinct, external influence or impulsive action. Usability Phenomenon Human-Computer Interaction (HCI) is the phenomenon through which we study and practice the usability of computers, with or without human assistance. It is about understanding and creating software and other technology that people will want to use, be able to use, and will be truly effective software when used. The concept of usability, and the methods and tools that automatically drive software, are fundamental to the culture of computing. Over the past decade, HCI has emerged as a central area of research in computer science and has strongly influenced the development and application of the social and behavioral sciences. Some of the reasons for its success are simply technical, while others are cultural and commercial. In the 1960s, advances in computer hardware enabled new applications that required software systems of far greater scale and complexity than before. However, these greater capabilities brought with them greater problems in software development: cost overruns, late delivery, and inefficient and unreliable systems that were difficult to maintain. It was also called the "software crisis", which triggered the emergence of software engineering as a scientific discipline. The software crisis is never solved by itself.

Instead, it helped us establish design and method development as entirely new, central topics in computing. From software engineering it develops; software psychology and human factors of computer systems; computer graphics, user interface software; and models, theories, and frameworks from cognitive science. However, empirical studies of the design process and practical experience in system development raised questions about new design methods. The software crisis increased interest in programming as a human activity. It increased the need to provide more developers, for better-trained developers, for more productive developers. Programming became recognized as an area of psychology involving problem solving and symbol manipulation (Weinberg 1971). The question of all questions is: what is the functional architecture of cognition, or what should a physical symbolic system, be it human or machine, be able to do in the entire course of the cognitive process? A cognitive model must satisfy a certain number of general tasks that give it competence at all levels, from the visual to the semantic to the conclusive. Lower cognitive levels and primary cognitive processes.

Lower cognitive levels and primary cognitive processes
- ✔ perception
- ✔ attention
- ✔ memory

Higher cognitive levels and higher cognitive processes
- ✔ opinion
- ✔ speech
- ✔ inference
- ✔ thinking
- ✔ speaking
- ✔ reasoning
- ✔ learning
- ✔ understanding
- ✔ problem solving
- ✔ decision making

One cognitive model should be capable
- ✔ (1) analyse / describe the object as an entity that provides stimulation;
- ✔ (2) present the relative location of the object in three-dimensional space;
- ✔ (3) sees an object in at least one situation and later recognizes it regardless of subsequent changes in size or position in space;
- ✔ (4) searches for and locates an object to be learned if it is present in a complex scene;
- ✔ (5) reconstructs the approximate appearance of the object or the image of the learned object if it is absent;
- ✔ (6) constructs and learns new images through the combination of parts of objects and scenes recalled from the learning or memory repertoire;
- ✔ (7) recognize learned patterns despite incomplete or degraded inputs;
- ✔ (9) discover, learn, and remember spatial relationships between objects in one scene;
- ✔ (10) if given arbitrary form input, respond with a series of recognition indicators and their associated images from memory;
- ✔ (11) learn substantial sequences of visual input and later remember at least parts of the image content of the selected sequence in the correct time order;
- ✔ (12) learn and remember the name of each learned entity;

✔ (13) arrange and relate internal representations as equivalents of subject and predicate in the statement structure;

✔ (14) generates sequences of connected conclusions;

✔ (15) imagine or otherwise recall, if the model is present with a name, its representation of the object, entity, characteristic, or connection for which the name stands;

✔ (16) controls his behavior in accordance with motivational needs;

✔ (17) adds some indicators of value to a real or imagined scene or episode;

✔ (18) plans, executes, and learns sequences of his own behavior that lead to environments or episodes in which he meets his motivational needs.

Based on research into the components of the cognitive model, it is possible to produce cognitive strategy instructions in education, that is, to create and construct "educationally relevant models of the components of thinking" such as: strategies (procedural knowledge), knowledge about these strategies and knowledge about one's own thinking process (metacognition), knowledge about the world in general, motivational beliefs and cognitive style as interacting components (Pressley and Woloshyn, 1995:3).

4. NEW ART SOFTWARE

Visual arts refer to art forms that express their message, meaning, and emotions through visual means. Visual arts can be categorized as decorative, commercial, or fine arts, such as painting, photography, or sculpture. Art is usually subjective and can be interpreted in many ways. However, one common characteristic of all forms of visual art is visual communication, without the need for other senses such as hearing or touch. The intent of visual art forms may be to visually delight the viewer through a work of art that is beautiful or soothing. Some works of art aim to entertain the viewer through interesting or amusing images or as a captivating visual story. Other works of art may aim to shock or disturb the viewer in order to stimulate thought and discussion about an important topic or pressing issue. In the fascinating field of visual arts, the brushstrokes of creativity are often guided by the quiet skills of a craft: tools and software. These digital companions are ubiquitous tools that bring an artist's vision to life, transforming a blank canvas of possibility into masterpieces that capture the imagination. From sophisticated design programs to cutting-edge 3D rendering applications, these tools increase precision, expand creative boundaries, and simplify the artistic process. For visual artists, mastery of this technological arsenal is not just an asset—it is indispensable for sculpting efficiency, refining techniques, and achieving the pinnacle of artistic expression. A deep understanding of the latest tools and software is essential for those embarking on this new path. Technology ensures that artists' craft keeps pace with industry standards. Whether you're an experienced artist looking to expand your toolkit or an inexperienced amateur, embracing the power of these tools is a step toward creating a new legacy in the ever-changing field of visual arts. The visual arts are art forms such as painting, drawing, printmaking, sculpture, ceramics, photography, video, image, filmmaking, design, crafts, and architecture.

The following are examples of visual art:

Drawing starts with lines made from pens, pencils, or other drawing tools.
Painting usually uses a canvas, brushes, and paints.
Photography is artistic photos made with a camera.
Sculpture is a form made from materials such as clay, wood, or metal.
Fashion design uses cloth with the intent of display through being worn.
Printmaking is when an image is taken from one form and transferred to another.
Filmmaking is similar to photography, but with a series of stills used to create motion or a story.

- Visual Artist Tools List
- Digital Illustration and Painting
- 3D Modeling and Animation
- Graphic Design and Layout
- Video Editing and Post-Production
- Portfolio and Presentation
- Collaboration and Project Management
- Types of Visual Artists

Visual artistry is a broad and dynamic field that encompasses a diverse range of specializations, each with its own unique focus and medium. Different types of visual artists bring distinct perspectives and skills to their craft, creating works that can range from the traditional to the avant-garde. This variety allows for a multitude of career paths within the visual arts, catering to different artistic interests and market demands. Each type of visual artist contributes to the rich tapestry of the art world, whether through capturing the visual essence of the real world, challenging perceptions with abstract forms, or innovating with digital technologies. The following are some of the well-known types of visual artists who have carved out specific niches in the art community.

Illustrator
Illustrators are visual artists who specialize in creating images that complement or elucidate concepts, narratives, or ideas. They often work in publishing, creating artwork for books, magazines, and other printed materials. Illustrators might also work in the digital realm, designing images for websites, video games, and animations. Their work requires a strong ability to convey stories and messages through visual representation, often collaborating with authors, editors, and art directors. Illustrators must be versatile, adapting their style to suit different genres and audiences, from children's literature to technical manuals.

Painter
Painters express themselves through the medium of paint, using a variety of techniques, styles, and surfaces. They may work with oils, acrylics, watercolors, or mixed media to create their pieces. Painters can be found exhibiting their work in galleries and museums, working on commissioned pieces, or selling their art directly to collectors. Some specialize in portraits, landscapes, still lifes, or abstract compositions, each requiring a unique set of skills and a deep understanding of color, texture, and composition. Painters must also navigate the business side of the art world, including self-promotion and sales.

Sculptor
Sculptors are artists who create three-dimensional works of art using materials such as clay, stone, metal, or wood. Their work can range from small, intricate pieces to large-scale public installations. Sculptors must have a strong grasp of form, space, and structure, as well as the physical properties of their chosen materials. They may create works that are representational, abstract, or somewhere in between, often evoking a physical presence and tactile experience that is unique to the medium of sculpture.

Graphic Designer
Graphic Designers are visual artists who communicate ideas and messages through the strategic use of typography, imagery, color, and layout. They create visual content for a wide range of applications, including branding, advertising, web design, and print media. Graphic designers must be adept at using design software and understanding the principles of visual communication. Their role is crucial in creating a visual identity for businesses and organizations, as well as in making information accessible and appealing to a target audience.

Photographer

Photographers capture moments, scenes, and subjects with their cameras, creating images that can tell a story, document an event, or convey an emotion. They may specialize in various genres, such as portrait, commercial, fashion, landscape, or photojournalism. Photographers must have a keen eye for composition, lighting, and detail, as well as technical proficiency in camera equipment and photo editing software. Their work can be found in a multitude of settings, from galleries and magazines to social media and corporate reports.

Concept Artist

Concept Artists are specialized visual artists who generate illustrations and designs that help bring ideas to life, particularly in the pre-production stages of film, video games, and animation. They create visual representations of characters, environments, and objects, providing a blueprint for the creative direction of a project. Concept artists must possess a strong imagination, an ability to adapt to various artistic styles, and the skills to work quickly and effectively communicate their ideas to directors, developers, and other members of a production team.

Multimedia Artist

Multimedia Artists are contemporary visual artists who integrate multiple forms of media, such as video, digital art, sound, and interactive installations, into their work. They often explore the convergence of technology and art, pushing the boundaries of traditional artistic expression.

Multimedia artists must be proficient in various software and tools, and they frequently collaborate with other artists and professionals in fields such as computer programming and engineering. Their work is often showcased in modern art galleries, festivals, and public spaces, engaging audiences in immersive and interactive experiences.

4. PROGRAMMING LANGUAGES

Constructions in programming languages are more or less difficult, and how aids such as variable name mnemonics, in-line program comments, and flowcharts support programming.

There are a whole host of programming languages. They are tools that can be used to do different tasks (sometimes in drastically different ways). In all this complexity, one thing is clear - if an enthusiast decides to learn any of the programming languages below, they will have a practically guaranteed job, reports Business Insider. Programming languages are similar today. Python and R are used for analytical purposes, Ruby and JavaScript are excellent for websites, and so on. In addition to being unique tools, developers usually stick to one or two that they prefer throughout their careers. With that said, the TIOBE Index provides an indicator of the popularity of some of these languages, and although the competition is melting away, the huge advantage that the programming languages Java and C had until recently, they still hold the top spot. Of course, popularity does not say which language is best for a particular task or in general. Regardless of which of the languages below beginners decide on, it is likely that they will easily adapt and have a job for a long, long time.

Java - made in the early nineties, and was originally intended for interactive televisions. However, it was too advanced for the industry at that time. Oracle Java is still the most popular programming language in the world, and it is essential for the development of the Android platform and applications, as well as a lot of business software. Java runs on everything - from gaming consoles to supercomputers for scientific purposes.

C - one of the oldest general-purpose programming languages still in use. Its history begins in the early seventies of the last century, and the legendary 800-page manual **'The C Programming Language'** was printed for the first time in 1978. The code written in it (if it adheres to standards) is very easy to compile for a number of different platforms, with minimal changes to the source code.

Python - this language saw the light of day in 1989, but it is still appreciated by many today, especially because of the readability of the code. Many more experienced programmers advise that you should start with this programming language.

PHP - mainly known as the language for programming Internet pages, and according to some estimates, it makes up a third of the entire web. In addition, PHP also serves as a general-purpose programming language, but it also has a bad reputation among programmers. The founder of Stack Overflow (Jeff Atwood) once called it 'not so much a language as a random collection of arbitrary things (...)'.

Visual Basic (and newer VB.NET) - many high school students could encounter this programming language, which is adorned with a graphical element. Thanks to it, they try to create an environment in which it is easier to program, and it is not a bad solution for beginners.

JavaScript - in some (very, very) distant sense a relative of the previously mentioned **Java language** (in that it is an OOP language - Object Oriented Programming), they really have no special connection beyond the name. JavaScript is extremely popular and is primarily used in web applications, but it is often criticized for slowing down browsers and for security vulnerabilities within applications.

R - was previously mentioned alongside Python as a very convenient programming language for statisticians and generally anyone who needs data analysis. It is known that Google is a big fan of this language.

Go - when we mention Google, we should also mention their work, which is one of the fastest-growing languages today. It is used in some of Google's production systems, and in this IT giant, it was created as a result of a kind of experiment. With it, the authors wanted to create a new language that would retain the positive aspects of existing programming languages, while addressing the common criticisms for which they were known. Version 1.0 was released in 2012.

Ruby - just like in the case of Python, this programming language has many fans precisely due to its readability and ease of writing code. The official slogan of the language is 'The Programmer's Best Friend'.

Objective-C - also worth highlighting from the list is this general-purpose programming language, best known for being used by Apple for its OS X and I OS operating systems. Although Apple has introduced its own language, Swift, Objective-C remains a more popular solution, although it is losing importance.

This study explores teachers' attitudes toward artificial intelligence and how these attitudes influence their educational decision-making. By exploring these perspectives, this research aims to provide insights into the design of AI-integrated teacher education programs that prepare future teachers to navigate the complexities of AI in education.

In short, AI offers numerous benefits in education, from enhancing traditional teaching methods to supporting student engagement and enabling personalized learning experiences. However, its effective implementation requires informed and ethical integration to address critical issues related to privacy, trust, and equity. A conscious and thoughtful approach to adopting AI can help mitigate potential risks by ensuring that ethical and practical considerations guide its integration into educational practices.

5. CONCLUSION

AI in education encompasses a diverse range of technological advancements aimed at revolutionizing the learning and teaching process (Drinovac, Topalović; Valčić, Herceg, 2024). These technologies not only improve traditional methods, but also introduce innovative and interactive learning experiences that go beyond conventional classrooms. By adapting to individual needs, preferences, and learning styles, AI supports student motivation, engagement, and personalized learning. Furthermore, by leveraging data-driven insights, AI is reshaping educational paradigms to optimize learning outcomes in new ways. The research discusses different pedagogical approaches to engage students and deepen their understanding of HCI concepts, skills, and methods. When we analyzed the literature review on HCI education over the past 20 years, we identified 12 types of experiential learning strategies, including applied research projects, industry/community projects, hands-on activities, role-playing, and interactive workshops. We found evidence that these techniques offer a number of benefits to students, such as improving their technical knowledge, acquiring soft skills, and increasing their marketability. All these new facts, activities, and achievements, of course, do not exist outside the cultural-historical-social framework, but neither outside man. They are in man's possession, in the possession of the Croatian man as the sum and continuity of all his positive human achievements, so true values and goods transcend their time and space and are also beacons and signposts for future generations in their human and civilized endeavors and aspirations towards, for now, uncertain success, communication with CHI and AI.

AI is transforming education by offering innovative solutions such as personalized learning experiences through intelligent tutoring systems (Ayeni et al. 2024; Pratama, Sampelolo, and Lura 2023) and instant academic support through AI-powered chatbots. However, integrating AI into education also presents challenges, such as aligning AI recommendations with educational goals, maintaining student engagement, and addressing ethical issues. Early-career teachers, Gen Z teachers, who are digital natives, are uniquely positioned to make innovative use of AI tools and potentially shape the future of AI-integrated education (List 2019; Ustun and Guler 2022). AI supports lesson planning, classroom management, and assessment, offering real-time feedback and personalized professional development. These technologies improve the quality and accessibility of educational resources by providing students with a more personalized learning experience. Given the transformative potential of AI, adaptation to this rapidly evolving educational landscape is essential.

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THE INTERACTION OF SUSTAINABLE BUSINESS MODEL AND CYBER SECURITY

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ABSTRACT

Analyzing the incorporation of ESG principles and addressing cyber risks requires robust econometric methodologies. In this paper, a panel analysis of the impact of investments in IT equipment and operations according to sustainable principles on cybersecurity for all EU countries was carried out. The paper tests the importance of ESG standards in maintaining cybersecurity. The dependent variable includes cyber resilience, approximated by the amount of secure internet servers in the EU, while independent variables include the ESG Enhanced Index for EU and IT security investments.
Keywords: *ESG, cybersecurity, cyber resilience*

1. INTRODUCTION

In a business environment in which corporate responsibility is continuously emphasized through the application of ESG principles and which is intensively digitized every day and thus exposed to numerous cyber security risks, it is necessary to investigate the connection between ESD performance and cyber resilience, since ESG metrics are used to assess sustainability and ethics, but they can also assess the ability to manage risks and the level of technological readiness - two categories that are key to cyber security. Companies with strong ESG scores show a proactive approach to risk factors, making them suitable for upgrading to the second level of security - cybersecurity. In order to examine this connection, an econometric regression model was used, whereby the dependent variable was cyber resilience estimated on the basis of secure internet servers in European countries. The independent variable includes the ESG enhanced index for the EU and organizational investments in IT security, which are expected to have an impact on withstanding and recovering from cyber threats. Cybersecurity is often classified under the "G" component of ESG, which relates to governance and accountability within an organization. In addition, cybersecurity also affects the "S" component, because security breaches can threaten privacy and data security, or lead to financial and reputational risk for the company. The connection between ESG standards and cybersecurity is recognized as integral to a sustainable and resilient management system of modern organizations. The mentioned connection can be achieved through:

- integrating cyber security into ESG reporting
- governance and risk management
- enhancing ESG disclosures
- building operational sustainability and trust

Data management and transparency in the G-Governance element of ESG is reflected through the transparent management of digital threats as a type of risk and the establishment of a solid information security policy and regular risk assessment. With the S component, cybersecurity protects the personal data of customers, employees, and business partners and ensures social responsibility towards a secure digital environment. Cybersecurity is recognized as an important factor in ESG ratings and evaluations because digital security is becoming a benchmark for responsible governance. The integration of cybersecurity into ESG frameworks protects the organization's values, strengthens its resilience towards the community and the environment, and contributes to long-term sustainability and competitiveness.

2. OVERVIEW OF PREVIOUS RESEARCH

Previous findings reveal that larger ICT firms exhibit lower environmental (E) risks but higher governance (G) risks, with lower governance risks strongly linked to superior financial performance, positioning governance as the most critical ESG factor (Kand, S, 2025). Some authors (Mickie, 2025) pointed to the fact that "*robust cybersecurity measures have become crucial in safeguarding sensitive data and ensuring business continuity in an era marked by increasing cyber threats*" and that: "*... integration of these three elements-ESG metrics, digital transformation, and cybersecurity-creates a powerful framework for businesses to navigate the challenges of the modern business environment*".

The importance of recognizing this relationship is particularly significant in the business of financial institutions, where findings reveal that banks implementing CSP experience improved financial resilience, with CSP having a statistically significant positive effect on return on assets (ROA), return on equity (ROE), and return on tangible equity (ROTE). ESG scores positively correlate with bank profitability, while operational risk plays a nuanced role (Brono, 2025). Precisely because of the importance of this relationship in general, even the World Economic Forum emphasized that "given the increasing number of cyberattacks on critical infrastructure in recent years, organizations must start looking at cybersecurity as part of ESG" (Hamidović, 2024).

This is precisely why: "*cybersecurity is a critical element of ESG and can be used to measure the maturity of the governance of an organization; thus, cybersecurity must be added to the ESG reporting framework. Resilience depends on data, technology, and long-term sustainability policies*" (Bose, 2023). Key findings: "*highlight cybersecurity as an indispensable enabler of sustainable development initiatives, safeguarding the technological infrastructure essential for environmental conservation efforts*". (Obasi, 2025)

Cyber Risk Management as a key to sustainable business includes the resilience against threats through enhanced cybersecurity measures, especially in the field of artificial intelligence (Buchan, 2020). The analysis made by Solove (2025) presents the importance of data privacy protection, which is connected to compliance with regulations such as GDPR and CCPA. Also, there is a huge need for cyber insurance growth, which refers to adopting cyber insurance policies to mitigate financial risks associated with breaches (Woods and Simpson, 2017).

3. DATA AND METHODOLOGY

The paper tests the importance of ESG standards in maintaining cybersecurity. The analysis is conducted for EU countries, for the period from 2013 to 2024. The dependent variable is cyber resilience, which is approximated by the number of secure internet servers. The thesis states that increasing of the factors of sustainability (ESG index) and the investments in secure IT equipment, the companies will positively affect the cyber resilience.

This study provides the evidence whether the sustainable business standards or investment in IT equipment provide more cybersecurity.

Type	Name	Description	Source
Dependent variable	Cyber resilience	Secure internet servers	World Bank
Independent	ESG index	Sustainable business model	MSCI
Independent	Investments	The investments in IT equipment	Statista
Control	GDP	Gross domestic product	Eurostat

Table 1: The variables used in the analysis
(Source: authors)

The variable ESG index unifies positive environmental, social and governance (ESG) factors while reducing cyber-risk exposure. Extended indices are common among scientists because they can provide a deeper understanding of the behavior of various phenomena (Pagano et al, 2018). In this paper, the index is created according to the MSCI Indexes data. ESG standards refer to compliance with environmental, social, and governance principles. The expanded ESG index also takes cybersecurity into account, as a precursor to a sustainable management model.

Variable	Lag Length *	t-statistic ADF	p	Test for unit root
bdp	1	-6.82019	0.0000	In 1st difference with individual intercept
esg	1	-6.04708	0.0000	In level
int	1	-2.99051	0.0014	In level
inv	1	-22.0624	0.0000	In 1st difference with individual intercept

*Table 2: Augmented Dickey- Fuller test*According to the Schwarz Info Criterion*
(Source: Author's calculation)

Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality. After conducting the ADF test, it was determined that the variables ESG and INT are stationary at the level, while the variables BDP and INV are stationary in the 1st difference.

According to Bahovec and Erjavec (2009), the model equation is:

$$\Delta Y_{i,t} = \blacksquare_{i,1} + b_1 INV_{i,t} + c_1 ESG_{i,t} + d_1 \Delta Y_{i,t-1} + e_1 BDP_{i,t} + f_1 INV_{i,t} + g_1 ESG_{i,t} + \varepsilon_{i,t}^{INV,ESG}$$

where the *INV* refers to investments in IT equipment, *ESG* refers to enhanced ESG index, and *BDP* is the control variable.

The Hausman test was used to determine whether the model was fit for fixed or random selection, considering the factors in the estimated coefficients. Based on the Hausman test, a fixed effects model was selected (Chi-Sq. Statistic=8.903079, p= 0.0028).

Durbin-Watson test showed that there is no autocorrelation detected in the sample (DW=0.196571). The model shows the significance according to the F-statistic=15.12016 and prob (F-statistic) = 0.000000.

The panel analysis of the impact of investment in IT equipment and adherence to ESG standards on cyber resilience in the company's operations was made. The dependent variable (Y) in the model is cyber resistance (expressed by the number of secure internet servers), the independent variables are investments in IT equipment and the expanded ESG index, and the control variable (X) is GDP.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	482418.8	53872.52	8.954821	0.0000
INV	37.29220	15.36085	2.427743	0.0159
ESG	5044.882	1926.199	2.619086	0.0093
BDP	0.050835	0.027691	1.835754	0.0675

Table 3: Panel analysis, dependent variable Cyber resilience
(Source: Author's calculation)

The panel analysis is conducted by applying the fixed effect model, using the method panel least squares and cross-sectional clustering. The results of the panel analysis show that independent variables have an impact on increasing cyber resilience, especially if applied jointly. In the model, the higher effect has the compliance with ESG principles.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	528306.1	36831.72	14.34378	0.0000
DINV	34.37810	14.23839	2.414466	0.0164
ESG	3551.605	1324.134	2.682210	0.0078

Table 4: The individual effect of the independent variables
(Source: Author's calculation)

Table 4 presents the individual impact of the independent variables on cyber resilience. The analysis showed that when applied together, the ESG has a greater impact. The analysis of the individual impact also speaks in favour of the ESG factors of sustainable business.

All calculations are based on the 5% significance level.

4. CONCLUSION

After the analysis, the importance of respecting the sustainable business model and incorporating ESG principles into all business activities was confirmed. At a time of increasing exposure to cyber risks, businesses are affected by financial damages caused by various forms of cyber attacks. Business resilience, therefore, largely depends on cyber resilience. In this paper, it has been proven that safe and resilient business, which is based on increasing the number of secure internet servers, is closely related to business based on sustainable principles, which includes environmental, social, and governance standards.

A panel analysis for EU countries confirms that safe business with respect to ESG principles contributes significantly to larger cyber resilience. These findings can benefit all companies to create resilient business policies as well as public sector decision makers related to cyber protection. Considering that this is a relatively new topic for which the collection of data into common databases has not yet been standardized, it is recommended to expand the analysis with additional variables when new data becomes available.

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CYBERSECURITY AS THE BASIS FOR THE ORGANIZATION'S OPERATIONS SECURITY IN THE DIGITAL AGE

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ABSTRACT

In the digital age, when companies move their operations into virtual space, cybersecurity has become a strategic imperative. With the digitization of operations, companies have opened themselves to vulnerability to cyber risks that appear regardless of the industry or field of activity. Because of this, it is important to raise awareness of designing internal risk monitoring systems and establishing procedures and mechanisms for risk management and protection. Due to the ease of doing business and the digitization of business processes, companies often do not notice the risks they are exposed to in time. A lower perception of risk, insufficient commitment to information security, often cause large financial losses to companies that can seriously threaten their business. The absence of advanced risk monitoring systems is often caused by the high costs of implementing cyber risk protection systems. Because of this, companies often ignore cyber risks until the financial damage materializes. In this paper, research was conducted in order to determine the existence of internal risk protection policies. It was proven that despite the increase in cyber activity, companies invest less effort in risk protection, which consequently led to a greater number of cyber-attacks and greater financial damages for organizations. The research was made using VAR analysis and impulse response functions to determine the relationship of risk management with past observations of risk exposure.
Keywords: Internet, business, strategy and decision, cybersecurity

1. INTRODUCTION

Cybersecurity has become a key component of organization's business security in the digital age. The development of information technologies has enabled companies around the world to improve their operations, improve communication, and store huge amounts of data on online platforms. However, these changes bring with them numerous risks related to unauthorized access, data theft, and attacks on network systems. Therefore, cybersecurity is the basis for protecting digital resources and maintaining business continuity. According to the FBI Internet crime report for 2023, ransomware continued to evolve through 2022 and 2023 and reported financial losses rose by 74% during 2023 (from $34.4 million to $59 million among reported cases to IC3), hitting larger targets or extracting bigger payments (Ganesan, 2023). This indicates that ransomware remains a top concern for financial security, capable of halting operations and causing multi-million dollar losses for even well-defended organizations. Phishing was the number one reported incident type, but the financial impact was far greater from BEC and related fraud schemes.

According to the same source, the second leading cause of financial losses is business email compromise (BEC) that have inflicted billions in losses and have been among the costliest cyber crimes ($2.7 billion loss in US in 2022 and 2.9 billion in 2023). Another very lucrative fraud are crypto-related scams that have surpassed BEC as the single biggest category of loss (FBI, 2023). Many studies point out the importance of focusing on security awareness training and building a strong security culture, especially in finance, where robust training programs for empowering employees as social engineering and insider exploits remain serious vulnerabilities (FBI statistics, 2023). Cyber risk must be managed as a core business risk, not just an IT problem. Companies with higher cybersecurity maturity and investments tend to suffer fewer breaches and lower losses. Consequently, many organizations are moving toward a layered defence strategy - combining prevention controls, detection capabilities, insurance, and resilience planning to protect their financial security against cyber risks.

2. PREVIOUS RESEARCH REVIEW AND HYPOTHESIS

In the world of permanent cyber attacks to ICT systems, "*risk management is "becoming a crucial task for minimization of the potential risks that can endeavor their operation*" (Bojanc, 2008). Therefore, it is "crucial for companies to implement robust cybersecurity measures to safeguard sensitive data from intrusion, which can lead to significant financial losses". (More at al, 2024). Many analysis found that cybersecurity risks can "significantly impact economies, causing direct and indirect financial losses. The economic impact of cybercrime on businesses is expected to reach US$10.5 trillion by 2025". (Dalei, Kandpal, 2024). According to Ganesan (2023) it is crucial to continuously monitor and assess the risk environment to identify any changes in the organization's context and to keep track of the entire risk management process. It is also important to understand that cyberattacks can lead to legal, reputation, and financial losses to the business, and that is the reason why vulnerable information systems inside an organization make it prone to cyberattacks, leading to loss of reputation, financial loss, customer churn, and loss of future prospects (Jain, 2023). The solution to preventing such problems is to recognize that there is a potential threat and to perform a cyber risk assessment to identify existing vulnerabilities, risks, and security gaps, and to develop and implement a plan to address the cyber risks and lower them to an acceptable risk tolerance in a timely manner. (Mostia, 2014) Some authors propose the:" *Cyber Risk Scoring and Mitigation (CRISM) tool, which estimates cyberattack probabilities by directly monitoring and scoring cyber risk based on assets at risk and continuously updated software vulnerabilities"* (Shetty et al, 2018). Others propose a security strategy that includes risk assessment, threat modeling, and vulnerability testing, as well as the proposed countermeasure model (Wisdom et al, 2024).

Some authors (Granadillo et al, 2016) even propose models such as "*Dynamic Risk Management Response model (DRMR) composed of two main modules: a Response Financial Impact Assessor (RFIA), which provides an assessment concerning the potential financial impact that responses may cause to an organization; and a Response Operational Impact Assessor (ROIA), which assesses potential impacts that efficient mitigation actions may cause on the organization in an operational perspective".* This model proposes: " *response plans to mitigate identified risks, enable choice of the most suitable response possibilities to reduce identified risks below an admissible level while minimizing potential negative side effects of deliberately taken actions"*(ibidem). Although awareness of the dangers of cybersecurity has increased and even legal regulations oblige organizations to invest in protection (from a technical and employee awareness point of view), the general impression is that organizations still do not take this threat seriously, or rather, they wait for an attack to occur before reacting.

Therefore, the following hypothesis is put forward in this paper:

H 1: Despite the increase in cyber activity, companies invest less effort in risk protection, which consequently leads to a greater number of cyber-attacks and greater financial damages for organizations

There are various reasons why investing in cybersecurity is not a priority for companies until the moment an attack occurs, forcing them to repair the damage (which often costs more than preventive investment) and carries multiple risks.

Underestimating the risk	False belief that the organization is not an attractive target for cyberattacks because of its size
Costs and budget constraints	The belief that infrastructure, employee training, and maintenance costs are too high compared to the potential benefits
Lack of awareness and knowledge	Lack of education about the threats or understanding the seriousness of potential attacks.
Business priorities	Cybersecurity doesn't generate direct revenue, therefore is often not considered a priority
A false sense of security	A false feeling of protection for the existence of basic protective measures (antivirus programs, firewalls).
A "reactive security" approach	Operating according to the principle of "fix it when it breaks"
Lack of regulatory pressure	Cybersecurity investment avoidance unless regulatory institutions require a high level of cybersecurity
Lack of understanding of financial consequences	Many organizations do not understand how high the financial risks are if an attack occurs (data loss, legal costs, reputational damage, business interruption).

Table 1: Most common reasons why companies do not invest enough in cybersecurity
(Source: authors)

3. DATA AND METHODOLOGY
The paper tests the effectiveness of cybersecurity in EU countries through a VAR model. The research was conducted using VAR model and Granger causality test.

The variables used in the analysis are:
- cyber security policies in companies (POL)
- the number of employees on the tasks of preserving cyber security (PERSO)
- number of ransomware attacks (RAN)
- number of malware attacks (MAL)
- investments in IT security equipment (EQU)

Data was collected from the official websites of the European Commission and the Statista database for the period from 2013 to 2024. The data is on an annual basis. VAR model proves that the number of cyber-attacks is caused by the change in the level of cybersecurity strategy in companies. In the last few years, trends show a decrease in the variety of cybersecurity in the way that the number of security policies in companies is decreasing, the number of employees in cybersecurity is decreasing, and investments in IT security equipment are decreasing. Despite the awareness of the existence of cybercrime, companies have reduced the level of security, which has consequently led to an increased number of cyber-attacks.

Within the framework of the Vector Autoregression (VAR) model, all variables are treated as endogenous, meaning each variable is explained by its own past values and those of the other variables in the system. Following the model's specification, the optimal lag length (k) was determined, after which tests for stationarity were conducted to ensure the validity of the time series data. The analytical process further encompassed a series of diagnostic evaluations, including the LM test, the Jarque-Bera test for normality, and a stability assessment. The stationarity of the variables was determined by performing the Augmented Dickey- Fuller test.

Augmented Dickey- Fuller test

Variable	Lag Length*	t-statistic ADF	p	Test for unit root
equp	1	-4.102312	0.0219	In 1st difference
perso	1	-2.683282	0.0166	In 2nd difference
pol	0	-4.242641	0.0013	In 2nd difference
mal	0	-2.284546	0.0297	In 1st difference
ran	0	-3.292034	0.0056	In 2nd difference

*Table 2: Augumented Dickey-Fuller test *According to the Schwarz Info Criterion (Source: Author's calculation)*

After conducting the ADF test, it was determined that the variables EQUP, MAL, MON are stationary in the 1st difference, while the variables PERSO, RAN, POL are stationary in the 2nd difference. To determine whether one time series can be used to forecast another, the Granger test was conducted. (Granger, 1969)

Granger causality test

Null Hypothesis	F-Statistic	Prob.
MAL does not Granger Cause EQUP	2.76724	0.2654
EQUP does not Granger Cause MAL	0.08667	0.9202
RAN does not Granger Cause EQUP	2.84629	0.3865
EQUP does not Granger Cause RAN	38.5564	0.1131
PERSO does not Granger Cause MAL	0.34559	0.7690
MAL does not Granger Cause PERSO	5.11861	0.2983
POL does not Granger Cause MAL	3.80804	0.3407
MAL does not Granger Cause POL	10.1292	0.2169
RAN does not Granger Cause PERSO	7.19820	0.2549
PERSO does not Granger Cause RAN	0.47591	0.7158
RAN does not Granger Cause POL	0.07128	0.9355
POL does not Granger Cause RAN	0.76620	0.6284

Table 3: Granger causality test (Source: Author's calculation)

VAR model is presented with equation below:

$$V_t = z + D(L)V_{t-1} + R_t \quad (1)$$

where $z = A^{-1}A_0$, $D(L) = A^{-1}C(L)$ and $R_t = A^{-1}\mathcal{E}_t$, what represents other shocks that have no direct security interpretation. (Bahovec, Erjavec, 2009)

Vector Autoregression Estimates (VAR model)

	Vector Autoregression Estimates	**Granger/Wald Test**
Dependent Variable *RAN*	t-statistics	p
POL	-0.24652	0.4648
SER	-2.14613	0.0000
MAL	0.01076	0.0124

Table 4: Vector Autoregression estimates - VAR model (Source: Author's calculation)

4. CONCLUSION

The findings derived from the VAR model reveal a pronounced and statistically significant relationship between declining levels of cybersecurity and the deterioration of cyber stability within organizations. In light of these results, it is imperative that companies boost their cybersecurity measures in order to mitigate the escalating threat of cyberattacks. The findings also prove that due to a lower perception of risk, and with a simultaneous increase in the scope of cyber activities, companies invested less in developing risk awareness, and consequently suffered greater damages. The conclusions of the analysis are useful to companies and regulators for more detailed planning of business security policies and raising awareness of the importance of protection against cybercrime. Due to the lack of data and non-standardized databases that monitor cyberattacks, it is recommended to expand the analysis with added data and additional variables in additional research.

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DEVELOPING THE TOURIST DESTINATION BRAND: IDENTIFYING THE IMPORTANCE OF INVESTING IN THE SUSTAINABLE DEVELOPMENT OF A TOURIST DESTINATION

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ABSTRACT

The tourism market is experiencing a growing demand for so-called green destinations, which are closely linked to the concept of sustainable tourism development. The principles of sustainability are increasingly expected by tourists and, at the same time, represent a challenge for the design of a competitive tourism offer. The success of a destination in the tourism market depends on investment in sustainable development, as environmental care directly influences visitor satisfaction and helps to attract new tourists. Sustainable tourism development has become a key factor in shaping the relationship between tourists and the local community, while investment in sustainability forms the basis for a destination's long-term prosperity. Sustainability is achieved through investment in environmental protection, which at the same time helps to build a strong identity for the destination. A destination's brand, or its perceived value, is evaluated based on factors such as brand awareness, brand image, brand quality, brand loyalty, and overall brand equity. On this basis, systematic investment in sustainability improves the destination's added value and its competitive advantage in the market. The aim of this article is to analyze the importance of investment in sustainable tourism development for increasing the perceived value of a destination's brand. Sustainable investment is primarily considered through environmental initiatives, while a scale to measure the perceived value of a destination's brand was developed based on previous research. The study was conducted in six destinations on the Croatian Adriatic coast, with 544 tourism professionals surveyed. The scientific contribution of this research lies in the results, which confirm that destinations that actively invest in sustainable development achieve better market results. It was also found that destinations with higher sustainability investments also have a higher perceived brand value. In addition, the study provides practical guidelines for marketing managers of tourism destinations.

Keywords: consumer-based brand equity, destination brand, sustainable tourism development, tourist destination, environmental protection

1. INTRODUCTION

Tourism contributes to the creation of demand for goods and services (Sompholkrang, 2014). To manage tourism demand for natural resources, destinations are increasingly adopting sustainable development approaches with a particular focus on the environmental dimension (Pérez, 2020). Tourism supply is influenced by perceived demand, which is shaped by the existing image of rural households (Cigale et al., 2013), with tourists traveling to experience attractive natural features and interact with nature (Farmaki, 2012).

Environmental preferences have increased, leading to an increasing market shift towards 'green development' of destinations. By engaging local communities and stakeholders and implementing sustainable practices, destination managers can ensure long-term success, not only by creating a positive image but also by supporting the economic and social sustainability of tourism (Alam et al., 2023). Popescu and Zamfir (2012) emphasize the need for collaboration between local stakeholders in the development of green destinations through policies and programs that promote and support green solutions and ultimately improve the competitiveness of cities. Our research is directly based on the United Nations Sustainable Development Goal 11 -"make cities and human settlements inclusive, safe, resilient and sustainable" (Gaia Education, 2025). Against the backdrop of the growing need for environmental development policies, research offers insights into building a tourism destination brand through a consumer-based brand equity perspective. In this way, it not only contributes to global development goals but also strengthens the role of local people with the aim of creating a better destination brand (Jurišić, 2018). In addition, previous research (Konečnik and Gartner, 2007; Yang, Liu, and Li, 2015; Tasci and Back, 2025) applies the concept of consumer-based brand equity (CBBE) mainly to tourists visiting specific destinations. However, this work focuses on measuring the perceptions of local people engaged in tourism, which opens up a new area of research. Based on the outlined concepts, this paper will analyse the impact of investments in environmental protection on the perceived brand equity of a tourism destination, and consequently how it influences the brand value of the destination. Therefore, the aim of this paper is to investigate the extent to which tourism destinations invest in environmental protection and to examine the perception of locals in determining the perceived value of a tourism destination brand.

2. LITERATURE REVIEW

A green campaign encourages local authorities and citizens to keep the environment clean through initiatives that reward communities for effective, sustainable development activities. These activities include the reduction of pollution of any kind, the development of green areas, reforestation, selective waste collection and recycling, the education of citizens about environmental protection, the involvement of residents in ecological projects, the development of ecotourism, the use of organic products and the maintenance of protected areas if they exist (Popescu and Corbos, 2010, p. 128, cited in Popescu and Zamfir, 2012, p. 417). When discussing the environment in the context of sustainable development, the most common problems are air and water pollution, loss of biodiversity, negative impacts on natural resources, and degradation of scenic beauty (Giddings et al., 2002, p. 190). The vision of effective sustainable development includes the reduction of pollution, new standards for clean water, and an integrated waste management system within destinations (Popescu and Zamfir, 2012). Green investment generally refers to renewable energy sources, pollution control and prevention, biodiversity conservation, and sustainable use of natural resources and land (Yang, 2022). The growing demand for environmentally sustainable tourism products and services by environmentally conscious tourists is driving investors to invest in green tourism (Thang and Thanh, 2023). Green attributes, such as sustainable services and environmentally friendly practices, significantly increase tourists' trust in destinations and ultimately increase the overall brand value of a destination (Malik et al., 2022). This trust is a key factor in the positive perception of a destination as sustainable. Many authors recognize the important role of local communities and explore residents' perceptions to raise awareness of the negative impacts of tourism in order to promote sustainable and environmentally friendly tourism development (Goliath-Ludic and Yekela, 2020). To understand the impact of tourism on the environment, local residents must be involved (Costa et al., 2020). Mangwane et al. (2019) state that local communities need to engage in responsible tourism initiatives and practice ethical tourism management to ensure sustainable tourism development.

In the context of sustainable tourism development, some authors also emphasize the importance of promoting environmentally conscious behavior among tourists (Lee et al., 2013; Kafyri et al., 2012). Information about environmental degradation raises tourists' ecological awareness (Miller et al., 2010). One of the key factors influencing responsible behavior is knowledge about the environment and ecosystems (Alessa et al., 2003). It is important to raise people's awareness as they are an integral part of both the environment and society (Giddings et al., 2002, p. 195). Community support is crucial for destination development, successful business operations, and the sustainability of tourism. If residents have a positive attitude towards tourism, they are more likely to support its development. However, if they feel that tourism brings more costs than benefits, they may feel threatened and withdraw their support. Residents' perceptions of tourism development depend on whether the negative environmental impacts of tourism outweigh its benefits. If tourism offers more benefits — such as theme parks, recreational facilities, sporting events, hotels, and restaurants — residents are likely to support it. Conversely, a lower perceived environmental impact leads to higher community support for tourism development (Yoon et al., 2001). Costa et al. (2020) found that residents generally have positive attitudes towards the economic, cultural, social, and environmental impacts of tourism. Kim et al. (2013) investigated residents' perceptions of the environmental impacts of tourism in terms of overall satisfaction. Their findings suggest that when tourism-related pollution increases, residents experience a lower sense of health and safety. However, tourism also plays a role in raising awareness of environmental protection. Goliath-Ludic and Yekela (2020) investigated the factors contributing to the environmental impact of tourism by assessing the perceptions of local residents. Their study found that waste management and overcrowding are the biggest environmental problems associated with tourism. While tourism has capitalized on the concept of "green" as a financial resource, such practices do not necessarily contribute proportionally to sustainability and environmental protection (Jaelani et al., 2023). In many cases, they even lead to the degradation of natural resources. Jaelani et al. (2023) emphasize the importance of government policies that promote the successful protection of natural resources and the environment while taking into account the economic sustainability and social well-being of local communities. In addition, business strategies and environmental policies promote innovation. Alvianna et al. (2022) examined the relationship between tourism behavior and environmental responsibility. Their research shows that the perception of green tourism has no significant influence on environmentally conscious behavior unless there is a clear intention to participate in green tourism. Andereck and Nyaupane (2011) confirm that tourism has a positive impact on perceived quality of life, while Andereck et al. (2005) suggest that tourism contributes to the aesthetic improvement of cities. The environmental impacts of tourism can include overcrowding, increased crime rates, rising costs of living, conflicts between tourists and residents, and changes in the host community's way of life (Caldicott et al., 2020). According to Arintoko et al. (2020), failure to consider the environmental impacts of tourism could jeopardise its sustainability. Clean air and water are considered public goods; therefore, the public sector, including local governments, is responsible for ensuring long-term environmental sustainability, covering clean-up costs and implementing the principles of sustainable tourism development (Emas, 2015, p. 2). Understanding the relationship between tourism and the environment is crucial as tourism affects environmental quality and economic benefits, creating a complex interrelationship (Tang, 2015). It is advisable to monitor the impact of tourism on the environment as this serves as a basis for decision-making in tourism development activities (Rizalu et al., 2020). There is an interdependence between tourism development and environmental quality (Rasekhi et al., 2016). This means that the tourism industry affects the economy and impacts the environment at the same time, and the environment cannot be considered separately from people (Giddings et al., 2002).

Tourism has an undeniable impact on the environment. Apart from its economic impact, it has both direct and indirect effects on the environment. Moreover, the environment is often seen as a tourist attraction or a tourist product (Sompholkrang, 2014). The environment is one of the fundamental symbols and attractions of a destination (Butler, 1991). According to Sompholkrang (2014), the environment of a destination can deteriorate if it is overcrowded by tourists, resulting in tourists choosing alternative destinations. For this reason, tourism can play a unique role in preserving nature, preventing environmental degradation, and mitigating harmful human activities. Kinnear and Taylor (1973) were among the first to establish a link between the environment and branding by examining the impact of environmental concerns on brand perception. Using consumer behavior studies, they analyzed how consumers perceive brands that incorporate an environmental dimension into their products. Consumers with a higher level of environmental awareness are more likely to value the environmental aspects of a brand when evaluating a product, which ultimately leads to a higher perceived brand value. Research by Dang-Van et al. (2023) highlights the importance of the link between the environment and branding through hoteliers' green practices. Their study confirms that the implementation of green initiatives, such as recycling, energy savings, and the use of environmentally friendly products, strengthens consumer identification with the brand. Green practices not only reduce the negative impact on the environment, but also create added value in terms of safety, health, and emotional satisfaction for customers and tourists. When tourists perceive a higher level of innovation in eco-friendly services, they develop stronger brand loyalty, as it fosters a sense of belonging and an emotional connection. This makes the environment a strategic resource for differentiating luxury hotel brands. Karagiannis and Andrinos (2021) establish a link between environmental practices and city branding by analyzing sustainable restaurant practices and their influence on destination perceptions. Sustainable practices, such as using local and seasonal ingredients and reducing waste, not only improve environmental sustainability but also create a unique experience for tourists. This increases perceived service quality, visitor satisfaction, and destination loyalty. By incorporating sustainable practices into their brand strategies, destinations can increase their appeal (Karagiannis and Andrinos, 2021). A holistic approach is emphasized by Abdou et al. (2022), who refer to green investments as a key strategy for sustainable tourism development. Green investments in hotels contribute significantly to the image of the hotel and the destination as environmentally conscious. Hotels that position themselves as environmentally conscious benefit from innovations in energy and water saving technologies, reduction of greenhouse gas emissions, and waste management (Abdou et al., 2022). Examples of practices where destinations implement the concept of sustainability while complying with environmental standards and promoting green marketing to achieve "green competitiveness" have been analyzed by Popescu and Zamfir (2012). Furthermore, Gartner (2014) argues that due to the unique characteristics of destinations, the concept of sustainability measurement and the concept of brand equity measurement are the same and merge together, as the brand equity of a destination is intertwined and united with sustainability. Teodorović (2015) states in his research that perceived brand equity should be built on the synergy effect of tourism and sustainability, where sustainability refers to the management of limited resources and emphasizes the environment. The author emphasizes that the environment is one of the key factors in tourists' choice of destination and is the most important and difficult element to integrate into the perceived brand equity of a destination. The foundation of a destination's perceived brand equity consists of the mechanisms of local government development, which should take into account measures to protect the environment, mitigation strategies, incentives to conserve resources, and environmentally conscious practices related to waste management, green energy, and similar initiatives (Teodorović, 2015).

Teodorović and Popescu (2016) have further developed these theoretical foundations in a model of a country's perceived brand equity, incorporating sustainability into the determination of a destination's brand equity. Their research (Teodorović and Popescu, 2016) confirms that a higher country image correlates with a higher perception of environmental well-being. However, the relationship between human well-being and environmental well-being is inversely proportional, meaning that an increase in human well-being often leads to a decrease in environmental well-being (Kaivo-oja et al., 2014). Improving environmental quality through the concept of an ecological city (Ecocity) has a significant impact on destination branding, making the environment a key element of a city's brand (Sulistiowati et al., 2023). Destinations that invest in environmental protection — such as the development of green infrastructure, public parks, bike lanes, and sustainable transportation, create a strong image of environmental responsibility, attracting both tourists and investors. Although the high cost of implementing green initiatives is a challenge, the authors (Sulistiowati et al., 2023) suggest solutions through partnerships with the private sector and international organizations. Government measures to promote sustainable tourism, such as tax incentives and ecological certifications, significantly increase the willingness of investors to invest in green tourism. These measures help tourism businesses to differentiate themselves in the market and attract environmentally conscious tourists (Thang and Thanh, 2023). The most commonly used definition of a tourism destination brand is based on the AMA (*American Marketing Association),* which interprets a brand as follows: "A destination brand is a name, symbol, logo, word, sign or other graphic mark that identifies a destination while distinguishing it from others." The brand of a tourism destination should develop a unique and attractive identity for the destination tourists and the local population (Reich, 1999, cited in Williams et al., 2004, p. 7). Creating an experiential brand for a destination focuses on sensory and/or cognitive attributes that the destination can offer, such as relaxation, personal discovery, and stress relief (Laws et al., 2002). To create an emotional connection, a destination brand should be credible, realisable, distinctive, and convey strong ideas (Morgan and Pritchard, 1999). A brand represents the belief in an incomparable and exceptional travel experience that is unique and specifically associated with the destination (Brent-Ritchie and Ritchie, 1998, p. 108, cited in Huzak, 2009). The memorable or emotional connection between the tourism target markets and the destination is the essence of a destination brand (Williams et al., 2004). When the name of a city or destination is mentioned, it can represent a financial, political, or social value in the mind of the consumer (tourist) (Baker, 2007, p. 19). The ecological dimension of a tourism brand can be emphasized through advertising slogans and visual identities that include natural elements (e.g. symbols of the sun, water or trees) (Sulistiowati et al., 2023). Michnik and Polok (2021) emphasize the importance of visual elements in the creation of destination brands. Logos and slogans often contain symbols of natural and cultural heritage that reflect tradition and history. However, they do not necessarily align with the modern concept of sustainable, future-oriented tourism. Furthermore, the economic and ethical aspects of sustainability, which are crucial for balanced development, are not sufficiently represented in visual identities (Michnik and Polok, 2021). The importance of the local population is reflected in studies dealing with the perceived value of a destination brand. Buhalis (2000) states that all stakeholders should align their strategic goals regarding destination marketing and the sustainability of local resources. The success of creating a destination brand and generating value requires a concerted effort by destination stakeholders to ensure that tourists experience positive promises and expectations (Baker, 2007, p. 22). On the one hand, the research recognises the role of all stakeholders in shaping the brand of a tourism destination. On the other hand, authors focus on the attitude of residents (Trueman et al., 2007; Gallarza et al., 2002; Zanfardini et al., 2011).

Lankford and Howard (1994) investigated the characteristics that determine residents' attitudes towards tourism and concluded that perceptions of the impact of tourism on citizens' personal well-being and lifestyle influence whether they accept or reject changes in tourism. Negative perceptions can destroy the trust of the local community and cause the destination to lose its clear identity and brand. The empirical research by Trueman et al. (2007) therefore identifies both positive and negative aspects of a destination and shows how stakeholder perceptions are influenced by visual environmental changes that can affect the perceived value of the destination brand. In environmental management, visible signs of decay, lack of cleanliness, litter, and neglected properties can be detrimental to a brand. Research also shows that there is no difference in opinions between employed and unemployed residents, and that negative features can overshadow the positive ones (Trueman et al., 2007, p. 26). Zanfardini et al. (2011) conducted a study to measure the perceived brand equity of two mountain destinations. In addition to tourists, they included the perception of locals and measured brand equity using dimensions such as brand awareness, image, quality, and loyalty. The results show that the selected destinations offer valuable experiences, high service quality, and strong customer loyalty. However, the brand image varied between destinations (Zanfardini et al., 2011). In addition, a harmonious relationship between tourists and residents has a positive effect on the destination brand. Residents' attitudes towards tourism significantly influence the destination image building process (Gallarza et al., 2002, p. 59). Locals may have their own perception of the destination brand compared to tourists, and their support for the tourism industry may influence tourists' perceptions (Gallarza et al., 2002). Local residents are often considered part of the destination's image (Echtner and Ritchie, 1991). A slogan can contribute significantly to a destination's image if brand development is strategically integrated while reinforcing the destination's brand equity (Lee et al., 2006). The local community is encouraged to participate in environmental initiatives to adopt environmental standards such as waste reduction and dealing with overcrowding (Goliath-Ludic and Yekela, 2020). Mangwane et al. (2019) suggest that local communities should participate in responsible tourism initiatives and practice responsible tourism ethics in the management and operation of their tourism businesses in order to maintain sustainable tourism (Mangwane et al., 2019). Similarly, Popescu and Corbos (2010) encourage local government officials and residents to initiate or participate in environmental projects that also improve the quality of life. Local governments and residents can prevent negative trends in resource use and integrate environmental problem-solving into destination management and planning strategies (Popescu and Zamfir, 2012). Companies that implement sustainable development concepts play a crucial role in marketing and influencing destination stakeholders. By emphasizing sustainability practices in branding, they also promote sustainability values (Kumar and Christodoulopoulou, 2014). Building a tourism destination brand based on user perception is key to increasing investment attraction and destination development. Elements such as brand awareness, destination image, perceived quality, and loyalty have a significant impact on the overall brand value of a destination (Bose et al., 2019). Bose et al. (2019) emphasize that strong brand awareness and public diplomacy increase investor attraction, while the quality of infrastructure, safety, and cultural offerings contribute to investor loyalty. Therefore, creating a brand for a tourism destination plays a key role in attracting domestic and foreign investment by promoting the perception that the destination is reliable, safe, and business-friendly. Green resources such as parks, green spaces, and urban landscapes enhance a destination's brand image, improve quality of life, and increase attractiveness, thereby attracting tourists, investors, and residents while promoting sustainability and environmental responsibility (Moreira et al., 2023). Government funding, support from international institutions such as the World Bank, and private investment are essential for the development of green tourism.

They enable investment in infrastructure, renewable energy and sustainable practices that reduce the negative impact of tourism on the environment (Thang and Thanh, 2023). In order to empirically test the perceived value of a tourism destination brand integrated with sustainability (Teodorović and Popescu, 2016), the following hypothesis is put forward: Higher investment in environmental protection within a tourism destination is related to higher perceived equity of the tourism destination brand.

3. METHODOLOGY

Investments in environmental protection include air and climate protection, wastewater and waste management, soil protection and soil remediation, groundwater and surface water protection, noise reduction, biodiversity conservation, and landscape protection (NSO). In accordance with Article 38 of the Official Statistics Act, the local authorities of tourist destinations are obliged to submit an annual report on environmental protection investments to the National Statistical Office. This study is based on internal secondary data from 2016 collected by local governments, as this is the only data available since it is not published individually for cities but at the district level. The cities included in the study are Split, Dubrovnik, Poreč, Mali Lošinj, and Zadar. They were selected based on a growing trend in tourist arrivals as well as based on received awards such as ETIS award and the Croatian Tourist Board award at the destination level (Jurišić, 2018). Based on the secondary data obtained from public authorities' investments in sustainable development (mostly related to investment in environmental protection in the specific city) it was calculated per capita investment rate in environmental protection (Jurišić, 2018). Cities included in this research have the following per capita investment rate in environmental protection: Dubrovnik 151.69, Mali Lošinj 817.42, Poreč 458.13, Split 24.29, and Zadar 87.4. The dependent variable, destination brand, is operationalized using four dimensions of brand equity (Im et al., 2012; Konecnik and Gartner, 2007; Boo et al., 2009; Liu et al., 2015): brand awareness, brand image, brand quality, and brand loyalty. To assess the perceived value of the destination brand, people working in the tourism industry were surveyed, including hotels, travel agencies, tourist boards, central hospitality businesses, private accommodation providers, and others. The survey was conducted during the winter season, and only companies operating all year round were included. A total of 544 duly completed surveys were collected. The questionnaire was completed in person, not online, to ensure that all job positions in the industry were included, from lower-level operations to upper management and executive positions. Results were analysed using IBM SPSS ver. 26 with methods, descriptive statistics, analysis of variance, post-hoc tests, exploratory factor analysis, and reliability analysis.

4. RESEARCH FINDINGS

4.1. Research sample

Research results indicate that typical respondent was female (57.5%), is old between 30-39 years (33.6%), has finished high school (44.9%), employed in hospitality (hotels, campsites, restaurants, bars, catering facilities, simple service facilities) (64.3%) and has work experience from 11 till 20 years (27.6%).

4.2. Research analysis

To test if the scales used are suitable for further analysis, exploratory factor analysis (EFA) was done. EFA was conducted using Principal Component Analysis in SPSS with oblimin rotation and Kaiser Normalisation. Research results were purified by removing items that had communality lower than 0.5 as suggested by Field (2009). The Kaiser-Meyer-Olkin (KMO) adequacy of sampling and Bartlett's test of sphericity reported: KMO=0.930 and $\chi2=11045.884$ (p<0.05).

Hence, according to the threshold values of Hair et al. (2010), this sample is adequate, and analysis can be continued. In the presentation of analysis, no factor loading lower than 0.3 is present, as Field (2009) has suggested. Regarding the results for EFA a five-factor solution emerged that explains 72.484% of the variance in the research results. Resulting factors are: brand awareness, brand image, brand quality-city, brand quality-employees in tourism, and brand loyalty. Results of the EFA and reliability analysis are presented in Table 1.

Items	Factor				
	Brand image	Brand loyalty	Brand awareness	Brand quality-employees in tourism	Brand quality - city
I recognize this city where I work as a tourist destination.			0.747		
The city where I work has a good (recognizable) name and reputation.			0.820		
I can quickly recall the characteristics of this city.			0.777		
This city is very well-known.			0.649		
When I think about a city where I would like to live, I immediately think of this city.		0.596			
The city has technologically developed businesses.	0.702				
The city has an advanced economic structure.	0.790				
The city has high-quality infrastructure (transport, roads, airport, technology, etc.)	0.788				
The city has good shopping facilities.	0.652				
The city has interesting cultural events and festivals.	0.401				
The city offers diverse forms of entertainment and nightlife.	0.432				
The city has a quality tourist offer.					-0.731
The city offers high-quality tourist experiences.					-0.851
I can expect excellent performance from the tourist offer of this city.					-0.798
The city follows modern trends (in culture, sports, entertainment, etc.).					-0.622
The city continuously invests in its tourist facilities (e.g. beaches, squares, events, etc.).					-0.604
The city organizes activities or programs that provide additional experiences.					-0.660
The employees in tourism in this city have expert knowledge.				-0.767	

The employees in tourism in this city quickly resolve complaints and negative comments.				-0.927	
The employees in tourism in this city are friendly in providing service.				-0.840	
This city would be my first choice (preferred) to live in.		0.817			
This city offers more amenities for living than any other destination.		0.649			
I intend to live in this city for the next 5 years.		0.835			
I would definitely recommend this city to someone looking for advice on which destination to visit.		0.657			
I love living in this city where I work.		0.906			
I am loyal to this city.		0.826			
Cronbach's alpha	0.882	0.925	0.857	0.900	0.931
% of explained variance	43.339	11.735	7.827	5.732	3.851
Eigenvalue	11.268	3.051	2.035	1.490	1.001

Note: Rotation converged in 10 iterations.

Table 1. Factor analysis and reliability analysis (Source: Authors)

The used scales (Table 1) are reliable as their reliability is above the suggested value of 0.7 (Nunnally, 1967) that is, Cronbach's alphas are in the range of 0.857 to 0.931. In subsequent analysis, all scales were composed as an average index of items that constitute the factor. Research concepts are observed by comparing destinations Mali Lošinj, Split, Poreč, Zadar and Dubrovnik. The analysis was done using analysis of variance and Bonferroni post-hoc test. The analysed variables were checked to see if they met the condition of homogeneity of variance in order to continue the analysis using the F-test or Welch test. Analysed constructs brand awareness, brand image, brand quality-employees in tourism, and brand loyalty have the condition of non-homogeneity of variance satisfied, except construct brand quality-city. The results of the analysis of variance are shown in Table 2, and the average values of constructs are shown in Table 3.

Factor	Analysis of variance
Brand image	$F(4,539)=10.171$***
Brand loyalty	$F(4,539)=3.058$**
Brand awareness	$F(4,539)=4.764$***
Brand quality-employees in tourism	$F(4,539)=3.452$***
Brand quality-city	$W(4,202.684)=12.335$***

Note: ** $p<0.05$; *** $p<0.01$

Table 2. Analysis of variance (Source: Authors)

City	Factor				
	Brand image	Brand loyalty	Brand awareness	Brand quality-employees in tourism	Brand quality-city
Mali Lošinj	4.012	5.536	6.135	4.866	4.769
Split	4.418	5.339	5.953	4.611	4.701
Poreč	5.052	5.466	6.159	5.042	5.588
Zadar	4.288	5.299	6.052	4.479	4.637
Dubrovnik	4.134	5.904	6.464	4.987	4.885

Table 3. Average values of constructs (Source: Authors)

After the Bonferroni post-hoc test was performed, statistically significant differences are noted in the following: 1) brand image – between Poreč and Mali Lošinj, Split, Zadar, and Dubrovnik; 2) brand loyalty – between Dubrovnik and Split; 3) brand awareness – between Split and Dubrovnik; 4) brand quality-employees in tourism – between Poreč and Split; 5) brand quality-city - between Poreč and Mali Lošinj, Split, Zadar, and Dubrovnik.

4.3. Discussion of the research results
Taking into account the per capita investment rate in environmental protection in the analysed cities: Mali Lošinj 817.42, Poreč 458.13, Dubrovnik 151.69, Zadar 87.4., and Split 24.29, we can conclude the following. Higher investments in environmental protection are related to the level of the destination's brand equity. Differences are noted in different destinations' brand equity dimensions such as for a city with a high level per capita investment in environmental protection, it has a higher perceived brand image and higher perceived brand quality of the city among local inhabitants, than cities with a lower level of per capita investments in environmental protection. Also, in small differences in per capita investment rate in environmental protection, such as between Split and Dubrovnik, is evident that there exists a difference in perception, among local inhabitants, of brand loyalty and brand awareness. Thus, a city with higher per capita investment in environmental protection has a higher level of brand loyalty and brand awareness perception among local inhabitants employed in the tourist sector. Similarly, Popescu and Zamfir (2012) emphasize that local stakeholders, which certainly include local people employed in tourism, need to be involved in the development of green destinations through policies and programs. Thus, through their involvement and engagement in responsible tourism initiatives (Costa et al., 2020; Mangwane et al., 2019), locals add value to tourism destinations, ensuring sustainable tourism development and building the destination's brand equity.

5. CONCLUSION
If the local population has a positive perception of tourism while mitigating its negative impact on the environment, this will lead to increased investment in environmental protection. Local governments in tourist destinations play a crucial role in guiding investments to improve environmental resources. In line with these findings, the proposed hypothesis is affirmed. Furthermore, the research results show that the destination's brand equity has to be analysed through the prism of its constructs of brand awareness, brand image, brand quality-city, brand quality-employees in tourism, and brand loyalty. If this is neglected, nuances related to differences in the per capita investment rate in environmental protection and its influence on the various dimensions of destination brand equity will be overlooked.

It is also important that locals, together with locals working in tourism, are co-creating value to the destination by providing quality tourism experiences, such as authentic tourism offerings like cultural tours, target group-specific tours, storytelling about historical events, etc. Another way is to create accommodation offerings that are excellent and inspiring, accompanied by authentic and memorable tourism experiences. In addition, the local government needs to be involved in this process as it can increase the destination's brand equity through investing in tourist facilities such as clean, accessible, and safe beaches with additional facilities such as playgrounds for children, sports facilities, and the like. It can also invest in appropriate meeting places and events where locals and tourists can share their experiences and provide facilities and open spaces for events that are related to history or combine modern and traditional experiences. This research has some limitations, as does any other research. Tourist destinations were observed from the perspective of the city as a destination. Hence, further research could focus on considering other types of tourist destinations according to geographical elements such as rural, coastal, continental, etc., according to developed selective forms of tourism (cultural, health, entertainment, etc.), and take into account a single county or region, and include all cities in that area in the research. Cities were selected due to their per capita investment rate in environmental protection. It could be that the reports of individual cities are different and uneven due to the used methodology and calculations used by the cities themselves for investments in environmental protection. Further research could focus on using, where possible, data based on indicators that are unambiguously defined and collected.

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EVALUATION OF EFFICIENCY OF CROATIAN OPEN VOLUNTARY PENSION FUNDS USING DATA ENVELOPMENT ANALYSIS

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ABSTRACT

Open voluntary pension funds represent an important segment of the pension system, which requires continuous evaluation of efficiency. The aim of the research is to evaluate the relative efficiency of Croatian open voluntary pension funds with the application of DEA methodology. By application of nonparametric methods of data envelopment analysis, technical efficiency and efficiency of fund scales through DEA models were evaluated. The research encompassed active open voluntary pension funds in Croatia using panel data for a five-year period. The methodological framework is based on input-oriented CCR and BCC models, where the number of fund members and contributions paid gross were used as inputs, and net asset value and unit prices as outputs. Such an approach facilitated a comprehensive evaluation of operational efficiency and identification of best practices. Empirical results point to a considerable heterogeneity in efficiency between funds. Four funds showed a consistent maximal efficiency, becoming reference points for the sector. The average efficiency of the open voluntary pension fund market shows a positive trend of growth in efficiency throughout the analysed years. The analysis also showed that the majority of funds operate close to the optimal size, suggesting the adequacy of the regulatory framework. Scientific contribution is manifested through the provision of a comprehensive analytical framework, using DEA methodology for the evaluation of the efficiency of voluntary pension funds in Croatia. The research results are applicable for fund management and regulatory policy, especially within the context of optimising operational efficiency and defining the benchmark for the sector.
Keywords: open voluntary pension funds, DEA analysis, efficiency, net asset value, Croatia

1. INTRODUCTION

The pension system represents one of the fundamental pillars of modern state social security and economic stability, and its efficiency has a direct impact on the quality of life of pensioners. Open voluntary pension funds have been operational in Croatia since 2002 as a part of the third pillar pension scheme, representing voluntary capitalised savings. According to the data of the Croatian Financial Services Supervisory Agency, eight open voluntary pension funds are currently operational in the Croatian market, which, together, manage considerable amounts of assets and gather increasing numbers of members. The development of voluntary pension funds in Croatia was gradual, but continuous, emphasizes Bejaković (2019), with a substantial number of members and assets under management during the last decade. Data Envelopment Analysis (DEA) represents a nonparametric method that enables the evaluation of the relative efficiency of the decision makers who use similar inputs for the generation of similar outputs.

The methodology is particularly suitable for financial institution analyses as it does not require specification of the functional form of relationships between inputs and outputs, which often proves to be problematic in the financial sector due to the complexity of the business itself and a multitude of factors that affect the performance. International research on pension fund efficiency provides an important theoretical and methodological framework for the analysis of the Croatian market. Among the first ones who applied the DEA methodology on the pension funds were Barros and Garcia (2006), analysing the Portuguese pension fund market. Their research identified key factors that affect the fund's performance, including the fund size, operational costs, and investment strategies. The development of voluntary pension funds in Croatia is characterised by specific challenges related to the market size, regulatory framework, and investment opportunities. According to Šonje (2011), key challenges include the limited depth of the domestic capital market, regulatory limitations in investment strategies, as well as the need to balance between the return and the safety of investment. These challenges make the efficiency analysis particularly important for the understanding of the performance of funds and the identification of the areas for potential improvement. The aim of this research is to evaluate the relative efficiency of the Croatian open voluntary pension funds with the application of the DEA methodology. The research encompasses the technical fund efficiency analysis, identification of the best practices and potential areas for performance improvement. Special attention was paid to the impact of different inputs and outputs on the fund efficiency, as well as to the analysis of the efficiency trends during the observed period. The methodological approach is based on the application of input-oriented CCR and BCC models of the DEA analysis, which enable the efficiency evaluation, provided there are constant and variable returns on scale. These two models give complementary insights into different aspects of fund efficiency and facilitate the identification of the source of inefficiency. The analysis also includes the evaluation of the efficiency scale, which is especially relevant given the different fund sizes in the Croatian market.

2. PREVIOUS RESEARCH

Previous research in the field of the efficiency of pension funds with the application of the DEA methodology provides a rich theoretical and empirical framework for the understanding of the key determinants of business performance of these financial institutions. The development of the research area can be followed through several key phases, starting from the research, which sets the methodological bases for the application of DEA in the financial sector. Among the first ones, Sherman and Gold (1985) applied the DEA methodology in the financial sector, analysing the efficiency of the bank branches. Their research set the basis for a later application of DEA in the analysis of different financial institutions, including also the pension funds. The authors identified the key advantages of the DEA methodology in the context of the financial institutions, particularly emphasizing the possibility of simultaneous consideration of multiple inputs and outputs, without the need to explicitly define their correlations. Wilson (1995) substantially contributed to the methodological development through the development of the methods for the identification of important observations in the DEA analysis. His work is important for ensuring the robustness of the results in the conditions of a limited number of DMU units, which is a frequent occurrence in the analysis of pension funds in smaller markets. Simar and Wilson (1998) developed a bootstrap methodology for the DEA analysis, which enables statistical conclusion about the obtained efficiency results. Their contribution is important for the validation of the results and evaluation of the reliability of the obtained efficiency scores, which is crucial for making informed decisions about fund management. Cooper et al. (2007) provided a comprehensive review of the development of the DEA methodology and its application within different contexts, including also the financial sector.

Their work enables the understanding of different modifications of the main DEA models and their applicability in specific contexts of pension fund analysis. Dyson et al. (2001) identified the key protocols in the applicability of the DEA methodology, which facilitate the realisation of the result validity. Their guidelines are relevant for the analysis of pension funds, where the correct specification of inputs and outputs is essential for achieving relevant results. Banker et al. (2010) developed the statistical tests for comparison of efficiency between different DMU unit groups, which enables a comparative analysis of funds of different characteristics and monitoring of the changes in efficiency over time. In the research of pension fund efficiency, Barros and Garcia (2006), who analysed Portuguese pension funds, made a considerable contribution to the understanding of the application of the DEA methodology. Their research identified key variables which affect the pension fund efficiency, including the number of members, asset value under management, and operational costs. The authors proved that the fund size affects efficiency, where larger funds generally show a higher level of technical efficiency. Babalos et al. (2012) conducted an extensive analysis of the Greek pension funds with the application of the DEA methodology, focusing on the period of financial crisis. In the research, it is shown that external shocks and market turbulence affect the pension fund efficiency. The authors proved that funds with more conservative investment strategies show a larger stability in efficiency during crisis periods. Furthermore, in their research, Basso and Funari (2017) directed themselves towards the relationships between the fund size and its efficiency. Their findings suggest that there is an optimal fund size where operational efficiency is maximised. This research is relevant for the Croatian market, with respect to a relatively small market size and a limited number of participants. In the Croatian market, Novaković (2015) carried out research on the financial performance of pension funds through the portfolio investment performance. The conducted research shows that pension fund financial business directly affects their competitiveness, which arises from the possibility to measure their performance in active portfolio management. Matek and Galić (2017) conducted comprehensive research on the risk management role for compulsory and voluntary funds. In their research, they illustrated how different fund categories require different approaches to risk management in order to achieve optimal performance. Gardijan and Krišto (2017) researched the total performance of mutual funds in the pre-crisis and post-crisis periods, proving that efficiency considerably varies, depending on market conditions. Their research shows that mutual funds in Croatia have different efficiency levels in different phases of the economic cycle. Draženović et al. (2019) focused on research on the compulsory pension fund efficiency, confirming the importance of the asset allocation for efficiency. The research results show that the optimal asset allocation must take into account not only market conditions, but also the specificities of the Croatian pension system. Previous research points to the importance of the proper input and output specification in the DEA models. Here, the number of members, the value of payments, and operational costs appear as the most frequently used inputs, while net asset value, return, and different risk measures often appear as outputs. Despite the conducted analyses, as far as we know, an efficiency analysis for open voluntary pension funds in Croatia has not been conducted, and therefore, the focus of this research is on the efficiency analysis itself of these types of pension funds.

3. RESEARCH METHODS

The research on the efficiency of open voluntary pension funds in Croatia is based on the application of the Data Envelopment Analysis (DEA) methodology, which facilitates the evaluation of the relative efficiency of decision units, taking into consideration multiple input and output parameters. This non-parametric method is especially adapted to the specifics of the open voluntary pension funds, which, as opposed to the mandatory pension funds, are characterised by a more flexible investment policy and a more heterogeneous member structure.

In the context of this research, the decision-making units (DMU - Decision Making Units) represent open voluntary pension funds that operate in the Croatian market. For evaluation of their efficiency, two DEA models are used in the research: the CCR model (Charnes, Cooper and Rhodes, 1978) which presumes a constant return on scale and the BCC model (Banker, Charnes and Cooper, 1984), which takes into account a variable return on scale. The research encompassed the period between 2019 and 2023, using panel data that included all open voluntary pension funds that continuously operated during the observed period. The data for the research were taken from the funds' annual financial reports and official statistics of the Croatian Financial Services Supervisory Agency (HANFA). The choice of input and output variables is based on the operational particularities of these kinds of funds. The input variables are defined as: the number of fund members, which represents the base for collecting contributions, and the paid gross pension contributions, which include individual member payments. The output variables are the net assets of the fund as an indicator of the total value of assets reduced by liabilities, and the unit prices that reflect the success of asset management. The choice of the input-oriented model is based on the analysed literature and on the presumption that pension fund management has a greater control over input variables than over output variables, which are under the influence of market movements.

After data collection, consistency and completeness of the data were checked to ensure comparability. Implementation of the DEA methodology was conducted through the calculation of the technical efficiency by application of the CCR model, pure technical efficiency by application of the BCC model, and the calculation of the efficiency of the ratio, as the scale of the CCR and BCC results. According to the methodology proposed by Cooper, Seiford and Zhu (2011), a separate DEA model is constructed for each year in order to determine the changes in efficiency over time. This approach facilitates the identification of trends and patterns in the fund performance. Special attention was paid to the sensitivity analysis, which includes a variation of input and output variable combinations, the application of a bootstrap method for evaluation of the reliability interval, and the analysis of the time component influence. The results obtained by the application of this methodology facilitated the ranking of the funds according to efficiency, the identification of best practices in fund management, and the formulation of recommendations for efficiency improvement. The applied methodology enabled a systematic analysis of the open voluntary pension funds, taking into consideration the specificities of the Croatian market and the regulatory framework. Through the combination of the CCR and BCC models, analysis of variables and identification of referential units, possibilities are illustrated for the improvement in the funds' business operations. However, as Dyson et al. (2001) emphasised, the DEA methodology has certain limitations which should be taken into consideration in result interpretation, including the presumption about the homogeneity of the decision-making units, sensitivity to extreme values, and the relative nature of the result.

4. RESEARCH RESULTS

The efficiency analysis of open voluntary pension funds in Croatia during the period between 2019 and 2023 was conducted using the application of two input-oriented DEA models – the CCR model, which presumes constant returns on scale (CRS), and the BCC model, which presumes variable returns on scale (VRS). This comparative analysis provides a comprehensive insight into the relative efficiency of the funds and enables the identification of the source of inefficiency through the analysis of technical and pure technical efficiency, as well as the scale efficiency. Descriptive statistics for chosen inputs and outputs, from which the differences are visible in the range of minimum and maximum values in inputs and outputs, are shown in Table 1 below.

Statistical indicator	(I) Number of members	(I) Pension contributions paid gross (thou. of EUR)	(O) Net assets (thou. of EUR)	(O) Unit prices
Arithmetic mean	44,400.95	13309.58	104700.15	64.48
Standard deviation	35,551.59	11023.63	107454.25	56.41
Minimum	937	870.47	1232.4	23.3
Median	36,340	8925.32	57073.5	36.1
Maximum	111,326	35762.84	354227.18	182.24
Number of observations	40	40	40	40

Table 1. Descriptive statistics for open voluntary pension funds
(Source: Author's calculation)

The CCR model results in Table 2 show that four funds - AZ profit ODMF, Croatia osiguranje 1000A ODMF, Croatia osiguranje 1000C ODMF, and Raiffeisen ODMF – consistently maintain maximum efficiency throughout the entire observed period. These funds represent the best practice in the sector and are used as referential points for other funds. On the other hand, the results obtained by the BCC model shown in Table 3 also identify the same funds as completely efficient, but they show somewhat higher efficiency grades for the remaining funds due to the presumption of variable returns on scale.

DMU	2019	2020	2021	2022	2023	Average
AZ benefit ODMF	0.8122	0.8599	0.8164	0.8153	0.794	0.8196
AZ profit ODMF	1	1	1	1	1	1
Croatia osiguranje 1000A ODMF	1	1	1	1	1	1
Croatia osiguranje 1000C ODMF	1	1	1	1	1	1
Croatia osiguranje ODMF	0.6447	1	1	1	1	0.9289
Erste Plavi Expert ODMF	0.9864	0.8109	0.7832	0.7339	0.7264	0.8082
Erste Plavi Protect ODMF	0.4374	0.4597	0.445	0.4716	0.4617	0.4551
Raiffeisen ODMF	1	1	1	1	0.9996	0.9999

Table 2. Efficiency of open voluntary pension funds with application of CCR-I model in the period between 2019 and 2023
(Source: Author's calculation)

DMU	2019	2020	2021	2022	2023	Average
AZ benefit ODMF	0.8159	0.8642	0.8232	0.8264	0.8041	0.8268
AZ profit ODMF	1	1	1	1	1	1
Croatia osiguranje 1000A ODMF	1	1	1	1	1	1
Croatia osiguranje 1000C ODMF	1	1	1	1	1	1
Croatia osiguranje ODMF	0.6793	1	1	1	1	0.9359
Erste Plavi Expert ODMF	1	0.8595	0.8432	0.7796	0.7711	0.8507
Erste Plavi Protect ODMF	0.5006	0.4915	0.4811	0.5025	0.4931	0.4937
Raiffeisen ODMF	1	1	1	1	1	1

Table 3. Efficiency of open voluntary pension funds with application of BCC-I model in the period between 2019 and 2023
(Source: Author's calculation)

Considering lower efficiency, it can be noticed that Croatia osiguranje ODMF shows considerable progress in efficiency during the observed period. In 2019, the fund had a relatively low efficiency of 0.6447 according to the CCR model, and of 0.6793 according to the BCC model, only to, from 2020 onwards, achieve full efficiency towards both models. This improvement suggests successful implementation of strategic changes in fund management and optimisation of resource use.

AZ benefit ODMF has a stable, but not a full, efficiency during the whole period, with an average CCR efficiency of 0.8196 and BCC efficiency of 0.8268. Relatively small differences between the CCR and BCC results for this fund point to the fact that the main source of inefficiency lies in technical inefficiency, and not in the problem of business scale. Erste Plavi Expert ODMF shows a trend of efficiency fall during the observed period. According to the BCC model, the fund was entirely efficient in 2019, followed by a continuous fall of up to 0.7711 in 2023. The CCR model shows a similar trend, but with somewhat lower efficiency values. This efficiency fall suggests the need for a change of operational strategies and a potential need for optimisation of resource management. Erste Plavi Protect ODMF shows the lowest efficiency towards both models, with an average CCR efficiency of 0.4551 and BCC efficiency of 0.4937.

DMU	2019	2020	2021	2022	2023	Average
AZ benefit ODMF	0.9955	0.995	0.9917	0.9866	0.9874	0.9912
AZ profit ODMF	1	1	1	1	1	1
Croatia osiguranje 1000A ODMF	1	1	1	1	1	1
Croatia osiguranje 1000C ODMF	1	1	1	1	1	1
Croatia osiguranje ODMF	0.9490	1	1	1	1	0.9898
Erste Plavi Expert ODMF	0.9864	0.9434	0.9289	0.9414	0.9420	0.9484
Erste Plavi Protect ODMF	0.8738	0.9354	0.925	0.9385	0.9364	0.9218
Raiffeisen ODMF	1	1	1	1	0.9996	0.9999

Table 4. Analysis of the scale of CCR and BCC models of open voluntary pension funds in the period between 2019 and 2023
(Source: Author's calculation)

The scale efficiency analysis, illustrated in Table 4, which is counted as a ratio of the CCR and BCC efficiency, gives an additional insight into the inefficiency sources. The funds that show full efficiency towards both models also have full scale efficiency, which means that they operate at an optimal size. AZ benefit ODMF has a high average scale efficiency of 0.9912, which suggests that the fund operates close to optimal size, although there is little room for improvement. Erste Plavi Expert ODMF shows a somewhat lower average scale efficiency of 0.94, which points to certain non-optimality in the size of operations.

DMU	2019	2020	2021	2022	2023	Average
AZ benefit ODMF	0.0037	0.0043	0.0069	0.0111	0.0101	0.0072
AZ profit ODMF	0	0	0	0	0	0
Croatia osiguranje 1000A ODMF	0	0	0	0	0	0
Croatia osiguranje 1000C ODMF	0	0	0	0	0	0
Croatia osiguranje ODMF	0.0346	0	0	0	0	0.0069
Erste Plavi Expert ODMF	0.0136	0.0486	0.06	0.0457	0.0447	0.0425
Erste Plavi Protect ODMF	0.0632	0.0318	0.0361	0.0309	0.0314	0.0387
Raiffeisen ODMF	0	0	0	0	0.0004	0.0001

Table 5. Differences in the efficiency between BCC and CCR models of open voluntary pension funds in the period between 2019 and 2023
(Source: Author's calculation)

The differences between the BCC and CCR results (BCC - CCR), listed in Table 5, show an additional influence of variable returns on scale. The biggest differences are perceived in Erste Plavi Expert ODMF, where the BCC model shows higher efficiency grades, with an average difference of approximately 0.0425. This suggests that this fund's non-efficiency part arises from the non-optimal operation size, and not only from technical inefficiency. Erste Plavi Protect ODMF shows the lowest efficiency according to both models, with an average CCR efficiency of 0.4551 and a BCC efficiency of 0.4937. The differences between the CCR and BCC results suggest that the main inefficiency source is technical inefficiency, and not the problem of business scale. This fund has substantial room for improvement of operational efficiency through optimisation of the use of input and increase of output.

Description	2019	2020	2021	2022	2023
CCR-I	0.8601	0.8913	0.8806	0.8776	0.8727
BCC-I	0.8745	0.9019	0.8934	0.8886	0.8835

Table 6. Average total annual efficiency according to BCC-I and CCR-I models in the Croatian market of open voluntary pension funds in the period between 2019 and 2023
(Source: Author's calculation)

Average annual efficiency in the Croatian market of open voluntary pension funds, shown in Table 6, has slight fluctuations during the observed period. According to the CCR model, average market efficiency varies between 0.8601 in 2019 and 0.8727 in 2023, with the highest value of 0.8913 in 2020. The BCC model shows similar trends, but with somewhat higher values, varying between 0.8745 in 2019 and 0.8835 in 2023, with the highest value of 0.9019 in 2020. Summarising the research results, the following conclusions can be drawn. First, the existence of funds with continuous full efficiency indicates that it is possible to maintain a high level of operational efficiency during a longer period, even in changing market conditions. These funds can serve as examples of best practices for the remaining sector participants. Second, the considerable efficiency improvement of Croatia osiguranje ODMF shows that it is possible to overcome operational inefficiencies through strategic changes in management. This experience can be particularly relevant for the funds that currently show lower efficiency, such as Erste Plavi Protect ODMF.

Third, relatively stable average efficiencies in the market suggest that the voluntary pension fund market in Croatia shows a satisfactory level of operational efficiency. Fourth, the scale efficiency analysis shows that the majority of funds operate close to the optimal size, which suggests that the current market structures and regulatory frameworks are generally supportive of efficient fund operations. However, the existence of certain inefficiencies in the size of operations in some funds indicates the potential for further business improvement.

5. CONCLUSION

The conducted research on the efficiency of open voluntary pension funds in Croatia with the application of the DEA methodology brings new scientific contributions and practical implications for the sector of voluntary pension savings. Through implementation of the CCR and BCC models, with the use of the number of fund members and contributions paid gross as input variables and the fund asset net value and the unit prices as output variables, the efficiency of the analysed funds during the period between 2019 and 2023. The research results show the existence of a group of funds that continuously maintain maximum efficiency. These funds serve as reference points of excellence in the sector, demonstrating that it is possible to maintain a high operational efficiency over a longer period of time. The analysis also identified the areas that require attention, especially in the open voluntary pension fund, which shows a trend of fall in efficiency, and the other fund, which records the lowest level of efficiency among the analysed funds. These findings suggest the need for a revision of operational strategies and optimisation of resource management in those funds. It is important to emphasize that the main source of inefficiency is technical inefficiency, and not problems related to the economy of volume, which points to the existence of space for improvement of operational processes. The scale efficiency analysis showed that a majority of funds operate close to the optimal size, which confirms the adequacy of the current market structure and the regulatory framework in supporting funds' efficient operations. These findings have implications for regulatory institutions and policy creators, suggesting that the current regulatory framework provides a corresponding basis for the efficient functioning of the sector of voluntary pension savings. The scientific contribution of this research lies in the presentation of the methodological framework for the evaluation of pension fund efficiency, which can be replicated in future research, and in the identification of the factors that contribute to the efficiency of the funds, which can serve as a basis for the development of performance improvement strategies. The obtained results provide an empirical basis for making informed decisions in the context of open voluntary pension fund management. The practical application of the research results is that they can serve as guidelines for fund managers to optimize operational processes and identify areas for improvement. The findings can help regulatory authorities, investors, and fund members in further analysing the efficiency of the sector. Future research can be focused on a detailed analysis of specific factors that contribute to the efficiency of successful funds, as well as on the development of recommendations for overcoming the non-efficiency sources in less successful funds.

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STRATEGIC THINKING – WHAT HAVE WE LEARNED SO FAR?

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ABSTRACT

Strategic thinking, as the buzzword, has been around in the literature of strategic management for almost half a century. A systematic content literature approach performed on the body of scientific literature reveals several layers, and perspectives of approaching strategic thinking. By consulting respected databases, selecting strategic thinking literature, and excluding military perspectives, there are a number of avenues for strategic thinking. Some of the researchers claim that we know a lot about strategic thinking, while others claim that it is still a black box phenomenon. Strategic Thinking as a phenomenon could be looked at from the human resource perspective as the key capability for top management. According to the phases of developing strategic management, it could be looked at from a strategic cognitive perspective as the way top management confronts challenges in their own head. Additionally, strategic thinking could be viewed as a dynamic capability, a resource needed for all employees in the firm. The results of the review indicate three distinctive sections based on timeline (embryo stage publications, the diversified stage publications, and the focused stage publications), the second one with three additional subsections based on the topics (educational stream, leadership, game theory, business acumen, and cognitive stream). Each one is fueled with key areas suggested for future research. The key results are that strategic thinking desperately needs to go deep into the epistemology and ontology and find an anchor to the existing well-received knowledge in order for strategic thinking to find its roots and solid grounding foundations. The key question this paper answers is what we have learned about strategic thinking so far.
Keywords: dynamic capability, systematic literature review, strategic thinking, content analysis

1. INTRODUCTION

Strategic thinking is a self-understood phenomenon that is an overwhelming topic in business boardrooms. The essential idea is that business intelligence, in any format, is crucial for top management-level decision-making. Strategic thinking is a proxy of business intelligence, supposed to be an obvious activity and job description of every top management team or top manager themselves. It is an everyday activity that is performed on a daily basis, and they have the status of an axiom- there is no special need to offer proofs for its importance or status- it is widely accepted and agreed upon. Strategic thinking is an underlying concept essential in each business, as the Holy Grail of strategic management. It is essential for the management of a company, and practitioners and consultants show a lot of attention, yet are too complex to capture by research. The aim of this paper is to present a systematic content literature review that answers the question of why the strategic thinking concept has been neglected in the research and why there are just a handful of high-quality suggestions on how to advance strategic thinking in the literature. Answering these two questions will open suggestions for improvement and further research that could take the development of strategic thinking to a higher level. The paper consists of a short introduction to the literature of strategic thinking, followed by a methodology section. The results are presented in three sections based on timeline, the second one with three additional subsections based on the topics. Discussion offers insights into the systematic content literature review, limitations, and suggestions for further research, and the last chapter is the conclusion.

2. INTRODUCTION TO THE LITERATURE

The general notion is that the definition of strategic thinking is the generation and application of business insights on a continual basis to achieve competitive advantage (Horwath, 2009). As Lake (Lake, 2004) would notice, strategic thinking is different because you have to step back from your organization and see the possibilities (rather than the problems), the important characteristics (rather than the urgent tasks), and the opportunities (rather than the obstacles). Strategic thinking started to be noticed in the literature of strategic management as early as the strategic management itself, but with no explicit definition, content, or specific construct. The underlying assumptions were not based in economics, as was the case with strategic management, and therefore, it still has very flexible foundations.

After the great popularity of strategic planning (Mintzberg, 1994), strategic thinking was set to be the counterpart of a popular trend and started to position itself against the mainstream. Strategic thinking was associated with the change that strategic planning does not offer per se. As the environment started to be more dynamic, the need to be familiar with strategic thinking became more appealing. Since academic curiosity started to be revealed in the publications, strategic thinking started to show its complexity, multidimensionality, and that its nature as a concept is multileveled. It is not a matter of one person in the company (TMT or TMT team) but everybody, it is not about one-time activity annually- but on a daily basis, it is not either rational or intuitive- rather paradoxical by nature.

3. METHODOLOGY

The systematic literature review did not follow the bibliometric nature of inquiry, but rather the content-based review of the literature. The systematic literature review is based on the articles published in the respective databases of Web of Science core collection, more specifically SSCI- Social Science Citation Index, SCI- expanded- Science Citation Index expanded, and Emerging Sources Citation Index (ESCI). All other editions are excluded. Search was performed during November 2024. The database was searched with the search category „strategic thinking" within the category of abstract. Titles have words „strategic thinking" just to sound more sophisticated or more appealing. The search results ended in 1276 documents. We excluded associated data and enriched cited references, and it was narrowed down to 1157. An additional filter was only text in the English language, which brought the number to 1039. We decided to go only for the research areas like Business Economics, Psychology, and Education research. This brought the number to 496.

There are many other fields, like military or medical studies, but this was excluded from further research. Strategic thinking in other research fields is a buzzword denoting something important or a word explaining environment-specific and crucial elements of the decision-making process. In addition to the manual research procedure, we double-checked the validity by using an AI-generated Clarivate Web of Science research assistant. The results were 24.763 documents generated. When looking closely within the research results, AI filtered for the topic „strategic thinking" and set it to 990 documents. Excluding enriched cited references brings the number to 951, and further filtering of only text in the English language brings the number of 850 documents. Excluding research areas apart from Business economics, Psychology, and Education, Educational Research brings the number of 405 papers. Since the results were pretty similar, the author took the manual (human) research results to continue the research.
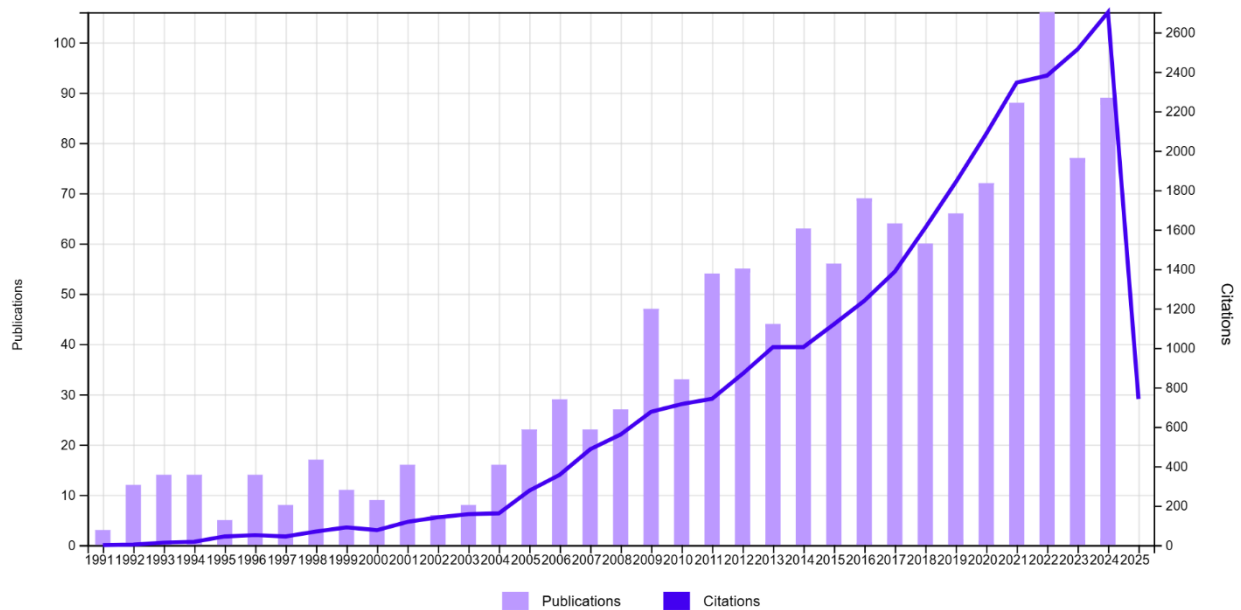
Figure 1 The overview of the published articles on *strategic thinking*
(Source: author's results of review on WOS platform)

When looking closely at the research (Figure 1), one could depict three stages of developing strategic thinking: the embryo stage (1991-2000), consisting of 64 publications, the diversified stage (2001- 2020), consisting of 287 publications, and the focused stage of evolution in strategic thinking literature (2021-2024), consisting of 145 publications.

4. RESULTS OF THE SYSTEMATIC CONTENT LITERATURE REVIEW

4.1. The embryo stage (1991-2000) publications

This systematic content review of literature starts with a publication from 1991 by Zabriskie and Huellmantel (Zabriskie, Huellmantel, 1991) answering the call to write more on developing strategic leadership in senior management. They have identified six major segments of strategic thinking, and these have been organized to reveal the tasks, questions, decisions, and skills that senior executives must acquire in order to lead their organizations strategically. Their conclusion was that market turbulence and technological turbulence foster strategic thinking at the organizational level, and there is a positive relationship between strategic thinking and marketing performance. Strategic thinking has been researched in the context of how to help develop support for strategic thinking, by information system (Rouhonen, 1993), case-study learning and training (Graham, Morecroft, Sterman, 1992), and experiments (Stahl, Wilson, 1994). It is suggested to use strategic thinking for managing the length of a product line (Guiltinan, 1993). The most important work was by Mintzberg (Mintzberg, 1994). That was the idea that positioned strategic planning and strategic thinking as counterparts and reserved a special place for strategic thinking in the future. Simon came up with the idea that strategic thinking must permeate the whole organization (Simon, 1993). The researchers put the concept of strategic thinking in relation to market needs (Kashani, 1995) and developing competitive advantage (Long, Vickerskoch, 1995). There was the first notion that cognitive perspective can help in understanding and developing strategic thinking (Klayman, Schoemaker,1993). One of the next milestones was the paper of Whittington (Whittington, 1996) confessing that strategy is a practice and not a scientific discipline, starting his strategy-as-practice turn in the literature of strategic management.

Liedtka (Liedtka, 1998) lists elements of strategic thinking like: systems perspective, it is intent-focused, involves thinking in time, is hypothesis-driven, and is intelligently opportunistic. A more elaborated relation between strategic planning and strategic thinking is done by Heracleous (Heracleous 1998), pointing out the similarity of relation between single and double loop learning and strategic planning and strategic thinking. Wilson (Wilson, 1998) concludes that it is important to embrace not either-or option of strategic planning or the strategic thinking, but rather a complementary approach which works well in practice. Linkow (Linkow, 1999) was the most precise one describing essential elements of strategic thinking: external factors that can be managed but not learned, enduring traits and characteristics that are inherited or result from early childhood development, and several thinking competencies. The external factors are experience, selection, and something Linkow calls "smart luck." The thinking competencies are reframing, scanning, abstracting, multivariate thinking, envisioning, inducting, and evaluating. Concluding, the first stage introduced several key ideas about strategic thinking, elements, relation toward strategic planning, and the way it should be perceived. There were no specific ways to measure it or develop. There were just a few publications that left a significant mark on future researchers in the strategic management literature.

4.2. The diversified stage (2001- 2020) publications
The second stage is, by nature, quite diversified and consists of a number of publications. It is the growing developmental stage where strategic thinking is a popular keyword used in different settings, meanings, and areas. Strategic thinking, apart from military and geostrategic studies, is heavily mentioned in marketing, finance and banking sector, supply chain, fashion design, agriculture, and health care. Examples of country levels (i.e. India, China, US, Taiwan), case-studies of specific companies, and even people. The research goes in all four directions concerning the size of companies; micro entrepreneurial companies (Mazzarol, Reboud, Soutar 2009), SMEs (Jelenc, Pisapia, 2015), large companies, and MNEs (Dabic, González-Loureiro, Furrer, 2014). Out of all those papers, it is possible to depict three avenues of research that overlap at the same point of analysis:

Educational stream of research -in this group, strategic thinking is defined as the skill that could be measured, trained, and developed from an early age. It is mainly focused on children, youth, and students, and the way we can recognize ways of improving their strategic thinking capability. Results show that strategic thinking is already present at nine years of age (Güroglu, van den Bos, Crone, 2009). Strategic thinking is a construct that is found to be different between gifted and average-performing children (Steiner, 2006). Research supports the benefits of engaging young people in the activist program in which young people work for social change. They develop three strategic modes of reasoning: seeking strategic information, framing communications to the audience, and sequential contingency thinking (Larson, Hansen, 2005). Youth's development of strategic thinking, defined as the use of dynamic systems reasoning to anticipate real-world scenarios and plan work, develops through youth's creative engagement with tactical challenges in the work and feedback from the work's outcomes (Larson, Angus, 2011). There was also an attempt to teach students strategic thinking with computer games and simulations about small company profit (Gächter, Thöni, Tyran, 2006).

Leadership- Influenced by the field of finance, strategic thinking was understood as the interaction between two or more players in the market. A wide range of publications is based on the notion of **game theory** and therefore offers an array of experiments and game settings that explain how to develop strategic thinking capability (Hong, Liu, 2003; Ho, Lim, Camerer, 2005; Ellingsen, Östling 2010; Costa-Gomes, Crawford, Iriberri, 2009; Crawford, Costa-Gomes, Iriberri, 2013; Soldano, Arzarello, 2016; Mustata, Alexe, and Alexe, 2017).

They explain differences in behavior, different study groups, and (non)managerial status in the company. The first level was experiments, then computer software games like Stratego, then virtual multiplayer games and online games (like Massively Multiplayer Online Role-Playing Games-MMORPGs (Silva, Mousavidin, 2015; Goeree, Louis, Zhang, 2018). In some cases, the target group are students or youth, and it correlates with the previous avenue of research.

Business acumen strategic thinking research was around the essence of strategic thinking. Articles argue about the positioning of strategic planning and strategic thinking, trying to test which of them brings more value to the company. Strategic planning is a way to lead companies and predict good performance. At the same time, it is suggested that it inhibits change. Strategic thinking is synonymous with autonomous actions, which bring change and strategic adaptation (Andersen, 2000). There is a need for the coexistence of strategic planning and strategic thinking, while strategic thinking enables managers to take responsive decisions under changing and dynamic environmental conditions. Strategic thinking is associated with change by fostering reflective dialogue (Jacobs, Heracleous, 2005). Later on, the view is that the strategic thinking process is composed of two joints, but paradigmatically distinct, activities-analysis and synthesis. Analysis represents the scientific paradigm (op.cit. strategic planning), whereas synthesis represents the artistic paradigm (Maranville, 2011). Strategic capabilities were more often associated with indicators of financial success, and dynamic capabilities (op. cit. one of the most distinctive is strategic thinking) were more often associated with non-financial measures of organizational performance (Simon, et al. 2015).

The articles suggest that strategic thinking could be labeled differently, like dynamic strategic thinking (Dickson, Farris, Verbeke, 2001) while it reflects market needs. Another suggestion was business system thinking (Van der Heijden, 2001). Strategic capability is just a fancy name describing the traditional process of strategic management (Cravens, Piercy, Baldauf, 2009). The discussion soon starts with the factors influencing strategic thinking, like social capital (Starkey, Tempest, 2004) or culture (Arayesh, Golmohammadi, Mansouri, 2017).

Problems in measuring constructs are pointed (Dortmans, Kurtis, Tri, 2006) but not heavily recognized in the literature from the methodological point of view. The stream of research directed toward frameworks or models builds on the attempts to offer the "strategy frame" produced by the four Es of strategy, which represent the strategic thinking drivers behind the different conceptualizations of strategy (Khalifa, 2008). The paper attempts to deal with the basic tensions and paradoxes in the strategy field in order to develop a hopefully useful framework, which is able to relate them in an integrative way. An example of such an instrument combining rationality and intuition is by Calabrese, Costa (Calabrese, Costa, 2015). Publication devotes the whole paper to the proposition of introducing an element or characteristic of strategic thinking, i.e. the ability to zoom in and zoom out (Kantner, 2011), or even strategic cubism, by using cubism to shape communication between managers (Dufour and Steane, 2014). One model of strategic thinking competency (Nuntamanop, Kauranen, Igel, 2013) consisted of: conceptual thinking ability, visionary thinking, analytical thinking ability, synthesizing ability, objectivity, creativity, and learning ability. The attempt (Pang, Pisapia, 2012) to measure strategic thinking capability within Hong Kong school leaders with the validated strategic thinking questionnaire (STQ) that Pisapia developed earlier (Pisapia, Greyes, Coukos-Semmel, 2005). Moon (Moon, 2013) had a well-received article establishing a link between elements of strategic thinking (systematic thinking, vision-driven thinking, creative thinking, and adding market-oriented thinking) and measuring on the organizational level the relation between strategic thinking and market performance. She stated the internal (culture, structure, and resources) and external (market and technological turbulence) antecedents of strategic thinking. Only formalization within the organizational structure impedes strategic thinking. Everything else seems to improve strategic thinking capability.

Strategic thinking competency could be explained like a competency model ready to be used by human resources (Goldman, Scott, 2016). Based on that, Goldman, Schlumpf, Scott (Goldman, Schlumpf, Scott, 2017) developed the Individual Behavior Assessment Tool for Strategic Thinking, compounding insights from the process of strategic thinking, psychology literature on personalities and other factors affecting cognitive processing, and the leadership literature. Research on sound definition of strategic thinking measured by the instrument (Dhir, Dhir, Samanta, 2018) and construction of a unified theory of strategy that recognizes the complexity of its object of study (Terra, Passador, 2018). The best way to attain strategic thinking is by action learning (Kuhn, Marsick, 2005), nonformal ways of training (Benito-Ostolaza, Sanchis-Llopis, 2014), and learning from experience (Acur, Englyst, 2006). When looking closely at experience, Goldman (Goldman, 2007) identifies ten experiences that shape strategic thinking capability. Additionally, she recognized three distinctive patterns of developing strategic thinking competency within the time horizon of at least ten years. The first pattern is understanding from different angles, the second one is with practicing rational planning, and the third is levels and the net of real-life complexity challenges. Scenario is a specific method that is advocated many times in the papers. Starting from Shell's scenario, it got positioned as a special category of thought experiments and as such they deal with the domain of the "possible" and "probable", i.e., with the world of speculation preceding and anticipating the possibility of its outcomes and its implications (Wilson, 1994, Aligica, 2005, Evans, 2011, Bentham, 2014). Strategic thinking is about putting shoulders next to the sophisticated cognitive capabilities-sensemaking, critical thinking, divergent thinking, conceptual capacity, and a malleable learning orientation (Kuhn, Marsick, 2005). In the case of a micro firm, managerial capability is leadership, strategic thinking, problem solving, and people relationships (Kearney, Harrington, and Kelliher, 2014). Researchers (Vuorinen, et. al. 2018) made a point by suggesting that the landscape of strategy tools is surprisingly traditional and that contemporary developments in strategic thinking have not yet been transformed into usable tools. Strategic thinking is put in marriage with entrepreneurship- Hitt, Ireland, and Sexton (Hitt, Ireland, Sexton, 2001) firstly introduced the call for an integration of entrepreneurial and strategic thinking into strategic entrepreneurship. Later, it was described more as the ecosystem of well-established and new companies collaborating and competing in a cycle that perpetuates and even sparks innovation (Zahra, Nambisan, 2012).

Cognitive notion of strategic thinking. The literature on strategic thinking concept realizes that it should really be the thinking and cognitive aspect of research that needs to be looked at closely. In the following years, in strategic thinking literature, the cognitive notion started to dominate. The research indicated that cognitive ability and accumulated work experience are the two most important predictors for executives' strategic thinking competency (Dragoni, et.al. 2011) among the other predictors. Moreover, decision-making based on strategic thinking is associated with age-dependent involvement of different brain regions (Steinmann et al. 2014). Leaders who have had exposure to a more culturally distant environment have demonstrated higher strategic thinking competency (Dragoni, et al. 2014).

The results of the study showed that knowledge management application has a positive and significant effect on agility through using competitive intelligence and strategic thinking (Tooranloo, Saghafi, 2019). There is a suggestion to define Meta-strategic Knowledge (MSK) as a sub-component of metacognition (Zohar, Ben David, 2008) that is defined in the study as general, explicit knowledge about thinking strategies. Using the cognitive hierarchy framework of Camerer, Ho, and Chong (Camerer, Ho, Chong, 2004), the authors develop a structural econometric model that estimates the level of strategic thinking. In the model, firms with a high level of strategic thinking are more likely to correctly conjecture the expected actions of their competitors (Goldfarb, Yang, 2009).

In 2018, the discussion was about how AI influences strategic thinking (Ferras- Hernandez, 2018). Knowing about the cognitive elements and the theory of mind informs us about the first avenue of research- how to educate and train young people to think strategically. The whole circle of research and knowledge needs the second loop of learning. The psychology literature mentions strategic thinking quite differently. They understand strategic thinking as the concept that explains individual traits of character that psychopathology puts in the construct of Machiavellianism. It has a lot of negative connotations. Stage two could find three avenues of research topics. The first one is the educational stream where strategic thinking is considered a positive and wishful construct that we search, teach, train, and measure with children, youth, and university students. Second avenue is the leadership literature on strategic thinking, which is the mainstream of applying game theory, business acumen of strategic thinking, and the last is the psychological stream of cognitive elements of strategic thinking.

4.3. The focused stage (2021- 2024) publications

Although the number of publications is high, using adjective strategic thinking to denote something crucial or eminent is more popular than ever. The publications in the area of interest are actually more focused on the cognitive aspect of research connected to dynamic capability in competitive advantage literature. Study results indicate that managerial strategic thinking is positively related to absorptive capacity, as well as to each of its four components - acquisition, assimilation, transformation and exploitation (Srivastava, D'Souza, 2020). It was time for a meta-analysis (Shaik, AS and Dhir, S, 2020) on factors affecting strategic thinking, and calculating the effect sizes generated for each factor helped them in determining the homogeneous or heterogeneous nature of the factor. Strategic thinking, within the sustainable competencies concept, is not used in the specific industries, but rather in the context of sustainability and corporate green strategy, renewable energy development, social entrepreneurship, and viable firm performance (Ramadani, et al 2022). Game theory stream of research developed further down to the level of introducing DeepNash, an autonomous agent (AI) that plays the imperfect information game like Stratego at a human expert level (Perolat, et al.2020). Once again, there is a publication on how to classify and identify the critical strategic thinking enablers, showing the indirect and direct consequences of all strategic thinking enablers on the implementation of strategic thinking by using modified total interpretive structural modeling (TISM) and matrices impacts croises multiplication appliquer classement (MICMAC) analysis. (Dhir, Dhir, 2020). The same group of researchers found the direct effect of creativity, corporate culture, and knowledge management on strategic thinking. Also, the study finds a significant relationship between strategic thinking and competitive advantage (Dixit, et al 2021). More specifically, they went to model the strategic thinking process, considering the different psychological traits of TMTs (top management teams) and how the technological dynamism affects the strategies framed together, impacting the performance of the firm (Shaik, Dhir, 2021). In the same stream is also a study to explain the interrelationships between the elements of strategic thinking, technological change, and strategic risks (Shaik, Dhir, 2021). This was a fruitful group of researchers who denoted several years of publications on strategic thinking. Others still work on conceptual frameworks for integrating strategic thinking factors, organizational performance, and the decision-making process (Sinnaiah, Adam, Mahadi, 2023). A new notion is that research results on strategic thinking report participants are driven by a strong embodied personal connection with nature, extending well beyond the cognitive dimension (mind) to a diverse range of sensibilities (heart, body and spirit) and share an experiential process of connection that binds them together as purpose- and value-driven organizations (Karami, Gorzynski, 2022). The focused stage went deeper and not so wide in the research and followed the roots and results of the previous overwhelming and over-diversified stage in publications.

5. DISCUSSION

The systematic literature review did not follow the recommended steps for bibliometric presentation of literature review, but rather focused on the content review of the most eminent publication in the period 1991-2024 with the "strategic thinking" construct in the abstract within the WOS databases. No matter which criteria you select to choose the filters, "strategic thinking" is a concept that is a buzzword in the field of politics, geopolitics, military, medicine, agronomy, marketing, fashion design, supply-chain, and many other fields that actually have nothing to do with the strategic management field of interest. And they appear as a result of any performing search. This is the reason why it was a better option to focus on the content-relevant publications and not perform a classical bibliography search according to the recommended methodology. Actually, one of the limitations is that this literature review is based on the articles that are published within the WOS database. On one hand, it is a relevant and quality-filtered database, and only the most methodologically rigorous research could be published within this database. Additionally, there is only a small number of publications in Q1 quartile journals. Strategic thinking is still not a very clear and focused research topic that could be promoted in the highest quality level publications. On the other hand, there are prominent research ideas that are not elaborated on a high level, but are still valid for the notion of development of strategic thinking, just published within the databases of Scopus or Econlit. Recommendation for further research is directed toward widening the number of databases for future searches. The second limitation is that, due to the fact that strategic thinking is a practical phenomenon as well, there are a number of authors who publish books on strategic thinking, but are not indexed by the WOS database. Those practitioners, usually consultants (Sloan, 2024, Horwath, 2024, Pisapia, 2005, McKeown, 2024) have their eminent work in the field of strategic thinking, yet they are hardly mentioned in the literature review. The nature of strategic thinking is, by nature, very pragmatic, and the contributions should be looked at in the practice and consultancy backyards. Additionally, human resource departments are places to visit when looking at current ways of measuring strategic thinking constructs. Due to the fact that strategic thinking has been developed by practitioners much faster than in research, it is advised to look for inspiration for more practical models, such as the competency models, in order to position strategic thinking and grasp the attention of TMTs. When focusing on the publications, it is obvious that the research focus is very dispersed. No wonder strategic thinking could not find a home, a wider circle of researchers interested in the topic, or a faster way to advance its methodological approach. It is so diverse in assumptions, paradigms, and theories that researchers use. Strategic management found strong foundations in economics, but strategic thinking is still wandering between psychology, neuroscience, management, economics, and decision-making. Since it was not built on solid ground, any kind of publication in strategic thinking did not reach the highest-level publication and cannot reach high citation records. Researchers are disappointed with publishing results, and they leave. Only a couple of them, like Goldman and Dhir and their research team, were dedicated to strategic thinking over the years; all other researchers had a publication or two and left the strategic thinking arena with no viable results. French (French, 2009) realized this trend of creating model after model in strategic thinking, with no or very little publication success. He argues that there are three fundamental issues that must be examined in order to resolve the conundrums of strategic thinking: the semantics, the structures, and the epistemology and ontology of the subject. We urge the need to go deep into the epistemology and ontology and find an anchor to the existing well-received knowledge in order for strategic thinking to find its roots and solid grounding foundations.

Almost all research was done within the modern paradigm. Up to know, there has been attempt to use the following theories; Cybernetic system approach, evolutionary theory (Evans, 2011), Peirce's theory of abduction (Calabrese, Costa, 2015), cognitive-hierarchy theory of brain and behavior (Griessinger, Coricelli, 2015), theory of Structural Cognitive Modifiability (Tan, 2006) and Siegler's adaptive strategy-choice model (Siegler, 1996). More space and recognition should be given to critical management studies, complex self-adapting systems, interpretivist research philosophy, such as inductive and ethnographic approaches, or Straussian grounded theory research method. Strategic thinking is a complex, multidimensional, and multileveled construct that should be approached like a metacognitive capability. The proposed instruments for measuring strategic thinking should be looked at more deeply and with rigorous tests for validity and reliability, and above all, methodological procedures for creating nomological networks for a specific construct. One of the suggestions is that strategic thinking anchors within the dynamic capability literature, while it offers a way to create the capability needed to develop sustainable competitive advantage.

6. CONCLUSION

As Zabriskie, Huellmantel (Zabriskie, Huellmantel, 1991) would start the conversation by stating that an important challenge for top management in the 1990s is to develop the strategic thinking ability of senior managers. This challenge still stays alive even after 34 years of practicing, researching, and discussing strategic thinking. The need for strategic thinking is valid and real, as it relates to change, and fits the current VUCA environment, helping to understand business models and the nature of future competition. The push is to create strong roots for strategic thinking to grow as a distinctive research area itself.

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CORPORATE ACCOUNTABILITY REIMAGINED: THE EU'S LEGAL TURN TOWARDS SUSTAINABILITY

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ABSTRACT

This paper examines the evolution of the European Union's legal framework for corporate sustainability reporting, focusing on the comparison between the Non-Financial Reporting Directive (NFRD) and the Corporate Sustainability Reporting Directive (CSRD). It follows the historical progress of sustainability reporting, starting with early initiatives for environmental protection and sustainable development, leading up to the adoption of the CSRD. The paper examines the main features and weaknesses of the NFRD, such as its flexible reporting approach and the lack of comparable data. It also looks at the improvements introduced by the CSRD, including a wider scope of entrepreneurs required to report, the introduction of the European Sustainability Reporting Standards (ESRS), the strengthening of the double materiality principle, and the requirement for independent assurance of reports. A comparison is made in terms of which entrepreneurs must report, the reporting frameworks used, the quality of data, the role of digitalization, transparency, and how reporting affects entrepreneurs' operations. The paper concludes that the CSRD represents a major step forward in strengthening corporate responsibility, improving transparency, and promoting sustainable business practices in the European Union.

Keywords: *Sustainable Development, Corporate Reporting, Principle of Double Materiality, NFRD, CSRD, GRI, ESRS*

1. INTRODUCTION – GENERAL PERSPECTIVE ON SUSTAINABLE DEVELOPMENT

In the contemporary world, societies are confronted with a range of complex and interrelated challenges, including rapid technological advancement, population growth, climate change, the depletion of natural resources, and widening social inequalities. Consequently, identifying ways to meet present needs without compromising the ability of future generations to meet theirs has become a critical concern. Within this context, the concept of sustainable development or "sustainability" has become increasingly prominent in both public discourse and policy agendas.[1] Although the term "sustainability" lacks a universally accepted definition, it is frequently associated with the definition offered by the United Nations Brundtland Commission, which describes sustainable development as " meeting the needs of the present without compromising the ability of future generations to meet their own needs".[2]

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[1] Although the concept of sustainable development was first introduced at the Brundtland Conference, the term "sustainability" or "Nachhaltigkeit" in Germany can be traced back to Hans Carl von Carlowitz (1645–1714), who managed the mining sector on behalf of the Saxon court in Freiberg. Despite existing court regulations on forest management, the shortage of timber had a devastating impact on Saxony's silver mining and metallurgy industries. In his work *Sylvicultura Oeconomica oder Anweisung zur wilden Baum-Zucht* (*Sylvicultura Oeconomica or Instructions for the Cultivation of Wild Trees*), Carlowitz formulated ideas about the "sustainable use" of forests. His view that only as much timber should be harvested as could be regrown through planned reforestation projects became an important guiding principle of modern forestry.
(Hans Carl von Carlowitz, https://www.environmentandsociety.org/tools/keywords/hans-carl-von-carlowitz-and-sustainability, accessed March 10, 2025.).

[2] Održivi razvoj (English: Sustainable developmet), https://mvep.gov.hr/vanjska-politika/multilateralni-odnosi/globalne-teme/odrzivi-razvoj/22706, accessed December 12, 2024.

In the modern business landscape, the pursuit of profit is increasingly complemented by the integration of sustainable practices into corporate strategies and business models. This marks a departure from the traditional view that the sole purpose of an entrepreneur lies in maximizing financial returns for their shareholders.[3] Stakeholders, including investors, regulators, and consumers, are increasingly recognizing and demanding the implementation of sustainable business models. In response, the concept of "sustainable value creation" has emerged, emphasizing that, alongside the traditional goal of maximizing shareholder profits, sustainable development must be recognized as a fundamental corporate purpose, positioning sustainability as an essential element of business operations and the preservation of natural resources.[4]

As climate change becomes more serious, entrepreneurs are facing increasing pressure to reduce their environmental impact and to integrate sustainability into all areas of their operations. Because of this, legislation has become an important tool for governments to ensure that businesses align with sustainability goals and report on their actions. Directives of the EU show a commitment to making sustainable business practices a key part of its economic and social system, and to fighting climate change through binding rules and regulations. In this regard, the European Union has introduced two key legal instruments: the Non-Financial Reporting Directive (hereinafter: NFRD)[5] and its successor, the Corporate Sustainability Reporting Directive (hereinafter: CSRD).[6] Furthermore, the implementation of these directives supports the achievement of the United Nations Sustainable Development Goals (SDGs), which provide a global framework for a more equitable and environmentally responsible future.

2. BRIEF OVERVIEW OF THE HISTORICAL DEVELOPMENT OF CORPORATE REPORTING IN THE EUROPEAN UNION

To fully understand the significance of the Non-Financial Reporting Directive (NFRD) and the Corporate Sustainability Reporting Directive (CSRD), it is essential to consider the historical context that preceded their adoption.

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3 On this topic: Tepeš, Nina; Bilić, Antun, The purpose of a company, in: Heinonline, 2022, p. 225. „According to the shareholder approach, the purpose of a company coincides with the financial interests of its shareholders. When managing the company, directors must primarily seek to increase the company's profits and, consequently, shareholder value. In contrast, the stakeholder approach views the purpose of a company as encompassing a much broader range of interests, including those of employees, creditors, suppliers, clients, local communities, the economy, society, and the environment. When managing the company, directors must take all of these interests into account and strive to find an appropriate balance. As long as the company remains sufficiently successful to avoid insolvency, directors are free to forgo part of the profit in favor of other societal benefits. In recent times, the stakeholder approach has become closely intertwined with the concepts of Corporate Social Responsibility (CSR) and Environmental, Social, and Governance (ESG) principles."

4 On this topic: Beate Sjåfjell and Jukka Mähönen, Nordic company law, broadering the horizon, 2023, p. 243244. „Sustainable value creation is a an emerging concept, increasingly reflected in corporate governance codes in Europe. Examples of this include Nordie corporate governanance code reforms, notably the Danish and the Norweigian. Proxit maximisation or maximisation of returns for shareholders, which the social norm of shareholders which the social normo of shareholder primacy requires, is a well-documented barrier to sustainable business. Value creation is a concept that resonates with business-it is what business sees itself as doing. Sustainable value cretation is in line with the zeitgeist of our time, as business increasingly recognizes its role as contributing to the fundamental transformation to sustainability, both for the sake of business itself, in light of the increasing financial and corporate risks of unsustainability, and to fulfill its societal role."

5 Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups.

6 Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting.

Over the years, the world and the European Union have faced numerous environmental challenges, including pollution, loss of biodiversity, and climate change, which have caused the need for more comprehensive approaches to environmental protection and sustainable development. Although the Treaty of Rome (1957) did not clearly mention environmental protection, awareness of environmental problems grew during the 1970s due to industrialization and urbanization, leading to greater European involvement in environmental issues.[7] This momentum culminated in the United Nations Conference on the Human Environment, held in Stockholm in 1972, where representatives of 113 countries adopted the Stockholm Declaration and the Action Plan for the Human Environment, establishing foundational principles of good environmental governance and promoting dialogue between developed and developing countries.[8] Following the Stockholm Conference, the European Community launched its first Environmental Action Programme (1973–1976), establishing a strategic framework and setting priorities for future environmental policy.[9] The Third Environmental Action Programme (1982–1986) was particularly important as the focus shifted from pollution control to pollution prevention, and the concept of environmental protection was expanded to include land use and the integration of environmental aspects into other European Community policies.[10] The Maastricht Treaty (1993) officially introduced environmental protection as an area of European Union policy, requiring Member States to evaluate the environmental impacts of their activities and to commit to the principles of sustainable development.[11] This commitment was further reinforced by the Treaty of Amsterdam, signed in 1997, which clearly identified sustainable development as one of the EU's main goals and called for environmental considerations to be included in all areas of policymaking.[12] Building on this direction, at the Lisbon European Council in March 2000, EU leaders set a strategic goal for the Union to become the most competitive and dynamic knowledge-based economy in the world by 2010, aiming for sustainable growth, high levels of employment, and stronger social and economic cohesion.[13]

3. NFRD – KEY ELEMENTS AND LIMITATIONS

The adoption of the NFRD marked the first major step in the development of sustainability reporting within the European Union. The NFRD, which amended the Accounting Directive (Directive 2013/34/EU) [14], entered into force in April 2014, and it forms part of the EU's broader Corporate Social Responsibility (CSR) strategy, aimed at promoting a consistent approach to reporting and supporting smart, sustainable, and inclusive growth, in line with the Union's objectives for 2020.[15]

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7 Smolčić Jordana, Dora; Korošec, Lorena, Politika zaštite okoliša – integralni dio koncepcije održivog razvitka Europske unije (English : Environmental protection policy – an integral part of the European Union's sustainable development concept), in: Hrčak, 2013, p. 610.

8 Održan Međunarodni sastanak Stocholm +50 (English : The International Stockholm +50 Meeting Was Held), https://mingo.gov.hr/print.aspx?id=8817&url=print, accessed December 04, 2024.

9 Povijest EU zakonodavstva vezanog za okoliš (English: History of EU Environmental Legislation), https://hiz.hr/icttrain/hr/trainings/01/01.html, accessed December 05, 2024.

10 *Ibid.*

11 *Ibid.*

12 Smolčić Jordana, Dora; Korošec, Lorena, op.cit. (note 7), p. 611.

13 *Ibid.*, p. 441.

14 Directive 2013/34/EU of the European Parliament and of the Council of 26 June 2013 on the annual financial statements, consolidated financial statements and related reports of certain types of undertakings, amending Directive 2006/43/EC of the European Parliament and of the Council and repealing Council Directives 78/660/EEC and 83/349/EEC.

15 Direktiva EU "Direktiva 2014/95/EU" (English: EU Directive "Directive 2014/95/EU), https://idop.hr/direktiva-eu-direktiva-2014-95-eu/, accessed January 03, 2025.

Under the NFRD, non-financial reporting became mandatory across the EU starting from January 1, 2017, for public-interest entities with more than 500 employees. [16]

3.1. KEY ELEMENTS OF THE NFRD

According to Article 19a of the NFRD, all large entrepreneurs[17] that are classified as public-interest entities and have, as of the balance sheet dates, the creation of an average number of 500 employees during the financial year, shall include in the management report a non-financial statement.[18] A non-financial statement refers to the disclosure of information regarding the entrepreneur's impact on the environment and society, typically through corporate social responsibility or sustainability reports.[19] Entrepreneurs must provide information necessary to understand their development, performance, and position, as well as the impact of their activities on environmental, social, and employee matters, respect for human rights, and anti-corruption and bribery issues.[20] In addition, they are also required to provide a brief description of their business model, the policies pursued in relation to these matters (including due diligence processes implemented), the outcomes of these policies, the principal risks related to these matters linked to the entrepreneur's operations, including, where relevant and proportionate, its business relationships, products, or services likely to cause adverse impacts in these areas, how the entrepreneur manages these risks, and non-financial key performance indicators relevant to the particular business.[21] The general objectives of the NFRD were threefold: to improve the quality of non-financial reporting across the EU, to enhance comparability of disclosed information, and to encourage internal investment.[22] Member States were also required to establish sanctions applicable in cases where entrepreneurs fail to comply with national provisions implementing the NFRD.[23] It is important to note that, prior to the adoption of this directive, entrepreneurs reported on similar indicators on a voluntary basis; the NFRD made such reporting mandatory for certain entrepreneurs.[24]

The NFRD requires entrepreneurs to describe their business model, the outcomes, and risks of the policies adopted concerning the mandatory topics, taking into account recognized reporting frameworks such as the Global Reporting Initiative (GRI), the Eco-Management and Audit Scheme (EMAS), the United Nations Global Compact (UNGC), and others. [25]

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16 *Ibid.*

17 The English version of the NFRD uses the term "undertaking" to refer to an entrepreneur. However, in the opinion of the author of this paper, the term "entrepreneur" is more appropriate for denoting a business entity, and will therefore be used throughout this paper.

18 Non-Financial Reporting Directive, op.cit (note 5), article 19.a

19 Krivačić Dubravka; Antunović Martina, Nefinancijsko izvještavanje: novi izazov za korporativne računovodstvene sustave, in: Hrčak, 2018, p. 86.

20 Tsagas, Georgina; Villiers, Charlotte, Why "Less is More" in Non-Financial Reporting Initiatives: Concrete Steps Towards Supporting Sustainability, in: Heinonline, 2020, p. 20. With reference to Non-Financial Reporting Directive, op.cit. (note 5), aerticle 19a.

21 *Ibid.*

22 Tsagas, Villiers, op.cit (note 20), p. 21.

23 Ćorić, Vesna; Knežević, Bojović, Ana; V.Matijević, Milica, Potential of the EU draft directive on corporate sustainability due diligence to contribute to a coherent framework of corporate accountability for human rights violations, in: Heinonline, 2023, p. 138.

24 Petrović Tomić, Nataša; Uloga industrije osiguranja u promovisanju održivog razvoja da li su osiguravači ambasadori održivosti? – „Svet od plus 4 se ne može osigurati. Neodrživa poslovanja se ne mogu osigurati, niti se u njih može ulagati,,' 2024, p. 180.

25 Krivačić, Antunović, op.cit (note 19), p. 86.

3.2. GRI STANDARDS FOR SUSTAINABILITY REPORTING

The NFRD provides flexibility in the approach to sustainability reporting, allowing entrepreneurs to choose the reporting standards they wish to apply. In practice, however, the Global Reporting Initiative (GRI) Standards have become the most widely used framework.[26] The GRI Standards for reporting were developed by the Global Reporting Initiative (GRI), an international, non-profit organization founded in 1997, which promotes sustainability in economic, social, and environmental dimensions.[27] The first version of the GRI Guidelines (G1) was published in 2000, representing the first global framework for sustainability reporting, followed by a revised version (G2) launched in 2001.[28] As interest in sustainability reporting grew, the guidelines were further expanded and refined, resulting in G3 (2006) and G4 (2013).[29] The GRI Standards provide a flexible framework that covers a broad spectrum of topics, including corruption, water management, biodiversity, and occupational health and safety, allowing reporting entities to focus on their most significant impacts, while being regularly updated to address emerging and evolving sustainability issues.[30] The GRI framework is structured around three Universal Standards applicable to all reporting organizations, with GRI 1 outlining key reporting principles including accuracy, balance, clarity, and comparability and emphasizing reporting within the broader context of sustainable development, taking into account the needs of future generations, environmental limits based on scientific consensus, alignment with the UN Sustainable Development Goals (SDGs), and societal expectations.[31] GRI 2 requires mandatory disclosures regarding the reporting entity's activities, strategy, governance, and stakeholder engagement, while GRI 3 defines the methodology for identifying and managing material topics.[32] Based on this analysis, entrepreneurs select specific GRI Standards from three topic-specific series: 200 (Economic topics), 300 (Environmental topics), and 400 (Social topics).[33]

3.3. LIMITATIONS IN PRACTICE AND CRITICISM

Although the NFRD was an important step towards establishing a stronger regulatory framework for sustainability, it has faced various criticisms and shown several weaknesses. The directive did not fully achieve its main goal of improving the relevance, consistency, and comparability of non-financial information disclosed by large entrepreneurs across the European Union.[34] One of the main problems of the NFRD is its flexible approach, which combines mandatory requirements with voluntary elements by allowing entrepreneurs to disclose information on key topics or, if they do not have specific policies in place, to simply explain their absence under the "comply or explain" principle, allowing them to explain why they do not have a policy instead of providing detailed data.[35]

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26 Molfetas, Marta, What are the GRI Standards?, https://www.sustain.life/blog/gri-standards, accessed November 24, 2024.

27 Global Reporting Initiative, https://totalenergies.com/sustainability/reports-and-indicators/csr-reports-reporting-standards/gri, accessed February 21, 2025.

28 Our mission and history, https://www.globalreporting.org/about-gri/mission-history/, accessed February 23, 2025.

29 *Ibid.*

30 The GRI Standards A guide for policy makers, https://www.globalreporting.org/media/nmmnwfsm/gri-policymakers-guide.pdf, accessed January 05, 2025, p. 9.

31 A. Adams, Carol, et. Al., The development and implementation of GRI Standards: practice and policy issues, 2022.

32 *Ibid.*

33 The GRI Standards A guide for policy makers, op.cit. (note 30), p. 9.

34 Monciardini, David, Mahonen, Tapio Jukka; Tsagas, Georgina, Rethinking Non-Financial Reporting: A Blueprint for Structural Regulatory Changes, in: Heinonline, 2020, p. 18.

35 Tsagas, Villiers, op.cit (note 20), p. 23.

While this flexibility allows entrepreneurs to focus on information that is truly relevant to their activities, it also leads to differences in the quality of reporting, making it harder to compare entrepreneurs across the EU.[36] In addition, the NFRD has been criticized for its weak framework regarding human rights reporting.[37] The way human rights requirements are framed reduces the directive's potential to promote strong and effective disclosure practices, especially when compared to international standards such as the UN Guiding Principles on Business and Human Rights (UNGPs).[38] Finally, the directive does not clearly define how the required information should be collected and reported, often resulting in unreliable and inconsistent data that increases the risk of so-called 'greenwashing'.[39] Greenwashing refers to situations where entrepreneurs give a misleading impression of their environmental efforts.[40][41]

4. CSRD – A STEP FORWARD IN SUSTAINABILITY REPORTING

The CSRD was published in the Official Journal of the European Union on December 16, 2022, and entered into force on January 5, 2023.[42] The CSRD forms an integral part of the European Green Deal, a comprehensive package of policy initiatives aimed at establishing the foundation for a green transition within the European Union and achieving climate neutrality by 2050. [43]

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36 *Ibid.*

37 Ćorić, Knežević, Bojović, V. Matijević, loc. cit.

38 *Ibid.*

39 Rogge, Ebbe; Ohnesorge, Lara, The Role of ESG Rating Agencies and Market Efficiency in Europe's Climate Policy, 2022, p. 126-127.

40 Cambridge dictionary, https://dictionary.cambridge.org/dictionary/english/greenwashing, accessed January 05, 2025.

41 Several major and well-known global companies have been accused of *greenwashing*. Among them is Ryanair, the Irish airline that launched a series of advertisements in the United Kingdom in September 2019, boasting about its "low CO_2 emissions" and referring to itself as "Europe's lowest emissions airline," citing a figure of 66g CO_2 per passenger kilometer. The airline justified this claim by pointing to technological solutions and the average load factor of its flights. On February 5, 2020, the Advertising Standards Authority (ASA) in the UK concluded that the company's claims were misleading and in violation of the British Code of Non-broadcast Advertising, Sales Promotion and Direct Marketing. (See: *ASA Ruling on Ryanair Ltd t/a Ryanair Ltd*, https://climatecasechart.com/non-us-case/asa-ruling-on-ryanair-ltd-t-a-ryanair-ltd/, accessed March 10, 2025.).
H&M has also been accused of greenwashing. Two plaintiffs filed lawsuits against H&M before U.S. district courts for using Higg sustainability labels on clothing. Plaintiff Commodore stated that most of the products H&M promotes as sustainable are "not more sustainable than items from their main collection, which is itself not sustainable." As a result, she claims, consumers pay a higher price believing they are buying genuinely sustainable and environmentally friendly clothing. Additionally, two other plaintiffs filed lawsuits alleging that H&M used sustainability-related claims especially within its "Conscious Choice" collection as part of misleading marketing practices. While there is no indication that the company has been held accountable for greenwashing, the behavior of consumers in these cases reflects a growing awareness of the need for accurate information about sustainable production, as well as a desire to support businesses that have genuinely committed to sustainable development. (See cases: *The United States District Court for the Southern District of New York, Case 7:22-cv-06247* and *United States District Court, Eastern District of Missouri, Eastern Division, Case 4:22-cv-01170.*)

42 Izvještavanje o održivosti (English: Sustainability reporting) https://mfin.gov.hr/print.aspx?id=3648&url=print**,** accessed December 24, 2024.

43 Obveza izvještavanja o održivosti – Što Direktiva o korporativnom izvještavanju o održivosti znači za vašu organizaciju? (English: Sustainability Reporting Obligation – What Does the Corporate Sustainability Reporting Directive Mean for Your Organization?) https://www.dqsglobal.com/hr-hr/edukacija/blog/obveza-izvjestavanja-o-odrzivosti-sto-direktiva-o-korporativnom-izvjestavanju-o-odrzivosti-znaci-za-vasu-organizaciju, accessed January 01, 2025.

Under the CSRD, the European Commission is responsible for developing sustainability reporting standards, taking into account the different capacities and resources of reporting entities.[44]

4.1. KEY ELEMENTS OF THE CSRD

The CSRD expands its reporting requirements compared to the NFRD. Specifically, the CSRD now applies to all large entrepreneurs[45] in the European Union, including subsidiaries of non-EU entrepreneurs that meet at least two out of three criteria: more than 250 employees, a turnover exceeding EUR 40 million, or total assets higher than EUR 20 million.[46] Additionally, the CSRD applies to all entrepreneurs listed on EU markets, regardless of their location, including SMEs, with the exception of some micro-enterprises.[47] Under the CSRD, non-EU entrepreneurs with annual EU revenues exceeding EUR 150 million, and that have significant subsidiaries or branches in the EU, are also required to report.[48] This framework mandates that private entrepreneurs meeting these criteria must also disclose sustainability information, which differs from the approach in the United States, where reporting is primarily focused on investor interests.[49] Regarding the reporting timeline, the CSRD will be implemented in four phases, following a progressive introduction.[50] The CSRD also introduces the obligation for digital sustainability reporting, requiring that large as well as small and medium-sized entrepreneurs, except micro-enterprises that are public-interest entities, prepare their management reports in an electronic reporting format as established in Article 3 of Commission Delegated Regulation (EU) 2019/815[51] and they must mark up their sustainability reporting, including the disclosures as defined in Article 8 of Regulation (EU) 2020/852[52], in accordance with this electronic reporting format.[53] The CSRD further introduces a section on "Audit and Assurance of Sustainability Reporting," establishing the requirement for verification by certified auditors or other assurance service providers.[54] It is essential that management reports comply with applicable legal requirements, excluding the requirements on sustainability reporting laid down in Article 19a of this Directive.[55] New rules have been introduced allowing independent assurance providers to issue opinions on this compliance, provided they meet specific standards of quality and professionalism.[56]

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44 Odobaša, Rajko; Marošević, Katarina, Expected contributions of the European corporate sustainability reporting directive (CSRD) to the sustainable development of the European union, in: Hrčak, 2023, p. 601.

45 See *supra*. Note 17.

46 Artigues, Johnathon, Who Wins? Analyzing Global ESG Reporting Through the EU's Corporate Sustainability Reporting Directive and the Evolving U.S. Scheme, in: Heinonline, 2024, p. 159.

47 *Ibid.,* p. 159.-160.

48 *Ibid.,* p. 160.

49 *Ibid.*

50 Vijeće dalo konačno zeleno svjetlo direktivi o korporativnom izvješćivanju o održivosti, https://www.consilium.europa.eu/hr/press/press-releases/2022/11/28/council-gives-final-green-light-to-corporate-sustainability-reporting-directive/, accessed December 29, 2024.

51 Commission Delegated Regulation (EU) 2018/815 of 17 December 2018 supplementing Directive 2004/109/EC of the European Parliament and of the Council with regard to regulatory technical standards on the specification of a single electronic reporting format.

52 Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088.

53 Corporate Sustainability Reporting Directive**,** op.cit. (bilj.10), article 29. d., point 1.

54 Corporate Sustainability Reporting Directive, op.cit. (bilj.10), chapter 8.

55 *Ibid.,* article 34. paragaph 1 point (a), sub-point ii.

56 *Ibid.,* article 34, paragaph 4.

4.2. PRINCIPLE OF DOUBLE MATERIALITY

The CSRD Directive clearly emphasizes and explains the principle of double materiality. As the term suggests, there are two aspects of materiality. One aspect refers to information about the social, environmental, and governance impacts of an entrepreneur, while the other refers to information necessary for understanding the development, performance, and position of the entrepreneur, specifically relating to risks and opportunities arising from sustainability issues that may affect the entrepreneur's financial performance.[57] On one hand, there is financial materiality, which must be included in the report if a sustainability issue can influence the development, results, or position of the entrepreneur, while on the other hand, there is impact materiality, which must be included if the issue concerns the entrepreneur's impact on society and the environment.[58]

While financial materiality is most relevant to investors, impact materiality is important to citizens, consumers, employees, business partners, local communities, and civil society organizations.[59] A materiality analysis can significantly influence investment decisions, as it helps identify key stakeholders and important sustainability issues, along with associated risks and opportunities.[60] This analysis requires increased stakeholder engagement, which contributes to diverse and mutual relationships of responsibility between entrepreneurs, their stakeholders, and broader society, enabling dialogue and assessment on sustainable development.[61] It is important to note that double materiality presents several challenges. Research shows that there is often inadequate disclosure in identifying material sustainability issues, which undermines the credibility of sustainability reports and can result in a distorted view of an entrepreneur's actual sustainability performance.[62] Entrepreneurs tend to highlight positive outcomes while ignoring negative ones, misrepresent scientific data, and use sustainability reporting to legitimize their actions or even mislead stakeholders.[63]

4.3. ESRS – EUROPEAN SUSTAINABILITY REPORTING STANDARDS

All reports that entrepreneurs are required to prepare must comply with the European Sustainability Reporting Standards (ESRS), developed by the European Financial Reporting Advisory Group (EFRAG).[64] On July 31, 2023, Delegated Regulation (EU) 2023/2772 was adopted, officially publishing twelve sustainability reporting standards.[65] Two of these standards, ESRS 1 and ESRS 2, are considered fundamental and apply to all entrepreneurs regardless of the outcome of the materiality assessment, while the remaining ten thematic standards focus on specific environmental, social, and governance (ESG) topics and are applied depending on the results of the materiality assessment.[66]

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57 Načelo dvostruke materijalnosti (English : Principle of double materiality), https://idop.hr/nacelo-dvostruke-materijalnosti/, accessed December 19, 2024.

58 *Ibid.*

59*Ibid.*

60A. Adams, Carol, et.al. The double-materiality concept Application and issues, 2021, p. 6.

61 *Ibid.*

62A. Adams, op.cit. (note 60), p. 7.

63 *Ibid.*

64 Odobaša, Marošević, op.cit (note 44), p. 601-604.

65 Europski standardi o održivosti objavljeni u obliku delegiranog akta (European sustainability standards published in the form of a delegated act), https://idop.hr/europski-standardi-za-izvjescivanje-o-odrzivosti-objavljeni-u-obliku-delegiranog-akta, accessed December 12, 2024.

66 *Ibid.*

Thematic standards, covering areas such as climate change, pollution, water resources, marine ecosystems, biodiversity, natural resources, and the circular economy, are classified as voluntary, allowing entrepreneurs to omit or limit mandatory disclosures under certain conditions defined by the CSRD.[67] Materiality, as previously mentioned, is assessed across two dimensions: environmental impact and financial relevance, where the subjective interpretation of what is considered material can lead to inconsistencies in the quality and comparability of reporting. [68] This, in turn, makes it difficult for stakeholders to assess environmental performance accurately and may result in the omission of important information, thereby reducing transparency and undermining trust in the integrity and accountability of entrepreneurs.[69] The ESRS also formalizes the principle of double materiality, requiring entrepreneurs to report both on how sustainability issues affect their business (outside-in perspective) and on how their activities impact people and the environment (inside-out perspective).[70] Entrepreneurs must therefore consider risks and opportunities related to ESG factors when developing their strategies and preparing their sustainability reports.[71] ESG covers Environmental (E1–E5), Social (S1–S5), and Governance (G1) categories, which form the framework for corporate sustainability disclosures.[72]

5. COMPARATIVE ANALYSIS OF THE TWO DIRECTIVES – NFRD AND CSRD

The NFRD requires the largest and most influential public-interest entities to take responsibility for their impact on the environment and society, encouraging more responsible business practices and greater transparency.[73] The CSRD, however, significantly broadens the range of entrepreneurs covered, applying to all large entrepreneurs and listed small and medium-sized enterprises (SMEs), and by 2028, it will also include approximately one thousand non-EU entrepreneurs with substantial business activities within the Union, covering around 50,000 entities in total.[74]

While the NFRD required entrepreneurs to disclose information related to five key areas namely the environment, social responsibility, human rights, diversity, and anti-corruption the CSRD introduces much broader reporting obligations, requiring entrepreneurs to provide detailed information about their strategies, goals, governance structures, impacts, risks, opportunities (IROs), value chains, intangible assets, and the methods used to determine which information is disclosed.[75]

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67 Martihnez-Torres, Virginia; Regulatory Developments on Sustainability Issues in Light of Delegated Regulation (EU) 2023/2772 (ESRS), in: Heinonline, 2024, p. 226.

68 *Ibid.*, p. 226, 227.

69 *Ibid.,* p. 227.

70 Strampelli, Giovanni, ESG, Sustainability Disclosure, and Institutional Investor Stewardship, in: Heinonline, 2024, p. 414.

71 *Ibid.*

72 ESG environmental, social and governance standards, https://alphacapitalis.com/esg/, accessed December 14, 2024.

73 Russel, Ben, NFRD vs CSRD: What's The Difference?, 2024, https://www.corefiling.com/2024/07/30/nfrd-vs-csrd/, accessed January 23, 2025.

74 *Ibid.*

75 Branquart, Camille, Understanding the NFRD and Its Evolution to the CSRD, https://www.greenomy.io/blog/evolution-nfrd-csrd, accessed February 15, 2025.

The NFRD allowed entrepreneurs to choose between different international, European, or national reporting frameworks.[76] In contrast, the CSRD makes the use of the European Sustainability Reporting Standards (ESRS), developed by EFRAG, mandatory.[77] Through the principle of double materiality, the CSRD addresses the main shortcomings of the NFRD, particularly regarding the risk of greenwashing.[78] While the NFRD lacked strict standards and did not impose digital reporting requirements, the CSRD mandates that reports should be prepared in the European Single Electronic Format (ESEF), ensuring that they are readable by both humans and machines.[79] The new reporting requirements under the CSRD are likely to make business operations more complex, requiring greater investment in resources, technology, and staff, as well as increased responsibilities for management and supervisory boards. Entrepreneurs will need to dedicate more resources to collecting, analyzing, and reporting ESG data, which may lead to the formation of specialized teams, the creation of new positions, and the use of new technologies and monitoring systems. Chief executive officers, chief financial officers, directors of insurance entrepreneurs, information security officers, and broader management teams will encounter new daily obligations arising from the implementation of the directive.[80] Both the NFRD and the CSRD reflect a broader transition from "soft law" to "hard law" within the European Union, establishing binding corporate obligations that are legally enforceable and subject to sanctions in cases of non-compliance.[81] Although the CSRD represents a concrete step toward achieving the EU's sustainable development objectives, it has faced criticism from non-governmental organizations, which argue that some of these goals lack a firm scientific basis and have accused the EU of engaging in greenwashing. [82]

6. CONCLUSION

The CSRD represents an important step forward in regulating corporate sustainability reporting, bringing greater transparency, credibility, and consistency in presenting the impact of business activities on environmental, social, and governance (ESG) factors.

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76 Branquart, Camille, Understanding the NFRD and Its Evolution to the CSRD,op.cit. (note 75).

77 Virranta, Jarrko, Why CSRD is a game changer for sustainability reporting, https://www.ey.com/en_fi/insights/consulting/why-csrd-is-a-game-changer-for-sustainability-reporting, accessed February 21, 2025.

78 Double Materiality in ESG & Sustainability Explained, 2024. godine, https://www.quentic.com/articles/double-materiality/, February 23, 2025.

79 Sustainability Reporting in a Digital Format (ESEF), U KPMG, https://assets.kpmg.com/content/dam/kpmg/nl/pdf/2024/services/sustainability-reporting-digital-format-esef-kpmg-nl.pdf, accessed February 23, 2025.

80 CSRD daje novi zamah planovima ESG-a za stvaranje vrijednosti, https://www.pwc.hr/hr/usluge/csrd.html, accessed March 05, 2025.

81 Ćorić, Knežević, Bojović, V.Matijević, loc. cit.

82 Carolina Ramalho dos Santos, Is the EU Greenwashing Us? How Climate Litigation Aims to Close the Gap Between Policy and Science, accessed March 26, 2025.
It is important to note that the CSRD represents a concrete implementation of the European Union's sustainability goals. However, the goals themselves have already come under public scrutiny, particularly from non-governmental organizations (NGOs) that argue they are not based on scientific and expert data. Namely, the non-governmental organizations Climate Action Network (CAN), Global Legal Action Network (GLAN), and Opportunity Green have filed lawsuits against the European Union, claiming that its climate policies are not grounded in scientific evidence.
These lawsuits directly challenge the EU's climate targets, suggesting that by setting goals that lack a scientific foundation, the EU is effectively engaging in "greenwashing" of its own citizens.

The directive not only expands the number of entrepreneurs required to report but also introduces standardized reporting frameworks (ESRS), digital reporting formats, and the obligation for independent verification of reports, thereby improving the quality and comparability of data. By addressing many of the shortcomings of the NFRD, particularly regarding data reliability, comparability, and the scope of reporting, the CSRD establishes a stronger system for sustainability reporting within the European Union. It helps entrepreneurs not only to meet legal requirements but also to better understand their role in sustainable development and move towards long-term sustainable business models. Although implementing the CSRD may be challenging, especially for smaller entrepreneurs and those without developed sustainability systems, the long-term benefits, such as stronger competitiveness, more resilient business models, and better fulfillment of stakeholder expectations, outweigh the initial difficulties. However, the real success of the CSRD will depend on the quality of its implementation and supervision by Member States. The CSRD is not just a tool for achieving the goals of the European Green Deal; it also sends a clear message to the business community that sustainability is no longer optional, but an essential part of long-term success. Sustainability reporting itself is not an end in itself, but a means of encouraging businesses to truly align their operations with the principles of sustainable development. In the long term, progress is expected not only in corporate reporting but also in the overall transformation of business strategies towards sustainability in European Union. While the CSRD strongly promotes sustainable business practices within the EU, addressing global challenges such as climate change will require broader international cooperation. Sustainability knows no borders, and real progress will depend on wider global adoption of similar standards and coordinated policies. Ultimately, the question arises whether it is enough to believe that regulation at the EU level alone will achieve sustainable goals, when many businesses around the world operate in environments without similar obligations. We all share the same air, the same seas, and the same natural resources, and it is said for good reason that when you dip your finger into the sea, you are connected to the whole world.

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COMMUNICATION SKILLS AND EFFECTIVENESS IN ONLINE PSYCHOTHERAPY

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ABSTRACT
The rapid integration of digital technologies into healthcare has spurred the adoption of online psychotherapy, or telehealth, a trend significantly accelerated by recent global events demanding remote access to essential services. This paper synthesizes current evidence regarding the effectiveness of online psychotherapy and delves into the critical adaptations required in communication skills to cultivate and maintain strong therapeutic alliances within virtual settings. A review of recent systematic reviews and meta-analyses indicates that online psychotherapy demonstrates significant effectiveness, often achieving outcomes comparable to traditional face-to-face therapy for prevalent mental health conditions such as depression and anxiety. However, the unique context of virtual interaction necessitates conscious adjustments in communication strategies. Effective virtual communication involves enhancing active listening techniques, adeptly conveying empathy through verbal and vocal cues, compensating for the limitations of non-verbal information, and strategically leveraging technology to foster connection. The therapeutic alliance, a cornerstone of successful therapy, remains paramount and requires specific, intentional strategies for rapport building and sustained engagement in the online space. In conclusion, virtual connections, when powered by skilfully adapted and empathetic communication, hold substantial potential for broadening access to mental healthcare. This expansion aligns with sustainable development goals focused on enhancing health and well-being, offering a promising avenue for more inclusive and accessible mental health support systems globally.
Keywords: *online psychotherapy, telepsychotherapy, communication skills, therapeutic alliance, effectiveness, virtual connections, telehealth*

1. INTRODUCTION

In recent years, the delivery of psychotherapeutic care has undergone a major transformation, marked by the rapid expansion of online psychotherapy, also referred to as telepsychotherapy or telehealth. Although remote therapy modalities existed prior to the pandemic, the global COVID-19 crisis acted as a catalyst, accelerating and widely promoting the shift to virtual formats across healthcare systems (Chi et al., 2022; Fischer-Grote et al., 2024; de Oliveira Cardoso et al., 2023; Mancinelli et al., 2021). Today, synchronous online psychotherapy, particularly through videoconferencing, represents a significant component of mental health service provision. The advantages of this approach are considerable: enhanced accessibility regardless of geographic location, greater flexibility for both clients and therapists, and the ability to reach previously underserved populations, thereby contributing to broader public health objectives and sustainable well-being (Rafieifar et al., 2024; de Oliveira Cardoso et al., 2023; Werbart et al., 2024; Lleras de Frutos et al., 2020). Nevertheless, this digital transformation has introduced a range of new challenges and critical questions.

A key issue is the empirical evaluation of clinical effectiveness — specifically, whether online interventions achieve outcomes comparable to traditional face-to-face methods (Rafieifar et al., 2024; Lleras de Frutos et al., 2020). Equally important, the success of any psychotherapeutic endeavour is closely tied to the quality of the therapeutic relationship and the effectiveness of communication (Norcross, 2011; Angelis, 2019). The virtual environment inherently alters the dynamics of interpersonal interaction — diminishing the role of embodiment, non-verbal cues, and the subjective sense of presence — thereby requiring specific adaptations in communication skills and therapeutic techniques (García et al., 2022; Mancinelli et al., 2021; Werbart et al., 2024). This paper aims to critically synthesize existing empirical findings on two interconnected themes: (1) the clinical effectiveness of synchronous online psychotherapy compared to traditional face-to-face approaches, and (2) the role of communication skills and therapist adaptations in building a strong therapeutic process in the virtual setting. The analysis draws exclusively from peer-reviewed scientific literature, including systematic reviews, meta-analyses, and qualitative studies exploring therapist and client experiences.

The review seeks to answer the following research questions:
- What does empirical evidence indicate regarding the comparative effectiveness of online versus face-to-face psychotherapy, particularly in individual and group settings?
- How are communication dynamics, including non-verbal cues and embodiment, altered in the online therapeutic space?
- What specific communication skills, strategies, and adaptations are identified as crucial for effective online practice and for building a strong therapeutic process?

By systematically addressing these questions, this review aims to provide a nuanced understanding of the strengths, limitations, and essential competencies associated with practicing psychotherapy in the evolving digital landscape.

2. EVALUATING THE CLINICAL EFFECTIVENESS OF ONLINE PSYCHOTHERAPY

The rapid expansion of online psychotherapy necessitates a careful evaluation of its clinical effectiveness, particularly when compared to established face-to-face methods across different clinical contexts. Drawing on systematic reviews, meta-analyses, and randomized controlled trials (randomly controlled trials) — many of which emerged during the accelerated adoption of telehealth during the COVID-19 pandemic — current evidence offers important insights into the efficacy of synchronous online interventions (Langarizadeh et al., 2017; Fernandez et al., 2021). A central question remains whether online psychotherapy achieves outcomes comparable to traditional face-to-face therapy. Meta-analyses focusing on individual therapy, particularly Cognitive Behavioural Therapy (internet-delivered Cognitive Behavioural Therapy), generally indicate equivalent effectiveness in treating conditions such as depression and anxiety (Carlbring et al., 2018; Greenwood et al., 2022). Fernandez et al. (2021) similarly found that synchronous telepsychotherapy is largely comparable to in-person therapy across various mental health conditions. Supporting this, Norwood et al. (2018) concluded through a noninferiority meta-analysis that symptom reduction via videoconferencing was not inferior to face-to-face therapy, although they noted potential concerns regarding the therapeutic process. Evidence regarding group interventions is more nuanced. Rafieifar et al. (2024) conducted a systematic review of 15 randomly controlled trials comparing group-based psychosocial interventions delivered online and face-to-face. While the majority (12 studies) reported similar outcomes, three studies favoured face-to-face formats for specific contexts.

Importantly, Rafieifar et al. (2024) highlighted significant heterogeneity among studies, including variability in participant characteristics, intervention types (mostly Cognitive Behavioural Therapy-based), outcome measures, and methodological quality (with only two studies rated as low risk of bias), limiting the strength of general conclusions regarding group therapy equivalence. Adding to this, Lleras de Frutos et al. (2020) demonstrated through a rigorously designed randomly controlled trials that an online group adaptation of positive psychotherapy for distressed female cancer survivors was as effective and engaging as its face-to-face version in reducing distress and enhancing posttraumatic growth. Similarly, systematic reviews of specific formats, such as online support groups, often report comparable outcomes but also acknowledge methodological limitations (Banbury et al., 2018; Gentry et al., 2019). Beyond direct comparisons, numerous meta-analyses confirm that online psychotherapy effectively reduces symptoms of depression, anxiety, and stress, particularly in contexts related to pandemic-related distress (Chi et al., 2022). Online interventions have also proven beneficial for younger populations — children, adolescents, and young adults — particularly regarding anxiety and depression, although effects on general well-being appear to be less pronounced (Fischer-Grote et al., 2024). Further evidence from Lleras de Frutos et al. (2020) supports the efficacy of online group psychotherapy for cancer survivors. Additionally, internet-delivered Cognitive Behavioural Therapy (internet-delivered Cognitive Behavioural Therapy) has shown effectiveness in improving broader quality of life measures among adults with depression (Fadipe et al., 2023), indicating benefits that extend beyond symptom reduction alone. Several interacting factors moderate the clinical effectiveness of online psychotherapy. Therapist involvement — both synchronous and asynchronous — emerges as critical, with guided interventions consistently outperforming unguided self-help formats, especially for anxiety and quality of life improvements (Chi et al., 2022; Fadipe et al., 2023). Intervention design features, such as session length and frequency, also influence outcomes, with evidence suggesting that shorter, more intensive interventions may be particularly effective for some conditions like depression (Chi et al., 2022). Client characteristics further shape treatment effectiveness. Higher initial symptom severity, female gender, younger age, and the presence of comorbid conditions are associated with greater quality of life improvements following internet-delivered Cognitive Behavioural Therapy (Fadipe et al., 2023). Adherence, a vital factor for success, is influenced by unique challenges in the online setting. According to a scoping review by de Oliveira Cardoso et al. (2023), key facilitators of adherence included basic computer skills, availability of private spaces, reduced costs and travel time, and fear of contagion. Barriers included lack of privacy (especially during lockdowns), technological issues (e.g., unstable connections), and screen fatigue. For therapists, confidence in online therapeutic competencies and stable technology were crucial facilitators (de Oliveira Cardoso et al., 2023; Werbart et al., 2024). While the pandemic context improved overall engagement with online therapy, ongoing barriers suggest that online formats may not be universally suitable for all clients or therapists in the long term. In conclusion, synthesized empirical evidence positions online psychotherapy as a clinically effective modality, particularly for individual therapy and Cognitive Behavioural Therapy-based interventions (Langarizadeh et al., 2017; Fernandez et al., 2021; Carlbring et al., 2018). Its effectiveness across various conditions and populations is well documented (Chi et al., 2022; Lleras de Frutos et al., 2020). Nevertheless, claims of universal equivalence — especially regarding group therapy — should be approached with caution due to methodological heterogeneity and research limitations (Rafieifar et al., 2024). Clinical outcomes are influenced by the nature of the intervention, therapist involvement, client-specific factors, and management of online-specific challenges, such as technological stability and privacy (Chi et al., 2022; Fadipe et al., 2023; de Oliveira Cardoso et al., 2023). A deep understanding of these moderating factors is essential to optimize the delivery and maximize the potential of online psychotherapeutic services.

3. COMMUNICATION AND THE THERAPEUTIC PROCESSES IN ONLINE SETTINGS: BRIDGING THE VIRTUAL DIVIDE

While previous findings confirm the clinical effectiveness of online psychotherapy, its successful implementation in practice largely depends on the quality of the therapeutic relationship. Consistent with decades of psychotherapy research, the therapeutic process — which includes agreement on goals, collaboration on tasks, and the emotional bond — remains a key predictor of treatment outcomes regardless of modality (Norcross, 2011; Angelis, 2019; Seuling et al., 2023). Communication is the fundamental mechanism through which this alliance is established, maintained, and developed. However, the shift to a virtual setting, marked by the absence of physical co-presence, significantly alters communication dynamics, demanding specific adaptations and introducing new relational challenges (García et al., 2022; Werbart et al., 2024). Initial scepticism questioned whether an authentic and strong therapeutic process could be established in online therapy (Kingsley & Henning, 2015; Lemma, 2017). Yet, growing empirical evidence suggests that meaningful alliances are indeed possible in teletherapy. Meta-analyses and systematic reviews comparing videoconferencing to in-person therapy generally report similar levels of client-rated alliance (Simpson & Reid, 2014; Seuling et al., 2023; Cataldo et al., 2020), indicating that clients often perceive relational quality as comparable across modalities. Some studies do point to slightly lower alliance scores in specific contexts or discrepancies between therapist and client ratings, with therapists — especially those new to the format or with less experience — sometimes perceiving the alliance as weaker in the online setting (Norwood et al., 2018; Aafjes-van Doorn et al., 2020; Fisher et al., 2021). Therapists frequently report initial concerns about their ability to emotionally connect, effectively convey empathy, and build trust through a screen (Aafjes-van Doorn et al., 2020; Békés & van Doorn, 2020; Mancinelli et al., 2021). Despite these early difficulties, longitudinal and qualitative studies suggest a process of adaptation, whereby therapists gain confidence, acquire new skills, and develop effective ways to foster presence and connection remotely (Aafjes-van Doorn et al., 2020; Werbart et al., 2024; Békés et al., 2023). While the core relational components remain essential, successfully cultivating them in virtual settings requires navigating a distinct and altered communication landscape. One of the most significant changes is the absence of physical co-presence, which impacts the embodied and intersubjective dimensions of communication that are central to face-to-face interactions (García et al., 2022; Russell, 2018). Enactive approaches highlight that traditional psychotherapy relies on a continuous, multimodal flow of information — such as subtle shifts in posture, micro-expressions, gestures, and physiological resonance — which facilitates pre-reflective understanding, mutual regulation, and shared sense-making (García et al., 2022; Fuchs & De Jaegher, 2009; Koole & Tschacher, 2016). In screen-mediated interactions, this flow is disrupted. Visual input is often restricted (e.g., limited camera frame, technical glitches), reducing the richness of full-body non-verbal cues and altering gaze and attentional dynamics (García et al., 2022; Werbart et al., 2024; Kingsley, 2021). The sense of shared physical space is replaced by digitally connected yet separate environments, which can impact the felt presence and implicit processes of atonement (García et al., 2022). This altered non-verbal landscape presents significant challenges. Therapists report difficulties in accurately perceiving clients' emotional states and concerns about their own ability to non-verbally communicate empathy and presence (Mancinelli et al., 2021; Aafjes-van Doorn et al., 2020). The technological medium itself becomes an active participant in the interaction, introducing disruptions such as unstable connections, audio or video lags, and environmental noise, all of which can fragment communication and require active management (de Oliveira Cardoso et al., 2023; Werbart et al., 2024).

Furthermore, clients' remote environments may present issues of privacy or distraction, influencing levels of engagement and self-disclosure (de Oliveira Cardoso et al., 2023; Werbart et al., 2024). Navigating these dynamics requires intentional and skilful adaptation of communication strategies. Qualitative research involving therapists and clients highlights the need for adjustments in verbal behaviour, limited non-verbal expression, gaze management, and interactional rhythm (such as silences), all aimed at compensating for the constraints of online settings (García et al., 2022). One key adaptation is a greater reliance on explicit verbal communication. Therapists must use verbal affirmations, clarifications, paraphrasing, and summarizing more frequently to ensure mutual understanding and signal active listening, given the reduced availability of non-verbal cues (Werbart et al., 2024; Isaacs Russell, 2021). Empathy is often conveyed more deliberately through vocal tone, warmth, and explicit validation (Werbart et al., 2024). Some therapists report becoming more talkative or directive — consciously or unconsciously — to maintain connection in the absence of familiar feedback loops (Mancinelli et al., 2021). Effective online practitioners actively co-create a sense of presence by paying closer attention to available cues, using more expressive facial gestures, directly addressing the virtual nature of the interaction, and creating shared focus (Werbart et al., 2024; García et al., 2022; Békés et al., 2023). Managing the technological frame becomes part of the therapeutic process itself, requiring technical reliability, openness about glitches, and clear agreements on the virtual setting, privacy, and potential distractions (Werbart et al., 2024; de Oliveira Cardoso et al., 2023). In sum, effective communication in online psychotherapy depends on increased intentionality, a stronger reliance on explicit verbal and vocal channels, adaptability to technological constraints, and a continuous, conscious effort to build and sustain relational depth across the digital divide (García et al., 2022; Werbart et al., 2024).

4. THERAPIST SKILLS, ADAPTATION, AND STRATEGIES FOR EFFECTIVE ONLINE COMMUNICATION

Effectively navigating the unique communication challenges of online psychotherapy requires more than awareness — it demands the development of specific skills, therapist adaptability, and the implementation of empirically grounded strategies. Therapists who succeed in the virtual space actively modify and tailor their approaches to preserve the quality of therapeutic relationships and interventions, despite the technological and communicative limitations of remote formats. A key task for therapists in online settings is to actively co-create a sense of presence and connection with the client despite physical distance (Werbart et al., 2024; García et al., 2022). This involves compensating for reduced non-verbal cues through heightened attention to available signals, such as facial expressions and vocal tone, and employing more explicit verbal communication to ensure mutual understanding and convey empathy (Werbart et al., 2024; García et al., 2022). Some therapists report becoming more active or directive in online sessions, a response that may be conscious or unconscious, aimed at maintaining emotional engagement in the absence of typical non-verbal feedback (Mancinelli et al., 2021). Therapists may also use exaggerated gestures or attention cues, such as managing gaze or emphasizing facial expressions, to compensate for challenges like distorted eye contact (Isaacs Kingsley, 2021; Fisher et al., 2021). Beyond communication techniques, effective technological management is a crucial skill in online therapy. A reliable setup, proper equipment, and stable internet connection form the foundation of quality care (de Oliveira Cardoso et al., 2023). Therapists who deliver successful online sessions often perform pre-session technical checks, establish backup plans for potential disruptions, and optimize their visual and audio setup (lighting, background, sound) to maintain a professional and comfortable atmosphere (Werbart et al., 2024). Maintaining clear therapeutic boundaries in the virtual environment is another vital strategy.

This includes managing potential distractions in the client's setting, ensuring privacy, and clearly communicating expectations for the online interaction (Werbart et al., 2024; de Oliveira Cardoso et al., 2023). The transition to online therapy often involves a progressive development of professional competence. While many therapists initially report uncertainty regarding their ability to work effectively online, most experience increased confidence over time (Aafjes-van Doorn et al., 2020; Békés & van Doorn, 2020; Mancinelli et al., 2021). Clinical experience appears to play a role: less experienced therapists may initially struggle more with self-efficacy, though research suggests they can also adapt relatively quickly (Fisher et al., 2021; Simpson & Reid, 2014). Mastery in teletherapy also involves developing a sense of "telepresence" — the subjective experience of being present in the online therapeutic space — which helps to strengthen the therapeutic process (Békés et al., 2023). Experienced therapists learn to leverage the advantages of online formats, such as increased accessibility or greater client comfort in discussing sensitive topics due to physical separation (Werbart et al., 2024; Norwood et al., 2018; Chen et al., 2021). These findings underscore the need for specialized training in telepsychology. Effective virtual communication and therapy delivery require a skill set that may not be adequately addressed in traditional psychotherapy education (Werbart et al., 2024; Mancinelli et al., 2021). Such training should include legal and ethical considerations, technical proficiency, specific strategies for building rapport and expressing empathy online, managing digital boundaries, and adapting interventions to virtual formats (Werbart et al., 2024). As remote and hybrid models of psychotherapy become increasingly common, integrating these competencies into education, supervision, and professional development programs is essential to ensuring high-quality care. By implementing evidence-based strategies — including fostering presence, proactively managing technology, embracing flexibility, and pursuing specialized training — therapists can significantly improve communication effectiveness in online psychotherapy, strengthen the therapeutic process, and optimize client outcomes.

5. CONCLUSION AND FUTURE DIRECTIONS

Online psychotherapy is no longer a temporary solution — it has become an integral and enduring component of modern mental healthcare. Findings from this review demonstrate that, particularly in individual settings and with cognitive-behavioural approaches, online psychotherapy is clinically effective and often comparable to face-to-face therapy. However, caution is warranted when generalizing these results, especially in the context of group interventions, where evidence still reflects considerable methodological heterogeneity and a lack of standardization. A key insight from the literature is that the quality of communication and strength of the therapeutic process remain just as critical in virtual settings as in physical ones. Yet, the online environment alters interpersonal dynamics, requiring therapists to consciously adapt both verbal and non-verbal communication, strengthen their technical competencies, and actively foster a sense of presence and trust. Furthermore, the effectiveness of online therapy is not solely determined by the modality itself, but by an interplay of factors — including the level of therapist involvement, client characteristics, intervention design, and adherence-related issues such as privacy and technological conditions. Thus, rather than simply concluding that online therapy is "just as good," we must ask: *for whom, under what circumstances, and with what adaptations* is it most effective? Given the growing prevalence of digital formats in psychotherapy, the integration of specific competencies for online practice into training curricula, continuing education, and supervision is essential. Incorporating knowledge of digital ethics, technological stability, communication strategies, and boundary management in virtual spaces will help therapists work more confidently, safely, and effectively.

Future research should focus on evaluating a wider range of therapeutic modalities in online formats, including psychodynamic, humanistic, and integrative approaches, and their impact on specific vulnerable populations (e.g., children, older adults, individuals with disabilities). Further investigation is also needed into the long-term outcomes of online therapy and the potential of hybrid models to offer personalized and flexible care. In conclusion, online psychotherapy holds significant promise for expanding access to mental health services. However, realizing this potential requires ongoing investment in knowledge, research, and ethical frameworks. High-quality online therapy does not happen by chance — it is the result of professional reflection, technological readiness, and the therapist's ability to create a genuine human connection across a digital medium.

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THE STRATEGIC SIGNIFICANCE OF PLACE BRAND ARCHITECTURE IN THE ALIGNMENT OF COMMUNICATION AND BRAND MANAGEMENT

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ABSTRACT

This research analyzes the perception of the brand architecture of the city of Varaždin, with the aim of identifying the most recognizable (sub)brands and their connection to the place's identity. The theoretical framework is grounded in contemporary approaches to place branding, incorporating symbolic, associative, and multisensory dimensions of place brands. Central to the analysis is the concept of brand architecture, defined as the strategic organization of a portfolio of brands that shape and convey the identity of a place. The study was conducted using a survey questionnaire administered to a sample of 616 respondents from Varaždin. A structured questionnaire with 38 Likert-scale items was used. The instrument was pre-tested in two stages and validated using statistical methods, with a Cronbach's alpha of 0.985, indicating high reliability. The sample was selected through purposive and snowball sampling, and the data were analyzed using descriptive and inferential statistics. The results show that respondents most strongly recognized events, economic entities, and cultural-historical heritage as key components of Varaždin's brand architecture. Sports clubs, cultural institutions, and educational organizations followed these. The connection between these (sub)brands and the place's identity was rated highly, indicating a strong integration of diverse identity elements within the place's brand system. These findings confirm the importance of strategically managing brand architecture within the context of place branding and highlight the need to incorporate multisensory and experiential elements in shaping urban distinctiveness. According to respondents' perceptions, Varaždin positions itself as a city rich in cultural, historical, and social content, forming a solid foundation for the further development of a coherent and differentiated brand strategy.
Keywords: Place branding, Place brand architecture, Place brand identity, Place brand communication, the City of Varaždin

1. INTRODUCTION

Over the past three decades, the field of place branding has evolved significantly, both in theory and practice. This evolution has brought about a shift in focus from simple place promotion to place marketing, and subsequently to the development of diverse place branding strategies. Place brands encompass a wide array of territorial units, including cities, regions, states, locations, and nations. An integrative definition by Eshuis and Ripoll González (2025) conceptualises place brands as multi-sensory, embodied experiences: *"Place brands are marketing systems that consist of dynamic performative assemblages of symbolic, discursive, institutional and material elements that selectively invite certain multi-sensory and embodied experiences of place by stakeholders and target groups."* This perspective underscores the complexity and experiential nature of place brands, beyond traditional symbolic representations. Place branding, as described by Stylianou, Pipyros, and Aslanides (2025), is a strategic process aimed at developing and promoting a distinctive identity or image for cities, regions, or nations to attract residents, businesses, visitors, and investors. It is a multifaceted policy mechanism, introduced for various purposes to enhance the socio-economic status of places through long-term investments, attract newcomers and tourists, and establish a well-perceived urban brand (Mutma and Dyanasari, 2025).

According to Ripoll González et al. (2025), beyond image creation, place branding also functions as a governance tool through which places craft their brand identity and implement policies for brand realisation. Place branding is thereby integrated into strategic city and regional management and aligned with policies aimed at fostering structural changes in the desired direction. Eshuis and Ripoll González (2025) identify three dominant conceptual approaches to understanding place brands: (1) as symbolic constructs composed of logos and slogans, (2) as associations in the minds of target audiences, and (3) as multi-sensory and embodied experiences of place. Within the third approach, brand management involves overseeing the entire spatial experience, including elements often beyond the direct control of brand managers, such as residents' and visitors' everyday behaviours or aspects of the physical landscape. This approach is considered to provide broader strategic options for fostering brand attachment and emotional connection, placing the brand beyond purely cognitive and rational stimuli. The authors argue that distinguishing between these three approaches allows brand managers to make informed decisions regarding their branding strategies and the role of place brands. Viewing place brands as embodied experiences implies a practitioner's focus on curating environments conducive to memorable and positive experiences, rather than simply developing brand symbols or meanings. Hence, brand managers act as facilitators and "curators" of authentic experiences, orchestrating the symbolic, discursive, institutional, and material elements of place, rather than merely transmitting symbolic representations (Eshuis and Ripoll González, 2025). The strategic model of place brand management proposed by Kavaratzis, Warnaby, and Ashworth offers a comprehensive framework consisting of ten components: brand infrastructure, brand leadership, stakeholder management, brand identity, brand articulation, brand architecture, brand communication, brand experience, word-of-mouth, and brand evaluation (Mutma and Dyanasari, 2025). Within this model, brand architecture refers to the strategic organisation and structure of the brand portfolio, determining how sub-brands are interconnected and differentiated, thereby influencing the overall perception and value of the brand ecosystem (Carrizo, 2025). Effective brand architecture facilitates the management of relationships between the parent brand and its sub-brands, ensuring clarity, consistency, and strategic alignment in communication and brand governance. In the context of place brands, brand architecture is essential for managing the diverse identities and strategic objectives associated with different territories (Carrizo, 2025). It comprises sub-brands that may be owned or co-developed by public and private sector organisations, including local authorities, tourism offices, businesses of various sizes, and civil society actors (Mulović Trgovac, 2023, 106-107). Carrizo (2025) outlines three primary approaches to brand architecture: the monolithic or branded house model, the endorsed brand model, and the house of brands model. Regardless of the model adopted, brand architecture plays a critical role in structuring and promoting the various elements of a place. Each model presents its own set of advantages and challenges and requires thoughtful consideration and strategic alignment to effectively manage and sustain place brand identity (Carrizo, 2025).

2. RESEARCH METHODS

Survey research was selected as the primary method for data collection due to its versatile applicability and ability to reveal both quantitative and qualitative characteristics in the present, past, and future (Mulović Trgovac, 2023, p. 202; Vranešević, 2014, p. 246). Following an extensive review of secondary data sources and desk research, the next phase involved the development of a survey questionnaire as the research instrument. The pre-testing of the questionnaire was conducted in two phases on a small sample in a smaller town in Northern Croatia. In the first phase, upon completion of the questionnaire administration, additional evaluation was conducted through focus group discussions.

The insights gathered from this initial pre-testing and the focus group discussions were used to revise and refine the questionnaire for the second phase of the research. This revised version was again tested through focus groups to evaluate the clarity and appropriateness of the questions. The same respondents were involved in four focus group discussions, and the conclusions drawn from these sessions were incorporated into the final version of the questionnaire. The research was conducted through a descriptive survey distributed in the city of Varaždin, the largest urban centre in Northwestern Croatia, which serves as a historical, cultural, educational, economic, sports, and tourism hub. The survey was administered online using a structured questionnaire. The sample consisted of 616 respondents recruited via purposive sampling and "snowball" sampling techniques, following an open call for participation in an internet-based survey. All survey items were measured using a five-point Likert scale. The collected data were analysed using descriptive and inferential statistical methods. This study forms part of a broader research project encompassing multiple cities in the Republic of Croatia, with aggregated results presented separately. Additionally, the sample used in this study meets the acceptable margin of error criteria, thus indicating statistical significance and representativeness of the results. The population size data were based on the preliminary results of the 2021 national census published on the official website popis2021.hr. For the Varaždin sample (N = 43,999, n = 616), the margin of error was calculated at ±3.92% at a 95% confidence level (CI = 95%, α = 0.05), which is within the accepted range for social science research.

Sample	City of Varaždin
Sample size (n)	616
Total population (N)	43,999
Confidence level (CI)	95%
Population proportion (p̂)	50%
Margin of error (ε)	±3.92%

Table 1: Sample Description
(Source: Author's calculation)

Based on the margin of error of ±3.92%, it can be concluded that the sample of 616 respondents in Varaždin provides a 95% probability that the actual population parameter lies within the ±3.92% range of the observed values. This conclusion is based on the population size of the city, the sample collected, a 95% confidence level, and a population proportion assumption of 50%, assuming a normal distribution. The margin of error remains within acceptable limits, affirming the validity of the survey results. The final survey instrument consisted of 38 questions, organised into five thematic sections. All statements were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The reliability and validity of the applied measurement scales were verified using appropriate statistical tests, including the KR-20 coefficient. The reliability results, measured by Cronbach's Alpha, are presented in Table 2.

Cronbach's Alpha	Based on Standardised Items	N of Items	Mean	Variance	Std. Deviation
0.985	0.985	72	262.02	4265.048	65.307

Table 2: Cronbach's Alpha Coefficient
(Source: Author's analysis in SPSS)

Based on the presented Cronbach's Alpha coefficient (α = 0.985), the developed Likert scales exhibit an excellent level of reliability and validity (Cronbach and Shavelson, 2004).

These results confirm that the measurement instruments used in the survey are appropriate and effective for capturing the attitudes and opinions of respondents.

3. RESULTS AND DISCUSSION

The research aimed to identify the most recognisable (sub)brands within the brand architecture of the city of Varaždin and examine their perceived connection with the place's identity. The research was conducted through an online survey administered via the internet using a purposive sampling method. A total of 616 respondents from the city of Varaždin participated in the study, following an open call for voluntary participation in the online questionnaire. Of the total sample, 39.3% identified as female and 60.7% as male. The majority of participants were between 18 and 24 years old (51.3%), followed by those aged 25 to 39 (25.2%). Regarding occupation, the sample predominantly comprised students (44.5%), followed by employees (35.2%), managers (3.9%), and civil servants (3.2%). Most respondents had completed secondary vocational school or grammar school (58.8%). In terms of monthly income, 29.7% of participants reported earnings in the range of €431.57 to €862.88 (29.7%), up to €431.44 (14.1%), €863.01 to €1,294.32 (10.9%), and €1,294.45 to €1,725.75 (4.1%). A significant portion (21.3%) reported having no income. The majority of respondents lived in towns with a population of 10,001 to 100,000 (39.8%), followed by settlements with 2,001 to 10,000 inhabitants (21.8%) and up to 2,000 inhabitants (20.9%). A smaller portion resided in cities with more than 100,001 inhabitants (14.4%). Regarding familiarity with Varaždin, 46.8% reported visiting the city rarely, 31.3% frequently, 11.6% lived in Varaždin, and 2.4% were visiting for the first time. Internet usage was prevalent, with 53.4% of respondents using it for more than four hours daily, and 37.3% for two to four hours per day. Blogs were not read by 35.6% of respondents, whereas 26.1% read them several times a month and 21.4% several times a week. Influencers were not followed by 35.6% of participants, while 23.4% followed them several times a month, and 22.6% several times a week. Online articles were read several times a week by 44.2% of the sample. Social media platforms were used for two to four hours daily by 44.5%, and more than four hours by 31.8% of respondents. Sociodemographic characteristics are summarised in Table 3.

Sociodemographic characteristics		Frequency	Percentage
Age	<18 years	35	5,7%
	18 - 24 years	316	51,3%
	25 - 39 years	155	25,2%
	40 - 55 years	89	14,4%
	56 - 75 years	19	3,1%
	>75 years	2	0,3%
	Total	616	100%
Gender	Female	242	39,3%
	Male	374	60,7%
	Total	616	100,0%
Occupation	Student / pupil	274	44,5%
	Employee	217	35,2%
	Unemployed	29	4,7%
	Freelancer / Business owner	17	2,8%
	Manager	24	3,9%
	Civil servant / Government official	20	3,2%
	Retired	13	2,1%
	(Un)skilled worker	12	1,9%
	Farmer	10	1,6%
	Total	616	100,0%

Education	No formal education; incomplete primary school	1	0,2%
	Completed primary school	30	4,9%
	Vocational school (up to 3 years)	64	10,4%
	Completed 4-year high school (including students)	362	58,8%
	Undergraduate degree / professional bachelor's degree	71	11,5%
	Graduate degree / university degree	70	11,4%
	Doctorate or scientific master's degree	5	0,8%
	Prefer not to answer	13	2,1%
	Total	616	100,0%
Monthly income	Up to €431.51	87	14,1%
	€431.65 – €863.30	183	29,7%
	€863.43 – €1,295.00	67	10,9%
	€1,295.13 – €1,726.69	25	4,1%
	€1,726.83 – €2,158.51	5	0,8%
	More than €2,158.64	10	1,6%
	I have no income	131	21,3%
	Prefer not to answer	108	17,5%
	Total	616	100,0%
Place of residence size	Up to 2,000 inhabitants	129	20,9%
	2,001–10,000 inhabitants	134	21,8%
	10,001–100,000 inhabitants (e.g. Zadar, Varaždin, Koprivnica)	245	39,8%
	More than 100,000 inhabitants (e.g. Zagreb, Split, Rijeka)	89	14,4%
	More than one million inhabitants (e.g. Belgrade, Budapest, Rome, Milan, London, Paris, Berlin, New York, etc.)	19	3,1%
	Total	616	100,0%
Blog reading	More than 4 hours daily	329	53,4%
	2–4 hours daily	230	37,3%
	Several times a week	40	6,5%
	Several times a month	11	1,8%
	I don't read blogs	6	1,0%
	Total	616	100,0%
Following influencers	More than 4 hours daily	42	6,8%
	2–4 hours daily	72	11,7%
	Several times a week	139	22,6%
	Several times a month	144	23,4%
	I do not follow	219	35,6%
	Total	616	100,0%
Reading online news articles	More than 4 hours daily	32	5,2%
	2–4 hours daily	93	15,1%
	Several times a week	272	44,2%
	Several times a month	145	23,5%
	I do not read	74	12,0%
	Total	616	100,0%
Use of social media	More than 4 hours daily	196	31,8%
	2–4 hours daily	274	44,5%
	Several times a week	77	12,5%
	Several times a month	44	7,1%
	I do not use social media	25	4,1%
	Total	616	100,0%

Table 3: Sociodemographic Characteristics of Respondents
(Source: Author's SPSS analysis)

The following section presents the results obtained from the survey, highlighting the most recognisable (sub)brands within the brand architecture of the city of Varaždin, as perceived by the respondents. In addition, it provides insights into participants' perceptions regarding the extent to which these (sub)brands are associated with the overall identity of the place.

3.1. Recognition of Brand Architecture

The primary objective of the research was to identify the most recognisable (sub)brands within the brand architecture of the city of Varaždin. The results presented in Table 4 reveal that respondents most strongly associate Varaždin with events such as Špancirfest, Advent in Varaždin, and the Varaždin Baroque Evenings (90.7%), followed by economic entities (e.g. Varteks, Vindija) with 83.9%, and cultural and historical heritage sites (e.g. the Old Town, Varaždin Cathedral, the City Guards) with 83.8%. Sporting clubs and organisations (e.g. FC Varaždin, FC Varteks) were recognised by 82%, and cultural institutions (e.g. theatres, museums such as the Croatian National Theatre in Varaždin, Varaždin City Museum, etc.) by 80.8%. Educational institutions, including the Faculty of Organization and Informatics and the Geotechnical Faculty, were recognised by 79.2%, while the University North was recognised by 77.9%. Gastronomic and enological specialities (e.g. Varaždinski klipič, Varaždinsko zelje, pumpkin seed oil, medenjaci) were acknowledged by 76.5%, and natural landmarks (e.g. the Drava forest park, Vatroslav Jagić promenade, Strossmayer promenade) by 73.1%. Souvenirs (e.g. City keys, Coat of arms) were recognised by 71.1%, and municipal companies and infrastructure (e.g. Čistoća, City market, Varkom, Parkovi, Zona Sjever) by 68.0%.

Associate/ (Sub)Brands Category	Strongly associate (5)	Associate (4)	Neither associate nor disassociate (3)	Do not associate (2)	Strongly do not associate (1)	Don't know (0)
Events	60.2%	30.5%	4.0%	1.0%	0.7%	3.6%
Cultural institutions	43.3%	37.5%	10.4%	2.3%	1.8%	4.7%
Cultural and historical heritage and landmarks	48.7%	35.1%	8.1%	1.6%	0.9%	4.4%
Natural landmarks and environment	38.0%	35.1%	14.8%	4.1%	1.1%	4.9%
City-owned companies, institutions and infrastructure	30.7%	37.3%	17.4%	6.1%	2.0%	5.5%
Scientific educational institutions (University North)	41.6%	36.4%	10.1%	2.4%	1.4%	5.0%
Scientific educational institutions (FOI, Geotechnical Faculty, etc.)	46.1%	33.1%	10.9%	3.2%	1.4%	4.4%
Sports clubs and organizations	48.2%	33.8%	8.2%	2.1%	1.4%	5.4%
Gastronomic specialties	41.2%	35.2%	12.2%	4.4%	1.5%	5.4%
Souvenirs	35.7%	35.4%	15.1%	5.2%	2.2%	6.5%

Table 4: Brand Architecture of the City of Varaždin
(Source: Author's analysis based on the obtained results)

The results in Table 5 present the average ratings of the most recognisable (sub)brands within the brand architecture of the city of Varaždin, as perceived by the respondents.

Brand Architecture of the City of Varaždin	Mean Score
Events	4.55
Cultural and historical heritage	4.34
Economic entities	4.35
Sporting clubs and organisations	4.30
Cultural institutions	4.25
Educational institutions (FOI, Geotechnical Faculty)	4.23
Educational institutions (University North)	4.16
Gastronomic and enological specialities	4.16
Natural landmarks and environment	4.08
Souvenirs	4.01
Municipal companies, institutions and infrastructure	3.92

Table 5: Mean Scores of Brand Architecture of the City of Varaždin
(Source: Author's analysis based on the obtained results)

The results indicate that events (such as Špancirfest, Advent in Varaždinu, the Varaždin Baroque Evenings, and others) are perceived as the most substantial brand element of Varaždin (4.55), whereas municipal services and infrastructure (e.g. Čistoća, City market, Parkovi, Varkom, Zona Sjever i sl.) are rated the lowest (3.92).

3.2. Perceived Connection Between Place Brand Architecture and Place Brand Identity

The study aimed to examine the extent to which these (sub)brands are perceived to be connected with the place's overall identity. Table 6 presents the respondents' perceptions regarding the connection between specific brand architecture (sub)brands and the identity of the place. The majority of participants agreed or strongly agreed that events (e.g. Špancirfest, Advent in Varaždin, and the Varaždin Baroque Evenings) are integral to the city's identity (87.7%).

This was followed by cultural institutions (83.1%) such as theatres and museums like the Croatian National Theatre in Varaždin, Varaždin City Museum, etc.; cultural and historical heritage (82.6%) such as the Old Town, Varaždin Cathedral, the City Guards; and economic entities (80.2%) like a Vindija, Varteks and others. Sporting organisations (e.g. FC Varaždin, FC Varteks) were viewed as part of the city's identity by 79.2% of respondents, educational institutions (FOI and Geotechnical Faculty) by 77.4%, and gastronomic specialities by 77.3% (e.g. Varaždinski klipič, Varaždinsko zelje, pumpkin seed oil, medenjaci). Souvenirs (e.g. City keys, Coat of arms) were recognised as identity-bearing by 76.1%, natural landmarks by 75.8% (e.g. the Drava forest park, Vatroslav Jagić promenade, Strossmayer promenade), University North by 73.9%, and municipal services and infrastructure (e.g. Čistoća, City market, Parks, Varkom, Zona Sjever i sl.) by 67.7%.

Statement	Strongly agree (5)	Agree (4)	Neither agree nor disagree (3)	Disagree (2)	Strongly disagree (1)	Don't know (0)
Špancirfest, Advent in Varaždin, Varaždin Baroque Evenings are part of Varaždin's identity	59.9%	27.8%	7.0%	1.7%	0.0%	3.6%
CNT in Varaždin, Varaždin City Museum are part of Varaždin's identity	46.3%	36.9%	10.5%	2.9%	0.0%	3.6%
Old Town, Varaždin Cathedral, Purgari are part of Varaždin's identity	48.9%	33.8%	10.2%	2.6%	0.0%	4.1%
Drava Park Forest, Jagica Promenade, Štrosmajer Promenade are part of Varaždin's identity	37.8%	38.0%	15.3%	3.1%	1.4%	4.5%
Čistoća, City market, Parks, Varkom, Zona Sjever are part of Varaždin's identity	32.6%	35.1%	21.1%	5.1%	1.1%	5.0%
University North is part of Varaždin's identity	39.0%	34.9%	15.7%	3.7%	1.7%	4.9%
FOI, Geotechnical Faculty in Varaždin are part of Varaždin's identity	40.1%	37.3%	13.1%	2.6%	1.1%	4.7%
FC Varaždin, FC Varteks are part of Varaždin's identity	46.4%	32.8%	12.5%	3.1%	1.3%	3.9%
Varaždin's klipić, Varaždin's sauerkraut, pumpkin seed oil, honey cakes are part of Varaždin's identity	43.0%	34.3%	13.8%	2.8%	1.6%	4.4%
The key to the city of Varaždin, the City Guard are part of Varaždin's identity	40.6%	35.6%	14.6%	2.6%	1.3%	4.4%
Varteks, Vindija are part of Varaždin's identity	47.6%	32.6%	11.2%	2.1%	2.3%	4.2%

Table 6: Connection Between the Brand Architecture of
the City of Varaždin and the Identity of the City of Varaždin
(Source: Author's analysis based on the obtained results)

The results presented in Table 7 show the mean scores of respondents' perceptions regarding the connection between the (sub)brands within the brand architecture of the city of Varaždin and the place's identity.

Statement	Mean Score
Events are part of Varaždin's identity	4.51
Cultural and historical heritage are part of the identity	4.34
Economic entities are part of the identity	4.28
Sporting clubs are part of the identity	4.25
Cultural institutions are part of the identity	4.30
Educational institutions (FOI, Geotechnical Faculty)	4.17
Gastronomic and enological specialities	4.20
Souvenirs	4.15
Natural landmarks and environment	4.13
Educational institutions (University North)	4.10
Municipal companies and infrastructure	3.97

Table 7: Mean Scores of Perceived Connection between
Place Brand Architecture and Place Brand Identity
(Source: Author's analysis based on the obtained results)

These findings confirm that events (4.51) such as Špancirfest, Advent in Varaždin, and the Varaždin Baroque Evenings, and others, cultural heritage (4.34), and economic entities (4.28) are perceived as the strongest carriers of the place's identity, while municipal infrastructure (3.97) is perceived as the weakest (e.g. Čistoća, City market, Parkovi, Varkom, Zona Sjever i sl.). This supports the thesis that symbolic, experiential, and cultural elements of a place brand hold stronger identity-building potential than institutional or administrative components (Anholt, 2010; Kavaratzis and Ashworth, 2005). The research results show that respondents most strongly associate the brand architecture of Varaždin with events such as Špancirfest, Advent, and the Varaždin Baroque Evenings, as well as with local economic entities like Varteks and Vindija, and the city's cultural and historical heritage. These elements are not only the most frequently mentioned but also most closely linked to the place's identity, indicating a strong integration of branded entities within the broader narrative of place identity. This perception highlights Varaždin's potential for strategic brand architecture management, in line with theoretical models that emphasize cohesion, recognizability, and emotional connection in place branding. Although multisensory and experiential aspects were less emphasized, they represent added value for differentiating the city's offer and enhancing the overall urban experience. In the eyes of the respondents, Varaždin is positioned as a culturally rich, historically significant, and socially vibrant city, forming a strong foundation for the development of a distinctive, consistent, and authentic place brand.

4. CONCLUSION

This study examined the perception of Varaždin's brand architecture, focusing on the recognisability and identity association of its key (sub)brands. Grounded in current place branding theory, which views place brands as multisensory and experiential, the research framed brand architecture as a strategic tool for organising diverse urban identities. Using a highly reliable survey (Cronbach's alpha = 0.985), data were collected from 616 respondents, ensuring statistical validity. The results highlight cultural events (Špancirfest, Advent, Baroque Evenings), economic entities (Vindija, Varteks), and cultural-historical landmarks (Old Town, Cathedral) as the most recognisable and identity-linked elements. Other important components include sports clubs, educational institutions, and gastronomy, while municipal services and souvenirs were less strongly associated, indicating potential for repositioning.

The findings support the idea of brand architecture as a governance and experiential strategy, not just a visual identity tool. Varaždin's strong cultural and economic recognition suggests an opportunity to adopt a more integrated brand management approach - one that includes stakeholder collaboration, emotional resonance, and alignment of symbolic and material elements. Finally, identifying dominant (sub)brands provides a basis for selecting an appropriate brand architecture model – branded house, endorsed, or house of brands - that could guide strategic planning, marketing, and urban development. This research thus contributes both empirical evidence and practical direction for developing a coherent and competitive place brand. Future studies may build on this by comparing cases across Croatian places to shape a national place branding framework.

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THE ROLE OF WASTE SEPARATION IN THE SUSTAINABLE DEVELOPMENT OF TOURIST DESTINATIONS

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ABSTRACT

Tourism is vital to Croatia's economy. Expanding destinations beyond the coastal areas is key to unlocking their full potential. Sustainability in this process has become one of the foundations of development, and sustainable waste management ensures the preservation of the environmental quality of tourist destinations. Various factors influence citizens' attitudes and behaviours regarding waste separation, with motivations playing a crucial role in encouraging household participation. This study examines the attitudes and motivations of citizens in northern Croatia toward household waste separation, utilizing a quantitative survey of 804 respondents from Krapina-Zagorje, Varaždin, Međimurje, and Koprivnica-Križevci counties, which are considered representatives of rural tourist destinations. The research aims to assess the correlation between understanding the importance of waste separation and actual behaviour, as well as to analyse motivational differences across demographic groups. Findings indicate that while most respondents engage in waste separation and acknowledge its importance, the correlation between understanding and behaviour is weak, suggesting that additional factors influence participation. Differences in motivation were observed across age groups, income levels, and regions, while gender and education level had no significant impact. These findings offer insights into waste management's impact on rural tourism and a gap-filling contribution by exploring citizens' motivations, in contrast to other studies focusing on island and coastal tourist destinations. Results also provide valuable insights for policymakers in designing targeted waste management strategies that enhance public engagement. Effective waste separation policies can contribute to sustainable tourism by preserving environmental quality, improving waste management efficiency, and enhancing the attractiveness of tourist destinations.

Keywords: *Sustainable tourism, waste separation, waste management, environmental policy, tourism destination*

1. INTRODUCTION

Sustainable tourism is a key driver of long-term economic, social, and environmental well-being (Duarte et al. 2024). A critical tourism sustainability component is effective waste management, particularly at the household level. Proper waste separation reduces landfill waste, promotes recycling, and minimizes environmental pollution, which are crucial for maintaining the attractiveness and ecological balance of tourist destinations (Perkumienė et al. 2023).

With the rapid growth of global populations, industrialization, and uncontrolled urbanization, environmental concerns, particularly air, water, and soil pollution, have intensified. Waste separation at the household level is an essential strategy for mitigating these effects, yet participation rates vary based on multiple socio-demographic and motivational factors (Moeini et al. 2023). Understanding these influences is essential for developing effective policies that encourage responsible waste disposal, particularly in regions reliant on tourism. In contrast to previous studies that focused on already developed tourist destinations in Croatia (Fistrić, 2011; Kiš et al. 2021; Zovko, Melkić & Marković, 2021; Jotanović, Ratković & Zakić, 2017), this study investigates the relationship between awareness of waste separation importance and actual household waste separation behavior, focusing on four northern Croatian counties: Krapinsko-Zagorska, Varaždinska, Međimurska, and Koprivničko-Križevačka. The research also examines the role of demographic characteristics in shaping citizens' motivations for waste separation. To address these objectives, the study defines the following key research questions:

1. To what extent does understanding the importance of waste separation correlate with actual household waste separation behaviour?
2. What demographic factors significantly influence motivation for waste separation?

Correspondingly, two research hypotheses are proposed:
- **H1:** A positive correlation exists between understanding the importance of waste separation and actual waste separation behaviour.
- **H2:** Significant differences exist in motivation for waste separation among different demographic groups.

By identifying the socio-demographic drivers of waste separation, this research provides insights that can inform waste management policies and sustainable tourism strategies. A well-structured waste management system not only preserves the environment but also strengthens a destination's sustainability credentials, fostering a positive image for both residents and visitors.

2. THEORETICAL BACKGROUND
Sustainable waste management plays a crucial role in preserving the environmental quality of tourist destinations. A well-organized waste separation system reduces pollution, supports circular economy principles, and enhances the overall attractiveness of a destination. This study builds on existing research by examining how citizens' awareness of waste separation correlates with actual behaviour and identifying demographic influences on waste separation motivation. While previous studies have focused on island and coastal destinations and general recycling behaviour, this research investigates regional trends in northern Croatia, providing insights into destination-specific waste management policies.

2.1. Waste separation and sustainable development
Proper waste separation contributes to sustainable development by enabling the reuse and recycling of materials, reducing landfill dependency, and minimizing environmental footprints. The European Union's Waste Framework Directive (2008/98/EC) establishes fundamental principles for waste management, prioritizing waste prevention, recycling, and recovery over disposal. The 2018 amendment (EU 2018/851) highlights that, although municipal waste represents only 7-10% of total waste in the EU, it remains one of the most complex waste streams to manage due to its mixed composition and high public visibility. The directive emphasizes structured waste collection programs, active citizen participation, and effective infrastructure investments.

In the context of tourism, sustainable waste management aligns with global initiatives, particularly the United Nations (2015) Sustainable Development Goals (SDGs):
- SDG 11: sustainable cities and communities, which encourages responsible waste management systems in urban areas and tourist destinations.
- SDG 12: responsible consumption and production, which promotes sustainable waste practices, including recycling and circular economy models.

The 2022 report by the Croatian Ministry of Economy and Sustainable Development highlights trends in municipal waste management: a total of 1,844,382 tons of municipal waste was generated in 2022, marking a 4% increase from 2021, the waste separation rate reached 46%, continuing an upward trend from previous years, and the highest separation rates were recorded in Međimurska county (55%), Koprivničko-križevačka county (50%), and Varaždinska county (47%). Economic growth and increased tourism activity have contributed to rising waste volumes, necessitating more effective waste separation policies at both local and national levels.

2.2. Psychological and behavioural drivers of waste separation
Understanding consumer behaviour regarding waste separation is crucial for developing effective policies. The theory of planned behaviour (TPB) (Ajzen, 1991) is a widely used model explaining how beliefs and motivations influence behaviour. TPB suggests that three key factors predict waste separation behaviour:
- Attitudes toward waste separation – if individuals perceive it as beneficial for the environment, they are more likely to engage in it.
- Subjective norms – social pressure from family, friends, or the community influences individuals' likelihood of separating waste.
- Perceived behavioural control – if individuals believe they have access to necessary resources (e.g., bins, collection services), they are more inclined to separate waste.

In addition to TPB, the Norm Activation Model (NAM) (Schwartz, 1977) emphasizes the role of personal moral norms. When individuals recognize the consequences of waste mismanagement and feel responsible, they are more likely to engage in pro-environmental behaviours such as waste separation. Botetzagias et al. (2015) extended TPB by incorporating moral norms and demographic factors, finding that while demographics such as age and income play a role, psychological factors strongly influence waste separation behaviour. This suggests that educational campaigns and incentive-based policies may be more effective than demographic-targeted strategies alone. Despite increasing awareness, several barriers continue to hinder household waste separation. Scheffer (2020) identifies key challenges:
1. Perceived inconvenience, as waste separation is often seen as time-consuming or complex.
2. Lack of clear information, as many households struggle to understand proper waste sorting procedures due to inconsistent communication.
3. Limited access to infrastructure, as the absence of adequate waste collection bins discourages participation.
4. Lack of feedback mechanisms, as households rarely receive confirmation on whether they are sorting waste correctly, leading to disengagement.

Given that waste separation motivation differs across demographic groups, policies should be tailored to address specific concerns, ensuring higher participation rates.

2.4. Waste separation and tourism

Integrating local communities into sustainable tourism practices is essential for effectively managing waste and the overall sustainability of tourist destinations. Research indicates that community-based approaches to tourism (Zovko, Melkić & Marković, 2021), which emphasize fair revenue sharing and enhanced conservation capabilities, are vital for long-term environmental stewardship and local development (Chan et al., 2021). Furthermore, the transient nature of tourists means their impact on sustainable practices, such as waste separation, is minimal compared to that of residents. Residents' daily habits in waste management significantly influence the ecological footprint of a destination. A case study in Lerep tourism village demonstrated that empowering the community through integrated sustainable waste management practices led to effective waste reduction and environmental conservation (Suryani et al., 2022). In addition, studies have shown that improper waste management within the tourism industry leads to excessive waste generation, causing severe environmental and social consequences. Inadequate disposal methods, lack of recycling initiatives, and excessive waste production contribute to pollution, habitat degradation, and harm to local communities (Green.org, 2024). Therefore, fostering active participation among local communities in sustainable tourism and waste management practices is crucial for the long-term viability of tourist destinations. The literature review in this chapter indicates that waste separation is a multifaceted issue influenced by policy frameworks, behavioural factors, and infrastructural challenges. While theories such as TPB and NAM explain psychological motivations, policy interventions and public awareness campaigns must also address practical barriers.

3. METHODOLOGY AND RESEARCH SAMPLE

A quantitative research approach with a survey method was chosen to examine citizens' attitudes and intentions regarding waste separation in northern Croatia. The study focuses on four counties: Krapinsko-Zagorska, Varaždinska, Međimurska, and Koprivničko-Križevačka. The research design is based on a cross-sectional survey that captures data on citizens' awareness, behavior, and motivations regarding household waste separation, like Fadhullah et al. (2022), Xu, Ling & Shen (2017), and Jotanović, Ratković & Zakić (2017). Closed-ended questions were used in the survey, along with Likert-type scales to measure attitudes and socio-demographic characteristics. The sample consisted of 804 respondents from the four selected counties in northern Croatia, chosen to reflect the demographic diversity of the population. Respondents were selected using a stratified random sampling technique to ensure representation across key socio-demographic variables such as age, gender, education level, and household income.

The survey sample distribution was as follows:
- County of residence: 182 respondents from Koprivničko-Križevačka, 146 from Krapinsko-Zagorska, 244 from Međimurska, and 232 from Varaždinska.
- Age groups: 27.2% were aged 18-30 years, 26% were aged 31-40 years, 25.7% were aged 41-50 years, 16.8% were aged 51-65 years, and 4.2% were older than 65 years.
- Gender: 57.3% female, 40.8% male, 1.7% preferred not to answer, and 0.1% identified as other.
- Education level: 4.2% completed primary school or vocational training, 38.5% completed secondary school, 28.4% completed undergraduate studies, 25.1% completed graduate studies, and 3.7% had completed post-graduate or doctoral studies.
- Monthly household income: 10.4% had a net income of up to €700, 22.4% between €700.01-€1,100.00, 26.7% between €1,100.01-€1,500.00, 14.9% between €1,500.01-€2,000.00, 14.8% between €2,000.01-€3,000.00, and 10.7% more than €3,000.01.

The data was collected through a mixed-model survey consisting of both online surveys and Computer-Assisted Telephone Interviews (CATI). The online survey was administered using Google Forms and distributed via digital channels and social media platforms, with a reach of approximately 71,000 citizens in the targeted counties. The CATI technique was used to gather responses from a random selection of individuals from the national telephone directory. Participation in the survey was anonymous and voluntary. The survey was conducted between November 17th and 30th, 2023. A total of 31.8% of the responses were collected through CATI, while the remaining responses were gathered via the online survey. To examine the relationship between citizens' awareness of waste separation importance and their actual behaviour, the following variables were measured:

- Independent variable: Awareness of the importance of waste separation (measured through survey questions regarding environmental awareness, knowledge of waste management practices, and attitudes toward the importance of waste separation).
- Dependent variable: Actual waste separation behaviour (measured by respondents' self-reported frequency of waste separation, types of waste they separate, and their participation in local waste separation programs).

The following statistical techniques were employed to answer the research questions and test the hypotheses: Spearman's Rank Correlation was used to examine the relationship between the perceived importance of waste separation and actual waste separation behaviour. This non-parametric test is appropriate as both variables were not normally distributed, as confirmed by the Shapiro-Wilk test. Chi-Square Tests were applied to assess significant differences in motivation for waste separation across various demographic groups (age, gender, education level, household income, and county of residence).

4. RESEARCH RESULTS

Most respondents (98.1%) reported that they separate waste in their households using designated bins or bags, indicating a high level of engagement in waste separation. A small percentage (1.9%) of respondents stated that they do not separate waste, highlighting an opportunity for targeted education and intervention. Most respondents engage in separating multiple types of waste, with the highest separation rates recorded for paper, plastic, metal, glass, and bio-waste. Additionally, a significant number of respondents separate specific waste categories, demonstrating high awareness of proper waste disposal practices.

However, some challenges remain regarding the consistency of waste separation across different waste streams (Graph 1).
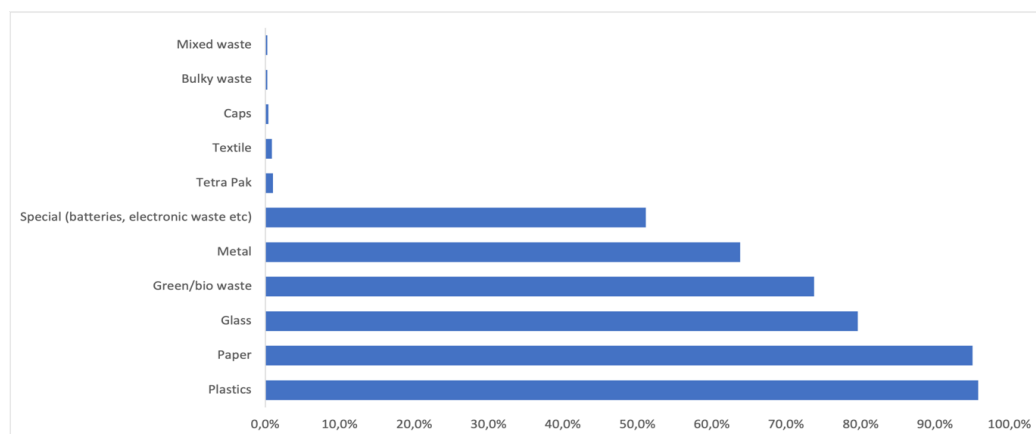
Graph 1: Types of waste separated by respondents
(Source: research results)

Among those who do not separate waste, the most frequently mentioned reasons include lack of information on proper waste separation methods, limited space for waste bins in their households, and the perception that waste separation is ineffective, suggesting a lack of trust in the waste management system. These findings indicate that improving waste separation infrastructure and increasing public awareness can enhance participation rates.
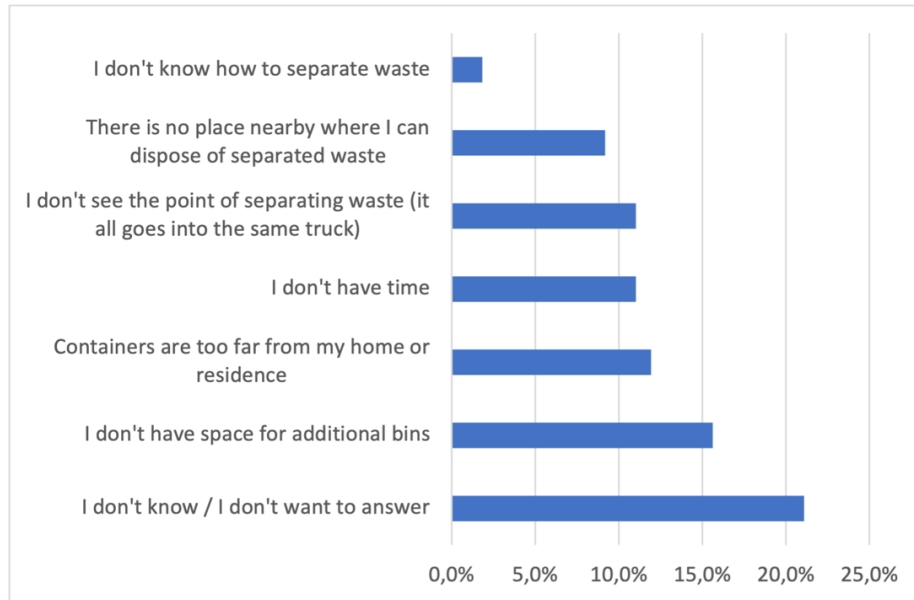
Graph 2: Reasons for not separating waste
(Source: research results)

Respondents identified several factors that would encourage them to separate waste more actively, which include financial incentives (e.g., reduced waste collection fees based on the amount of waste separated) were seen as the most effective motivator, penalties for non-separated waste were also highlighted as a potential means to encourage compliance, and increased availability of waste separation bins was cited as an important factor in promoting proper waste disposal. These results suggest that both incentive-based policies and improved waste management infrastructure could lead to higher rates of household waste separation. (Graph 3).
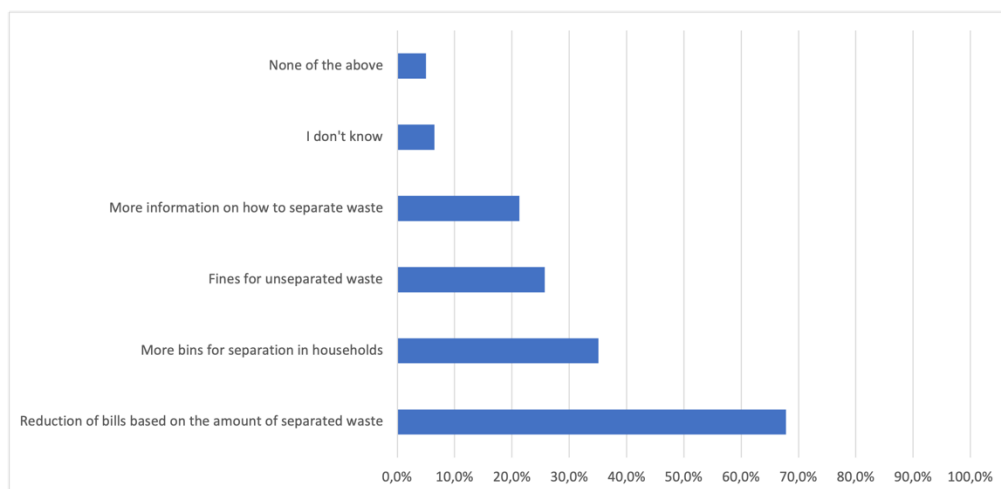
Graph 3: Incentive for increased household waste separation
(Source: research results)

Most respondents rated compliance with EU environmental standards in waste management as very important or extremely important. More than 600 respondents gave high ratings (4 or 5 on a Likert scale), indicating substantial public support for environmentally responsible waste disposal policies (Graph 4).
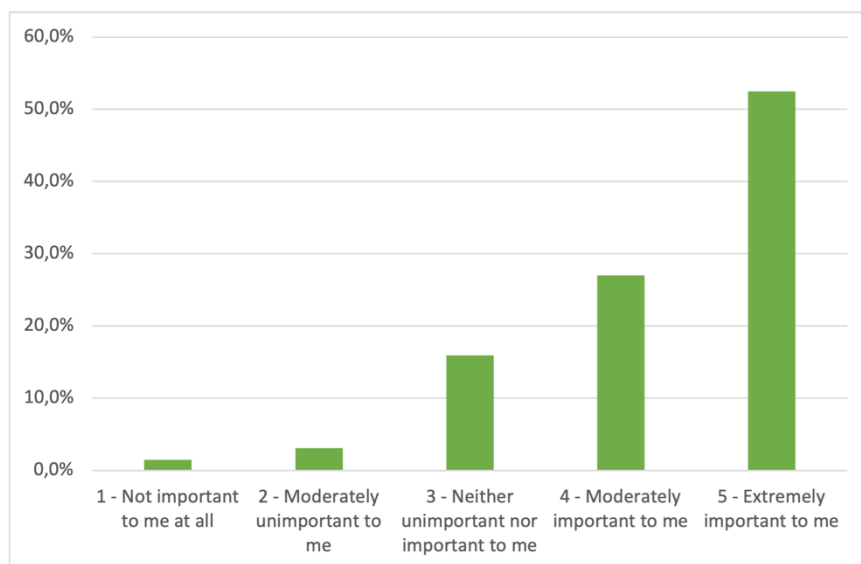
Graph 4: The importance of waste management according to European Union standards (Source: research results)

Regarding how respondents receive information about environmental protection and waste management, the findings show that the digital platforms (online news portals and social media) are the primary sources of information, reflecting a broader global trend toward digitalization. Television and local/regional newspapers still play a role, but their influence is lower compared to digital sources. Results highlight the importance of using online platforms for environmental awareness campaigns to reach a larger audience (Graph 5).
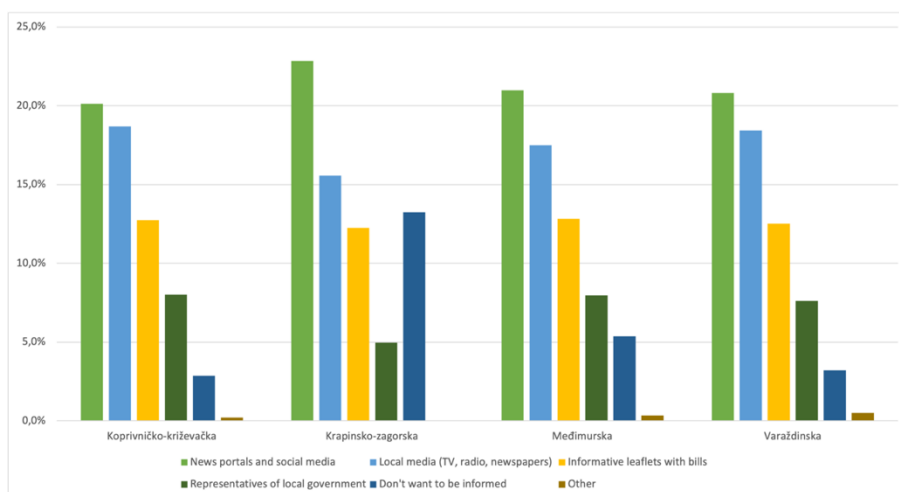
Graph 5: Channels for receiving information about daily events in the county (Source: research results)

The study also examined which sources respondents trust when it comes to environmental protection and waste management information. The majority of respondents trust environmental experts, ecologists, and waste management professionals the most.

Many respondents indicated that they do not trust any information sources, suggesting scepticism about environmental policies. Media and local government authorities were also recognized as relevant information sources, but their trust levels were lower than those of experts. Personal recommendations from friends and acquaintances had some influence but were not a major trust factor.
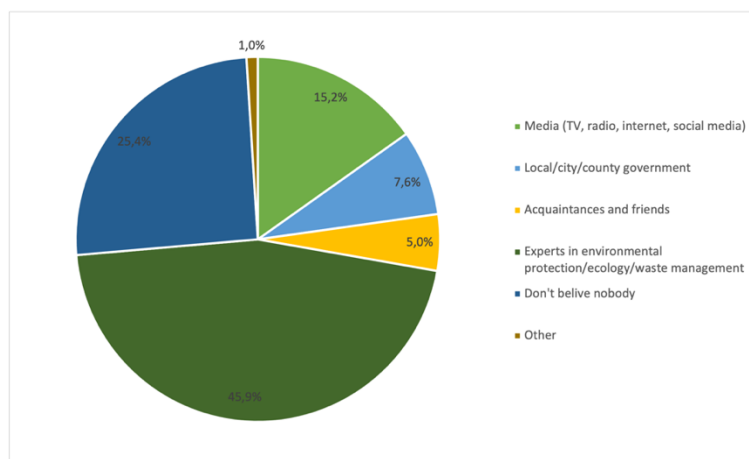
Graph 6: Respondents' trust in a specific source/channel regarding
environmental protection and waste management topics
(Source: research results)

To test Hypothesis H1 (*There is a positive correlation between understanding the importance of waste separation and actual waste separation behaviour*), the study identified variables representing understanding of waste separation importance and actual waste separation behaviour. A Shapiro-Wilk test was conducted to check for normal distribution. The test results showed that both variables were not normally distributed (p-values < 0.05), requiring the use of Spearman's Rank Correlation for analysis. Spearman's correlation coefficient was 0.145 (p < 0.05). The positive correlation indicates that as the perceived importance of waste separation increases, the tendency to separate waste also increases.

However, the correlation strength is weak, suggesting that additional factors influence waste separation behaviour beyond awareness alone. These results confirm Hypothesis H1 but indicate that awareness alone may not be a strong enough driver of behaviour, pointing to the need for structural and motivational interventions. To test Hypothesis H2 (*There are significant differences in motivation for waste separation among different demographic groups*), a Chi-Square test was used to determine the presence of statistically significant differences in motivation for waste separation across various demographic groups. The demographic variables included in the analysis were county of residence, gender, age group, education level, and monthly household net income.

The results of the Chi-Square test for independence for each demographic variable are presented in Table 1.

Demographic variable	Chi-Square Value	p-value	Degrees of freedom	Significance
County of residence	93,53	0,0036	6	Yes
Age group	127,59	0,000574	8	Yes
Gender	49,94	0,8196	6	No
Education level	71,41	0,7429	8	No
Monthly household income	129,88	0,0239	10	Yes

Table 1: Chi-Square results
(Source: research results)

The Chi-Square test indicates that there are significant differences in motivation for waste separation among different counties of residence and age groups, meaning that these two factors significantly influence motivation for waste separation. Regarding gender and education level, the results show no significant differences in motivation for waste separation. Additionally, the results reveal significant differences in motivation among different income levels, indicating that household income has a significant impact on motivation for waste separation.

6. DISCUSSION AND CONCLUSION

This study aimed to analyse the correlation between awareness and actual waste separation behaviour and identify demographic differences in motivation for waste separation among residents of northern Croatia's tourist regions. As indicated from the literature review, destinations that integrate sustainable waste management into tourism strategies can enhance competitiveness. Sustainable waste practices preserve the environment and attract environmentally conscious travellers who prefer destinations with strong eco-initiatives. The results of this empirical study confirm that the majority of respondents actively separate waste, demonstrating a high level of commitment to sustainable waste management practises. A positive but weak correlation exists between understanding the importance of waste separation and actual behaviour, suggesting that awareness alone is not a strong enough motivator. Structural factors, convenience, and incentives play a crucial role in waste separation participation. Significant demographic differences in motivation exist, particularly regarding age, county of residence, and household income, while gender and education level do not significantly influence motivation for waste separation. Enhancing waste separation infrastructure, particularly in high-traffic tourist areas, is crucial. Well-marked separation bins in city centres, parks, hotels, and transport hubs can improve accessibility. Financial incentives such as reduced waste collection fees or tax benefits should encourage participation, while penalties for non-compliance can strengthen accountability. Tourism businesses should integrate strict waste separation policies, leveraging eco-certifications to enhance their sustainability credentials and attract eco-conscious travellers. Public awareness should be improved through digital campaigns and multilingual materials, as the study shows that most residents rely on online sources for information. Mobile apps, social media, and interactive websites should provide guidelines, collection schedules, and real-time waste tracking. Building public trust is essential, requiring transparent reporting on recycling outcomes and clear feedback mechanisms. The study is based on a quantitative survey of 804 respondents in four counties in northern Croatia. This robust sample size improves the reliability of the results and ensures wider applicability in similar rural contexts. While the study is valuable, there are potential limitations, such as self-report bias (respondents' answers may not always reflect actual behaviour) and regional specificity (results may not be fully transferable to other rural tourism regions outside Croatia).

While this study provides key insights into waste separation behaviours and motivations, further research is needed to examine waste separation behaviour among tourists to understand their role in sustainable waste management and compare waste management strategies in different tourist destinations, identifying best practices that could be applied in Croatia and beyond. The originality and contribution of the study lie in the fact that most studies on waste separation and tourism in Croatia focus on coastal and island regions. In contrast, this study focuses on rural tourist destinations in northern Croatia. As it deals with a less studied geographical area, it provides new empirical data that can be used for comparative studies and policy adaptation. The results also contribute to understanding the gap between awareness and behaviour by explaining that actual behaviour does not strongly correlate with awareness. This finding challenges the assumption that knowledge is automatically translated into action. It suggests that external factors (e.g. infrastructure, convenience, incentives) may play a more important role, which could lead to further research on behavioural factors in sustainability studies. A policy-relevant contribution is seen in the fact that the results could help design a targeted waste management policy that considers the motivational differences between different population groups.

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FACTORS INFLUENCING CONSUMER BEHAVIOR AND ATTITUDES TOWARDS ORGANIC FOOD PRODUCTS

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ABSTRACT

Although organic food products are not a novelty, in the last few decades, there has been a noticeable trend of increasing consumption. The importance of organic products is constantly rising – over the last thirty years, the value of the organic retail sales grew substantially, rising from EUR 6 billion in 2000, to EUR 51 billion in 2023. There are several reasons for the above, from the rising concern for the environment and the climate to the fact that individuals no longer want to consume food of dubious origin that contains various pesticides or genetically modified organisms. The rising awareness of what we consume was the main driver for this research, with a focus oriented towards the investigation of consumer purchase intent of organic products. The theory of planned behavior was chosen as the most appropriate method to analyse factors that drive consumers to prefer organic food products in Croatia. Insights from the empirical research conducted in this paper reveal that attitude toward lifestyle and subjective norm concern significantly influence the intent to purchase organic food.
Keywords: *Ajzen's model of planned behaviour, consumer attitudes, consumer behaviour, organic food products*

1. INTRODUCTION

Due to significant exposure to a large amount of information and participation in various social networks that are increasingly becoming an advertising tool, the modern consumer wants to be healthier and create a positive image of themselves and their lives. In accordance with this, recently, there has been a noticeable trend towards a healthy diet and physical activity among consumers. With food expenditure being the largest household expenditure with a significant impact on well-being, it directly implies the importance of scientific analysis (Mjeda et al., 2020). Recently, we have witnessed double-digit inflation growth in the food segment, which further contributes to the importance of this topic. A possible solution to a healthier diet for the individual, but also the problem of environmental pollution and irrational depletion of resources, organic food products are entering the homes of modern consumers with a bang. Organic products are defined as a special type of product that is obtained with the help of organic agriculture and production, i.e., without the use of artificial fertilizers or without any chemicals or pesticides (Anić et al., 2015). For something to be organic food products, during their production and processing: GMOs may not be used under any circumstances, ionizing radiation may not be applied, artificial fertilizers may be used to a limited extent, as well as herbicides and pesticides, hormones may not be used, while the use of antibiotics is possible only if absolutely necessary to protect animal health (European Commission, 2023). As consumers increasingly understand the need to preserve the climate and environment for future generations and want to consume "healthier" products, it is clear that the consumption of organic products will continue to grow, and a greater amount of their production will be required.

The value of organic products is constantly rising – over the last thirty years, the value of the organic retail sales grew substantially, rising from EUR 6 billion in 2000, to EUR 51 billion in 2023 (FIBL and IFOAM, 2025). Croatia still lags behind the EU average, although a significant growth in organic production is noticeable. In accordance with the National Action Plan for Organic Agriculture 2023-2030, Croatia has started to follow trends in organic production, and in recent years, there has been a significant increase in agricultural areas intended for organic production, along with an increase in the number of organic producers and processors. Despite this, there are some areas in which Croatia lags behind the European Union average, such as organic production in aquaculture and the production of organic spices (Ministry of Agriculture, Forestry and Fisheries, 2024). Given the importance of the consumers' role in the emerging market of organic food products, a substantial number of studies analysing the factors that influence the intention to purchase organic products is understandable. Many studies are striving to provide valuable insights into consumer behavior regarding organic food consumption by implementing the theory of planned behaviour (TPB). This paper aims to determine the factors of demand for organic food products using the theory of planned consumer behavior. The aforementioned model captures factors such as lifestyle, behavioral control, and the opinion of the environment in order to ultimately reach a conclusion about what influences the purchase of organic food products. Numerous authors have used the TPB framework to assess the consumer's intention to buy organic food products (Zagata, 2012; Ham et al., 2018; Canova et al., 2020; Teixeira et al., 2022; Khan et al., 2023; Serebrennikov et al. 2024). Across the studies, this model has proven to have a strong predictive power regarding consumer behavior context, with variables such as attitude, subjective norm, and perceived behavioral control significantly impacting purchase behavior. The remainder of the paper is structured as follows. The second chapter continues with the literature review and theoretical framework of the paper, while the methodology and data are explained in the third chapter. The fourth chapter discusses the research results, and the fifth chapter presents concluding remarks.

2. THEORETICAL FRAMEWORK

Consumer behaviour is strongly influenced by a range of different external and internal factors, making it difficult to predict. Various authors who deal with economics and marketing have characterized and classified the factors differently. For the sake of simplicity (and given that most relevant authors divide the factors in a similar way), the factors are divided into the following main groups: social factors (external), personal factors (internal), and psychological factors (Kesić, 2006). Social factors, including culture, socialization, social classes, reference groups, family, and situational influences, present external factors and are largely beyond the individual's control (Grbac & Lončarić, 2010). Cultural background, in particular, plays a major role in shaping values, attitudes, and long-term habits—often including preferences related to sustainability. Socialization, through institutions like family and education, also reinforces shared expectations. On top of that, situational factors—such as time pressure, the store environment, or promotional offers—can shift decisions in ways that are often hard to predict (Kesić, 2006). On a more individual level, personal characteristics such as age, lifestyle, or income directly affect how people make purchasing decisions. For example, younger adults might be drawn to convenience or price, while older consumers may pay more attention to health and nutritional value (Grbac & Lončarić, 2010). Occupation and income shape what products are considered affordable or desirable, while lifestyle reflects broader patterns of behavior, including hobbies, routines, and values. Today, many consumers integrate environmental awareness into their daily lives, making sustainability part of their lifestyle rather than just a shopping preference (Keller & Kotler, 2015). Personality traits also matter—people who score high on openness or conscientiousness tend to show stronger preferences for ethical and environmentally friendly options (Piri Rajh, 2023).

These attributes not only determine how people shop but also their alignment with values like sustainability. For instance, individuals high in openness and conscientiousness are more inclined toward ethical consumption. Thus, understanding the interplay of lifestyle and personality is essential for marketers aiming to build long-term brand relationships. Psychological factors emerge within the consumer and determine how they process and react to external stimuli. According to Keller and Kotler (2015), the four main psychological factors influencing purchase decisions are motivation, perception, learning, and attitudes. Motivation is about what pushes someone to act—whether it's a basic need or a deeper value. While many people may be motivated by similar needs, how they respond to them often varies (Jakšić, 2003). Perception is the lens through which consumers interpret information from their surroundings, and since everyone brings different experiences to the table, their interpretations and decisions vary as well (Kesić, 2006). Learning plays a role too - over time, people update their preferences based on what they've tried before or heard from others (Grbac & Lončarić, 2010). Finally, attitudes, shaped by knowledge, emotions, and behavioral readiness, guide how consumers respond to products and brands (Nakić, 2014). These internal states tend to be stable over time and are closely tied to long-term loyalty or resistance. Research on organic food products has increased in the last three decades, with studies coming from different fields, due to the multidisciplinarity of the topic. Organic products are defined as a special type of product that is obtained with the help of organic agriculture and production, i.e., without the use of artificial fertilizers or without any chemicals or pesticides (Anić, I. D., Jelenc, L., Šebetić, N., 2015). In accordance with the strict rules of the European Union, in order for something to be organic food products, during their production and processing: GMOs may not be used under any circumstances, ionizing radiation may not be applied, artificial fertilizers may be used to a limited extent, as well as herbicides and pesticides, hormones may not be used, while the use of antibiotics is possible only if absolutely necessary to protect animal health (European Commission, 2023).

All of the strict rules, standards, and laws stipulate that something can only be called an organic food product when at least 95% of the product is produced or processed with organically grown ingredients, while the remaining 5% refers to possible pollution from the environment, but even that small percentage is subject to strict conditions (European Commission, 2023). As consumers increasingly understand the need to preserve the climate and environment for future generations and want to consume "healthier" products, it is clear that the consumption of organic products will continue to grow, and a greater amount of their production will be required. In accordance with the National Action Plan for Organic Agriculture 2023-2030, Croatia has started to follow trends in organic production, and in recent years, there has been a significant increase in agricultural areas intended for organic production, along with an increase in the number of organic producers and processors. Despite this, there are some areas in which Croatia lags behind the European Union average, such as organic production in aquaculture and the production of organic products (Ministry of Agriculture, Forestry and Fisheries, 2024). Many studies provide valuable insights into consumer behavior regarding organic food consumption, engaging the theory of planned behaviour. They mostly focus on consumer purchase intention toward organic food products, conducting quantitative researches. Studies reveal that the theory of planned behaviour has a strong predictive power regarding consumer behavior context, with variables such as attitude, subjective norm, and perceived behavioral control significantly impacting purchase behaviour. The theory of planned behavior (TPB) was developed by Icek Ajzen in 1985 and has since been supplemented several times with recent research. What this theory deals with is the intentions of individuals (consumers) to perform a certain behavior. Ajzen identified three independent components from which an individual's intention to perform a certain behavior can be read.

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The first component is "attitude towards behavior", which he explained as a positive or negative assessment that an individual has of a certain behavior, the second is "subjective norm", or the way an individual experiences social pressure to perform a certain behavior, while the third component is "perceived behavioral control". Perceived behavioral control is the perception of whether an individual believes that a behavior will be difficult or easy to perform (Ajzen, 1991). It is considered that if an individual has a positive attitude towards a behavior and a favorable subjective norm with a high level of perceived behavioral control, this means that the individual's intention to perform a behavior is high and strong. On the other hand, if an individual feels a negative attitude towards a certain behavior, along with an unfavorable subjective norm and a sense of behavioral control, it would mean that it is most likely that he will not perform such behavior. The theory of planned behavior has been extensively applied and expanded upon in recent years to explore consumer behavior in organic food markets. Numerous contemporary studies confirm the robustness of this model in predicting organic food purchasing across diverse geographic and cultural contexts. Serebrennikov et al. (2024) conducted a cross-country analysis within the EU, confirming that attitudes, subjective norms, and perceived behavioral control significantly influence organic food purchase intentions. The study highlights regional variability and the importance of policy harmonization. Similarly, Loera et al. (2022) extended the TPB by incorporating moral norms and trust, showing their significant moderating effects on consumer intention across four EU countries. Trust also emerged as a crucial construct in Canova et al.'s (2020) Italian study, where it indirectly affected purchase behavior by enhancing perceived behavioral control. The multidisciplinarity of this theory can be clearly seen from different research areas. For instance, recent methodological advancements have led to the integration of additional psychological theories. Khan et al. (2023) combined TPB with Self-Determination Theory, identifying autonomy, competence, and relatedness as underlying motivational factors influencing organic food attitudes and behaviors. Structural equation modeling (SEM) is the predominant method used to test these theoretical models, enabling multi-group comparisons and complex path analyses. For example, De Canio and Martinelli (2024) applied multigroup SEM to compare consumer intentions between EU quality-labeled and organic products, emphasizing the differential roles of sustainable motives and product knowledge. Extensions of the TPB also enclose domain-specific variables. Teixeira et al. (2022) incorporated environmental concern, health awareness, and perceived product quality into their Portuguese consumer study, all of which significantly enhanced explanatory power. Relying on the theory of planned behaviour, additional empirical studies in Central and Eastern Europe further underscore the model's relevance, while also identifying region-specific factors that enrich its explanatory scope. Research in Croatia and the Czech Republic provides valuable insights into how consumers' beliefs, values, and socio-cultural backgrounds shape their intentions to purchase organic food. Ham, Pap, and Stanic (2018) conducted an empirical investigation into the purchasing behavior of Croatian consumers, emphasizing health consciousness and environmental concerns as primary drivers. Their findings suggest that not only attitudes, subjective norms, and perceived behavioral control, but also deeply held values about personal and ecological well-being significantly affect organic food preferences. This highlights the potential utility of incorporating value-based constructs into the TPB model, particularly in post-transition economies. The study also suggests that perceived benefits and ethical considerations can act as mediators between core TPB variables and behavioral intentions. Similarly, Zagata (2012) applied the TPB to examine consumer behavior in the Czech Republic, finding that attitudes and subjective norms are particularly influential in shaping purchase intentions for organic food. The research confirms that positive attitudes towards organic products—driven by beliefs about health benefits and environmental impact—are critical determinants of behavioral intent.

Subjective norms, reflecting the influence of peers and social expectations, also showed strong predictive power, suggesting that organic food consumption in the Czech context is significantly socially embedded. These findings collectively suggest that while TPB remains a foundational model in understanding organic food purchase behavior, its predictive accuracy is significantly improved through the inclusion of contextual, emotional, and moral dimensions.

3. METHODOLOGY AND DATA

For the purpose of the paper, a survey questionnaire was conducted and completed electronically by the respondents via Google Forms. The research was carried out using the method of collecting primary data in May 2024, on a sample of 106 respondents, using a questionnaire. A five-point Likert scale was used to assess consumer attitudes, according to which the respondents had the opportunity to determine their agreement with the statement. The respondents were asked a total of 29 questions divided into four sections. The most appropriate research model related to the behavior of consumers of organic food products was chosen as Ajzen's model, the theory of planned behavior.

As earlier mentioned, Ajzen states that intention is key to consumer behavior, while intention is significantly influenced by the consumer's attitude towards a certain behavior, subjective norm, and perceived behavioral control. According to the above model, which serves as a foundation for examining the extent to which each of the factors influences consumer intention and behavior in Croatia, the next research hypotheses were set:

H1: "The attitudes toward consumers' lifestyle significantly influences the intention to purchase organic food products."

Namely, there are numerous scientific studies, books, and articles on how the food that people consume, more than all other factors, affects their health, while a person's health is closely related to the lifestyle they live. From this interconnection of lifestyle and food consumed, hypothesis 1 was set to determine whether people who lead a "healthier" lifestyle choose organic food products, or whether people with a "worse" and "unhealthier" lifestyle (which includes alcohol consumption, insufficient physical activity, choosing nutritionally poor foods, etc.) prefer to choose conventional food products.

H2: "Subjective norm significantly influences the intention to purchase organic food products." Perceived behavioral control is the basic premise of I. Ajzen's model, which proves that behavioral intention and final behavior are influenced by what the consumer perceives that he or she can or cannot do.

H3: "The perceived behavioral control significantly influences the intention to purchase organic food products."

Considering the information presented in the previous chapters, it is concluded that it is possible that the consumer's behavior is significantly influenced by their environment.

The next table represents the socio-demographic description of the survey respondents.

	N	%
Gender		
Female	31	29,2
Male	75	70,8
Age		
18 - 25	29	27,4
26 – 35	29	27,4
36 – 45	27	25,5
46 – 55	16	15,1
> 55	5	4,7
Education level		
No education	0	0,0
Elementary school education	2	1,9
High school education	44	41,5
University degree	57	53,8
Doctoral level	3	2,8
Employment status		
Scholar	1	0,9
Student	10	9,4
Employed	90	84,9
Not employed	3	2,8
Retired	2	1,9
Household size		
1	5	4,7
2	5	4,7
3	21	19,8
4	44	41,5
5 or more	31	29,2
Household income		
EUR 0 – 500	1	0,9
EUR 501 – 1000	2	1,9
EUR 1001 – 1500	6	5,7
EUR 1501 – 2000	11	10,4
EUR 2001 – 2500	30	28,3
> EUR 2501	56	52,8
Household food budget		
EUR 50 – 100	0	0,0
EUR 101 – 200	2	1,9
EUR 201 – 300	14	13,2
EUR 301 – 400	14	13,2
EUR 401 – 500	27	25,5
> EUR 501	49	46,2

Table 1. Survey sample characteristics
(Source: author's calculation)

A survey was conducted using the "Google Forms" program with 106 respondents participating in the survey. The respondents were of different genders, ages, and levels of education. The gender structure of the respondents is in favour of one group - of the total number of respondents (106 respondents), 75 were female (70.8%), while 31 respondents were male (29.2%). Regarding the age structure of the respondents, the majority of the respondents are younger than 45. Furthermore, the respondents are mostly highly educated and employed.

4. RESEARCH FINDINGS

The respondents were asked to rate a certain statement with a score from 1 to 5, where the scores are as follows: 1 – I completely disagree, score 2 – I disagree, score 3 – I neither agree nor disagree (neutrality), score 4 – I agree, score 5 – I completely agree. The SPSS Statistical software suite was used to analyze and process the questions and answers from the survey. In order to check the reliability of the measurement scale, or the reliability of the answers that the respondents gave to the questions in the questionnaire, the Cronbach Alpha indicator was used. The survey questionnaire contained 19 items to which the respondents gave ratings from 1 to 5. Cronbach's Alpha was calculated for these 19 items, and the total value is 0.843, meaning that the reliability of the measurement scale is very good. Furthermore, basic statistical measures, namely the arithmetic mean and standard deviation, were used to analyse the survey results. Results are presented in the following tables.

Statement	Mean	Standard Deviation	Cronbach's alpha
1. I take care to exercise and move regularly.	3.61	1.047	
2. I take care to avoid consuming alcohol and tobacco products.	2.8	1.32	
3. I take care to buy high-quality and nutritionally rich food products.	3.46	0.997	
4. I care about knowing how the food products I buy are produced.	3.09	1.028	0.735
5. I avoid buying food products whose production negatively affects biodiversity.	2.98	1.078	
6. I care about protecting the environment and preserving it for future generations.	3.86	0.99	

Table 2. Result on consumer attitudes towards lifestyle
(Source: author's calculation)

Statement	Mean	Standard Deviation	Cronbach's alpha
1. I believe I am capable of consciously choosing organic food products during daily grocery shopping.	3.94	0.964	
2. I believe consumers prefer conventional food products because they are cheaper than organically grown ones.	4.25	1.04	
3. I believe organic food products are healthier than conventional ones.	3.97	0.961	0.788
4. I believe organic food products taste better than conventional ones.	3.71	0.985	
5. I believe buying organic food has a positive impact on the environment.	4.15	0.826	
6. I feel better after buying and consuming organic food products.	3.66	1.086	

Table 3. Result on subjective norm regarding organic food products
(Source: author's calculation)

Statement	Mean	Standard Deviation	Cronbach's alpha
1. I often seek and respect the opinions of people around me.	3.42	0.925	
2. In my household, we often eat organically grown food products.	3.3	0.968	
3. My family members encourage me to buy organic food products.	2.78	1.113	0.761
4. My friends regularly consume organic food products.	2.75	0.967	
5. My friends encourage me to buy organic food products.	2.42	1.086	
6. Doctors and experts encourage me to eat organic food products.	2.62	1.238	
7. Various environmental organizations encourage me to eat organic food products.	2.55	1.131	

Table 4. Result on perceived behavioral control regarding organic food products
(Source: author's calculation)

To test the hypotheses set in the previous part, we used the T-test and Pearson correlation. The tables below show the results of the T-test and the Pearson correlation coefficient.

	t	df	Significance		Mean Difference	95% confidence interval of the difference	
			One-sided p	Two-sided p		Lower	Upper
1. I take care to exercise and move regularly.	35,524	105	<,001	<,001	3,613	3,41	3,81
2. I take care to avoid consuming alcohol and tobacco products.	21,861	105	<,001	<,001	2,802	2,55	3,06
3. I take care to buy high-quality and nutritionally rich food products.	35,757	105	<,001	<,001	3,462	3,27	3,65
4. I care about knowing how the food products I buy are produced.	30,977	105	<,001	<,001	3,094	2,90	3,29
5. I avoid buying food products whose production negatively affects biodiversity.	28,478	105	<,001	<,001	2,981	2,77	3,19
6. I care about protecting the environment and preserving it for future generations.	40,133	105	<,001	<,001	3,858	3,67	4,05

Table 5. T-test result on consumer attitudes towards lifestyle
(Source: author's calculation)

Table 5 shows that the following claims related to H1 can be accepted: 1. I take care to exercise and train regularly; 3. I take care to buy quality and nutritionally rich food products 4. I take care to know how the food products I buy are produced 6. I take care to protect the environment and preserve it for future generations, while the following statements cannot be confirmed: 2. I take care to avoid consuming alcohol and tobacco products, and 5. I take care not to buy food products whose production I know has a negative impact on the protection of biodiversity. Table 6 reveals that all statements related to H2 can be confirmed.

			Significance			95% confidence interval of the difference	
	t	df	One-sided p	Two-sided p	Mean Difference	Lower	Upper
1. I believe I am capable of consciously choosing organic food products during daily grocery shopping.	42,098	105	<,001	<,001	3,943	3,76	4,13
2. I believe consumers prefer conventional food products because they are cheaper than organically grown ones.	42,017	105	<,001	<,001	4,245	4,04	4,45
3. I believe organic food products are healthier than conventional ones.	42,563	105	<,001	<,001	3,972	3,79	4,16
4. I believe organic food products taste better than conventional ones.	38,741	105	<,001	<,001	3,708	3,52	3,90
5. I believe buying organic food has a positive impact on the environment.	51,759	105	<,001	<,001	4,151	3,99	4,31
6. I feel better after buying and consuming organic food products.	34,710	105	<,001	<,001	3,660	3,45	3,87

Table 6. T-test result on subjective norm regarding organic food products (Source: author's calculation)

It is evident that only the following statements can be confirmed in relation to H3: In my life, I often seek and respect the opinions of people around me, and in my household, organically grown food products are often eaten, since the arithmetic mean of these statements is greater than 3. All other statements in relation to H3 have an arithmetic mean value less than 3 and cannot be confirmed as relevant.

			Significance			95% confidence interval of the difference	
	t	df	One-sided p	Two-sided p	Mean Difference	Lower	Upper
1. I often seek and respect the opinions of people around me.	38,105	105	<,001	<,001	3,425	3,25	3,60
2. In my household, we often eat organically grown food products.	35,127	105	<,001	<,001	3,302	3,12	3,49
3. My family members encourage me to buy organic food products.	25,750	105	<,001	<,001	2,783	2,57	3,00
4. My friends regularly consume organic food products.	29,238	105	<,001	<,001	2,745	2,56	2,93
5. My friends encourage me to buy organic food products.	22,905	105	<,001	<,001	2,415	2,21	2,62
6. Doctors and experts encourage me to eat organic food products.	21,812	105	<,001	<,001	2,623	2,38	2,86
7. Various environmental organizations encourage me to eat organic food products.	23,191	105	<,001	<,001	2,547	2,33	2,76

Table 7. T-test result on perceived bihevioral control regarding organic food products
(Source: author's calculation)

Correlation analysis was conducted to examine the presence of multicollinearity among variables. For the first set of questions, the test shows the highest correlation between the statement "I take care to buy quality and nutritionally rich food products" and the statement "I take care to know how the food products I buy are produced". The correlation is 0.570, which indicates a moderate correlation. On the other hand, the lowest correlation is between the claims "I take care to exercise and train regularly" and "I take care not to buy food products whose production I know has a negative impact on the protection of biodiversity", where the correlation is a low 0.171. When analysing the second set of claims, the highest correlation is visible between the statement "I believe that organic food products are healthier than conventional food products" and the statement "I feel better after buying and consuming organic food products", where the correlation value is 0.602.

The lowest correlation is between the statement "I believe that consumers prefer conventional food products because they are cheaper than organically grown food products" and the statement "I believe that organic food products taste better than conventional food products". Mostly, indicators point to the absence of multicollinearity among the independent variables, which relates to good reliability of the model (Šošić, 2004). Since the H3 cannot be confirmed, the multicollinearity was not examined for the third set of claims. The research results imply that while choosing organic food products, the attitudes toward lifestyle and subjective norm have a significant impact. According to our findings, perceived behavioral control is not statistically significant when choosing to buy organic products.

5. CONCLUSION

Organic food products are no longer just an alternative to conventionally grown food products, but represent the future of nutrition for a growing number of consumers. The value of the organic food sales, which exceeded 51 billion euros in 2023, proves that its demand cannot be neglected, not only in scientific research but also in the wider community, especially taking into account that food cost comprises a vast portion of the household budget. The main question that arises in this context is what drives consumers to buy organic food products. In general, studies reveal that there is a broad number of factors that drive an individual to become a consumer of an organic product. In this paper, the research was built on the theory of planned behavior developed by. I. Ajzen, considered notably suitable when analysing different factors that influence consumer behaviour. The basic model, which includes research into the influence of attitudes, subjective norms, and perceived behavioural control of respondents on the intention to purchase functional products, was applied. The variables that make up the model were analysed using 19 claims. The Cronbach alpha coefficient was calculated to assess the reliability of the applied measurement scales. The significance of the claims was tested using a T-test, and the correlation analysis examined the presence of multicollinearity among variables. Empirical research conducted on a convenience sample of 106 respondents established a significant influence of attitudes toward lifestyle and subjective norms on the intention to purchase organic food. No statistically significant relationship was found between perceived behavioural control and the intention to purchase organic food products. The research has its limitations, which mainly concern the structure of the sample being in favour of female respondents. Nevertheless, the study presents a groundwork for further understanding of the key factors that influence Croatian consumers' behavioural intention while choosing organic food products, and should be further investigated in the next research.

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GENDER ASYMMETRY IN THE REPUBLIC OF CROATIA: LEGAL SYSTEM, PROFESSIONS AND SOCIAL SUSTAINABILITY

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ABSTRACT

This paper analyses gender asymmetry in the Republic of Croatia, with special emphasis on the legal system, professions, and business environment. The purpose of the research is to point out existing inequalities in the representation of women in high professional positions and identify patterns and obstacles that make it difficult to achieve complete gender equality. The reason for writing the paper stems from the need for a deeper understanding of the process of feminization of certain rules of professions and their impact on social sustainability. The research methodology is based on the analysis of statistical data from official sources such as the Croatian Bureau of Statistics and the Croatian Bar Association, with a comparative analysis of trends in Croatia and at the international level, especially in the United States. Research findings show that despite the increase in the share of women among law trainees and judges, there is still a pronounced glass ceiling that makes it difficult for women to reach the highest management positions. The contribution of this paper is reflected in exposing structural and cultural obstacles that shape the professional development of women in the legal and business sectors. In particular, the need to change institutional policies and strengthen social awareness of the importance of gender equality for the sustainable development of society is emphasised. As a proposal for future research, the paper underlines the need for longitudinal monitoring of women's career progression in legal professions and for wider sectoral comparative studies to better understand and address existing gender asymmetries.

Keywords: *gender equality, glass ceiling, legal professions, social sustainability, women's leadership*

1. INTRODUCTION

Lawyers within the legal profession show a different gender structure of employment than lawyers within the judicial profession. Data on this are available from the publication of the Croatian Bureau of Statistics' Statistical Yearbook 2022. Table 2 provides data on the number of employed lawyers and trainees in Croatia, as well as data on the number of employed lawyers and trainees per sex.

2. ANALYSIS OF THE SEXUAL STRUCTURE OF THE LEGAL PROFESSION IN THE REPUBLIC OF CROATIA

The data show the following: there is a clear trend of an increase in the number of lawyers in the period 2018-2022. Furthermore, there is a trend of linear growth in the number of law trainees in this period. The number of women working as lawyers is increasing. In parallel, however, the number of lawyers is increasing.

That is why we cannot speak of a significant trend in the feminization of the legal profession. The percentage of women among the attorneys increased from 39% to around 42% in the observed period. We can conclude that both women and men contribute on a similar scale to the trend of increasing the number of lawyers in Croatia. According to the latest data from the Croatian Bar Association, on 31 May 2024, 5,281 attorneys were registered in the Register of attorneys, of which 2,372 were women and 2,909 men, which means that women make 44.9% of attorneys in Croatia. Furthermore, the attorneys' profession can be conditionally labelled as a 'male profession' due to a higher number of attorneys than attorneys in the profession of attorneys in Croatia, as the judicial profession can be conditionally considered a 'female profession' due to the number of judges in Croatian courts. However, the conclusion on attorneys as a 'male profession' would be incomplete and inaccurate. The analysis of data on the number of lawyer trainees in Croatia from 2018 to 2022 shows the gender structure of a group of lawyer trainees, which is different from the gender structure of lawyers.

Unlike lawyers, where women are minorities (42%), women are the majority among law trainees (about 63%). According to data from the Croatian Bar Association for May 2024, women account for 44.9% of all attorneys in Croatia, which further confirms the trend of approaching sexual balance in attorneys. Nevertheless, among lawyers, women still make a pronounced majority -- about 63%. Law trainees are a younger part of the law population and reflect the trend of feminization of the law profession. If we compare the percentage of law trainees in 2018 and 2022 (62 and 63%), there is no significant difference. In other words, the feminisation of law practice has already taken place and is maintained at the same level during that period. The number of trainees and trainee grows slightly every year, and the total number of trainee lawyers grows accordingly. The exception is the period from 2020 to 2021, when the number of law trainees has a slight decline, regardless of gender.

However, the total number of employees in the attorneys, i.e. lawyers trainees, and lawyers combined, is continuously increasing from 2018 to 2022. From a large number of lawyers, we can conclude that the legal profession is being rejuvenated. What is the relationship between the analysis of these data and the first research question on the feminization of the profession of attorney in Croatia? Feminization is visible in the population of lawyer trainees, but it is not yet clearly visible in the population of lawyers. The first reason is that the sexual structure of law trainees correlates with that of graduates of the Faculty of Law in Zagreb. The interval between the completion of studies and the hiring of lawyer trainees is small enough for the percentage of graduate lawyers among graduate students of the Faculty of Law in Zagreb to be very similar to the percentage of lawyer trainees in the trainee population. The population of lawyer trainees is much younger than the population of lawyers. Not only are law trainees recruited early between the ages of 23 and 29, but under the law, the traineeship has a limited duration of 3 years. This practically means that most of the lawyers are between the ages of 23 and 32, while the lawyers are between the ages of 26 and 65. And this broad range of years gives a possible answer to why 58 percent of lawyers are men -- because 20 to 40 years ago, most lawyers and law students were men. They are now 40 to 65 years old and influence the structure of the profession. The difference in age between the two groups prevents the feminization of the profession at the moment, but we can expect a wave of feminization to manifest in the attorneys in 5 to 10 years for two reasons. First, a number of trainees will become lawyers. Second, most lawyers who retire at the age of 5 to 10 will be men because in the oldest group of lawyers, men are the dominant majority.

Table 1 Sexual structure of Croatian attorneys and traineeships from 2018 to 2022

	2018.	2019.	2020.	2021.	2022.
Attorney Total	4300	4400	4500	4600	4700
Women	1720	1800	1880	1950	2020
Men	2580	2600	2620	2650	2680
Lawyers trainees	1700	1750	1600	1650	1700
Women	1060	1100	1000	1040	1070
Men	640	650	600	610	630
Total of lawyers and trainees	6000	6150	6100	6250	6400
Women	2780	2900	2880	2990	3090
Men	3220	3250	3220	3260	3310

Source: Croatian Bureau of Statistics, 2023:558.

3. GLASS CEILING" PHENOMENON IN CROATIAN ATTORNEY'S OFFICE

The profession of attorney is undoubtedly feminized. Women make up the majority of lawyers and are likely to make up the majority of lawyers over time. However, that presumption does not give us an answer to the question of whether the percentage of women in the highest positions in the profession of attorneys will correspond to the percentage of women in the profession of attorneys. If we look at who the presidents of the Croatian Bar Association were, we conclude that there was no woman at the head of the Bar until today. So, regardless of what, according to data for 2022, women make up about 42% of lawyers in Croatia and about 63% of lawyer trainees, in the history of the Croatian Bar Association 0% of its presidents. If it is to be judged by sexual representation in the leading position in the profession of attorneys in Croatia, which is the position of President of the Croatian Bar Association, then there is a glass ceiling in the profession of attorneys in Croatia.

This is not a protocol function, but it is the management of the body that regulates the profession of lawyer in Croatia. According to the Executive Board of the Croatian Bar Association, out of 11 members of the Executive Board, there are only two women, i.e. women make up about 22% of the Executive Board. The Board of Directors of HOK has 37 members, of whom eight are women, i.e. 21.6% (Croatian Bar Association, 2023). The total share of women among lawyers in Croatia is approximately 42%. The share of women in the HOK Executive Board is 20 percentage points lower than the total share, that is, almost twice lower, and in the HOK Management Board, it is about 20 percentage points lower than the total percentage, that is, almost twice lower. From the above, we conclude that there is a glass ceiling in the Croatian attorney's office. According to the latest data from 2024, no women were elected president of the Croatian Bar Association, and the share of women in the management bodies of the Croatian Bar Association remains significantly lower than the share of women among lawyers.

Table 2 Percentage of women among law trainees, lawyers, and members of the Executive Board and the Board of Directors of the Croatian Chamber of Commerce

	Percentage of women	Ratio of number of women to total number
Lawyers trainees	63,0%	1070 OUT OF 1700
Lawyers	42,0%	2020 OF 4700
Members of the Executive Board of the CHC	22,2%	2 OF 9
Members of the Hoka Management Board	21,6%	8 OF 37

4. COMPARISON WITH INTERNATIONAL EXPERIENCE

The legal profession in the Republic of Croatia had a particularly egalitarian structure about 30 years ago. Data from Abel's Article on comparative sociology of the legal profession show that in no country other than France the percentage of women in the legal profession was as high as in the former Yugoslavia. According to Abel, this percentage was almost 50%. As far as the judicial profession is concerned, according to Abel's data, women accounted for 30% of the judicial profession in Yugoslavia in 1985. Furthermore, the legal profession facilitated mobility for members of the lower classes. The record representation of lower layers in the legal profession in Croatia (indirectly *de facto* throughout the SFRY) can be attributed to social organization. Furthermore, the social status of the profession of lawyer in Croatia has changed in those 30 years. There have been major changes in the Croatian profession of attorneys, and it has evolved differently from the American profession of attorneys. In Croatia, these were political and economic changes in the transition from the 1980s to the 1990s, while in the USA, this was the loss of a monopoly of white Anglo-Saxon Protestants (WASP) over the law profession. For example, in the Yugoslav version of self-governing socialism, due to self-administration at all levels and the signing of various self-governing agreements, there was a great bureaucratic need for lawyers at all levels, in all companies and organizations. So a lot of lawyers did unattractive, bureaucratic work. Croatia lacked difficult access for women to the profession of lawyer because Croatia did not have and could not have a WASP-Phase of the profession of lawyer, such as the USA and Great Britain, within the socialist Yugoslavia. For years, the U.S. Attorney's Office was a domain dominated by white men of Anglo-Saxon descent, mainly Protestant provenance. Another important difference in the development of the Croatian and American law profession is the introduction of a capitalist system in the economy in Croatia, i.e. a change in the economic model. Law enforcement, primarily law enforcement, becomes a lucrative profession. Thanks to high lawyer fees, the law firm can make a lot of money. Demand for legal services is increasing, increasing the number of lawyers in both Croatia and the us. A comparison of data on the number and sex of lawyers in Croatia and the USA was announced. In 1980, 92% of the licensed lawyers in the United States were male, and only 8% were female. In 1991, the percentage of lawyers increased to 20% and in 2000 to 27%.

Table 3 Percentage of lawyers in the USA 1980-2000

YEAR	1980.	1991.	2000.
PERCENTAGE OF LAWYERS IN THE USA	8%	20%	27%
PERCENTAGE OF LAWYERS TO THE USA	92%	80%	73%

Source: Strickland and read, 2008:23

Croatia has a higher percentage of women in the law profession than the United States. According to data from the Croatian Bar Association for May 2024, the share of lawyers in Croatia is approximately 44.9% (HOK, 2024). Furthermore, the share of female students in the total number of law students in the United States between 1995 and 2004 shows a slight increase. The latest data from the American Bar Association shows that women 2022/2023. accounted for about 55% of law students in the United States, and the feminization of the legal profession continued its growth trend.

Table 4 Percentage of students and law students in the United States

PERIOD	1995. -- 1996.	--1999. 2000.	--2003. 2004. --
PERCENTAGE OF LAW STUDENTS in the United States	44%	47%	49%
THE PERCENTAGE OF LAW STUDENTS in the United States	56%	53%	51%

Source: Strickland and Read, 2008:23

As can be seen from Tables 4 and 5, the trend of feminization of the American legal profession is at work -- the percentage of lawyers in the USA is increasing linearly. The same trend of feminization is at work in Croatia, however, in Croatia, this trend is more pronounced because the number of students enrolled in legal faculties in Croatia is around 70% (2022 data). This information supports the claim about the feminization of the Croatian legal profession.

5. THE PRESENCE OF WOMEN IN THE BUSINESS WORLD

The contribution of women to the business world has been increasing year by year. In the last few years, women have increasingly been given significant roles in the business environment. Never in history have women had greater economic power, either as employees or as consumers of products and services. As a result, state institutions and the real sector need to understand the importance of investing in the advancement and education of businesswomen, as well as the importance of integrating them into decision-making processes. A study conducted by Deloitte (2013) in the Republic of Croatia showed that only 30% of respondents know a large number of women who occupy executive or high-level positions within companies. The majority of respondents, or 62%, stated that they know only a few such women. These results are almost identical to the results of studies conducted in neighboring countries, such as Bosnia and Herzegovina and Slovenia, where 29% and 31% of respondents, respectively, stated that they know many such women, while the majority, or 64% of respondents in both neighboring countries, stated that they know only a few such women. These results are not very surprising. For example, the publication "Men and Women in Croatia 2013", published by the Central Bureau of Statistics, points to the fact that men are at the forefront of positions of constitutional and supreme judges, while women are at the forefront of positions of municipal, commercial, misdemeanor, and county judges. If we look at the data over the past twenty years, we can see a trend of a significant increase in the number of women in the judiciary. Similarly, the "Survey on the Representation of Women and Men in Management and Executive Positions in Business Entities in the Republic of Croatia", conducted in 2011 by the Office of the Gender Equality Ombudsman, shows that women occupy around 35% of total management positions, with the majority of them occupying lower levels within management.

According to the latest research conducted in 2024 by Deloitte and the Croatian Employers' Association, as many as 93% of respondents believe that women have to put in more effort than men to reach leadership positions. Although this is a slight improvement compared to previous data, women are still underrepresented at the highest management levels. Similar results are shown by the Selectio Group's 2022 survey, according to which the percentage of companies without women on boards has decreased, but the gender balance is still insufficient. Deloitte's (2013) survey showed that in companies with a single level of management positions, women occupy an average of 29% of all management positions, while within companies with two management levels, women occupy 23% of higher-level management positions and 41% of lower-level management positions. The situation is very similar in the case of companies with three management levels, in which women occupy 34% of low-level management positions, 38% of middle-level management positions, and 23% of high-level management positions. This survey also showed that women make up only 19% of members of management boards and 20% of members of supervisory boards. According to the latest research by Deloitte and the Croatian Employers' Association from 2024, the percentage of women in management positions in Croatia continues to grow, but there is still a significant gap between women and men at the senior management level. Women make up 27% of members of management boards, and 23% of members of supervisory boards. These results indicate gradual, but not fast enough, progress towards gender balance in the highest management positions. According to the 2022 Inter-Parliamentary Union (IPU) research, which determined the percentage of women's political participation in national parliaments, the Republic of Croatia, with 31.8% of female parliamentarians, ranks 93rd out of a total of 189 countries included in the research. The highest share of women in parliament was recorded in Rwanda (53.8%). Among European countries, Sweden leads in terms of the number of women in parliament, where 43.6% of parliamentary seats were held by women. In the immediate region, Slovenia leads the way, with 36.7% of female representatives in 24th place, and the Republic of Serbia, which, thanks to 34% of female representatives, took 31st place. It is followed by Macedonia in 32nd place, Bosnia and Herzegovina in 81st place, and Montenegro in 105th place. Not only in politics, but also in the business sector, research shows similar patterns when it comes to the success of men and women in management positions. Deloitte's 2024 research also indicates the existence of differences in views in some areas. Respondents believe that women are more successful in the segment of human resources management (66%), that they work more on personal development (56%), and that they maintain a better balance between private and work life (50%). When it comes to areas in which men are ahead, according to 76% of respondents, this includes professional advancement, which is easier for men to achieve. Respondents also believe that men will be more successful in the fight for a company's position in conditions of high competition on the market (47%). Research conducted among business people from Bosnia and Herzegovina and Slovenia yielded similar results. While the results in Croatia and Slovenia were almost identical, respondents in Bosnia and Herzegovina believe that men are more successful in making decisions under pressure (43%) and that they are better at dealing with business challenges (29%). The importance of women in the labor market is growing year by year. Stronger cooperation between men and women will have a positive impact on improving efficiency, especially thanks to the optimal ratio of qualities that both men and women bring with them. Companies that manage to achieve this ratio will achieve the ideal balance of knowledge, quality, and innovation. Also, if women do not receive deserved professional recognition, the company risks losing women with high professional qualities, which, in the end, could have long-term negative consequences for business activities. Numerous international studies have indicated the existence of a connection between the optimal ratio of men and women in important management positions and the successful operation of the company in which they operate.

A global analysis conducted by Deloitte shows that diversity is key to improving organizational culture. Most companies that participated in the survey stated that efforts aimed at improving diversity were effective. According to a 2012 study by the Office of the Gender Equality Ombudsman, the share of women among board members in the Republic of Croatia was only 19%. According to data from the Central Bureau of Statistics of the Republic of Slovenia, their share in Slovenia was slightly higher at that time - 26%. According to more recent data from 2024, the share of women on boards in Croatia increased to 27%, but is still below the average of some European countries. Also, a 2024 study by Deloitte and the Croatian Employers' Association showed that 27% of board members in Croatia are women, while women occupy 23% of seats on supervisory boards. Furthermore, 66% of respondents believe that women are more successful in managing human resources, 56% that they invest more in personal development, while 50% believe that they maintain a better balance between private and work life. On the other hand, 76% of respondents believe that men advance professionally more easily, and 47% believe that men are more successful in the fight for market competition.

6. WOMEN'S ENTREPRENEURSHIP IN THE REPUBLIC OF CROATIA

Since 2002, when Croatia was included in the international Global Entrepreneurship Monitor (GEM) survey, data show that men are more likely to enter entrepreneurial activities motivated by a perceived opportunity than women in all years. According to the GEM report for 2014, men were 1.83 times more likely to start entrepreneurial ventures than women. On the other hand, women were more likely to enter entrepreneurship out of necessity, although the difference in motivation gradually decreases over time. It is important to encourage entrepreneurship based on perceived opportunities because it contributes to the development of an innovative and sustainable economy in the long term. The more people who enter entrepreneurship because of opportunity, rather than necessity, the better it is for both the economy and society as a whole. According to the latest GEM report for the period 2022/2023, women account for 9.2% of total entrepreneurial activity in Croatia, while men account for 15.5%. The ratio of women to men in entrepreneurial activity is 0.59, which shows that women are still underrepresented in entrepreneurship compared to men. Women in Croatia more often start business ventures out of necessity (1.26 times more often) than because of a perceived opportunity (0.83 times). This indicates that women in Croatia more often enter entrepreneurship out of necessity than because of recognizing business opportunities. In 2022, 63% of respondents in Croatia believe that entrepreneurship is a good career choice. Croatia is among the leading EU countries in terms of expressed intentions to start a business venture. Although gender also influences the differences between starting a business venture due to a perceived opportunity or necessity in other European Union countries, this coefficient is at a significantly lower level for Croatia and therefore indicates a huge loss of business opportunities. It is evident that women more often start a business venture due to necessity than because of a perceived opportunity, which also raises the problem of women's preparedness for such activity. The statistical data that self-employed women have a higher rate of exposure to the risk of poverty (20.4% compared to 16.4% for men) proves this. GEM research establishes the fact that women have a slightly lower perception of opportunities, a higher level of fear of failure, and a lower level of self-confidence in their competencies to start a business venture, which indicates that environmental obstacles have a different impact on women than men. By analyzing the assessment of the state of economic and entrepreneurial activity of women in Croatia, the Report on the implementation of the Strategy for the Development of Women's Entrepreneurship in the Republic of Croatia 2010-2013 and the analysis of the strategic framework for the development of women's entrepreneurship in the EU, as a starting point for determining public policy in Croatia for the period from 2014 to 2020, the fundamental problems of women and entrepreneurship were identified:

- large underrepresentation in entrepreneurial activities;
- large underrepresentation in employment;
- lower wages for performing similar jobs;
- greater dominance in unemployment compared to the male gender;
- greater managerial underrepresentation;
- greater underrepresentation in the ownership structure of companies and trades;
- lack of statistical monitoring with regard to gender;
- greater investments in various activities to strengthen women's entrepreneurship;
- lack of coherence in activities to strengthen women's entrepreneurship;
- lack of mechanisms for assessment and evaluation of the effects of the application of certain measures on the development of women's entrepreneurship i
- Insufficient coordination and cooperation among those responsible for implementing public policies, programs, and initiatives that contribute to the development of women's entrepreneurship make it difficult or even impossible to implement the activities and the financial resources invested.

Obstacles that make it difficult to address the problem of strengthening women's entrepreneurship are the dominance of women in unemployment compared to men, the persistent gap in entrepreneurial activity between men and women, and the particular underrepresentation of women in management activities. Such a set of obstacles that are intertwined and very different poses complex demands for their removal. The obstacles can be grouped into three groups: structural, economic, and "soft".

Structural barriers include:
- Women's educational choices reduce their ability to start business ventures in technology-intensive industries;
- stereotypes about women in science and technology;
- traditional views on the role of women in society;
- lack of support for women with two jobs;
- the political-regulatory framework and its implementation to strengthen gender equality.

Structural obstacles are the most demanding because they are the result of cultural heritage, lack of political will for consistent application of the political-regulatory framework, and infrastructural insufficiency to support family life. To eliminate them, political consensus, long-term activities in the field of education, as well as changes in the regulatory framework, and significant support for the development of institutions for the care of children and the elderly are needed. In addition, it is extremely important to constantly and permanently work on gender sensitization of the public, but also to consistently incorporate the gender dimension into the functioning of society.

Economic barriers are characterized by:

- difficult access to financing (proven in the Strategy for the Development of Entrepreneurship in the Republic of Croatia from 2013 to 2020 as a key problem of small and medium-sized enterprises, further complicated for female entrepreneurs due to ownership issues);
- Insufficient business connections make it difficult to access sources of financing.

Despite the fact that the banking sector in Croatia is truly stable and develops a wide range of financial products, there are no alternative forms of financing for entrepreneurial ventures. In relation to the financing needs of women's ventures, special incentive measures and strategic partnerships of various government programs with commercial banks are necessary, with the intention of encouraging women's entrepreneurial projects with growth potential. Tax policy can encourage alternative forms of financing, and regulatory solutions can enable new forms of financing.

Obstacle characteristics:

- lack of advice, mentoring;
- lack of training and education and training programs for technology-intensive ventures and role models, especially in the field of entrepreneurial ventures in technology-intensive industries and science;
- women's perception of lack of self-confidence, capacity to take risks.

The availability of advice, mentoring, and training for starting businesses is still regionally uneven and also insufficient in the segment of technology-intensive ventures. Support infrastructure in cooperation with universities should be developed to provide such services, and umbrella organizations of entrepreneurs should help women network and learn from good role models.

7. WOMEN IN THE LEGAL PROFESSION: CHALLENGES AND OBSTACLES
This part analyzes the key challenges and obstacles faced by women in the legal profession.

7.1 Discrimination and stereotypes in the legal profession
A long-standing obstacle to equal opportunity includes the mismatch between characteristics associated with women and those associated with professional success, such as assertiveness and competitiveness. Women continue to face long-standing double standards and double binds. They risk criticism for being "too soft" or "too tough" or "too aggressive" or "not aggressive enough". What appears as assertiveness in a man often comes across as abrasive in a woman. A similar obstacle is that female lawyers often do not receive the same presumption of competence or commitment as their male counterparts. In large national surveys, between half and three-quarters of women believe that they are held to higher standards than men. The problem is compounded for women of other races or other identifiable minorities, including women of homosexual orientation and women with disabilities. The work of these groups is subject to special scrutiny, and their results are often attributed to special treatment rather than to professional qualifications. The power of traditional stereotypes is reinforced by other biases in decision-making. People are more likely to notice and remember data that confirms their previous assumptions than information that contradicts them. For example, lawyers who assume that working mothers are less dedicated tend to recall times when they left work early and stayed up late at night. People also want to believe that their evaluations and jobs are meritocratic. If women are underrepresented, the most psychologically plausible explanation is that they lack the necessary qualifications and commitment.

7.2 The importance of mentoring and professional support for female lawyers
A pervasive problem of inequality is inadequate access to informal networks of mentoring, contacts, and client development. Despite recent progress, many lawyers feel more comfortable supporting others who seem similar in experience and values. Many organizations do not provide sufficient time and rewards for mentoring.

The low number of women, especially women of color, in senior positions prevents adequate support for their younger colleagues who need it. Women lawyers who have significant family responsibilities also have difficulty making time for mentoring and for informal social activities that generate peer support and client contacts. As a result, many women lawyers remain excluded from professional advancement and career development. They are not given sufficiently challenging assignments. They are not included in social events that provide professional opportunities. They are not helped to acquire the legal and marketing skills that are central to advancement. These barriers can become self-perpetuating. Overburdened older lawyers are often reluctant to invest their limited time in mentoring women because they assume that they will leave the legal profession or the organization. Women who are not supported are actually more likely to leave quickly. Their inability to reach senior positions then reduces the number of available female mentors and reinforces assumptions that continue to maintain existing barriers for women in the legal profession. Again, the problem is particularly pronounced for women of color. In recent national surveys, less than a third were satisfied with the availability of mentors, and less than one percent remain at the firm where they initially joined.

7.3 Problems of reconciling private and professional life
One of the biggest challenges facing the legal profession involves a workplace structure that does not allow for a work-life balance. About two-thirds of lawyers surveyed reported having experienced conflict at work or at home, and the majority believe this is the biggest obstacle to women's advancement. Only a fifth of lawyers surveyed said they were very satisfied with the balance between work and personal needs, as well as the ability to dedicate their work to the public good. The most obvious shortcomings of the work environment include excessive working hours and a lack of flexible work schedules. Client expectations for full availability, coupled with lawyers' expectations of hefty salaries, have pushed working hours to new and often excessive levels. Hourly demands have increased dramatically over the past two decades, while the number of hours in a day has not changed. Unpredictable deadlines, uneven workloads, or frequent travel pose further difficulties for those with significant family commitments. Not surprisingly, the majority of female lawyers feel that they do not have enough time for themselves or their families, while half report high levels of stress in trying to balance professional and private responsibilities. In addition, women without families often have difficulty finding time to develop personal relationships that could lead to starting a family. Single associates often report taking on an uneven workload because they have no legitimate reason to turn down additional assignments. However, many lawyers who want to adjust or reduce their working hours face significant resistance. A wide gap exists between official policies and accepted practice. Although more than 90 percent of law firms surveyed formally allow flexible or reduced schedules, only three to four percent of lawyers actually take advantage of these options. The majority of women surveyed believe that any reduction in working hours or reduced availability would seriously jeopardize their prospects for advancement. Assumptions about the inadequate efforts of working mothers can influence performance evaluations, promotion decisions, and opportunities for mentoring and challenging assignments that are essential for advancement. Yet, contrary to popular belief, there is little basis for assuming that working mothers are less committed to their careers than other lawyers. Women are no more likely to leave the legal profession than men. Instead, they tend to move into positions and jobs with greater flexibility. Also, contrary to popular assumptions, a reduced schedule does not necessarily mean reduced professional engagement. In fact, such schedules usually require extraordinary commitment from women who have to "juggle" work and family responsibilities in a work environment that is not sufficiently supportive.

While inadequate family-friendly policies are not exclusively a "women's problem," their burden is disproportionately borne by women. Despite the significant increase in men's housework over the past two decades, women in families where both are business people continue to bear a large share of the burden. This is due to long-standing patterns of socialization and workplace practices that discourage people from taking part-time work or taking family leave of more than a few weeks. Only about 10-15 percent of law firms surveyed offer equal, equally paid parental leave for men and women. Yet these practices are difficult to justify. A wide range of research suggests that employees who work only part-time are often more productive than their full-time colleagues, especially when compared to those who regularly work overtime. Tired lawyers rarely provide quality, cost-effective services, and are disproportionately exposed to stress, substance abuse, and other health problems. In addition, full-time employees are not necessarily more available than those who work reduced or flexible schedules. A review of the various studies available shows that reduced or flexible work schedules do not have a negative impact on client relationships. Moreover, substantial data also show that such work arrangements save money in the long run, reducing absenteeism and the associated recruitment and training costs. Adequate options for alternative schedules and reasonable working hours are becoming increasingly important factors in attracting and retaining talented lawyers. Nearly half of the women surveyed and a third of the men cited work-life balance as a primary reason for choosing their current legal employer. Similar observations can be made about other work policies that directly impact the quality of life of lawyers. Organizations that do not offer reasonable accommodations for lawyers with disabilities pay a similar price. Greater support for pro bono activities would also yield similar benefits. American Bar Association surveys consistently show that the biggest source of dissatisfaction among lawyers in their legal practice is the lack of connection to social justice issues. This lack of engagement is partly attributed to a lack of employer support. Many organizations do not give full credit to pro bono services as part of meeting billing goals. While the inadequacy of pro bono policies is a concern for the legal profession in general, it also assumes particular importance for women. Without employer support, pro bono services are likely to fall by the wayside for women lawyers who already face special challenges in balancing family and professional obligations. The lack of accessible pro bono legal aid has additional consequences for women as potential beneficiaries, as women make up about two-thirds of the low-income population in the United States who lack adequate access to legal services. Nearly three-quarters of female lawyers believe that harassment is a problem in their workplace. It is a problem for which women pay a significant and disproportionate price. They account for about 90% of reported complaints and often experience both economic and psychological consequences, such as job loss, unwanted transfers, anxiety, depression, and other stress-related conditions. Organizations also incur significant costs due to reduced productivity, increased employee turnover, and the risk of legal liability. The problem is further compounded by the high costs of identifying harassment. Many women rightly fear ridicule or retaliation. Those who file complaints are often dismissed as overly sensitive or frivolous, and they often face informal "blacklists" that stigmatize them professionally in the long term. As a result, research from a variety of professional contexts shows that very few women -- often less than 10% -- file a formal complaint, and even fewer can afford the financial and psychological costs of litigation. Yet, while the likelihood of filing a complaint is low, except in the most serious cases of misconduct, concerns about unfair accusations deter individuals from mentoring or informally associating with younger women. The gender bias faced by female lawyers is part of a broader pattern that affects women throughout the justice system. Efforts to address bias in these other settings again reflect some progress. The Code of Judicial Conduct and the Model Rules of Professional Conduct include prohibitions on bias.

Yet despite such initiatives, biased commissions typically find persistent problems related to gender, but also to race, ethnicity, disability, and sexual orientation. Gender differences are evident in a variety of areas: in the composition of benchings, chambers, and court staff. In outcomes for male and female litigants in areas such as bail, sentencing, and custody awards, and perceptions of participants in the justice system. Between two-thirds and three-quarters of women reported bias, while only one-quarter to one-third of men reported seeing it, and far fewer reported experiencing it. About two-thirds of African-American lawyers and less than a fifth of white lawyers reported experiencing racial bias in the justice system. Forty percent of lawyers surveyed reported witnessing or experiencing sexual orientation bias in professional settings, and between a quarter and a half of lawyers with disabilities also experienced various forms of prejudice in the legal system. The most commonly cited issues included offensive treatment, such as racist, sexist, or homophobic comments; devaluation of credibility, and injury; and stereotypical assumptions about gender, race, ethnicity, disability, and sexual orientation. While women are most often the victims of harmful gender stereotypes, men can be targets, particularly in areas such as custody disputes. While many of the opportunities and barriers for women in the legal profession and legal system are broadly shared, there are also some important differences across practice contexts. About a third of women lawyers now work in law firms, and another third are in solo practice. About 10 percent work in government or corporate advisory firms. About three percent are in the judiciary or public interest and legal aid organizations. And about one percent of women are in legal education. Compared with men, women are less likely to work in law firms and more likely to work in the public sector and public sector offices. Part of the reason for such gender differences reflects perceptions of different opportunities for women and men in these practice settings.

Most studies find that men are two to three times more likely than women to become partners in law firms. Gender differences are particularly pronounced for managing and ownership partners, and for women of other races. Minority women hold less than 1 percent of ownership partnerships, and their attrition rate after 8 years is nearly 100 percent. On the other hand, women, especially women of color, have traditionally perceived more welcoming environments in public service and public sector positions. When freed from the obligation to reward business growth and increase profits, many government and public interest organizations are more likely to promote women and establish flexible work structures. Thus, many corporate law firms have attracted women by offering reasonable hours and freedom from developing client commitments. However, the latest national survey data shows that only a quarter of women in corporate legal departments are satisfied with the opportunities for advancement, and that they experience similar difficulties in balancing personal and professional lives as women in law firms. For women in the judiciary, progress has been dramatic, but they remain significantly underrepresented in positions that carry the most power, status, and job security. For example, the percentage of women judges on federal district and appellate courts has doubled in the past decade, but still remains below one-fifth of the total. Underrepresentation may arise from the exclusion of women from informal networks and from the tendency for selection and confirmation processes to penalize those with public sector or public interest backgrounds. These backgrounds, it is assumed, often predict "activism" on contentious issues. Such assumptions work against women, particularly women of color, who are disproportionately likely to come from these practice settings or to have connections to such issues. Thus, too, women who have attained judicial positions speak of many of the same problems of credibility and disparaging treatment that other women in the justice system face.

8. CONCLUSION

In conclusion, the analysis of the gender structure of the legal profession in the Republic of Croatia indicates clear but complex trends. Although the legal profession still shows a majority representation of men, the process of feminization is noticeable, especially through the continuous increase in the number of female lawyers among the younger generation, where women have been a stable majority among legal trainees for a long time. Despite this positive trend, the phenomenon of the "glass ceiling" is still strongly present, which is reflected in the extremely low representation of women in leading positions within the Croatian Bar Association. A comparison with the legal profession in the United States confirms global trends of feminization, but also points to the specific circumstances of the development of the Croatian legal profession, shaped by historical, political, and social factors. In the business sector, the presence of women is gradually increasing, but the gender imbalance at the highest management levels is still pronounced. Women more often encounter obstacles in advancement and more often enter entrepreneurship out of necessity than from recognized business opportunities, which puts them in less favorable economic positions. Structural, economic, and social ("soft") barriers make it difficult for women to have equal access to career opportunities in the legal and entrepreneurial spheres. Lack of mentoring, limited access to financing, and unadapted working conditions further slow down women's professional progress, as confirmed by international research. To achieve real gender equality in the legal and business professions, it is necessary to introduce systematic measures: gender equality policies, flexible working conditions, organised mentoring programmes, and strategic initiatives to remove existing barriers. Only with consistent, long-term, and inclusive measures is it possible to achieve a fairer system, ensure balance, and contribute to the social sustainability of the legal profession in the Republic of Croatia.

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THE CONNECTION OF ORGANIZATIONAL CULTURE AND PERFORMANCE OF EMPLOYEES IN IT ORGANIZATIONS

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ABSTRACT

Organizations around the world, including in Bosnia and Herzegovina, strive to attract and retain quality employees. Organizational culture plays one of the main roles in all of this. Especially in IT organizations where changes are frequent and fast, therefore, organizational culture can help maintain a certain stability within the organization itself. And this can ultimately affect employee performance. Therefore, this paper analyzes the connection between organizational culture and employee performance, as well as their obstacles, state, and development. This and similar research can help different subjects inside and outside the organization, such as employees, managers of organizations, human resources departments, owners of organizations, and also other researchers or consultants. In this research, the sample refers to 300 employees of IT organizations in Bosnia and Herzegovina. Employees are chosen randomly. Data collection and analysis lasted 2 months, and an online Google form for the survey questionnaire was used. In this research, the hypotheses were confirmed, SPSS and Excel were used. Hypotheses are H1- there is a connection between the state, development, and obstacles of organizational culture and employee performance, and H2- there are differences in employee performance indicators that are influenced by the development of organizational culture.

Keywords: *Bosnia and Herzegovina, employee performance, organizational culture, IT organizations, IT sector.*

1. INTRODUCTION

In the last couple of years, whenever there is a job interview, it is usually seen how that potential employee fits into the organizational culture of a certain organization. However, this process is not one-way, potential employees also look to see if they fit into the organizational culture of a particular organization. So the question arises, what is organizational culture? And why has it become so important in today's modern era of employment and work in organizations? Organizational culture implies certain correct ways of behaving within an organization when it comes to various situations. It is based on shared beliefs and values that organizational managers clearly communicate and establish using various strategies and behaviors. It is believed that those organizations that have a stable organizational culture are among the successful organizations where the focus is on various social needs and the quality of their employees. And there is a big difference compared to unsuccessful organizations, where if the organizational culture is ineffective, this community and management can be jeopardized (Kumari, 2021). Organizational culture contributes to the stability of the social system within the organization by reducing individual differences among employees. It fosters a sense of identity and belonging among organizational members. It is important for organizations to continuously evaluate and nurture their culture to ensure that it is in line with their goals and values (Siddiqi and Jamal, 2024). Competition in business is becoming increasingly fierce, which has led to the collapse of many organizations, while at the same time, new ones with innovative energies and strategies have emerged. Every company strives to improve its performance in order to remain competitive. The human resources that manage the organization are continuously evolving to keep up with the latest trends.

In this context, organizational culture becomes a key habit that encourages the culture of achieving various organizational goals (Wahjoedi, 2021), so employee performance plays a key role in achieving these goals. Organizations in the IT sector often face faster changes in the industry because they are more exposed to certain innovations. Well, that's exactly where organizational culture plays a special role, which can represent a more stable element within the organization that can make it easier to deal with constant changes outside the organization. So, this and similar research become important in order to be able to listen to the employees of a certain organization, because they are the ones who can be the further driver of creativity and innovation within organizations in the IT sector, which long for this in order to respond faster and better to the challenges of modern business when achieving various goals. Therefore, employees of IT organizations in Bosnia and Herzegovina gave answers, which shaped the results of this research, through a questionnaire. The added value of this research is also evident in the fact that it can be important and necessary for various stakeholders, such as employees, managers of organizations, human resources departments, owners of organizations, and other researchers or consultants.

2. LITERATURE REVIEW

Although organizational culture can sometimes be identified with organizational goals or a mission statement, organizational culture represents a separate and very important part of an organization, where organizational goals and a mission statement can help in additional shaping the organizational culture itself. However, its clear definition is important. Culture plays a key role in explaining the inner workings of an organization. Its elements, mostly defined by sociologists and authors, include attitudes, traditions, values , and lifestyles of the community. These elements are characterized by the acquisition and transfer of knowledge to future generations." (Egide, 2024). The term culture means a "general state or way of thinking that is closely related to human perception. The basic phenomenon that enables different groups or individuals to come together to achieve a common goal is precisely culture" (Hamkar and Watanyar, 2024). Organizational culture is described as "a shared set of views among company members" (Hofstede et al., 2005). Organizational culture "encompasses the mutual views, assumptions and norms shared by the members of the organization. Its key elements include organizational structure, leadership style, mission, and strategy" (Körner et al., 2015). Organizational culture "encompasses the values and beliefs that set the norms of behavior expected of employees" (Schein, 1992). Organizational culture "stems from main sources:

- The norms, attitudes, and values of senior managers play a key role in the development of organizational culture, with charismatic leadership being central.
- Previous employees' experiences help to solve the problems that new employees face. Based on these situations, norms are formed and transmitted to new members of the organization through myths and stories" (Nazir and Zamir, 2015).

Denison (1990) describes organizational culture, "as the core values, beliefs, and principles that form the basis of the management system. It also includes a set of practices and behaviors that support and reinforce these core principles. For example, clear communication and teamwork can further reinforce the values of cooperation and trust within the organization." Organizational culture is "a combination of organizational expectations, experiences, philosophies, and values. It significantly affects the performance and productivity of the organization, providing guidelines for product quality, precision, safety, and other aspects that affect the environment. Every organization has a unique culture that is often difficult to change" (Nazir and Zamir, 2015). Nayak (2011) emphasizes that, "changing organizational culture is a complex and challenging process with a significant impact on organizations and their employees."

Employee performance refers to "the level of productivity, efficiency, and effectiveness with which an employee performs their work tasks and meets the employer's expectations. This term encompasses various aspects, including the quality and quantity of their work, their ability to meet deadlines, adherence to company rules and procedures, as well as their communication and teamwork skills, and their general work ethic and attitude" (Alama and Chikeleze, 2023). According to Lusri (2017) in Wahjoedia (2021) employee performance, "is the outcome of their achievements in carrying out specific duties and responsibilities, which contribute to the company's profit and progress regarding accuracy of work results, level of initiative, mental dexterity, time discipline and attendance". The connection between organizational culture and employee performance has been discussed for a long time. Especially since organizations are moving faster in the business world today, the employees of the organization themselves are often forgotten. "The importance of a strong organizational culture and its alignment with the company's goals cannot be ignored. A strong organizational culture can have a significant impact on employee performance. Those who feel connected to a positive culture and whose personal values are in line with it are more likely to be actively engaged in the workplace, experience high job satisfaction, and contribute productively to the achievement of organizational goals" (Iskamto, 2023). Organizational culture," which develops over time, shapes employee behavior, motivation, and performance, which ultimately affects the success of the organization" (Mohd Isa et al., 2016). Organizational culture " significantly affects employee performance because it helps employees align their goals with the overall goals of the organization" (Alama and Chikeleze, 2023). Research shows that there is a positive relationship between employee performance and organizational culture, and also suggests that there is no significant difference in responses between employee genders when it comes to organizational culture and their performance (Nazir and Zamir, 2015). What is particularly characteristic of IT organizations is the fact that they often operate in international markets where they can encounter different values, beliefs, and customs, or other organizational cultures. And often, people from different countries can work in such organizations. Bosnia and Herzegovina is also specific, since it certainly has three peoples living and working there: Croats, Serbs, and Bosnians. All of this can certainly be characteristic of organizational culture, but also employee performance. Regardless of the persistence of such research, the topic is extremely current and in demand, given that organizations today operate in a very dynamic environment full of changes that can certainly affect both organizational culture and employee performance, so it is good to conduct such and similar research frequently.

3. RESEARCH METHODOLOGY AND RESULTS

This research is based on the following hypotheses:

H1- There is a connection between the state, development, and obstacles of organizational culture and employee performance

H2- There are differences in employee performance indicators that are influenced by the development of organizational culture

While the objectives of the research are as follows:

- to investigate organizational culture and employee performance,
- to determine the connection between organizational culture and employee performance.

In order to conduct research on the connection between organizational culture and employee performance in IT organizations in Bosnia and Herzegovina, a sample of 300 employees of IT organizations was selected. The selection of these employees was random. The research model was obtained by reviewing the relevant literature, with an emphasis on Schein (1992); Nazir and Zamir (2015); Wahjoedia (2021) who also mentioned Limbunan (2016) and Lusri (2017), as can be seen in Figure 1. Accordingly, the questionnaire was developed and adapted to the needs of this research.
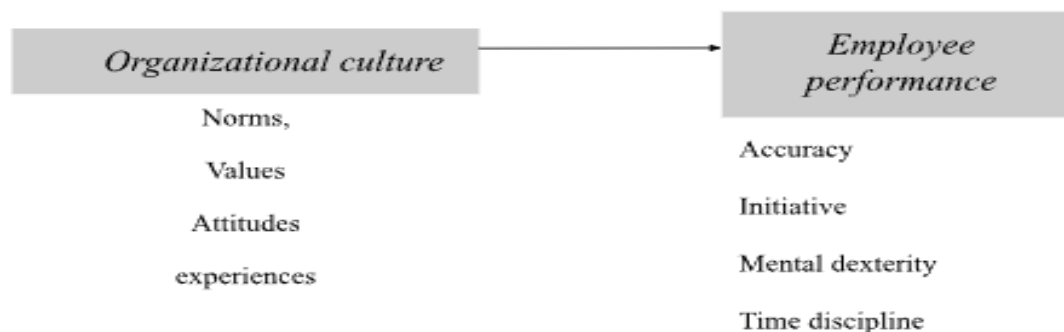
Figure 1: Research model
(Source: Author)

Figure 1. shows how organizational culture is viewed through norms, values, attitudes, and experiences. While employee performance is viewed through accuracy, initiative, mental dexterity, and time discipline.

Age	R	%	Sex	R	%
under 25	33	11	Male	199	66.3
25-35	100	33.3	Female	101	33.7
36-45	90	30	Level of education	R	%
46-55	60	20	High school	12	4
Over 55	17	5.7	Bachelor's degree	158	52.7
Experience in the IT industry	R	%	Master's degree	115	38.3
less than 5 years	65	21.7	Experience in this company	R	%
5-10	82	27.3	less than 5 years	30	10
10-15	75	25	5-10	74	24.7
More than 15 years	78	26	10-15	138	46
			More than 15 years	58	19.3

Table 1: Demographics of respondents
(Source: Author)

Table 1. demonstrates demographics of respondents. The table shows that out of 300 respondents, the majority are in the age range of 25-35. It can also be seen that there are more men, as many as 66.3% and most respondents have a Bachelor's degree. Regarding experience in the IT industry and experience in the company, the majority have 5-10 years of work experience in the IT industry, and that is 25% but there are 46% respondents who have the most experience in the company.

	Limited availability of resources	Deficit of employee recognition and appreciation	Conflict between values	Toxic atmosphere	Lack of transparency and effectiveness of communication	Reluctance to accept changes	Insufficient alignment of leadership behaviors with the stated cultural values
Average grade	1.81	2.41	2.71	2.61	2.21	1.77	2.43
Standard deviation	1.13	1.41	1.44	1.40	1.35	1.10	1.27
Median	1.00	2.00	3.00	3.00	2.00	1.00	2.00

Table 2: Obstacles of organizational culture and employee performance
(Source: Author)

Obstacles of organizational culture and employee performance are shown in Table 2, where the results show the highest average grade of 2.71 for conflict between values, and the lowest average grade of 1.77 for reluctance to accept changes. But there is little difference between the items. A Likert scale with answers was used during the survey questionnaire. The opinions of the employees were checked through different statements of the survey questionnaire, in order to fulfill the objectives of the research, but also to test the hypotheses. Some of them are:

S1: The norms, attitudes, and values within your organization have evolved over the past five years
S2: Norms, attitudes, and values within your organization will evolve over the next five years
S3: The development of organizational culture affects your ability to deliver accurate work results
S4: The development of organizational culture affects your ability to manage time
S5: The development of organizational culture affects your ability to take initiative and find creative solutions
S6: The development of organizational culture affects your ability to adjust quickly to changes in your work environment
The survey showed employees' opinions for *S1* are 11.1% strongly disagree, 11.6% disagree, 5% neutral, 42.3% agree, and strongly agree 30%.
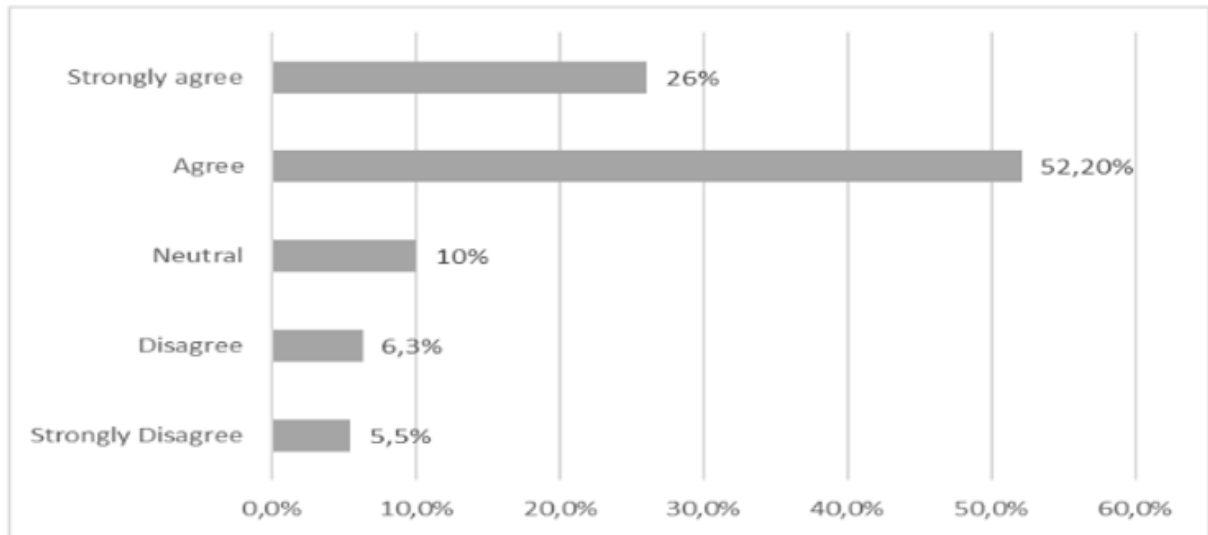
Graph 1: The survey results from S2
(Source: Author)

The survey showed employees' opinions for S3 are 21.2% strongly disagree, 22.3% disagree, 2.5% neutral, 32.3% agree, and strongly agree 21.7%.
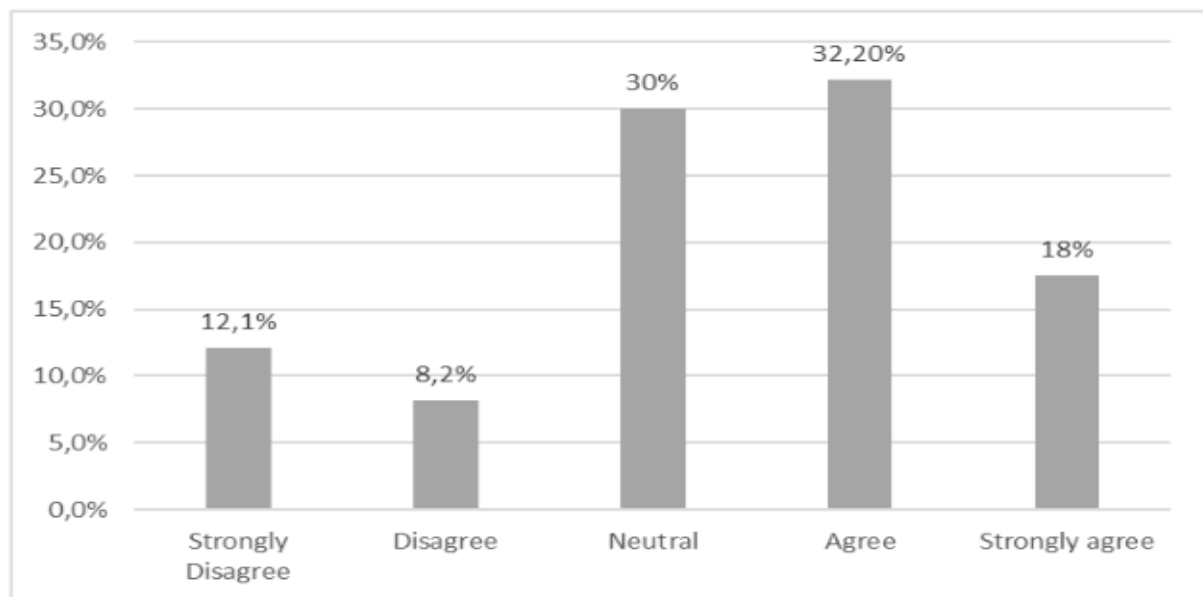
Graph 2: The survey results from S4
(Source: Author)

The survey showed employees' opinions for S5 are 33.4% strongly disagree, 31.7% disagree, 15% neutral, 10.2% agree, and strongly agree 9.7%.
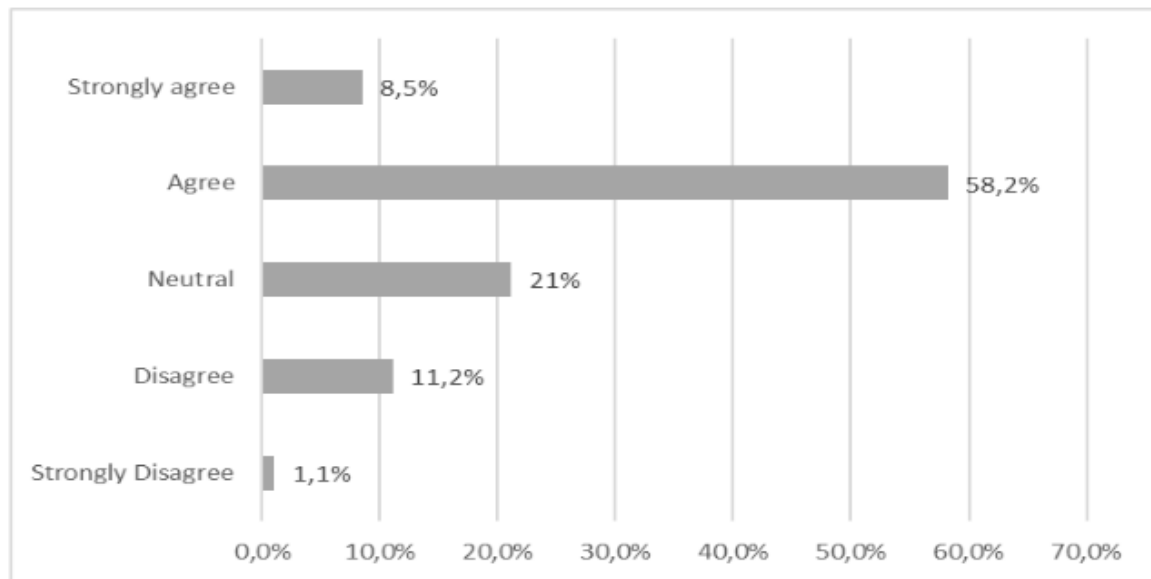
Graph 3: The survey results from S6
(Source: Author)

It was also shown in the study that those who have a longer experience in the IT industry and in the company evaluate the organizational culture and performance better.

4. CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

After conducting research using an online questionnaire on 300 employees of IT organizations in Bosnia and Herzegovina, both hypotheses of this work were confirmed. That is, H1- there is a connection between the state, development, and obstacles of organizational culture and employee performance, and H2- there are differences in employee performance indicators that are influenced by the development of organizational culture. Employees are randomly selected. The collection and analysis of data lasted 2 months, and the online Google form for the survey questionnaire, SPSS, and Excel were used. Some of the limitations in this research are certainly subjectivity, fear of change, but also time constraints. In any research, including this one, respondents give their own opinion on the given statements/questions in the survey questionnaire, and this can usually lead to differences in opinion since it happens that sometimes employees have different views of the same situations. Therefore, a certain amount of bias can occur. Especially if the goal is to present the situation in the organization better than it is, because employees are afraid of being punished for their honest opinion. It also happens that in practice, employees often do not like changes, even if they are for the better. So they do not want to participate in such research because they are afraid that changes might occur, and they offer some resistance. This is also a common case in IT organizations because changes happen there even more often than in other organizations, so at least to avoid them to some extent. It would be good to conduct such research over a longer period of time, in order to collect and analyze more data, and perhaps make some comparisons. This and similar research should continue in IT organizations because it is the sector that is most exposed to various changes in business in modern times. In addition, this and similar research can help various subjects inside and outside the organization, such as employees, organization managers, human resources departments, organization owners, and also other researchers or consultants. Employees, so that they can clearly and loudly define their situation within the organization, and perhaps thus encourage changes for the better. Organization managers, because in this way they can see what can help improve employee performance, but also influence a better working atmosphere.

Human resources departments, so that they know what to work on when it comes to attracting and retaining quality employees. Consultants, so that they can make better recommendations in the context of improving organizational culture and employee performance. Researchers, so that they can see and recognize the needs for research and thus give a voice to those who need it. Therefore, it would be recommended to expand this type of research to other subjects, but also sectors, and possibly make certain comparisons.

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IMPACT OF COVID 19 ON PRIVATE EQUITY AND VENTURE CAPITAL MARKET – EXAMPLE OF CROATIA, SLOVENIA AND CZECH REPUBLIC

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ABSTRACT

The COVID-19 pandemic has had a profound and far-reaching impact on economies and industries around the world. Among different markets, this crisis significantly affected the private equity and venture capital markets, too. These financial markets, known for their investments in high-growth companies, faced unique challenges and opportunities amid the global health crisis. During the early stages of the pandemic, private equity and venture capital markets experienced significant disruption. Uncertainty and market volatility have led to a cautious approach among investors as they reassess their investment strategies and focus on protecting their existing portfolios. The problem of the paper is related to the impact of the COVID-19 crisis on the PE/VC market of Croatia, Slovenia, and the Czech Republic. The purpose of the research is to determine the impact of the crisis itself on certain segments of the PE market, like the total size of investments, investments per GDP, the structure of investments, and the number of companies. The analysis is provided using secondary data available in Invest Europe publications for the period from 2019 to 2022. According to the results of the analysis, the COVID-19 pandemic did not negatively affect the PE market of observed countries, which is contrary to the impact of the crisis on the PE/VC market of the entire CEE region. Namely, the value of the total private equity investments, the number of companies as well as the private equity investment as a % of GDP increased for all three countries in 2020 compared to 2019. Certain decreases occur only in 2022 compared to 2021. Related to the structure of the private equity investments in all three countries, growth capital and buyout transactions dominate. As a limitation of the research, we can highlight the shorter observed time period, which can be expanded in future research.
Keywords: Covid-19, Croatia, Czech Republic, Private equity, venture capital, Slovenia

1. INTRODUCTION

Private equity and venture capital, as an alternative source of finance, are very important for economies around the world due to their impact on innovation and the development of new technologies (Cumming and Johan, 2013). Also, they are important for a sustainable and strong development of economies (Dušátková, 2017; Breuer and Pikwart, 2018). From the company's view, in addition to financial support, they also provide numerous other benefits, such as managerial knowledge, strategic and organizational advice, contacts, all with the aim of ensuring their growth and development (Caselli and Negri, 2021; Šimić Šarić, 2019). Additionally, private equity and venture capital-backed companies increase employment opportunities (Arandule and Mason, 2020). During 2020 the world economy was shocked, significantly and unexpectedly, by COVID-19 (Gompers et al., 2022). The period of 2020 and 2021 was marked by huge changes in the economic environment as a result of lockdown and social distancing rules (Rogić Dumančić et al., 2021). Due to the fear of virus infection, people reduced work and consumption, which consequently had a negative impact on the whole economy. Also, the crisis negatively affected sales and the financial health of enterprises (Banerjee and Ćirjaković, 2024), primarily affecting liquidity. Furthermore, the COVID-19 crisis had a harmful effect on financial markets (Panetsidou and Synapis, 2024), including the negative effects on the private equity and venture capital activities (Kraemer- Eis et al., 2020; Bellavitis et al, 2022).

The private equity activities in the CEE region were also affected by the COVID-19 crisis. Namely, the total investments decreased by 36% looking at the five-year average, and were 49% smaller than in 2019. Also, mega buyout projects, several of which are common on an annual basis, were absent in 2020. Furthermore, the venture capital investments in 2020 compared to 2019 were 4% less (Invest Europe, 2021). Due to the previously mentioned and the fact that the impact of COVID-19 on the PE/VC markets of Croatia, Slovenia and the Czech Republic as a part of the CEE region has not been investigated, the aim of this paper is to show what happened at the markets during the crisis. The analysis is provided using the secondary data from Invest Europe publications for the period from 2019 to 2022. The organization of the paper is as follows: the introduction provides the importance of private equity for the economy and the impact of COVID-19 on the CEE market. The next section, section two provides the theoretical review of the impact of COVID-19 on the private equity and venture capital market. Also, the development of the PE/VC market in chosen countries is presented. Section three provides the results of the analysis regarding the total private equity investments, the number of companies, as well as the private equity investment as a % of GDP. Also, an overview of investments by individual phases is given. Finally, section four delivers the conclusion, which summarises the key findings.

2. COVID 19 AND PRIVATE EQUITY AND VENTURE CAPITAL MARKET

The COVID-19 crisis has significantly affected the private equity industry around the world. The pandemic caused major disruptions in the global economy, financial markets, and business activities, which had an immediate impact on the private equity sector (Chen et al, 2021). One of the main challenges that the PE/VC industry faced during the COVID-19 crisis was significant volatility in the capital markets. The overall confidence of investors was shaken, which resulted in a reduction of available capital for investment. Investors became more cautious about new investments, and existing investments were exposed to the risk of a decrease in value (Chen et al, 2021). Physical limitations made it difficult to conduct meetings, negotiate contracts, and analyze potential investments, ie. to conduct due diligence (Bellavitis et al, 2022). This situation created the need for quick adaptation of the way of work and the application of virtual tools for collaboration and communication. The impact of the crisis on different sectors and industries was uneven. While some sectors, such as technology, e-commerce, and healthcare, saw demand rise, other sectors, such as travel, tourism, and hospitality, suffered serious losses (Gardijan Kedžo, 2022). This affected the investment strategies of private equity funds, which had to adapt to new trends and identify sectors that showed resistance to the crisis (Gompers et al., 2022). On the other hand, the COVID-19 crisis has also created new opportunities for the private equity industry. Funds identified potential investments in companies that dealt with work-from-home technology, e-learning platforms, online commerce, and health technologies (Gompers et al., 2022). Private equity funds have shown their importance as a source of capital for companies that faced financial difficulties during the crisis. Many companies turned to PE funds to get financial support for recovery and growth, especially in situations where traditional sources of financing were limited or unavailable (Lexa and Lexa, 2020). Private equity funds could provide capital for business restructuring, acquisitions, or investments in new projects, which helped companies overcome the financial challenges caused by the crisis. Also, the frequency of exits from investments decreased during the crisis. Many funds postponed planned exits in order to preserve the value of their investments and wait for more favorable market conditions. This change in exit strategy may have long-term consequences for the funds' liquidity and return on investment. It is important to point out that regulatory frameworks also had an impact on the private equity industry during the crisis. Some countries have enacted temporary measures to facilitate financing and reduce administrative barriers for investors.

In other countries, new regulations have emerged or existing ones have changed to better cope with the challenges and risks brought by the pandemic (Arundale and Mason, 2020). Overall, the COVID-19 crisis has caused significant changes in the private equity industry. Funds have faced new challenges in terms of investment, portfolio management, and exit. At the same time, the crisis has created new opportunities for investing in sectors that have proven to be resistant to the crisis and for providing financial support to companies in difficult times. The COVID-19 pandemic brought a series of research questions about the private equity business that needed to be answered, therefore, Table 1 shows the research questions and results.

Author	Research Question	Results
Helmut et al. (2021)	PE surveys 2020: Market sentiment - impact of COVID-19.	Travel restrictions complicate fundraising, but PE fund managers remain optimistic about the market.
Kraemer-Eis et al. (2020)	European PE and venture capital: Impact of COVID-19	The European PE market experienced a significant negative impact due to COVID-19. Managers believe the PE ecosystem will recover and become more mature.
Saraswati Dr C et al. (2020	Study on trends and development of PE investments in India.	In India, the lack of adequate analysis and the absence of personal meetings negatively impacted PE investments. Funds reduced new investments and maintained a cautious stance towards the market.
Zeidan (2020)	Sustainable finance and the COVID-19 crisis.	Financial return is the main goal for PE during the COVID-19 crisis. The epidemic encourages PE companies to revolutionize and become more flexible.
Arundale and Mason (2020)	How did PE funds handle the pandemic?	Private equity funds find opportunities through undervalued companies and restructuring businesses that are not performing well.
Bruch et al. (2021)	Significant role of PE fund investments in healthcare during and after the pandemic.	The pandemic created an urgent need for engagement from private equity funds. With the PE sector, the impact on patient healthcare and social resources becomes an important issue for domestic policy.
Song et al. (2020)	Economic and clinical impact of COVID-19.	During the pandemic, millions of workers applied for unemployment, and some small healthcare facilities faced financial difficulties, leading to layoffs and salary reductions.
Wang and Day (2020)	Financing digital health in 2020.	2020 was a record year for financing digital health, driven by a sharp recovery in the stock market and policy changes due to the pandemic.
Tashanova et al. (2020)	Investment opportunities and strategies during the pandemic.	Online services, healthcare, and the food industry are sectors that benefited during the pandemic.

Table 1: The research questions and results.
(Source: Chen et al., 2021.)

According to Kraemer-Eis et al. (2023), Covid-19 affected the European PE and VC market in 2020 in a way that the net balance for the VC market declined by 18 % and PE by 60%, but that the industry quickly recovered. The development of private equity and venture capital markets in chosen countries started to develop nearly at the same time, and that was in the early 90s of the last century, with the change of political regime (Mlikotić and Šimić Šarić, 2024). From then to now, the development of the markets has been different and affected by different crisis. In Croatia, the development of the market started with representative offices of foreign PE and VC funds (Šimić Šarić, 2019) continued through domestic and Economic Co-operation Funds (ECF) (CEPOR, 2019). Today, many private equity and venture capital funds in Croatia are established in cooperation of the Croatian Bank for Reconstruction and Development and European Investment Fund (EIF) (HBOR, 2025). In the Czech Republic the first funds were established as a result of help from the United States, the European Union, and EBRD. The Czech-American Entrepreneurial Fund was the first one launched in 1991 followed by the Regional Entrepreneurial Fund and Venture Capital Fund founded in 1994 from the former Ministry of Economy in Ostrava and financed by the European Union's Phare program. The Renaissance Fund was the first one established by private sources. After 1995, international funds started activities on the Czech PE/VC market (Sedláková, 2008). For the future development of the market in the Czech Republic, Sato (2013) points to the improvement of taxation and unification and simplification of legal regulation. Regarding Slovenia, the investment environment was first determined with the privatization of state-owned enterprises in the mid-to late 90s, and secondly related to the EU membership in 2004. According to Damijan et al. (2022) the Slovene capital market is weak, and the venture capital market is non-existent, meaning that the banking sector is the leading source for investment projects. Due to that fact, it is necessary to promote alternative financing sources.

3. RESULTS

During the observed period from 2019 to 2022, it is visible that the Czech Republic had the highest annual PE investments with a total value of 1,870 million euros, followed by investments in Croatia with the total value of 989 million euros and Slovenia with the total value of 519 million euros (graph 1). The value of total PE investments for Croatia shows a consistent increase, indicating steady growth over these years. In Slovenia, a peak is reached in 2021 with a sharp decline in 2022. The Czech Republic records an increase till 2021, followed by a decrease in 2022. Slovenia and the Czech Republic record a peak in 2021 despite the Covid-19 crisis in 2020, while in Croatia, growth continues in 2022.

Graph following on the next page
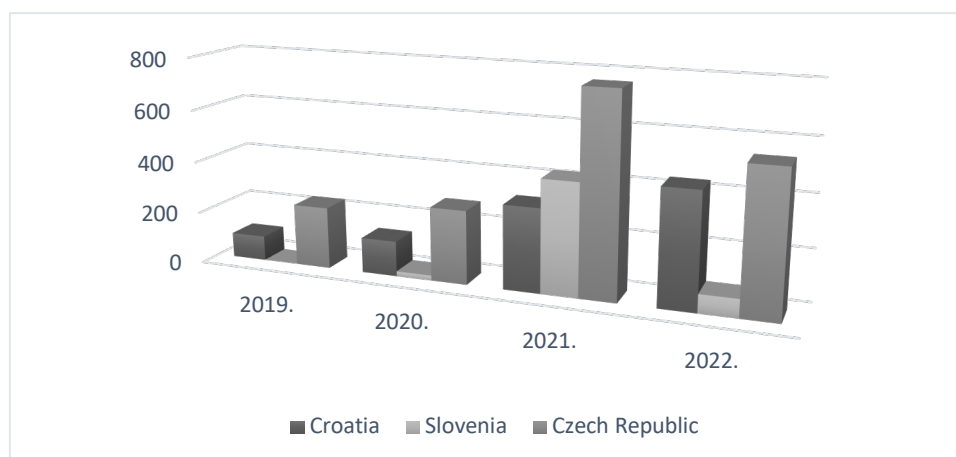
Graph 1: Annual Private Equity investments for Croatia,
Slovenia and the Czech Republic (in million euros)
(Source: authors' according to Invest Europe 2021, 2022, and 2023)

Looking at the Graph 2 it is visible that the annual PE investments as a percentage of GDP for all three countries vary from 0% to 0,65%. Croatia records a constant increase in the percentage from 0,17% in 2019 to 0,65% in 2022. Slovenia had a peak in 2021 with the percentage of 0,79%, whereby the percentage for 2019 is 0,00% and in 2020 0,01%. For the Czech Republic the value of the percentage varies from 0,03% in 2019, achieving the peak in 2021 with 0,32% and a decrease in 2022 with the % of 0,20%.
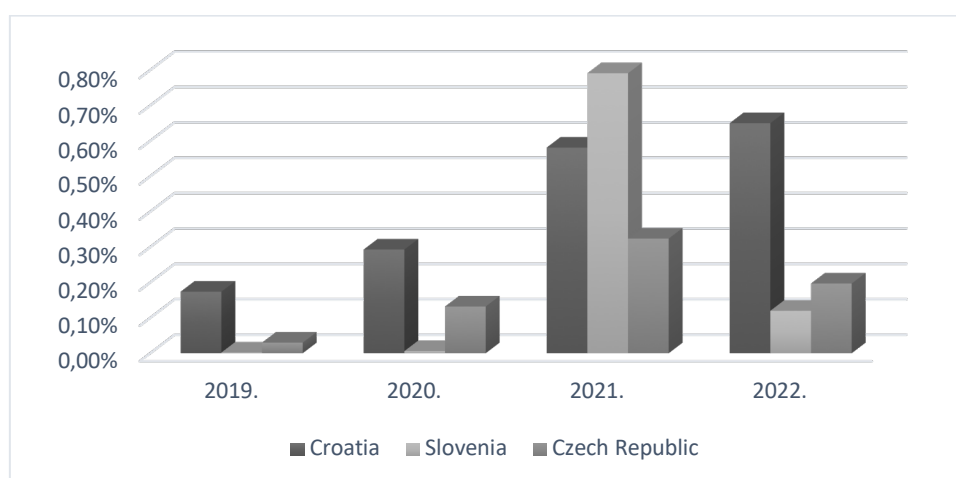
Graph 2:Annual PE investment as % of GDP for Croatia, Slovenia, and the Czech Republic
(Source: authors' according to Invest Europe 2021, 2022, and 2023)

Table 2 summarizes the PE investments by investment stage. The investment in the seed phase in Croatia is the highest in 2021, with the value of 7 million euros. For the observed period, it varies from 1,2 million to 7 million euros.   Slovenia recorded very small values from 0 euros to 1 million in 2022. In the Czech Republic, investment values range from 1,4 million euros to 5,7 million euros. Investment in the growth capital phase records the highest values compared to other phases, with an approximate total value of 675 million euros in Croatia, with the peak in 2022, as well as in the Czech Republic, with the approximate total value of 968 million euros and the peak in 2021.

In Slovenia, investments in the buyout phase dominate with the approximate value of 468 million euros, with the peak in 2021. In all three countries, the investments in the later phase dominate, such as growth capital and buyout. Investments in the early phases, especially for Slovenia they are negligible.

	Croatia			
Stage Focus	2019	2020	2021	2022
Seed	1,200	4,467	7,048	5,530
Start-up	450	4,300	5,574	4,796
Later stage Venture	650	850	23,250	4,773
Growth capital	18,151	102,564	142.950	410,350
Turnaround/Rescue	0	0	0	0
Replacement capital	0	0	0	0
Buyout	75,000	23,051	141,502	13,140

Slovenia				Czech Republic			
2019	2020	2021	2022	2019	2020	2021	2022
0	300	672	1,000	1.404	3,453	5,477	5,769
0	2,3	0	4,600	9.768	8,924	88,802	20,883
0	431	250	2,000	13.130	4,400	16,944	85,177
780	128	7,675	14,582	125.502	25,000	639,474	165,540
0	0	0	0	0	0	0	0
0	0	0	16,500	0	0	0	0
0	16,000	419,897	32,297	87.679	240,653	14,104	265,694

Table 2: Structure of PE investments in Croatia,
Slovenia and Czech Republic (in thousands euro)
(Source: authors' according to Invest Europe 2021, 2022 and 2023)

Regarding the number of companies invested in (Graph 3), the Czech Republic dominates with a total of 122 companies invested during the observed period, followed by Croatia with 112 companies and Slovenia with just 30 companies. The peak for Croatia was in 2021 with 51 companies invested, whereas the peaks for Slovenia and the Czech Republic were in 2022 with 12 or 38 companies.

Croatia records a constant growth from 2019 to 2021 and a decline in 2022. Slovenia records a constant growth, whereas the Czech Republic records a growth in 2020 compared to 2019, and then a decline in 2021 compared to 2020, and again a growth in 2022 compared to 2021. Taking into account the total value of investments, it can be concluded that the investment per company is highest in the Czech Republic.
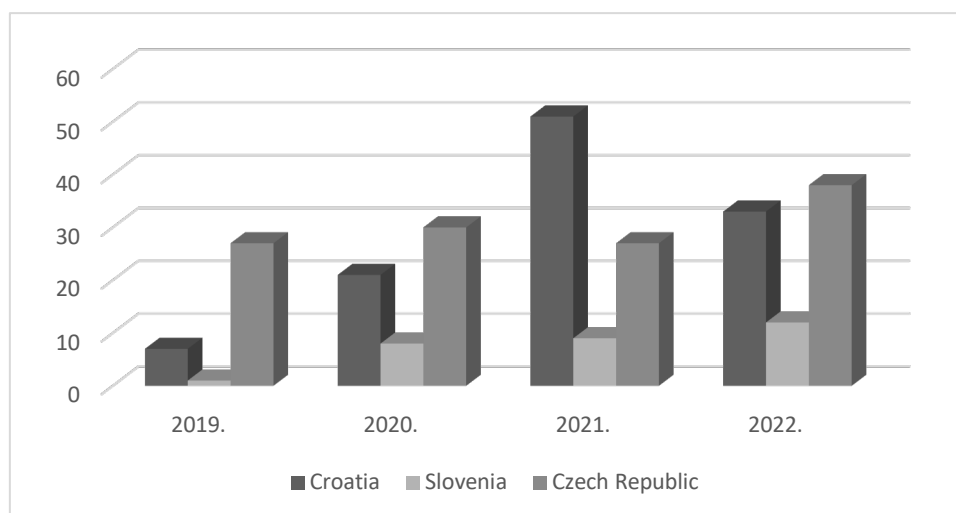
Graph 3: Number of companies invested from Croatia, Slovenia and the Czech Republic

(Source: authors' according to Invest Europe 2021, 2022, and 2023)

4. CONCLUSION

Private equity and venture capital investments are very important for innovation, job generation, i.e., for the development of the whole economy. The COVID-19 crisis affected various segments of the economy, including the PE/VC markets. The PE/VC markets in Europe recorded a drastic decline in activity in 2020 compared to 2019, but also a rapid recovery of the market, already visible in 2021. Regarding the analyzed countries, from the data, it is visible that all three countries achieved the total PE investment growth in 2020 in accordance with 2019, which is contrary to total investments in the overall CEE PE/VC market. Growth continued in 2021, but a decline occurred in 2022. Regarding the different phases of private equity investments in all three countries, the phases of growth capital and buyout dominate. Furthermore, the private equity investment as a % of GDP increased for all three countries in 2020 compared to 2019. Certain decreases occur only in 2022 compared to 2021. The results show how COVID-19 did not have a negative effect on the PE/VC market of observed countries in 2020 and 2021. A certain decline is visible in 2022. Future research could consider a longer period of time to determine whether the decline in activity was short-term or ongoing. Also, from the data, it is visible that the private equity and venture capital market of Slovenia, for the observed period, is the least developed. the reasons for this can also be explored in the future.

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THE ROLE AND IMPACT OF INSTAGRAM STORYTELLING IN HIGHER EDUCATION

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ABSTRACT

The rapid advancement of digitalization and technology has profoundly transformed communication and promotional strategies across various sectors, including higher education. Instagram has emerged as a pivotal platform for audience engagement, providing higher education institutions with opportunities to leverage digital storytelling to attract and interact with prospective students and establish partnerships with stakeholders from the business sector. This study examines content creation on Instagram as a tool for promoting higher education, with a comparative analysis of Instagram profiles from several Croatian universities. The primary objective is to assess how digital storytelling, particularly through video content, enhances the visibility and engagement of higher education institutions and how its implementation can be optimized for greater effectiveness. Three specific research objectives stem from this overarching goal: (1) to conduct a comparative analysis of the quantity, type, and frequency of posts on the Instagram profiles of selected higher education institutions in Croatia, (2) to explore the perspectives of digital communication experts regarding the effectiveness of storytelling on Instagram in increasing audience engagement for higher education institutions, (3) to identify key factors that contribute to the success of Instagram content within the context of higher education promotion. The research employs both quantitative and qualitative methodologies, combining a comparative analysis of Instagram profiles from various universities with semi-structured interviews with digital communication experts. This approach aims to provide a comprehensive understanding of the role and impact of storytelling on Instagram in the higher education sector. By contributing to the scholarly discourse on digital media and communication, this paper offers insights into the practical applications of storytelling on Instagram as a strategic tool for the promotion of higher education institutions.

*Keywords***:** *communication strategy, Instagram, reels, social networks, storytelling, universities*

1. INTRODUCTION

Social media plays an increasingly important role in higher education, both in a marketing context and in communication with students. Universities employ platforms such as Instagram, Facebook, and LinkedIn to promote their programs, engage with prospective students, and maintain continuous dialogue with current students. Social media enables targeted communication, with visual content being essential for attracting the attention of younger generations. Regular and relevant posts, combined with prompt responses to inquiries and comments, contribute to increased interest in a given institution and its academic programs.

Interaction via social media significantly influences students' decisions when selecting a university. As social media becomes a primary source of information for many prospective students, it is crucial that higher education institutions adopt strategies that include frequent publication of content highlighting their educational and social values. Moreover, responding to questions and engaging with users through these platforms can markedly increase student interest during the early stages of the university selection process (De Los Reyes, 2023). Students frequently use platforms such as Facebook, Twitter, YouTube, and Instagram to search for information about universities, send and receive messages, and participate in academic communities. The use of these platforms enables them to acquire essential skills, including cultural adaptation, collaboration, and access to information. Universities should utilize these tools to maintain two-way communication with prospective students (Attuluri & Fuiks, 2020).

2. THEORETICAL FRAMEWORK

As higher education institutions seek to enhance communication and engagement with students, Instagram has emerged as a particularly effective platform. Among its various features, Instagram Reels stands out for its capacity to deliver concise, engaging, and highly visual storytelling. This section explores how Reels functions as a tool for digital storytelling and considers its potential for educational communication strategies, especially in fostering institutional identity, student interaction, and content dissemination. Drawing from the theory of mediatized communication (Hepp, 2020) and digital storytelling frameworks (Lundby, 2008), this section situates Instagram Reels within broader trends of visual and narrative engagement in the digital age. Instagram, as a visually oriented platform, has, from its inception, required all posts to include a visual component. Users can publish photographs or videos, while purely textual posts without visual elements are not permitted. It is possible to combine multiple photos or videos, with text added only in the form of captions. Although initially predominantly popular among younger populations, Instagram is now recognized as one of the leading social networks with a significant number of users across all age groups (Butow, 2020). Instagram Reels represents one of the key formats for creating dynamic and creative videos, enabling users to present various types of content through short vertical videos. Reels frequently appear on Instagram's Explore page, further increasing their visibility and user engagement. The popularity of Reels is particularly pronounced among younger generations, who favor fast, creative formats that reflect trends and allow interaction with audiences through appealing visual presentations (Noor&Zafar, 2024). Introduced in 2020 as a competitor to TikTok, Reels achieves significantly higher engagement than traditional formats such as images and videos, across various post categories including product showcases, brand humanization, and interaction stimulation. Reels generate a larger number of "likes" and comments, making them a more effective tool for audience attraction and increasing visibility on Instagram (Liang&Wolfe, 2022). Reels videos have quickly become a core feature of Instagram, enabling users to express creativity and reach wider audiences. Young users employ Reels for personal branding, while companies use them as a marketing tool to enhance visibility. Reels generate high engagement, including more views, likes, and comments compared to traditional posts (Sharma, 2023). One of the key advantages of Reels is Instagram's algorithm, which favors highly engaging content, thus enabling organic reach expansion. Meanwhile, sponsored Reels and branded content are becoming increasingly popular. As Instagram Reels is designed to meet the needs of contemporary users who prefer "easily consumable" content, brands are required to optimize their campaigns to be concise, visually appealing, and emotionally resonant with audiences (Ashraf, 2024).

3. EMPIRICAL RESEARCH

This study examines content creation on Instagram as a tool for promoting higher education, with a comparative analysis of Instagram profiles from several Croatian universities. The primary objective is to assess how digital storytelling, particularly through video content, enhances the visibility and engagement of higher education institutions and how its implementation can be optimized for greater effectiveness. Three specific research objectives stem from this overarching goal: (1) to conduct a comparative analysis of the quantity, type, and frequency of posts on the Instagram profiles of selected higher education institutions in Croatia, (2) to explore the perspectives of digital communication experts regarding the effectiveness of storytelling on Instagram in increasing audience engagement for higher education institutions, (3) to identify key factors that contribute to the success of Instagram content within the context of higher education promotion. To address these objectives, the research applies a mixed-method approach, combining quantitative and qualitative methodologies. Based on the defined objectives, the following hypotheses were formulated: (H1): Different higher education institutions apply different communication strategies on Instagram; (H2): Storytelling on Instagram significantly contributes to strengthening institutional image and student engagement; (H3): Adapting content to student needs and monitoring digital trends are key to the effectiveness of higher education promotion on Instagram. A content analysis was conducted on the Instagram profiles of three national public universities in Croatia, University North, the University of Zagreb, and the University of Rijeka, focusing on post types, frequency, and use of storytelling techniques within a defined time frame. In addition, a semi-structured in-depth interview was carried out with a digital communication expert employed at a higher education institution.

3.1. First research – content analysis

The content analysis focused on the official Instagram profiles of three Croatian public universities: the University of Zagreb, the University of Rijeka, and University North. Posts published during June 2024 were analyzed, coinciding with the launch of pre-enrollment campaigns, a strategically significant period for attracting prospective students. This timeframe was selected in order to examine communication strategies used during a critical phase of institutional promotion. Two main content formats were included in the analysis: Reels and photo posts. Each post was systematically reviewed and categorized according to a predefined coding scheme, allowing for a structured interpretation of communication patterns across institutions. The coding encompassed five key variables. The first variable, channel, referred to the type of post, whether it was a Reel or a standard photo post. Post length was recorded in terms of video duration for Reels, and the presence of multiple images for photo posts, providing insight into the complexity and depth of each publication. The third variable, themes, captured the dominant topic of the post, such as academic content, promotional material, student life, institutional events, or social initiatives. This helped identify the focus of storytelling strategies and content prioritization across profiles. Caption length was assessed by estimating the number of words in the accompanying text, offering an additional layer for understanding the extent and tone of the narrative used to engage audiences. Finally, audience engagement was measured by recording the number of likes and comments on each post, while for Reels, additional metrics such as views and shares were also considered, since Instagram makes these available only for video-based content. While this approach enabled a detailed comparison, several methodological limitations should be noted. View and share metrics were available exclusively for Reels, limiting comparability with photo posts. Some posts may have been removed or archived during the research period, which may have affected the completeness of the data.

Moreover, significant variations in posting frequency among the institutions posed challenges for establishing direct comparisons and generalizing conclusions across the sample.

Table 1. Codebook 1: Selected Unit of Content Analysis

CATEGORY	CODE
University North https://www.instagram.com/universitynorth/	Sjv
University of Zagreb https://www.instagram.com/sveucilisteuzagrebu/	Zg
University of Rijeka https://www.instagram.com/university_of_rijeka/	Rj

Codebook 2 presents the categorization of the analyzed posts, including the key elements of posts on the Instagram profiles. The categorization covers various aspects of the posts, such as channel (Ch), post length (Pl), themes (Th), caption length (Cl), and audience engagement (Ae), as described in the text above.

Table 2. Codebook 2: Overview of the Categorization of Analyzed Posts

CATEGORY	CODE
Channel	Ch
Post length	Pl
Themes	Th
Caption length	Cl
Audience engagement	Ae

Codebook 3 presents the categorization of subcategories within the analyzed posts, elaborating on subcategories within the key categories such as channel, post length, themes, caption length, and audience engagement. Each subcategory was assigned a corresponding code to facilitate analysis and comparison. The channel category (Ch) includes the subcategories photo posts (Php) and Reels (Rl), covering different post formats. Post length (Pl) is divided into three subcategories: short (Sh) for posts up to 15 seconds, medium (Md) for posts from 16 to 45 seconds, and long (Lg) for posts lasting from 46 to 120 seconds. The themes category (Th) includes key content themes such as events (Ev), student experiences (Se), promotions (Pr), other themes (Ot), and academic programs (Apr), allowing for a more precise analysis of thematic focus. Caption length (Cl) is divided by extent, including short captions (Shc) up to a specific character count, medium captions (Mdc), and long captions (Lgc), providing insight into the amount of information conveyed through the post text. The audience engagement category (Ae) includes the subcategories likes (Lk), comments (Cm), shares (Shr), and Reels views (Rv), which serve as measures of user interaction.

Table 3. Codebook 3: Analysis of Posts on the Profiles of Higher Education Institutions

CATEGORY	SUBCATEGORY	ANALYSIS		
		Sjv	**Zg**	**Rj**
Ch	Php	2	25	73
	Rl	14	2	2
Pl	Sh	1	1	0
	Md	3	0	2
	Lg	10	1	0
Th	Ev	9	10	15
	Se	3	0	0
	Pr	2	2	7
	Ot	0	9	58
	Apr	2	5	0
Cl	Shc	2	0	33
	Mdc	11	10	32
	Lgc	4	15	8
Ae	Lk	1027	1356	588
	Cm	4	6	4
	Shr	23	16	4
	Rv	**46577**	**21193**	**6068**

University North

The Instagram profile of University North employs various content formats for audience communication, including photo posts and Reels videos. An analysis of posts from June 2024, during the pre-enrollment campaign, recorded a total of 16 posts. Of these, two were photo posts, while the remaining 14 were Reels videos, indicating a strong orientation toward dynamic and video content, which typically generates higher engagement and reach. The Reels format dominates the profile, enabling faster and more effective communication, while photo posts are less frequent. Regarding post length, there was only one short Reel (up to 15 seconds), three medium-length Reels (16–45 seconds), and ten long Reels (46–120 seconds), reflecting a tendency toward more detailed content. Thematically, the posts primarily addressed higher education events (nine posts), followed by student experiences (three posts), program promotion (two posts), and academic fields (two posts), with no other themes recorded during the analyzed period. In terms of caption length, the profile featured two short captions, 11 medium captions, and four long captions, indicating a balance between providing information and maintaining audience attention. Audience engagement included 1,027 likes, four comments, 23 shares, and a total of 46,577 Reel views, demonstrating significant audience interest in video content.

University of Zagreb

The Instagram profile of the University of Zagreb showed moderate activity during June 2024, with a total of four posts. Of these, two were photo posts and two were Reels videos. Although the number of Reels was limited compared to other profiles, this format enables rapid interaction and higher engagement. Post length included one short Reel (up to 15 seconds) and one long Reel (46–120 seconds), with no medium-length Reels, suggesting a communication strategy that leverages contrasting timeframes to capture user attention. Thematically, the four posts focused on higher education events (two posts), academic program promotion (one post), and academic content (one post).

No content related to student experiences or other themes was identified. In terms of caption length, two posts featured medium-length captions, while the remaining two included long captions, indicating a moderate preference for more elaborate textual content. No short captions were observed during the analyzed period. Audience engagement included 1,356 likes, six comments, 16 shares, and 21,193 Reel views, indicating solid audience interest despite the relatively low number of posts.

University of Rijeka
The Instagram profile of the University of Rijeka showed a high level of activity during June 2024, with a total of 75 posts, including 73 photo posts and two Reels videos. The dominance of photo posts suggests an emphasis on visual content, while the presence of Reels was limited. Regarding post length, the two Reels were medium-length (16–45 seconds); no short or long Reels were recorded, indicating a preference for mid-length video content. Thematically, the profile focused on events (15 posts) and promotions (seven posts), while other topics not related to academic programs or student experiences appeared in as many as 58 posts, indicating a wide thematic range. No posts related to student experiences or academic fields were recorded. In terms of caption length, short captions dominated (33 posts), followed by medium captions (32 posts) and long captions (eight posts), reflecting a preference for concise, streamlined communication. Audience engagement was relatively moderate, with 588 likes, four comments, four shares, and 6,068 Reel views, indicating limited interaction with video content.

3.1.2. Comparison of Audience Engagement
A comparison of audience engagement on the Instagram profiles of the four higher education institutions in June 2024 revealed varying levels of reach and interaction.

Figure 1. Achieved Views on Reels Content Among Higher Education Institutions
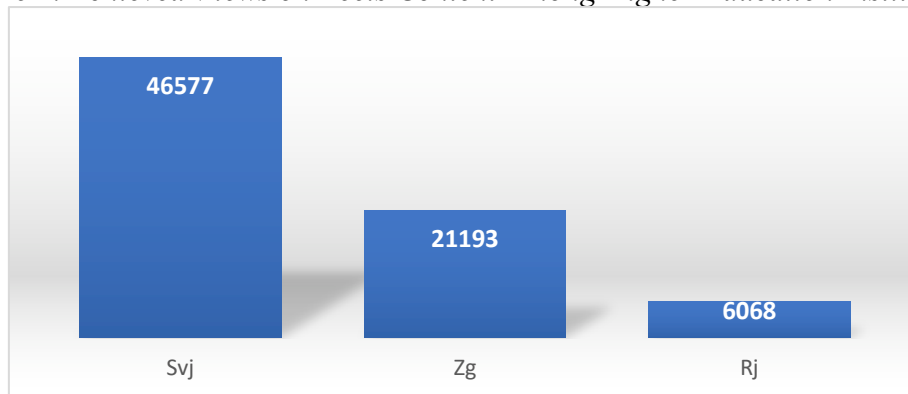
University North demonstrated exceptionally high audience interest in Reels content. A total of 14 Reels videos were published, achieving 46.577 views in total. This figure indicates a strong orientation toward dynamic video content, enabling the university to communicate efficiently with its audience and achieve significant reach and engagement. University of Zagreb, with two published Reels videos, recorded a substantial number of views, specifically 21.193 views. Although the total number of posts was lower, the audience showed solid interest in the content, confirming the importance of this format for audience reach. University of Rijeka published only two Reels videos, which together achieved 6.068 views. Compared to the other institutions, the number of views was lower, which may be attributed to the limited presence of this format on their profile, where photo posts dominate.

Figure 2. Achieved "Likes" Among Higher Education Institutions
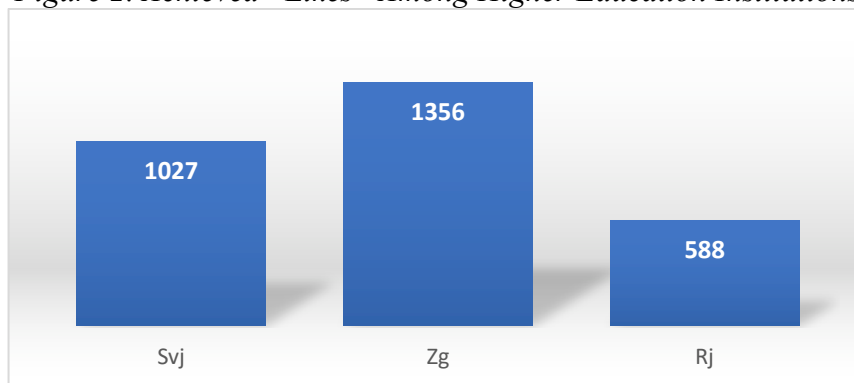
University North collected a total of 1.027 likes, indicating strong audience engagement and interest in the published content. University of Zagreb achieved the highest number of likes, with a total of 1.356, demonstrating that, despite a lower number of posts, the audience responded strongly to the content. University of Rijeka collected 588 likes, the lowest number among the observed institutions, reflecting lower audience engagement compared to the others. The analysis of the Instagram content of Croatian higher education institutions reveals diverse approaches to digital communication and audience engagement. Universities and faculties use different formats, including photo posts and Reels videos, yet clear differences exist in the frequency and type of posts across institutions. The profile of University North shows a strong orientation toward video content, with a dominant number of Reels posts and an emphasis on longer formats, indicating a strategy of using dynamic content to engage the audience during the pre-enrollment campaign. By contrast, the University of Zagreb has significantly fewer posts but tends toward detailed and lengthy captions, allowing it to provide comprehensive information about events and promotions. University of Rijeka has by far the highest number of photo posts, but the number of Reels videos is limited. Its focus on thematic diversity and shorter captions suggests a broad range of communication with the audience, although audience engagement is relatively moderate compared to the other institutions. Overall, the findings suggest that Croatian higher education institutions adopt differentiated Instagram strategies tailored to their specific communication goals. Reels videos consistently demonstrate a higher potential for user engagement, while longer captions enable the delivery of richer, more detailed information. Variations in post type, frequency, and engagement levels reflect the institutions' distinct approaches to digital outreach and the promotion of their academic programs.

3.2. Second research: semi-structured in-depth interview

As part of the research on the role of storytelling on Instagram in the promotion of higher education institutions, a semi-structured in-depth interview was conducted with Nina Šešić Mežnarić, Senior Advisor in the Department of Information and Public Relations at University North. Her role includes a broad range of tasks related to the communication and promotion of the university, including management of the institution's Instagram profile. Šešić Mežnarić actively monitors the activities of other higher education institutions on Instagram: "I often follow the posts of competing higher education institutions on social media, including Instagram. I believe we can learn from each other, and I draw inspiration from both other public universities and private institutions. I also find it interesting to follow the work of some foreign universities to observe their practices." This practice reflects her commitment to continuous learning and adapting to the latest trends in digital marketing and communication. When discussing content strategy, she noted that Reels have become the dominant format on Instagram: "Currently, the balance leans toward Reels posts, which generally have higher view counts.

On the Facebook profile, photo posts linked to texts on the website are more common, while on Instagram, Reels posts dominate, and news is connected to the website via Stories." On the effects of different content types, she adds: "Reels posts generally have better view counts, although content is always key - when a post is about something interesting to the audience, it is reflected in the view statistics." These responses indicate that while post format can affect reach, the essential factor remains high-quality, relevant content that resonates with the audience. Šešić Mežnarić furthermore highlights the importance of social media in reaching the target audience: "Social media is primarily a channel to reach a younger target group that spends a significant portion of their daily time on these platforms. On the other hand, it provides the broader public with insight into the work and events at University North and can certainly serve as a promotional tool that we control most directly." This statement underscores the dual role of social media: as a direct communication channel with students and as a platform for shaping the institution's public image. When asked about the key elements of successful storytelling, Šešić Mežnarić replies: "It is important to deliver the information we want to convey to the target group in a way that is interesting and acceptable to them. Credible, authentic, dynamic, high-quality, and critically nuanced content. The content must align with the communication needs and expectations of the target group, which is primarily our students. It also needs to 'speak their language.'" Here, she emphasizes the need for empathy and understanding of the student perspective to make communication more effective and engaging. When asked what works best in attracting and engaging the audience, Šešić Mežnarić responds: "Short and clear information that they need, original and well-deserved content, and a good balance between informative and entertaining content." This points to the need for content that is both useful and interesting, reflecting the authenticity and values of the institution.

4. CONCLUSION

The primary objective of this study was to examine how digital storytelling, particularly through video content, contributes to the promotion of higher education institutions. Through content analysis and a semi-structured in-depth interview, the research confirmed that Instagram-based storytelling is a key tool for engaging target audiences and shaping the public image of universities and faculties. The findings indicate that Reels videos consistently generate the highest levels of audience engagement, while longer captions serve to convey detailed information about institutional events and promotional activities. Furthermore, the results highlight the necessity of developing formal communication strategies that integrate storytelling techniques, monitor media trends, and adapt content to the specific preferences of student audiences. All three hypotheses were confirmed, demonstrating that Croatian public higher education institutions adopt diverse and context-sensitive approaches to Instagram communication. University North stands out for its emphasis on dynamic video content, particularly Reels, whereas the University of Zagreb tends to rely on static visuals supported by elaborate, information-rich captions. These institutional differences underscore the importance of a precise and audience-aware strategic approach to digital communication. In addition to confirming the dominance of video formats in engagement metrics, the study reveals that well-structured textual content also plays an essential role in delivering messages, contextualizing institutional initiatives, and encouraging interaction. This multi-layered approach fosters deeper audience understanding, facilitates emotional and informational resonance, and strengthens institutional identity. Therefore, the research affirms the role of digital storytelling as a crucial element in audience attraction and retention within the higher education sector. Consequently, it contributes to the growing body of literature on digital media and communication by offering empirical insights into the practical application of narrative formats on Instagram. It should be noted here that the research does not include an in-depth analysis of narrative content within individual posts from a storytelling perspective.

Instead, the study focused on content types, caption length, and engagement metrics as indicators of communication effectiveness and as components of digital storytelling. Nevertheless, the findings suggest that future communication strategies should place greater emphasis on content optimization, particularly content tailored to the needs of students, while actively responding to technological and media developments. Higher education institutions are encouraged to develop integrated communication strategies that combine visual, narrative, and interactive elements to communicate effectively, strengthen their brand image, and ensure greater visibility in an increasingly competitive digital environment.

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STUDENT NEEDS AND EXPECTATIONS IN THE DIGITAL AGE: COMMUNICATION CHALLENGES FOR HIGHER EDUCATION INSTITUTIONS

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ABSTRACT

The advancement of information and communication technologies, along with the changing media environment, requires higher education institutions to develop new forms of communication, rapidly adapt methods of information dissemination through digital channels, and provide support while encouraging collaboration. The communication needs of key publics—namely students as active participants in the educational process—should be recognized and addressed to enable timely and effective institutional responses. Student satisfaction, success, and engagement directly influence the visibility and reputation of higher education institutions. This paper examines the communication needs and expectations of the key publics of a selected higher education institution in Croatia, with an emphasis on the use of digital media from the perspective of the institution's primary audiences. The PESO model (Paid, Earned, Shared, and Owned media) is used as an analytical framework for understanding contemporary communication practices. The research was conducted using a quantitative method through a survey questionnaire designed to identify emerging communication trends and student expectations, as well as to better understand changes in the institution's communication practices. Data were analyzed using descriptive statistics, and the reliability of the instrument was tested using Cronbach's alpha coefficient. The results show that students expect timely, transparent, and two-way communication, primarily through digital channels. Based on the findings, a communication model tailored to the digital habits and expectations of students is proposed. Furthermore, this paper aims to foster an understanding of student communication needs in the digital environment in order to improve communication between higher education institutions and students, as well as with other stakeholders.

Keywords: Communication needs, Digital environment, Higher education institution, PESO model, Quantitative research

1. INTRODUCTION

The development of digital technologies has significantly changed the way communication takes place within higher education institutions. Furthermore, due to the rapid advancement of information and communication technologies, the role of communication in higher education has never been more important than it is today. Students are no longer just passive recipients of information, but active participants in shaping their educational experience. As members of a digitally literate generation, they are increasingly self-aware regarding information and expect personalized, interactive communication from the institutions they attend. In this context, it is essential to recognize, understand, and address their communication needs so that institutions can respond promptly and effectively to their expectations. Communication is no longer one-directional; it now requires a dynamic and interactive exchange of information across various digital channels. Two-way and balanced communication between higher education institutions and students, digital accessibility, and information transparency are just some of the goals that institutions can achieve through planned and systematically managed communication. Such structured communication allows specialized public relations professionals to contribute to strengthening the recognition and reputation of higher education institutions through strategic approaches and the implementation of sophisticated two-way public relations models.

This paper explores how a selected higher education institution in Croatia responds to the demands and expectations of its key publics through digital media, using the PESO model to analyze its communication strategies.

2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW
2.1. Digital transformation in higher education
The digital environment has brought not only new opportunities but also challenges in achieving high-quality, transparent, timely, socially responsible, and two-way communication. Higher education, like other sectors of society, is undergoing a process of digital transformation that requires the adaptation of existing communication strategies, tools, and platforms (Selwyn, 2012; Veletsianos, 2020). In the digital era, students are increasingly taking on the role of active participants in communication processes. They shape information, create content, and engage in public debates on social media, thereby transforming the traditional hierarchy in the relationship between institutions and knowledge users (Jenkins et al., 2009).

In this environment, higher education institutions are compelled to adopt innovative communication methods and digital platforms (such as websites, social media, and mobile applications) to meet the needs of their students and ensure the transparency and timeliness of information. The use of innovative information and communication technologies has become essential for effectively managing relationships with various stakeholders in the higher education sector (Veletsianos, 2020).

2.2. Students – active users of digital platforms
Contemporary students are no longer passive recipients of messages, but digitally literate users who expect interactive, timely, and personalized communication. Moreover, students expect higher education institutions to recognize and take their needs and expectations into account, and to adapt their communication strategies and activities accordingly. In line with this, Junco (2012) advocates for a student-centered communication approach, which includes students as active participants in the creation of communication content and strategies—an approach that is crucial for building long-term and effective relationships. In this context, it is important to mention the theory of participation, according to which students not only consume information but also create and share it through various channels, including social media, blogs, and online forums (Jenkins et al., 2009).

Furthermore, according to the theory of two-way symmetrical communication, Grunig and Hunt (1984) argue that a successful communication relationship is based on dialogue, compromise, and mutual understanding, with messages adjusted according to feedback. This approach, and the application of two-way communication models, is essential for higher education institutions aiming to build trust, engagement, and loyalty among their students (Kent & Taylor, 2002). Student involvement and engagement in communication processes contribute not only to their satisfaction but also to the institution's visibility, credibility, and social relevance (Rowley, 2008).

2.3. The PESO model in the context of higher education institutions
For this research, the PESO model (Paid, Earned, Shared, Owned media) was used as an analytical tool that enables the classification of communication activities in the digital space. The PESO model, first systematically introduced by Gini Dietrich (2014), integrates four types of communication channels:

- Paid media (e.g., social media ads, sponsored articles, website banners),
- Earned media (e.g., media coverage, public relations),
- Shared media (e.g., communication on social media, interaction, content sharing, commenting, or reacting to content),
- Owned media (e.g., websites, blogs, newsletters, social media accounts).

Sedak (2022: 33) emphasizes that for the PESO model to be functional and effective, all four types of media must be used in conjunction. This approach is essential for establishing credible and authentic communication, as well as for building authority that enhances the institution's reputation. In this context, higher education institutions can utilize all four components of the PESO model to build and strengthen their visibility and image. For example, paid media can be used to promote study programs or student enrollment campaigns, while earned media can help build the institution's reputation and credibility. By using shared media, student and alumni communities can become ambassadors of their institutions. By sharing their study experiences and career achievements on social media, they create *"word-of-mouth"* promotions that can help attract new students. Owned media (such as institutional websites and social media channels) can be used for direct and personalized communication with students, dissemination of important information, responding to inquiries, and promoting transparency. By combining all elements of the model, institutions can design communication strategies that better align with students' digital habits and expectations (Xing & Marwala, 2017). The application of the PESO model in the communication practices of higher education institutions contributes to a coherent and integrated communication strategy that includes students, academic staff, and the broader public.

1. METHODOLOGY

This paper is based on a segment of comprehensive research conducted as part of the author's doctoral dissertation. The research was carried out using a quantitative method, through an online survey questionnaire distributed to all key publics of a selected higher education institution in Croatia (a public integrated university). The study, which examined the communication demands, needs, and expectations of the university's key publics, was conducted on a sample of 200 respondents. Participants included various stakeholders connected to higher education, such as current, former, and prospective students, university staff, students' family members, media representatives, local and national government officials, community representatives, employees of educational and financial institutions collaborating with the university, as well as individuals with no direct affiliation to the institution. The survey questionnaire was designed to cover all variables of the PESO model, which consists of Paid, Earned, Shared, and Owned media, along with additional questions related to the institution's communication with its key publics and events within the university. The questionnaire contained 15 questions, most of which were closed-ended and structured according to a standard five-point Likert scale. The first part of the questionnaire focused on the respondents' sociodemographic characteristics, while the second part aimed to identify the communication needs of the university's key publics. The purpose of the survey was to detect contemporary communication trends and contribute to understanding the transformations in how the university communicates with its key publics. Data analysis was conducted using descriptive statistics, and the reliability of the questionnaire was tested using Cronbach's alpha coefficient ($\alpha = 0.968$). This result indicates an exceptionally high level of reliability, confirming that the questionnaire is a valid measurement instrument for examining respondents' attitudes and opinions. In line with the aim and purpose of the paper, the following hypotheses have been formulated and will be tested in the research:

H1: *Students of higher education institutions expect timely, transparent, and two-way communication with the institution through digital channels.*

H2: *It is possible to define a communication model created for students based on their digital needs and habits.*

The pie chart and table below present the demographic characteristics of the respondents. Out of the total of 200 respondents included in the research, the majority are female (68%), while 32% are male (*Figure 1*). Regarding the age structure of the respondents, the largest proportion falls within the 19 to 29 age group (52%).
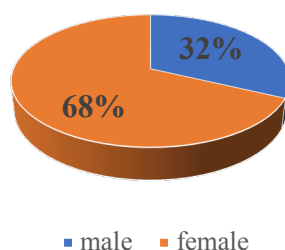
Figure 1: Respondents by gender
(Source: Author)

The results related to the respondents' occupations (statuses) are presented as frequencies in Table 1. The majority of respondents are higher education students, accounting for 64.5% (129), which is unsurprising given that the largest age group of respondents is between 19 and 29 years old. Employees/staff of the higher education institution make up 15% (30) of the respondents, while only 6% (12) are employed in the media sector. The smallest percentages are respondents employed in financial institutions cooperating with the university, 0.5% (1), and prospective students planning to enroll in the institution, also 0.5% (1).

Status/occupation of respondents	Frequency
Higher education student	129
Higher education staff/employees	30
Media employees	12
Family members of higher education students	2
Employees of a financial institution cooperating with a higher education institution	1
No direct connection to a higher education institution, but one exists in their place of residence	2
Prospective student (planning to enroll in a higher education institution)	1
No direct connection to a higher education institution, nor does one exist in their place of residence	3
Employees of other educational institutions	3
Representatives of national government bodies (Government of the Republic of Croatia, Ministry of Science, Education and Youth, AZVO, etc.)	4
Representatives of local and regional self-government bodies	7
Former student/alumnus/alumna	6
Total	200

Table 1: Frequency of respondent status
(Source: Author)

The following tables present the results of the research examining the communication needs of the key publics of the higher education institution, based on the elements of the PESO model (Paid, Earned, Shared, and Owned media).

The results show descriptive statistical measures for the observed variables included in the PESO model, as well as variables related to communication and events within the higher education institution. To present the results clearly and understandably, the values of the three highest arithmetic means are highlighted. In the question regarding preferred informational content on the institution's official website, respondents expressed their opinions through the following statements or variables*: timely and relevant information and announcements about the schedule and times of lectures, exercises, seminars, workshops, and guest lectures (cancellations, consultations, etc.)* ($\bar{X}$ = 4.74); *information and announcements about admissions, study programs, scientific activities, international cooperation, collaboration with industry and the local community, alumni club, projects, etc.* ($\bar{X}$ = 4.68*); and information about academic and non-academic staff (contacts, email addresses)* ($\bar{X}$ = 4.53). The lowest average score refers to *electronic greeting cards (e-cards) and other promotional materials to be shared through the institution's digital channels* ($\bar{X}$ = 3.11). From these data, it can be concluded that respondents want to see timely information and updates about lecture schedules, admissions to desired study programs, scientific activities, international cooperation, collaboration with industry and the local community, alumni clubs, projects, as well as information about academic and non-academic staff (contacts, email addresses) on the university website. Furthermore, in the question regarding preferred features of the institution's official website, respondents expressed their opinions through the following statements or variables: *diverse, authentic, and high-quality content; clear and easy navigation; a mobile-friendly version; and the possibility of downloading the institution's mobile application for smartphones (proprietary mobile app).* According to *Table 2*, the highest average score was given to the *clarity and ease of navigation of the website* ($\bar{X}$ = 4.85), followed by the mobile-friendly version ($\bar{X}$ = 4.79), and the need for diverse, authentic, and high-quality content ($\bar{X}$ = 4.60). Regarding the distribution of statements describing the owned digital content of the higher education institution (*website 2*), the majority of respondents (68.5%) strongly agree, and 24.5% agree, that the institution's website should have diverse, authentic, and high-quality content. Furthermore, as many as 99% of respondents (13% agree and 86% strongly agree) believe that the website should be clear and easy to navigate. Additionally, 81% of respondents strongly agree that the website should have a mobile-friendly version, and 51% strongly agree that the website should offer the possibility of downloading the higher education institution's mobile app (a proprietary mobile application).

Owned digital content (*institution's website 2*)		Diverse, authentic, and high-quality content on the website	Clarity and ease of navigation of the website	A version for viewing on mobile devices	The possibility of downloading the institution's mobile application for smartphones (own mobile app).)
N	Valid	200	200	200	200
Mean		4,60	4,85	4,79	4,18
Mode		5	5	5	5
Standard Deviation		,673	,415	,455	1,039
Skewness		-1,923	-3,161	-2,060	-1,253
Kurtosis		4,605	12,820	3,560	1,126
Minimum		1	2	3	1
Maximum		5	5	5	5

Table 2: Descriptive statistics for variables describing owned digital content (website 2)
(Source: Author)

Furthermore, in response to the question about the content and information they would like to see on the institution's social media, respondents rated the following three variables with the highest average scores: multimedia content (*photos, videos, images, infographics, memes*) *about current events at the higher education institution* ($\bar{X}$ = 4.55*); information and posts about admissions to study programs at the institution* ($\bar{X}$ = 4.50*); and timely responses to comments and questions* ($\bar{X}$ = 4.49).

The lowest average score was given *to posts and examples related to the institution's social responsibility* (X̄ = 4.00). The distribution of responses for the highest-rated statements is presented in Figure 2. From this, it can be concluded that the majority of respondents—65% strongly agree—that they would like to see multimedia content about current events on the institution's social media. Additionally, 63.5% would like timely responses to comments and questions, and 62% would like information and posts about admissions to study programs.
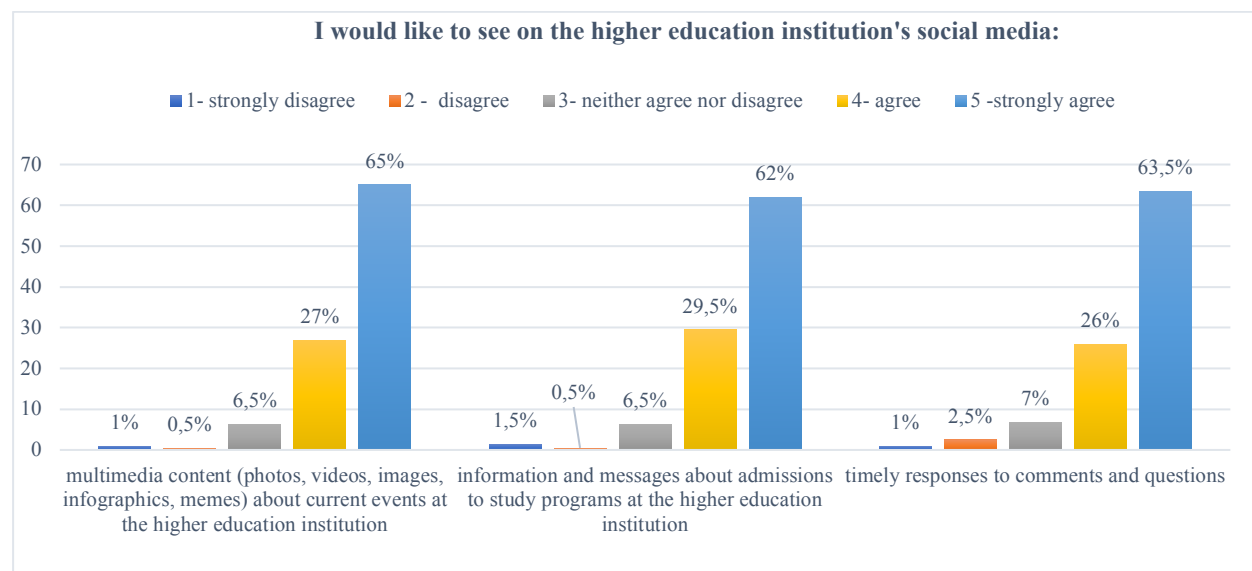
Figure 2: Content on the higher education institution's social media
according to the respondents' opinions
(Source: Author)

In response to the question about what content and information they would like to see in the paid advertisements of the higher education institution, respondents rated the following three variables with the highest average scores: *relevant and valuable content about the institution's study programs* (X̄ = 4.45); *advertisements about admissions to the institution's study programs* (X̄ = 4.38); *and information about working and studying conditions* (X̄ = 4.30). The lowest average score was given to *information about student life outside the institution* (X̄ = 3.62). Accordingly, respondents want to see important information about admissions to desired programs, specifics of the study programs, and key details about working and studying conditions in the institution's paid advertisements. Furthermore, in response to the question about what type of content (posted by the institution) respondents would share (on social media, the website, and other online sources), the highest average scores were given to the following types of content: *authentic and original content* (X̄ = 4.26); *educational content* (X̄ = 4.21); *and objective and credible content* (X̄ = 4.20). The lowest average score was given *to content about the institution created by other users* (X̄ = 3.60). Based on this, it is evident that respondents prefer to share content from the institution that is primarily authentic, educational, objective, and credible. Indicators of the earned digital content of the higher education institution are presented in *Figure 3*. Specifically, *Figure 3* shows the distribution of statements with the highest average values. The majority of respondents—80% (30% agree and 50% strongly agree)—would post content about the institution if it were diverse and high-quality, as well as authentic and original (80% = 27.5% agree and 52.5% strongly agree). Additionally, 79% (28.5% agree and 50.5% strongly agree) of respondents would post content they created themselves if it were recognizable, and 77.5% (27% agree and 50.5% strongly agree) would post content that is educational in nature.
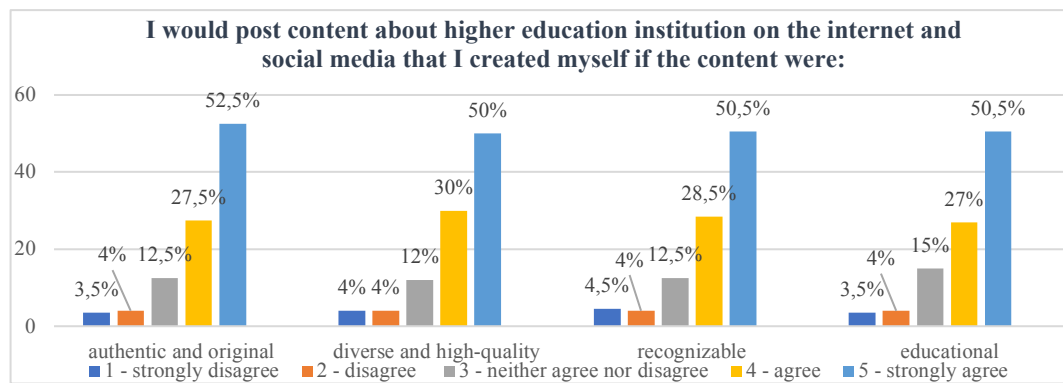
Figure 3:

Earned digital content of the higher education institution
according to the respondents' opinions
(Source: Author)

Figure 4 shows the distribution of statements describing events at the higher education institution that received the highest average ratings. It is evident that the majority of respondents—84% (42% agree and 42% strongly agree)—would participate in guest lectures by established experts. Furthermore, in second place, respondents mentioned scientific and professional conferences, panels, round tables, forums, public lectures, workshops, and similar events (77% = 36.5% agree and 40.5% strongly agree), followed by Career Days (connecting students with employers and fostering business collaboration), with 76% (35% agree and 41% strongly agree). The highest average ratings were given to the following variables: *guest lectures by established experts* ($\bar{X}$ = 4.18); *scientific and professional conferences, panels, round tables, forums, public lectures, workshops, etc.* ($\bar{X}$ = 4.08); *and Career Days* ($\bar{X}$ = 4.02). The lowest average rating was given to *sports events at the higher education institution* ($\bar{X}$ = 3.41).
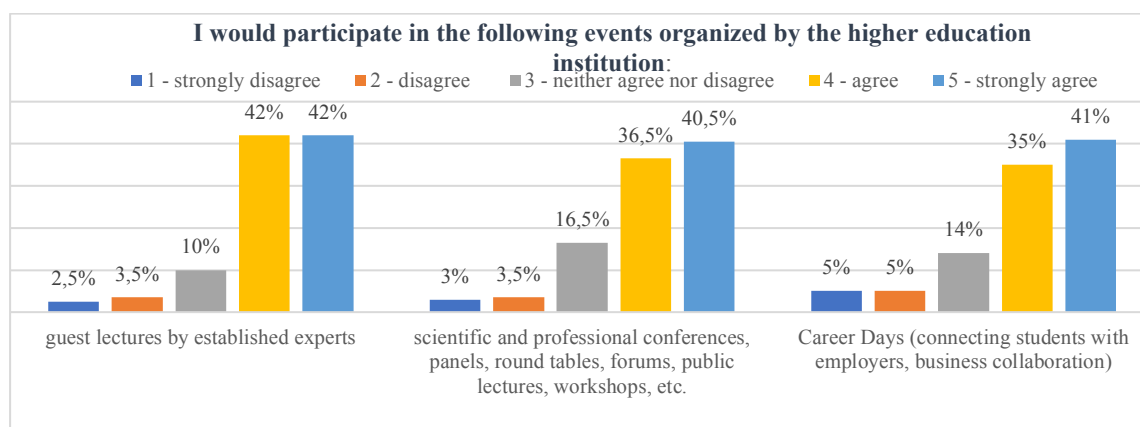
Figure 4: Events at higher education institutions
(Source: Author)

The last question in the questionnaire concerned communication between the higher education institution and its key stakeholders (current and former students, prospective students, professors, staff, media, local community, government, etc.). The highest average rating was given to open *communication between students and professors* ($\bar{X}$ = 4.58), *followed by free communication between students and administrative staff* ($\bar{X}$ = 4.49), *and two-way, balanced communication between the administration and employees of the institution* ($\bar{X}$ = 4.42). *The lowest average rating was given to planned and long-term communication with alumni associations (connecting alumni to promote the reputation and well-being of the institution)* ($\bar{X}$ = 4.21).

3.1. Description and definition of the communication model developed for students

The main outcome of the research is a defined digital communication model specifically developed for students. The model is based on previously obtained results from descriptive and inferential statistics, as well as analyzed theoretical frameworks. It consists of eight variables, primarily grounded in the elements of the PESO model. The first and second variables relate to the institution's digital content, namely the official website and social media channels of the higher education institution. The third variable refers to the institution's paid advertisements. The fourth and fifth variables encompass shared and earned digital content, while the sixth variable addresses specific reasons why students choose not to share or post content related to the institution. The seventh and eighth variables represent communication and events organized by the institution in line with student needs. Each variable includes the top three average ratings given by students, as well as categories of responses they independently provided in open-ended questions. Figure 5 illustrates the digital communication model created for students based on their digital needs and expectations.

The first variable, *the official website*, includes the following items listed in order of arithmetic mean value: timely and relevant information and announcements regarding the schedule and timing of lectures, exercises, seminars, workshops, and guest lectures (postponements, consultations, etc.) ($\bar{X} = 4.76$); information and announcements about enrollment and study programs, scientific activities, international cooperation and collaboration with industry and the local community, alumni club, projects, etc. ($\bar{X} = 4.62$); information about teaching and non-teaching staff (contacts, email addresses) ($\bar{X} = 4.50$); website clarity and ease of navigation ($\bar{X} = 4.81$); mobile-friendly website version ($\bar{X} = 4.78$); and diverse, authentic, and high-quality website content ($\bar{X} = 4.50$). Additionally, the first variable includes items defined based on respondents' answers to an open-ended question.

These include the institution's intranet (class schedules, exercises, seminars, audiovisual recordings and links, exam results), student-oriented content (extracurricular activities, maximum clarity and focus on essential information), employer satisfaction parameters, and direct communication with students (an application that directly connects students and employers through joint activities; employers' opinions on the educational concept), technological innovations for communication with students and key publics (a chatbot for asking questions), the number of enrolled and graduated students (per study program), and an online database (professional and scientific). The second variable, *social media*, includes the following items listed in order of arithmetic mean value: multimedia content (photos, videos, images, infographics, memes) about current events at the institution ($\bar{X} = 4.54$); timely responses to comments and questions ($\bar{X} = 4.51$); and information and announcements about enrollment in the institution's study programs ($\bar{X} = 4.47$).

Like the previous variable, this one also includes items defined based on respondents' answers to an open-ended question, including timeliness and up-to-dateness of information, and the publication of student survey results to improve the quality of teaching.

Students

Website	• timely and relevant information and announcements about the schedule and timings of lectures, exercises, seminars, workshops, and guest lectures (cancellations, consultations, etc.) • information and announcements about enrolment and study programs, scientific activities, international cooperation, cooperation with industry and the local community, the alumni club, projects, etc. • information about teaching and non-teaching staff (contacts, email addresses) • straightforward and easy to search for • providing users with easy access and smooth navigation on smartphones and tablets • diverse, authentic, and high-quality website content • institution's intranet (lecture schedules, exercises, seminars, audiovisual recordings, links, exam results) • content tailored for students (extracurricular activities, maximum clarity, and focus on essential information) • employer satisfaction parameters and direct communication with students (an application that directly connects students and employers through joint activities, and employers' opinions on the education concept) • interactive communication system *(chatbot)* • number of enrolled and graduated students (by individual study programs) • online database (professional and scientific)
Social Media	• multimedia content (photos, videos, images, infographics, memes) about current events at the university • timely responses to comments and questions • information and announcements about admissions to higher education programs • accuracy and timeliness of information • publication of student survey results to improve the quality of teaching
Paid Media	• relevant and valuable content about the university's study programs • advertisement about admissions to the university's study programs • information about work and study conditions
Shared Media	• authentic and original content • objective and credible content • educational content
Earned Media	• authentic and original content • diverse and high-quality content • objective and credible content • educational content
Reasons why students might not post or share content related to the university	• does not post anything about higher education institutions or other organizations • there is no two-way communication between the university administration, students, and other key stakeholders • there is no mutual understanding between the university and key stakeholders
Events	• guest lectures by established experts • Career Days (connecting students with employers; collaboration with entrepreneurs) • scientific and professional conferences, panels, round tables, forums, public lectures, workshops, etc. • informal gatherings with professors and administrative staff • student trips
Communication	• open communication between students and professors • free communication between students and administrative staff • two-way and balanced communication between the university administration and staff

Figure 5: Digital communication model for students (Source: Author)

The third variable, ***paid advertisements,*** includes the following items in descending order based on their arithmetic mean values: relevant and valuable content about the higher education institution's study programs ($\bar{X} = 4.39$); advertisements about enrollment in study programs ($\bar{X} = 4.29$); and information about working and studying conditions ($\bar{X} = 4.24$). The fourth variable, ***shared content***, includes the following items in descending order based on their arithmetic mean values: authentic and original content ($\bar{X} = 4.19$); objective and credible content ($\bar{X} = 4.14$); and educational content ($\bar{X} = 4.14$). The fifth variable, ***earned content***, includes the following items in descending order based on their arithmetic mean values: authentic and original content ($\bar{X} = 4.22$); diverse and high-quality content ($\bar{X} = 4.17$); objective and credible content ($\bar{X} = 4.16$); and educational content ($\bar{X} = 4.16$). The sixth variable, ***reasons for not publishing content related to the higher education institution***, includes the following items in descending order based on their arithmetic mean values: the user generally does not publish anything about higher education institutions or other institutions ($\bar{X} = 3.80$); there is no two-way communication between the management of the higher education institution, students, and other key stakeholders ($\bar{X} = 3.53$); and there is a lack of mutual understanding between the higher education institution and key stakeholders ($\bar{X} = 3.43$).

The seventh variable, **_university events_**, includes the following items in descending order based on their arithmetic mean values: guest lectures by established experts ($\bar{X} = 4.13$); career days (connecting students with employers; industry collaboration) ($\bar{X} = 4.06$); and scientific and professional conferences, panels, round tables, forums, public lectures, workshops, etc. ($\bar{X} = 4.00$). Additionally, this variable encompasses items defined based on respondents' answers to an open-ended question, including informal gatherings with professors and non-academic staff, as well as student trips. Finally, the eighth variable, communication, includes the following items in descending order based on their arithmetic mean values: open communication between students and professors ($\bar{X} = 4.53$); free communication between students and administrative staff ($\bar{X} = 4.45$); and two-way, balanced communication between university management and staff ($\bar{X} = 4.36$).

4. CONCLUSION

The research findings presented in this paper indicate the need to strengthen institutional communication strategies, with a particular focus on dialogue, participation, and digital accessibility for users in higher education. Existing communication models of higher education institutions often fail to keep pace with the rapid changes in digital media user behavior, with students being the fastest adopters of new patterns. Additionally, the results highlighted a strong demand for authentic, original, objective, credible, and educational content on the institution's digital channels, as well as a highly rated need for timely information, transparency, and interactive forms of communication. In this context, the implementation of a communication model specifically designed for students is proposed—one that integrates all components of the PESO model and enables fast, participatory, and personalized communication with students. This approach not only meets their needs and encourages engagement but also contributes to the institution's overall recognition and reputation. The results of descriptive and inferential statistics confirmed *Hypothesis 2*—that a communication model tailored to students can be defined based on their digital needs and habits. The proposed digital communication model for students includes the integration of all PESO elements, active monitoring of students' communication habits, a focus on dialogue rather than mere information transmission, as well as transparency and prompt responses to feedback. Furthermore, descriptive indicators related to the communication variable of the higher education institution suggest a prevailing need for open, balanced communication that includes interaction and the possibility of two-way dialogue with students. This confirms *Hypothesis 1*—students of higher education institutions expect timely, transparent, and two-way communication with the institution through digital channels. Following the research results, it is evident that students expect an equal and active role in communication, and higher education institutions that recognize these needs will be more successful in building relationships and fostering a positive reputation and image. In conclusion, this paper emphasizes the necessity of redefining the communication strategies of higher education institutions to align with the expectations of digitally literate generations.

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CREATIVE LEARNING IN THE DIGITAL AGE: THE ROLE OF ONLINE ENCYCLOPEDIAS IN UNIVERSITY EDUCATION

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ABSTRACT

In an era where digital tools increasingly shape how students learn, online encyclopedias have emerged as more than just reference sources—they have become platforms that foster creativity, independent research, and digital literacy in higher education. This paper explores the evolving educational role of platforms such as Wikipedia, Britannica Academic, Scholarpedia, and the Stanford Encyclopedia of Philosophy. When used intentionally, these platforms can help students move beyond surface-level understanding toward critical engagement, interdisciplinary exploration, and ethical knowledge production. This paper examines how online encyclopedias can be meaningfully integrated into university teaching— highlighting both their benefits and challenges. While students benefit from accessible and structured content, they also face issues such as variable quality, source reliability, and information overload. Educators play a critical role in guiding students through these complexities, helping them build the skills to assess digital content, contribute responsibly, and think critically about the information they encounter. Drawing on real-world classroom models, recent studies, and practical teaching strategies, the paper outlines how encyclopedia-based assignments can support curiosity-driven learning, collaborative authorship, and global engagement. Examples include cross-cultural Wikipedia editing projects that help students connect with peers abroad and develop global writing literacy, as well as introductory courses where students critique or expand entries related to their field of study. Rather than replacing traditional academic methods, online encyclopedias can enhance them by creating new opportunities for public scholarship and digital fluency. When supported by thoughtful pedagogy, these platforms not only inform but also transform how students interact with knowledge. They encourage learners to be not just consumers of information, but active contributors to the knowledge commons.
Keywords: *creative learning, digital literacy, online encyclopedias, higher education, information evaluation*

1. INTRODUCTION

The nature of learning in higher education has undergone a major shift. Students are no longer confined to lecture halls and printed textbooks—they are increasingly engaging with digital platforms, open-access materials, and collaborative tools to support their academic work. Among these, online encyclopedias have become surprisingly central. While once viewed with skepticism, they are now recognized for their potential to support serious academic inquiry. They present clear, well-organized, cross-disciplinary perspectives that ignite the imagination rather than merely convey facts.

They encourage students to think creatively and to dig deeper in order to satisfactorily answer their questions. This trend is not confined to isolated pockets—the change is worldwide. According to a 2022 UNESCO report, more than 60% of university students begin their research endeavors on open-access platforms. Features such as internal links, references to sources, and multimedia (enabled by inline links) make articles more accessible and convenient for readers while improving self-referential efficiency in writing—an essential quality in the digital era. Over the past two decades, universities have undergone an unprecedented digital transformation, intensified by the rapid pivot to online teaching during the COVID-19 pandemic. Recent UNESCO monitoring shows that nearly seven in ten courses worldwide now integrate at least one open-knowledge resource into their curriculum (UNESCO 2023). This widespread adoption has propelled platforms once considered peripheral—such as online encyclopedias—from marginal reference tools to core components of classroom practice. In this paper, we treat creative learning as a process in which students construct novel understandings by recombining existing ideas within authentic communities of practice—a view rooted in Vygotsky's (1978) sociocultural theory and extended by Siemens's (2004) connectivism. Complementing this, we adopt Bawden's (2008) four-strand definition of digital literacy—technical, cognitive, social, and ethical—as the lens through which to interpret learning outcomes. Unlike closed e-textbooks or instructor-curated discussion boards, online encyclopedias exemplify "living knowledge bases": continuously updated, publicly scrutinized, and collectively authored. Wikipedia alone hosts more than 6.8 million English-language articles and receives 18 billion page views per month, making it one of the largest participatory projects ever undertaken (Jenkins 2009). Peer-reviewed counterparts such as Scholarpedia and the Stanford Encyclopedia of Philosophy similarly provide discipline-specific arenas where novices and experts converge. These environments invite students to move beyond passive consumption toward active contribution, thereby blurring traditional boundaries between learner and author. Pedagogical scholarship has documented a growing number of class-based editing projects, but the literature remains fragmented. Many studies are confined to single-semester interventions in journalism or information science courses, leaving unexplored questions about broader disciplinary applicability, sustained cultural impact, and the comparative affordances of different encyclopedia platforms. Moreover, while claims abound that Wikipedia editing "increases cultural engagement" or "cultivates public scholarship," systematic evidence across contexts is scarce.

To address these gaps, we pose two guiding questions:
1. How do encyclopedia-centered assignments influence university students' creative learning and digital literacy practices?
2. Under what pedagogical and institutional conditions do these effects emerge?

The next section details our qualitative meta-synthesis of empirical studies published between 2014 and 2024. Findings are organized around four themes—digital literacy, cultural engagement, assessment, and institutional support—each illustrated with mini-cases. We conclude by suggesting design guidance for educators and highlighting future research directions. Here, we should note that we focus on the English-language Wikipedia. Although platforms like the English Wikipedia can provide trustworthy, well-sourced information and a strong network of internal links, not all language versions maintain this quality. For example, the Croatian Wikipedia has been heavily criticized for bias and misinformation and is not nearly as reliable a resource for learning.

2. LITERATURE REVIEW

Over the past decade, academic perspectives on online encyclopedias have shifted significantly. Where once platforms like Wikipedia were met with caution or outright dismissal, today they are being studied—and increasingly embraced—for their educational value. Scholars now recognize these resources not just as passive repositories of information, but as active tools for teaching research skills, digital fluency, and interdisciplinary thinking. McDowell and Vetter (2022) describe Wikipedia as a site of experiential learning, where students navigate real-world knowledge ecosystems by critically evaluating, revising, and creating content. Their classroom model includes editorial authorship, feedback loops, and peer review, blending technical writing with ethical reflection. Frances Edwards (2023) similarly highlights how students gain ownership of their work when creating Wikipedia content, especially when they know their writing will be read by the public. Di Lauro and Johinke (2017) incorporated weekly Wikipedia editing modules into their first-year writing curriculum. Each module targets a specific academic writing skill—citation, argument structure, tone—and provides students opportunities to apply these skills in live environments. Students reported increased confidence and a sense of agency, especially when contributing content that reflected their cultural identities or regional expertise. Externally to Wikipedia, solicited encyclopedias such as Scholarpedia and the Stanford Encyclopedia of Philosophy fulfill other academic needs. These platforms, as Tatnall (2020) notes, emphasize authenticity of content combined with clear design. In areas such as mathematics and neuroscience, they enable students to navigate sophisticated ideas in bite-sized pieces. These resources are particularly useful in graduate-level courses, where precision and depth are essential. Li, Thelwall, and Mohammadi (2021) conducted a large-scale citation analysis showing platform-specific usage across disciplines. Wikipedia dominates in social sciences, computing, and media studies; Britannica appears most in the humanities; and Scholarpedia is frequently cited in engineering and hard sciences. This distinction helps clarify where each resource fits within a university context. Digital literacy is central to this conversation. Navigating digital information is not intuitive—it must be taught. Without guidance, students often conflate search engine rankings with reliability. When encyclopedias are thoughtfully integrated into coursework, they provide an opportunity not only to learn content but also to practice critically evaluating and constructing knowledge. These studies collectively argue that online encyclopedias—whether peer-reviewed or publicly edited—can function as bridges between traditional academic standards and the fast-moving, interconnected world students now inhabit.

3. ENCYCLOPEDIAS AND DIGITAL PEDAGOGY

Online encyclopedias have evolved into more than just information hubs—they are now used in higher education as active learning platforms. By involving students in tasks such as editing Wikipedia entries or comparing encyclopedic content across languages, educators foster inquiry-based learning, critical thinking, and global awareness. McDowell and Vetter (2022) describe a model in which students collaboratively edit Wikipedia articles aligned with course themes. This process emphasizes ethical writing, editorial responsibility, and audience awareness. Frances Edwards (2023) adds that when students write with a real audience in mind, they demonstrate deeper engagement and pay more careful attention to clarity and structure.

Educational initiatives in Brazil and Indonesia have implemented similar strategies, especially in bilingual editing environments. As Pastutia and Iskandar (2023) point out, students who compare and revise local-language and English Wikipedia entries not only improve their academic writing but also increase cultural representation and digital fluency. Structured programs like the one designed by Di Lauro and Johinke (2017) use Wikipedia as a platform to teach core academic skills.

Their curriculum introduces citation practices, tone, and argument structure in a practical weekly format, allowing students to directly apply abstract academic conventions in a live context. Students often report that one of the most appreciated features of Wikipedia is how easily they can jump from one idea to another through its internal links. As Mareca and Bordel (2019) note, this kind of interconnected structure not only helps learners follow their curiosity but also naturally leads them to explore topics across different fields, making interdisciplinary learning feel effortless. Tatnall (2020) suggests that when educators treat encyclopedias as learning environments rather than static references, they empower students to become thoughtful contributors to public knowledge, rather than mere passive consumers.

4. INFORMATION EVALUATION AND DIGITAL LITERACY

Even though today's university students are digital natives, many still find it challenging to critically evaluate the information they encounter online. Caroline Ball (2019) points out that students often take the first search result at face value, without questioning its credibility or potential bias. This makes platforms like Wikipedia both useful and instructive for teaching information literacy. When students are tasked with editing articles, they must carefully evaluate sources, justify their editorial decisions, and adopt a neutral tone. Through this process, they develop a "deep digital literacy"—an awareness of how information is constructed, curated, and interpreted in digital spaces. To reinforce these skills, instructors often ask students to compare different platforms. Britannica Academic, Wikipedia, and Scholarpedia each reflect different standards of review and academic culture. As noted by Li, Thelwall, and Mohammadi (2021), Wikipedia dominates in computing and social sciences, Britannica in humanities, and Scholarpedia in more technical disciplines. Recognizing these distinctions helps students select the right tool for the right task. Arslan and Turk (2024) found that students involved in Wikipedia editing projects demonstrated greater care in citation, stronger source evaluation, and more thoughtful writing. The public nature of their contributions heightened their sense of responsibility and encouraged deeper reflection on accuracy and tone. Leitch (2014) argues that digital research tools should not be viewed as threats to academic rigor. Instead, they shift where rigor takes place—from memorizing information to analyzing, cross-referencing, and synthesizing it. When students learn to ask critical questions about online content, they begin to see themselves as active participants in shaping how knowledge is produced and shared.

5. THE ROLE OF EDUCATORS AND INSTITUTIONS

Now that online encyclopedias are playing an increasingly central role in the way students learn, the educator's role in the process is changing. It is no longer enough to be just a subject-matter expert—educators are now also responsible for guiding students through the digital landscape. This means helping them navigate the complexities of open-access platforms, demonstrating how collaborative knowledge is created, and encouraging thoughtful discussions about the ethics of information sharing. Frances Edwards (2023) describes a five-phase teaching framework for Wikipedia assignments: orientation, topic selection, research, revision, and reflection. Each step is designed to help students move beyond surface-level information use toward critical content creation. The model promotes accountability and gives students a clearer sense of their audience. Universities have begun recognizing the value of such digital engagements by integrating them into curricula. According to Sofiani et al. (2023), assignments involving students writing or editing entries on local culture and history increase not only research skills but also cultural literacy. Students start to see their knowledge as both locally grounded and globally relevant. Projects focused on updating or correcting encyclopedia content—especially concerning underrepresented or marginalized topics—serve a dual purpose: strengthening student agency while addressing content gaps. As Pastutia and Iskandar (2023) argue, visual and multimedia content also play a critical role.

Adding images, diagrams, or videos enhances the learning experience, particularly for students with diverse learning preferences. Maloy and Malinowski (2017) describe how students in teacher education programs applied what they learned from Wikipedia editing to their own teaching practices later on. These experiences provided a lasting framework for ethical citation, inclusive content creation, and active learning. The success of such models depends heavily on institutional support. When universities allow room for experimentation, collaboration, and interdisciplinary work, they help create conditions where students can not only learn with encyclopedias—but also grow into contributors who help shape them.

6. STUDENT PERSPECTIVES AND LEARNING OUTCOMES

While much of the literature on encyclopedic pedagogy focuses on instructional design and institutional benefits, student reflections provide equally compelling insights into the value of these approaches. Integrating platforms like Wikipedia and Scholarpedia into coursework does more than reinforce academic skills—it changes how students perceive their role in the learning process. Many students report a heightened sense of ownership and pride when their work is visible beyond the classroom. As Edwards (2023) notes, students who contributed to public-facing projects like Wikipedia entries often felt that their writing "mattered" in a way that traditional term papers did not. This sense of impact led to more deliberate writing and increased attention to detail, particularly in source selection and citation. In qualitative studies by Mareca and Bordel (2019), students consistently expressed that assignments involving digital encyclopedias encouraged deeper engagement with course content. They valued the real-world relevance of editing entries that could be read and used by others. Some even described the process as their "first time feeling like a real academic."

Another key outcome is increased confidence in academic writing. Di Lauro and Johinke (2017) observed that students who initially struggled with formal structure and tone improved more rapidly when those skills were tied to visible, public tasks. Knowing that their work would be read by others—sometimes thousands of readers—added constructive pressure that motivated higher standards. In bilingual and regional editing projects, students often found themselves reconnecting with their local histories, dialects, and cultures in meaningful ways (Pastutia & Iskandar, 2023). These experiences didn't just enrich the content—they also helped create more inclusive classrooms, where students felt proud to bring their own identities into their academic work. Ultimately, these experiences point to a broader pedagogical shift: from knowledge consumption to knowledge co-creation. When students are given the tools to participate meaningfully in public knowledge platforms, the outcomes go far beyond literacy—they speak to confidence, community, and critical agency.

7. CHALLENGES, ETHICS, AND CRITICAL CONCERNS

Though using online encyclopedias in an academic setting has obvious benefits, there are important challenges that educators and administrators must address head-on. These challenges revolve around misinformation, editorial bias, imbalanced participation, and the need for robust institutional support. Content reliability is one of the most critical issues. Wikipedia's open-editing model is part of what makes it so dynamic and wide-reaching—but that same openness can lead to problems like vandalism, inconsistent quality, or gaps in accuracy. As Ball (2019) notes, students often assume an article is trustworthy simply because it looks polished or appears high in search results. That's why teaching media literacy is so crucial—students need to learn how to double-check sources and think critically about what they're reading. Another key issue is bias. Research has shown that Wikipedia content tends to reflect the perspectives of its most active editors—who are largely male, Western, and English-speaking (Li et al., 2021).

This can lead to blind spots or systemic gaps in coverage, especially regarding marginalized voices or underrepresented topics. Educators must be aware of these gaps and intentionally design assignments that address them by encouraging students to contribute content related to women, perspectives from the Global South, or Indigenous knowledge systems. Instructor workload can also be a barrier. Designing and supporting Wikipedia-based assignments requires careful planning, formative feedback, and sometimes technical training. Without institutional backing—such as digital literacy centers or librarians trained in open education—this burden can fall heavily on individual faculty members. Ethically, the public nature of student writing introduces complex questions around authorship, anonymity, and consent. Some students may feel uncomfortable sharing their work online or with a wider audience. To make Wikipedia-based assignments respectful and fair, clear guidelines should be established regarding control over one's image and reputation in public spaces. Students should have the option to opt out of using their real names or photos, and classrooms should encourage open discourse about digital identity and intellectual ownership. But it's not just students who are responsible—institutions have a significant role to play as well. Sometimes, there is quiet resistance within academia. Many universities still regard traditional academic publishing—such as peer-reviewed journals—as the gold standard, while open-access contributions are seen as less legitimate. As Leitch (2014) notes, integrating platforms like Wikipedia into formal coursework challenges deeply rooted ideas about what counts as "real" academic work. That's why incorporating online encyclopedias into teaching needs to be done thoughtfully and carefully. It involves walking a fine line between innovation and responsibility—providing opportunities for students to participate in public knowledge spaces while ensuring they are supported and protected throughout the process.

8. CONCLUSION

In short, online encyclopedias are much more than just study aids. When used intentionally and supported by thoughtful teaching, they can become powerful tools to spark creativity, foster collaboration, and develop critical literacy. They provide students with a way to move beyond passively receiving knowledge toward actively generating knowledge through their interactions with it. As we have argued throughout this paper, platforms such as Wikipedia, Scholarpedia, and Britannica Academic each bring unique strengths to the table, opening up diverse educational possibilities and learning experiences. Assignments that require students to revise or create content on these platforms can foster research skills and editorial awareness, as well as cultivate a sense of responsibility. More importantly, these activities shift the focus of learning—transforming students from mere recipients of information into active contributors to public knowledge. Traditional academic practices—such as lectures, guided reading, and expert-led instruction—remain essential. The goal is not to replace them but to complement and expand them by integrating the digital tools and platforms that students already engage with in their independent learning. As noted, incorporating public writing into the classroom can make abstract academic skills feel more meaningful and enduring. Ultimately, what matters most is that students come to see their voices as valid and their work as valuable. If online encyclopedias can support that transformation—helping learners become more thoughtful, engaged, and confident—then they certainly deserve a central place in how we envision the future of higher education.

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YACHTING – A DEEPER DIVE INTO SOCIOECONOMIC IMPLICATIONS IN CROATIA

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ABSTRACT

This article provides a comprehensive analysis of the socio-economic implications of yachting in Croatia, examining its multifaceted influence on the national and local economy, employment, and social fabric. It outlines the structure of nautical tourism, emphasizing the primary roles of marinas, charter services, and cruising, alongside secondary and supporting activities. The study highlights the significant economic impact of the yachting industry, including shipbuilding, marina operations, and charter services, which collectively generate substantial revenue and employment. Croatia's shipbuilding sector, historically vital, is discussed in the context of post-EU accession restructuring and the industry's shift toward yacht construction and maintenance. The article explores the transformative effects of yachting on local economies, noting increased spending by nautical tourists, job creation, and infrastructure development, while also addressing challenges such as seasonality and real estate pressures. Socio-cultural aspects are examined through the changing demographics of nautical tourists and the mixed perceptions among local residents. The article underscores the growing importance of sustainability in yachting, driven by both consumer demand and regulatory pressures, and calls for Croatia to adopt innovative, eco-centric practices to maintain competitiveness. Ultimately, yachting is portrayed as a dynamic sector with broad economic and socio-cultural impacts, poised to remain a key pillar of Croatia's tourism industry.
Keywords: yachting, nautical tourism, Croatia, EU, shipbuilding

1. INTRODUCTION

Nautical tourism has emerged as a dynamic and economically significant segment within the Broader tourism industry, particularly along the Croatian coastline. This article is based on a comprehensive review of secondary data sources, complemented by the unique perspective of a 'researcher insider' actively engaged within the yachting sector. Such a dual approach enables a nuanced understanding of both the macro-level trends and the practical realities shaping the industry today.

Nautical tourism consists of a wide range of activities and interactions initiated by tourists engaged in sailing, within or outside nautical tourism ports, together with the use of vessels and related means in pursuit of recreational, sporting, entertainment, or other leisure and practical needs. The primary core categories are: 1) marinas, 2) charter services, and 3) cruising, alongside secondary activities (such as fishing, surfing, rafting, etc.) and further supporting activities like superyacht construction, skipper services, and sailing schools (Luković, 2012).

2. ECONOMIC IMPACT OF YACHTING

Europe is home to approximately 150 expansive shipyards, of which a significant portion—about 40—actively compete on the global stage, especially in the construction of large maritime commercial vessels (EC, 2023). These shipyards are more than mere production facilities; they are important employment centers. Within the European Union alone, shipyards covering both civil and naval domains, as well as new construction and repair facilities, provide livelihoods for an impressive 120,000 individuals (EC, 2023). However, the industry's impact extends beyond shipbuilding to the construction of maritime equipment, which holds a significant global market share of 35% (EC, 2023). Headquartered in Brussels, EUROYARDS—established as a European Economic Interest Grouping based on EEC Regulation 2137/85 (EEC, 2023)—operates primarily to safeguard its members' interests by representing unified positions to international entities that set industry policies, implementing these policies through specialized working groups (Euroyards, 2023). EUROYARDS members include some of the most prominent shipyards in Europe: Italian Fincantieri S.p.A.; Dutch Damen Shipyards Group; German Meyer Werft GmbH and Thyssenkrupp Marine Systems AG; Norwegian STX Europe ASA; and Spanish Navantia S.L.

As an example of the economic significance of shipyards, the Dutch Damen Shipyard Group comprises 54 companies worldwide, including 36 shipyards and repair yards, 5 engineering entities, and 13 other companies. The group has delivered over 6,500 vessels to more than 100 countries, with a consistent annual shipment of about 160 vessels worldwide (OESD, 2020). In 2022, Damen Shipyard Group achieved revenues of €2.5 billion (Damen, 2023), and employs over 12,000 people, of whom 3,500 work in the Netherlands and 8,500 globally. In Croatia, the shipyard 3. MAJ d.d. in Rijeka reported revenues exceeding HRK 310 million in 2023; however, expenses led to an annual loss of over HRK 101 million (3. MAJ, 2023). The total number of employees is 700, down from 805 in 2021.

The shipbuilding sector in Croatia, historically the cornerstone of its industrial framework, requires detailed examination, especially given recent geopolitical and economic fluctuations. Croatian shipyards—particularly Brodosplit in Split, 3. Maj in Rijeka, and Uljanik in Pula—once symbolized national engineering prowess. In the 1980s, Yugoslavia emerged as a dominant player in global shipbuilding, with Croatian shipyards playing a key role. Yugoslav shipbuilding was shaped by a carefully crafted economic strategy, representing the culmination of a comprehensive technological and production continuum initiated much earlier (Bilten, 2018). The shipyards used steel, a by-product of domestic steelworks, while vessel assemblies included alloy components from TLM and Aluminij in Mostar, utilizing ores mined from local mines such as Ljubija and Vareš. Further enhancements included engines, electronic systems, and hydraulic components produced by nationally recognized companies (Jugoturbina, Končar, etc.). This era not only underscored the regional importance of Croatian shipyards but also established their international significance. Croatia's accession to the European Union in 2013 brought rigorous regulatory requirements. Compliance with EU state aid rules necessitated restructuring, and in some cases, privatization of historically state-supported shipyards. While essential for alignment with European standards, these transitions accelerated industrial unrest, exemplified by worker protests, especially at Uljanik (Reuters, 2019). Amid these challenges, pragmatic shifts in strategy have emerged. Several Croatian shipyards, recognizing the growth potential of the nautical tourism sector, have begun diversifying into yacht construction and maintenance. Contract acquisitions, such as Brodosplit's €32 million polar cruiser project, offer glimmers of optimism (Poslovni dnevnik, 2023). The Croatian shipbuilding industry, marked by periods of historical prominence and hardship, now stands at a crossroads.

Its future trajectory will depend on strategic decisions, economic imperatives, and an understanding of the global shipbuilding landscape. At the same time, the European Commission addresses shipbuilding sector challenges through initiatives like LeaderSHIP 2020, which focuses on innovation to ensure the industry remains at the forefront, pushing boundaries and setting global standards (EC, 2024). Alongside innovation is a strong commitment to environmental responsibility. The maritime industry of the future, the report predicts, will be deeply green, conscious of its carbon footprint, and continuously seeking sustainable alternatives. It is also expected to specialize in high-tech markets, leveraging advanced technologies to improve efficiency, safety, and profitability. Meanwhile, the unexpected surge in demand for superyachts has drawn attention, especially given initial concerns during the COVID-19 pandemic and the impact of Western sanctions on Russian clients (The Economist, 2023). Yet, the market has remained robust. The ultra-wealthy's desire for privacy, luxury, and exclusive experiences continues to drive investments in these floating palaces.

1.1.Chartering

According to a 2015 study by the European Competitiveness and Sustainable Industrial Policy Consortium, the European charter industry generates revenues of around €6 billion and employs nearly 20,000 people (ECSIP, 2015). Interestingly, while Northern Europe—especially Sweden and the Baltic states—holds the record for the number of boat owners, an impressive 70% of global charter demand is directed toward the Mediterranean. The industry is primarily dominated by five major players: Sunsail, Le Boat, and Footloose (all under TUI Marine), Dream Yacht Charter, and Kiriakoulis, which together control approximately 80% of the European charter market (ECSIP, 2015).

SuperYacht Times reported that at the beginning of 2022, the highest number of bookings for the year were made—unlike the usual peak bookings in April or May—mainly due to clients who missed the opportunity in 2021 (Superyacht Times, 2022). Conversely, there is a trend of yacht owners using their vessels more frequently, which slightly reduces availability during peak seasons. The war in Ukraine has created a unique challenge, especially for Russian clients; even Russians not on the sanctions list face difficulties chartering vessels. Brokerage companies remain cautious, and some yacht owners, given the current global situation, prefer not to associate their vessels with Russian clientele (Superyacht Times, 2022).

In Croatia, 60% of chartered or rented vessels are Croatian-owned and participate in Croatian tourism; 28% are in personal or co-ownership structures; 9% are owned by others such as friends or family, and 3% are owned by foreign owners. Additionally, of the total Croatian charters, 54% were rented with a skipper, 43% without a skipper, and in 3% of cases, a skipper was hired later (MINT, 2023).

It is estimated that the Mediterranean accounts for 40% of the global charter boat market (Lazaru et al., 2021). According to Superyacht News (2021), during the northern hemisphere summer months, 75% of the world's superyacht fleet is located in the Mediterranean. During the winter months, this presence remains significant at 56%. This concentration leads to a pronounced seasonal limitation, with the number of vessels over 30 meters exceeding the total available berths in the region by approximately 15%. Specifically, around 3,796 superyachts compete for only 3,287 superyacht berths.

1.2.Marinas and Berths

Marinas are defined as designated water and coastal areas, specially built and equipped to provide mooring services and accommodate tourists on vessels (DZS, 2023). Within their boundaries, marinas also offer basic visitor services, including, but not limited to, food and beverage options. Marinas, which can be categorized as either private entities or publicly owned—at municipal or regional levels—generate significant revenues of nearly €4 billion and provide employment for approximately 40,000 to 70,000 individuals (ECSIP, 2015). Similar to the charter industry, marinas experience substantial seasonal fluctuations in demand and revenue. There is a noticeable trend toward private ownership, especially among operators managing multiple marinas or forming interconnected marina networks. Most of these marinas are concentrated in a select group of member states, including Croatia. The Croatian coastline, stretching from Istria in the north to Dubrovnik in the south, offers numerous ports and secluded coves, making it an ideal location for yachting. Marinas contribute significantly to the Croatian economy, not only through berth fees but also by attracting tourists who spend on local services. Like many Mediterranean destinations, Croatian marinas are seasonal, with peak demand occurring during the summer months, requiring efficient management to ensure year-round profitability. The Croatian Tourist Board's report (2023) shows slight increases in the number of marinas and ports between 2021 and 2022, with a more pronounced rise in the number of berths. Regarding berth occupancy rates, NBS (2023) reports that in 2022, average occupancy was 65.1% for berths in ports, 73.2% for sea berths, and 43.6% for land berths. At the same time, the success rate of finding a free transit berth in marinas and ports in 2022 was 91%, while the success rate for sea berths was 85% (MINT, 2023).

Broj plovila u marinama prema zastavi plovila				
	BROJ PLOVILA		STRUKTURA (u %)	
	2021.	2022.	2021.	2022.
UKUPNO	12.040	12.632	100,0	100,0
Hrvatska	5.275	5.589	43,8	44,2
Italija	386	391	3,2	3,1
Njemačka	2.012	2.152	16,7	17,0
Austrija	1.873	1.940	15,6	15,4
Slovenija	610	709	5,1	5,6
Ujedinjena Kraljevina	215	210	1,8	1,7
SAD	111	99	0,9	0,8
Francuska	149	129	1,2	1,0
Mađarska	146	140	1,2	1,1
Nizozemska	142	126	1,2	1,0
Češka	197	212	1,6	1,7
Švedska	46	39	0,4	0,3
Poljska	230	290	1,9	2,3
Slovačka	199	181	1,7	1,4
Švicarska	69	79	0,6	0,6
Belgija	64	60	0,5	0,5
Rusija	5	2	0,0	0,0
Grčka	1	1	0,0	0,0
Izrael	0	0	0,0	0,0
Ostale zemlje	310	283	2,6	2,2

Figure 1: Number of vessels in marinas by vessel flag
Source: HTZ, Tourism in Numbers 2022

Regarding the nationality of vessels in marinas in 2022, 44.20% of the vessels sailed under the Croatian flag, followed by 17% under the German flag, 15.40% under the Austrian, 5.6% under the Slovenian, and others. In terms of transit vessels, there was an 11.6% increase in 2022 compared to 2021. According to the categorization of vessel types in transit, 59.6% were sailing yachts, 32.5% motor yachts, and 8% other vessels—representing increases compared to 2021, specifically 9.1% for sailing yachts and 16.7% for motor yachts (NBS, 2023).

1.3.Stimulating Local Economies

The transformative power of yachting on local economies extends far beyond the picturesque image of luxury vessels anchored in azure waters. This industry—characterized by affluence, precision, and exclusivity—has a significant and tangible impact on coastal communities worldwide. A deeper examination of the economic consequences of yachting reveals its multifaceted influence and underscores the importance of understanding its broader implications. First, direct financial inflows stem from the fundamental operational needs of yachts, including berth fees, routine maintenance, refueling, and provisioning. Local businesses—such as marinas, shipyards, fuel stations, and grocery suppliers—are the immediate beneficiaries. This direct spending stimulates the economy, generates turnover, and contributes to regional GDP growth. However, the financial ripple effect extends well beyond these core services. Yacht tourists, upon disembarkation, engage with local communities—dining in restaurants, visiting cultural landmarks, purchasing souvenirs, and often booking overnight stays. These interactions not only enhance other segments of the tourism industry but also promote cultural exchange, which, though intangible, fosters sustainable and long-term tourism engagement. In 2022, the average total expenditure of charter boaters in Croatia amounted to €255 per day, with the largest portion—€166—allocated to the vessel and associated costs (MINT, 2023). By nationality, the highest daily spenders were tourists from Nordic countries (€298), followed by the British (€296) and Italians (€280). Compared to 2017, overall spending has increased by 39%. Additionally, 8.2% of boaters used local accommodation for overnight stays, most frequently for stays ranging from four to seven nights (MINT, 2023). When interpreting statistical indicators related to tourist arrivals in the nautical charter segment, it is important to note that these figures primarily reflect embarkation port data. Traffic from each documented trip is attributed to its point of departure, due to the absence of a sophisticated, universally accepted methodology capable of dynamically tracking vessel routes. Such a system would more accurately represent the spatial progression and complexity of individual journeys (HTZ, 2023). Nevertheless, in 2021, data on total arrivals and overnight stays in the nautical charter sector show a pronounced concentration of activity in the Split-Dalmatia County—a trend consistent even before the COVID-19 pandemic (HTZ, 2023). Zadar and Šibenik-Knin counties follow as secondary hubs, reinforcing their strategic importance within Croatia's nautical tourism landscape.

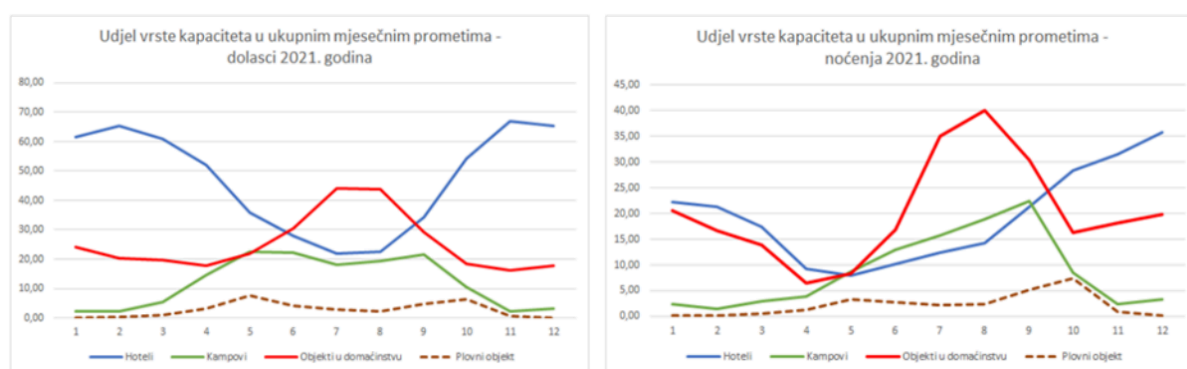Figure 2. Share of nautical charter in total tourism traffic in 2021
Source: HTZ (2023)

In the presentation of the share of capacity types in total monthly traffic in 2021, regarding both arrivals and overnight stays, the brown dashed line indicates the figures for floating objects. Prior to the COVID-19 pandemic, the highest contributions from nautical charter were recorded in May, June, and August.

However, in 2020 and 2021, the share of nautical charter in overall tourism traffic peaked in May, September, and October—largely as a result of travel opportunities relative to prevailing restrictions. Yachting also plays an increasingly significant role in job creation. While onboard roles—such as captains, stewards, and engineers—are the most visible, there is growing demand for skilled tradespeople, local artisans, hospitality staff, and even language translators. As regions become more integrated into the yachting economy, this trend contributes to the upskilling of the local workforce—an often overlooked but vital factor in shaping a region's long-term development trajectory.

Infrastructure, the backbone of modern society, is also impacted. The influx of yachts can prompt local governments to invest in improved infrastructure—ranging from advanced port facilities and more efficient road networks to enhanced waste management and water purification systems. These improvements benefit not only the yachting community but also the local population in the long term.

In 2022, revenue across Croatia—particularly in key nautical tourism counties—showed an overall increase. Ports generated revenue (excluding VAT) amounting to HRK 1.1 billion, representing a 14.4% increase compared to 2021 (NBS, 2023). Šibenik-Knin County recorded the highest share, accounting for 25.5% of total national nautical tourism port revenues—HRK 276 million. The largest share of income came from berth rentals, which accounted for 70% of total port revenue (NBS, 2023).

The real estate market in these regions has also experienced significant transformation. The attractiveness of yachting often drives up land values, particularly near marinas and coastal areas. This can increase the wealth of local property owners and attract further investment to the region. In parallel, tax revenues rise. As business activity expands and employment increases, so too do public revenues. When strategically managed, these funds can support community development projects, education programs, and additional infrastructure investments.

However, it is essential to emphasize the need for sustainable management. Overreliance on yachting, or poor regulatory oversight, can lead to challenges—including environmental degradation and cultural erosion. Yet, with prudent planning and balanced policy, yachting can serve as a robust pillar of the coastal economy—one that fosters both prosperity and resilience.

3. SOCIO-CULTURAL DIMENSIONS OF YACHTING

Regarding the demographics of boaters in Croatia, the following data should be considered: the average age of boaters in 2022 was 44 years, with 8% of boaters aged 29 or younger, 61% aged 30 to 49, and 31% aged 50 and over (MINT, 2023). In terms of education, 48% of boaters have a university degree or higher, 44% have higher education, and 8% have secondary school or lower education (MINT, 2023). In 2022, the share of boaters with higher incomes also increased; 78% of boaters had monthly household incomes over €3,500, compared to 56% in 2017. These data clearly show a shift in the profile of boaters visiting Croatia. Of the total number of charter tourists in 2022, 33% visited Croatia for the first time, 21% for the second time, between 3 and 6 visits were made by 23% of charter boaters, and 7 or more visits by 23%. Compared to 2017, the share of charter boaters on their first visit decreased from 40% to 33% in 2022. Most charter boaters on their first visit come from Nordic countries, followed by boaters from the USA, the Netherlands, and the United Kingdom. Regarding repeat visits, Slovenians, Italians, Americans, Austrians, and Germans top the list of frequent visitors to Croatia (MINT, 2023).

3.1. Local Population Response to Yachting

In regions where yachting is emerging as an influential industry, the intersection between local communities and these maritime entities requires special attention. The arrival of yachts in domestic ports creates a complex matrix of economic, socio-cultural, and environmental considerations. Such interactions can potentially disrupt established local patterns, necessitating a deeper understanding of their scope and impact. According to a study on local residents' attitudes toward tourism development in Croatia (IT, 2018), with a specific focus on charter tourism, 65.3% support an increase in yachts during the season. The Dalmatia-Šibenik region leads in negative opinions about the number of vessels in Croatia, with 39.1% of locals believing there are too many yachts and boats in the Adriatic during the season. Slavonia follows with 37.8%, the City of Zagreb with 37.1%, and Central Croatia with 36%. There is a notable lack of more recent research on this topic. Interestingly, negative opinions among the local population are most prominent in areas generating the highest revenues from ports (Figure 3). While this should not be treated as a direct correlation, it serves as a valuable prompt for further analysis.
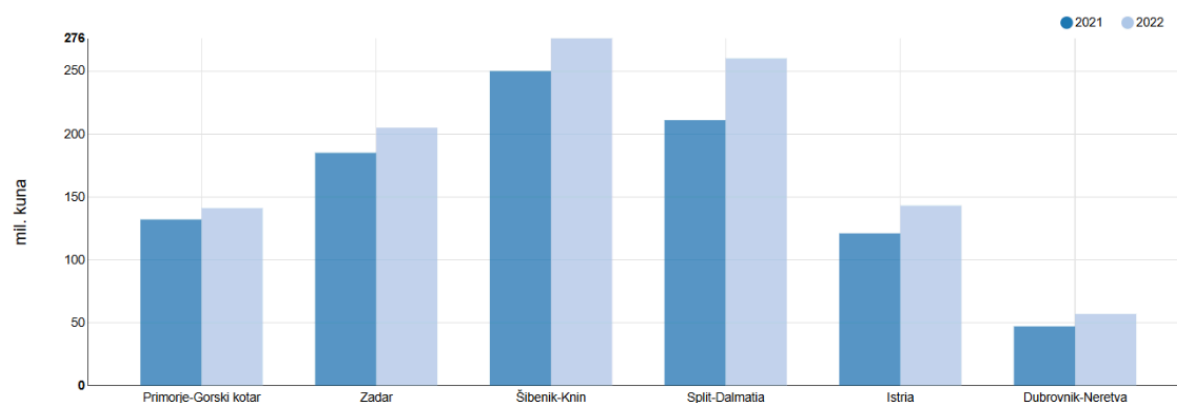
Figure 3. Income generated by Nautical Ports.
Sources: NBS (2023)

3.2. Awareness of Sustainable Development

Nautical tourism is a subsector within the broader tourism industry whose competitive advantage largely depends on two sets of determinants. Primary determinants include general elements such as climatic conditions, unspoiled marine environments, scenic landscapes, intricate coastlines and island configurations, and the charm of nearby settlements (Jugović et al., 2013). In contrast, secondary determinants focus on more specific elements such as the accessibility of nautical ports from major markets, navigational safety, the quality of port infrastructure, the professionalism and hospitality of staff, vessel maintenance services, onshore attractions, cultural initiatives, pricing structures, and the regulatory frameworks governing maritime operations. Sustainable development is fundamentally the balanced integration of environmental, economic, social, and socio-cultural dimensions, with an emphasis on meeting the needs of present and future generations. Human involvement—whether as tourists, employees, businesses engaged in primary or ancillary tourism services, public service providers, or local residents—plays a vital role in shaping sustainability outcomes. Advocating sustainability in nautical tourism, as in any tourism subsector, means ensuring lasting benefits for local communities, not only economically but also in terms of social cohesion and environmental responsibility (Jugović et al., 2013).

The global demand for sustainable products reflects a broader societal shift. As individuals around the world strive for more conscious living and feel an increasing sense of responsibility toward the environment, there has been a corresponding rise in demand for sustainable goods and services (Letschert, 2020). Within the yachting sector, a noticeable shift toward sustainable yacht design is emerging. This is particularly evident at shipyards such as Feadship in the Netherlands, where interactions with potential clients reveal a clear preference for yachts that minimize environmental impact. For this consumer demographic, sustainability is not just a choice—it is a marker of prestige. This trend is spreading throughout the nautical market. A secondary driver pushing the sector toward sustainability stems from new regulations issued by the International Maritime Organization (IMO), which set limits on the permissible environmental footprint of vessels. However, in the area of sustainable yacht construction, the intense competition within the shipbuilding and design industries often results in reluctance to share data, knowledge, or innovation. This competitive atmosphere undermines collaboration, making it difficult to develop effective innovations, especially when multiple shipyards are likely working on similar technologies but choose to protect their competitive edge rather than cooperate. This mindset poses particular challenges when it comes to environmental responsibility—an area that arguably requires a unified, collaborative approach. Despite growing consumer interest in environmentally friendly alternatives, the implementation of sustainable systems often comes with higher costs than traditional methods. As a result, many buyers remain hesitant to choose greener options, favoring lower prices over long-term environmental considerations.

4. CONCLUSION

The economic footprint of yachting is extensive and deeply influences both local and global economies. To begin with, yacht construction represents a major industry, intricately connected to supply chains, technological advancement, and skilled labor markets. Yachting contributes significantly to GDP in regions where it is prevalent, while also fostering innovation and shaping trade dynamics. Yachting-related events, such as international boat shows, attract global audiences, generate substantial revenue, and elevate the profile of host destinations. Marinas, often overlooked in broader discussions, function as hubs of economic activity. Their operations extend far beyond simple mooring—they encompass a wide range of services, businesses, and employment opportunities. The employment landscape in the yachting industry is equally expansive. From marine engineers to stewards, event organizers to marina staff, the industry creates a diverse array of specialized jobs, fostering skill development and providing lucrative career pathways. Beyond these direct economic impacts, yachting stimulates local economies. Destinations popular among boaters experience a rise in ancillary employment and economic activities, particularly in hospitality, local attractions, and retail. The arrival of higher-spending guests leads to increased local consumption, benefiting small businesses and local artisans alike. From a socio-cultural perspective, yachting offers unique insight into the evolving intersection between leisure and societal values. The demographics associated with yachting reflect changing notions of luxury and the underlying motivations that drive individuals toward such experiences. Notably, the growing emphasis on sustainability highlights the yachting community's adaptability and awareness of broader global concerns. Moreover, the unforeseen challenges brought about by the global health crisis underscored the industry's resilience and its close connection to broader social patterns. In summary, while yachting remains a symbol of wealth and luxury, it is also deeply intertwined with contemporary socio-cultural dynamics, reflecting changing social preferences, global challenges, and aspirations.

When reviewing the multifaceted nature of nautical tourism from a Croatian perspective, several key observations stand out. Economically, Croatia recognizes the enormous value of nautical tourism and has continued to invest in its infrastructure while diversifying its tourism offerings to meet growing demand. This effort is evident in the increase in the number of ports, marinas, and berths; the hosting of maritime events; the streamlining of charter yacht rental and registration processes; and the creation of new employment opportunities across the sector. The charter segment, in particular, plays a crucial role in national economic development and underscores the importance of maintaining high standards across Croatia's maritime assets. Coastal towns, especially those with marinas or yacht construction facilities, experience strengthened local economies, business growth, and improvements in living standards. This interaction between yachting and local economies demonstrates the holistic contribution of the sector, emphasizing the need for strategic, sustainable, and forward-thinking policies to manage future challenges and seize emerging opportunities. From a socio-cultural standpoint, the relationship between yachting tourism and local communities in Croatia is nuanced. The demographics of yacht tourists present both opportunities and challenges. While the proportion of first-time nautical tourists has declined, the total volume of visitors in this segment continues to grow. The average length of stay and overnight visits have slightly decreased, yet average daily spending has increased—indicating clear economic benefits. However, the impact of global exogenous shocks has once again drawn attention to the vulnerability and resilience of the sector within Croatia. In a global context where sustainability is no longer a trend but a necessity, the Croatian nautical tourism sector shows clear gaps in eco-centric implementation. There is an urgent need for innovation, particularly in sustainable marina design and operations. By becoming a leader in sustainable nautical tourism, Croatia has the potential to carve out a distinctive position within the Mediterranean. While the natural beauty of Croatia's marine ecosystem is undeniably appealing, there is a pressing need to raise its visibility on the global stage. A sophisticated, well-targeted marketing strategy—one that showcases Croatia's maritime heritage, modern yacht infrastructure, and commitment to sustainability—could be transformative, attracting a larger share of the international audience. The key areas for improvement include addressing regulatory inconsistencies, advancing sustainable solutions, expanding global reach, and implementing more comprehensive quantitative and qualitative monitoring systems.

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SUSTAINABLE ENTREPRENEURSHIP IN HOSPITALITY: FINANCIAL VIABILITY OF GREEN INVESTMENT PROJECTS

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ABSTRACT

This paper examines the viability of green investment projects in the hospitality sector, highlighting the role of sustainable entrepreneurship in responding to the growing demand for eco-friendly practices. The main objective of the study is to explore how entrepreneurs can structure businesses that integrate sustainability into hotel construction, operations, and management. The methodology employed is based on a comprehensive literature review encompassing the Sustainable Development Goals (SDGs), Environmental, Social, and Governance (ESG) criteria, financial incentives, and empirical examples of sustainable hospitality. This is further complemented by the analysis of case studies and financial projections. Classical project evaluation tools—such as Net Present Value (NPV) and Internal Rate of Return (IRR)—were used to assess the economic viability and benefits of sustainable practices. The research findings suggest that the adoption of green practices, combined with access to tax incentives and subsidies, enhances both the competitiveness and profitability of businesses in the hospitality sector. Furthermore, sustainability was found to serve as a competitive differentiator, fostering increased customer loyalty. This study provides practical recommendations for entrepreneurs seeking to optimize their operations while adapting to the demands of a more sustainable market—integrating innovation with environmental responsibility.

Keywords*: Sustainability, Entrepreneurship, Green Hospitality, Economic Viability, Sustainable Development Goals (ESG)*

1. INTRODUCTION

The hospitality sector has undergone significant transformation in recent decades, driven by shifts in consumer behaviour and the rise of environmental regulations. Growing awareness of climate change and increasing pressure to transition to a low-carbon economy have compelled governments, businesses, and individuals to adopt more sustainable practices. In this context, sustainable entrepreneurship emerges as a strategic response to the challenges and opportunities presented by the move toward a greener future. As a resource-intensive industry, hospitality plays a crucial role in this transformation. The sector's high consumption of energy, water, and other natural resources—as well as its generation of waste and carbon emissions—places hotels at the forefront of environmental responsibility. The implementation of sustainable practices, such as green technologies, energy efficiency optimization, sustainable waste management, and the use of eco-friendly materials, is no longer just an ethical imperative but also an operational and competitive necessity. Moreover, the demand for sustainable accommodations has grown significantly. Today's consumers are more informed and environmentally conscious, seeking hospitality experiences that align with their values. This shift is creating new market opportunities for entrepreneurs who are ready to innovate. Public policies are also increasingly supportive of sustainability, offering subsidies, community funds, and tax incentives for green projects—making sustainability not only a moral imperative but also an economic advantage. Developing sustainable hotels requires a multidimensional approach that incorporates sustainability from the earliest stages of project design through to daily operations. This includes environmental planning, as well as a thorough assessment of economic and financial viability. Key factors include the upfront costs of green technologies, long-term savings, and available incentives (see e.g. Furtado, 2019; Lourenço, 2023; Yoong, 2022). For entrepreneurs, the main challenge lies in balancing the need for significant initial investment with the assurance of competitive financial returns. This study is therefore situated at the intersection of sustainability, innovation, and financial viability—three essential pillars for the future of hospitality. By exploring these dimensions, the article seeks to contribute to the ongoing debate and offer practical recommendations for entrepreneurs aiming to integrate environmental responsibility into economically sound business models.

2. LITERATURE REVIEW

A study by Orsiolli and Nobre (2016) highlights the importance of sustainable entrepreneurship as a tool for integrating stakeholders in creating value for sustainable development. The authors argue that the hospitality sector, due to its complex supply chain, offers vast opportunities for sustainability practices, particularly through collaboration with suppliers to reduce environmental impacts. This article provides a theoretical foundation for understanding how entrepreneurs can structure business models that align economic objectives with environmental and social responsibilities. Through an analysis based on the Web of Science database, Andrade-Valbuena et al. (2022) present a comprehensive overview of sustainable entrepreneurship in the tourism and hospitality sector, identifying trends, challenges, and opportunities in adopting sustainable practices. This research emphasizes the importance of integrating the Sustainable Development Goals (SDGs) into the strategic planning of hotels, highlighting that sustainability is increasingly becoming a requirement in the global market. De Lange and Dodds (2017) explore the role of social entrepreneurship in promoting sustainable tourism. Their study shows that entrepreneurs can adopt sustainable practices—such as energy efficiency and waste management—not only in response to regulatory demands but also as an opportunity to transform their businesses into platforms for positive social and environmental impact. The analysis demonstrates that sustainable tourism can lead to differentiated guest experiences, foster customer loyalty, and enhance brand reputation in the hospitality industry.

The feasibility of photovoltaic systems in hotels is investigated by Al-Zoubi et al. (2021), who present a case study of the Cedars Hotel in Jordan. Their analysis reveals that implementing green technologies can result in significant savings and a reduced carbon footprint. This research provides a practical perspective on how investing in renewable energy technologies can strengthen both the financial and environmental viability of hotel operations. Similarly, Halil et al. (2016) examine the economic feasibility of sustainable construction projects. While the study acknowledges the high upfront costs associated with green practices, it concludes that the long-term benefits—such as operational savings and enhanced investor appeal—substantially outweigh initial investments. In another contribution, Floričić (2020) analyzes sustainable solutions in the hospitality industry within the context of competitiveness among green hotels. These types of analyses are particularly relevant in a sector where sustainability initiatives must be economically justified to ensure adoption. Government and corporate incentives for the development of sustainable hotel buildings are addressed by Sloan et al. (2010), who emphasize that public policies and financing programs significantly influence the feasibility of green projects. The authors highlight the importance of entrepreneurs understanding and leveraging these incentives to strengthen their business models. Yu et al. (2024) investigate the effectiveness of sustainable marketing strategies in the hospitality sector. Their study demonstrates that incentives such as green rewards can increase customer willingness to engage in sustainable consumption. This reinforces the idea that sustainability should not only be an operational focus but also a central element of communication and brand positioning strategies. Aleixo (2023) examines the implementation of ESG practices in small and medium-sized enterprises within the hospitality sector. The study highlights the benefits of integrating environmental, social, and governance criteria into business operations, including reduced operational costs and strengthened corporate reputation. This research provides practical insights for entrepreneurs seeking to adopt a management model aligned with contemporary market expectations. Finally, Alonso-Almeida and Álvarez-Gil (2018) explore green entrepreneurship in the tourism sector, identifying the skills and strategies necessary to build successful ventures. The authors argue that adopting sustainable practices is not only a means to comply with regulations but also a pathway to achieving long-term competitive advantage. This study supports the broader discussion on the importance of embedding sustainability into every phase of a tourism enterprise's lifecycle—from conception to operation. This literature review illustrates the diversity of approaches and practices that can be adopted to promote sustainability in the hospitality sector, serving as both a theoretical and practical foundation for the present research.

3. METHODOLOGY

The methodology employed in this research to analyse the feasibility of green investment projects in the hospitality sector is structured to combine qualitative and quantitative approaches. This combination aims to provide a comprehensive and in-depth perspective on the subject, considering the particularities of sustainable entrepreneurship in the hospitality industry and the profitability of sustainable projects. The research adopts an exploratory and descriptive approach, based on case studies and financial analysis. For the qualitative analysis, sustainable hotels that have implemented eco-friendly practices at various stages of their operations were selected. These practices include the use of renewable energy, waste management, and the selection of sustainable materials for the construction and operation of the establishments. Case studies were chosen based on representativeness criteria, encompassing hotels of different sizes and locations, including both large international chains and local enterprises.

Additionally, these cases were selected for their emphasis on green practices and the integration of ESG (environmental, social, and governance) criteria into their operations, as evidenced in previous studies (Sloan et al., 2010; Legrand & Matthew-Bolofinde, 2022). From the case studies, data were collected on the implementation of green technologies as well as the challenges and benefits experienced by entrepreneurs. These data were analysed to identify patterns and best practices, and to understand the main motivations and barriers to adopting sustainable practices in the hospitality sector. The results of this qualitative analysis provided deeper insights into successful strategies for using sustainable technologies, along with changes in consumer perceptions and behaviours, which increasingly demand eco-friendly practices in the industry. Additionally, financial analysis was conducted to assess the economic viability of sustainable projects in the hospitality sector. Established financial methods were used, such as calculating Net Present Value (NPV), Internal Rate of Return (IRR), and payback period, based on real or projected financial data found in the literature and case studies of sustainable hotels. NPV was used to calculate the present value of future cash flows, enabling identification of a project's net profitability over time. IRR was applied to determine the rate of return generated by the project, comparing it to the minimum return required by investors. The payback period, in turn, was used to assess the time required to recover the initial investment—an important indicator for entrepreneurial decision-making. These financial calculations considered the impact of financial incentives such as subsidies, community funds, and tax incentives, which have been widely discussed in the literature as essential mechanisms for making sustainability projects economically viable (Sloan et al., 2010; Yu et al., 2024). These incentives, which may vary by country and region, were factored into cash flow projections to reflect their influence on reducing the project's total cost and accelerating the return on investment. Moreover, the analysis incorporated sustainability criteria as critical variables in evaluating project feasibility. These criteria involve implementing practices aligned with ecological principles, such as the use of renewable energy, water consumption reduction, waste management, and the choice of low-impact materials. The importance of these practices, aligned with the Sustainable Development Goals (SDGs) and ESG criteria, has been highlighted in various studies, including those by Legrand & Matthew-Bolofinde (2022) and Lima et al. (2024), as differentiating factors that add value to businesses and positively impact brand image. The methodology also includes an analysis of market trends and demand for sustainable accommodation, using consumer data and tourist behaviour that prioritize eco-friendly practices. According to Andrade-Valbuena et al. (2022), the growing preference of consumers for sustainable establishments can directly influence investment decisions and the competitive positioning of companies. Considering this market factor helps integrate sustainability into business strategy, making it a central element of the value proposition of sustainable hotels. The integration of quantitative and qualitative data, obtained through case studies, financial analysis, and literature review, provides a holistic view of the feasibility of green investment projects in the hospitality sector. This methodological approach, combined with a focus on financial incentives, sustainable practices, and consumer behaviour, aims to offer valuable insights to entrepreneurs seeking to integrate sustainability into their hospitality projects, thereby contributing to the promotion of a greener and more profitable hospitality industry.

4. DISCUSSION OF RESULTS
4.1. Sustainable Entrepreneurship in the Hospitality Sector
In the context of hospitality, sustainable entrepreneurship involves implementing practices that not only address environmental needs but also create social and economic value. Entrepreneurs can adopt various approaches to integrate sustainability into the construction, operation, and management of their hotels.

An example is provided by the research of Al-Zoubi et al. (2021), which explored the feasibility of using photovoltaic systems for green electrification in hotels. The use of green technologies, such as solar panels, reduces the consumption of electricity from non-renewable sources, thereby lowering the hotel's carbon footprint and generating long-term savings. Moreover, waste management and the selection of eco-friendly materials are essential components of sustainable hotel operations. Using materials with a lower environmental impact, such as certified wood, and implementing effective waste management systems, such as recycling and composting, contribute to operational sustainability. These practices not only help reduce environmental impact but can also result in greater customer loyalty. This is supported by Yu et al. (2024), who showed that green incentives in hotel marketing programs positively influence the consumption intent of environmentally conscious guests.

4.2. Economic and Financial Feasibility of Green Investment Projects

In the financial analysis of sustainable investment projects, such as the construction and operation of green hotels, financial indicators like Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period are used to assess economic feasibility. Below are the values of these indicators as described in feasibility studies of sustainable projects in the hospitality sector:

4.2.1. NPV: Net Present Value

The Net Present Value (NPV) is an essential indicator for calculating a project's profitability. In the analysed studies, NPV was used to determine whether investments in sustainable technologies, such as solar panels or energy management systems, would yield positive returns over time. For instance, Al-Zoubi et al. (2021) demonstrated a positive NPV of USD 420,000 for implementing a photovoltaic system at the Cedars Hotel in Jordan. This value indicates that, after accounting for implementation costs, the project would yield returns exceeding the initial investment, proving the economic viability of the sustainable investment.

4.2.2. IRR: Internal Rate of Return

The Internal Rate of Return (IRR) is another crucial indicator for measuring project profitability. An investment is considered viable when the IRR exceeds the minimum return rate required by investors. Halil et al. (2016) observed that the IRR for green building projects varies between 12% and 15%, depending on the technologies implemented and market conditions. These values indicate attractive profitability, especially since traditional investment returns in the hospitality sector typically range from 6% to 10%.

4.2.3. Payback

Payback calculates the time required to recover the initial investment and is used to evaluate how quickly a green hotel project can become financially sustainable. Sloan et al. (2010) reported that the payback period for investments in sustainable technologies in green hotels, such as energy-efficient systems and eco-friendly materials, ranges from 2 to 5 years. For instance, Al-Zoubi et al. (2021) estimated a payback period of approximately 5 years for the installation of a photovoltaic system, suggesting that after this period, the hotel's operating costs would significantly decrease, leading to substantial profits from energy savings. These values illustrate how financial indicators can be used to assess the feasibility of sustainable investment projects in the hospitality sector. Positive NPVs, high IRRs, and relatively short payback periods demonstrate that investments in green technologies are not only viable but also financially advantageous in the long term. These indicators provide a solid foundation for hospitality entrepreneurs to make informed decisions about implementing sustainable practices, aligning financial profitability with environmental goals.

4.3. Incentives and Green Financing

Green incentives and financing are crucial for implementing sustainable investment projects, particularly in sectors like hospitality, where the initial costs of green technologies can be high. The analysed studies identified various types of incentives and financing mechanisms to support sustainability projects in the hospitality sector. These include:

4.3.1. Tax Incentives and Government Subsidies

Sloan et al. (2010) discussed the use of subsidies and tax incentives for green building construction. These incentives are common in many countries and aim to reduce the initial costs of sustainability investments. For example, hotels implementing energy-efficient systems, such as solar panels and water recycling systems, may qualify for tax deductions, credits, or exemptions on renewable energy consumption. Subsidies for installing green technologies, such as solar or wind energy systems, can significantly lower initial investment costs, enhancing the economic viability of sustainable projects and accelerating the return on investment.

4.3.2. Community Funds and Green Financing Programs

Andrade-Valbuena et al. (2022) explored the increasing availability of community funds and green financing programs to support sustainable hospitality projects. For example, the European Union offers several funding lines, such as the European Regional Development Fund (ERDF), to finance energy efficiency and green construction projects in hotels. These funds are important because they often offer favorable terms, such as reduced interest rates or longer repayment periods, making projects more accessible to small and medium-sized entrepreneurs in the hospitality sector.

4.3.3. Green Credit Lines for Sustainability Investments

According to Halil et al. (2016), banks and financial institutions are increasingly offering green credit lines to finance sustainable technology implementations. These green loans, with favorable interest rates, are granted based on the hotel's commitment to adopting environmentally responsible practices. Such credit lines can be used to finance renewable energy systems, such as solar panels or wind turbines, or waste management systems more affordably.

4.3.4. Certificates and Green Certification Programs

Environmental certification programs, such as LEED (Leadership in Energy and Environmental Design) and Green Key, discussed by Legrand and Matthew-Bolofinde (2022), also play an important role in attracting financial incentives. Although these programs do not directly offer subsidies, hotels that obtain green certifications can access various benefits, including tax reductions, preferential credit lines, and partnerships with local governments for incentive programs.

4.3.5. Incentives for Research and Development (R&D)

Yu et al. (2024) highlighted that the hospitality sector can benefit from R&D incentives, particularly for technological innovation projects aimed at sustainability. These incentives are offered by various governments and can support the development of new green technologies, such as advanced energy management systems and sustainable construction solutions. These incentives and financing mechanisms are essential for encouraging hotel entrepreneurs to adopt more sustainable practices. They not only make investments in green technologies more accessible but also mitigate the financial risks associated with innovative, environmentally responsible solutions.

4.4. Competitive Positioning in the Sustainable Hospitality Market

Sustainability can be a decisive factor for competitive positioning in the hospitality sector. Hotels adopting eco-friendly practices have the opportunity to stand out in an increasingly environmentally conscious market. Legrand and Matthew-Bolofinde (2022) emphasized that integrating sustainable practices can create a significant competitive advantage, attracting tourists who prioritize environmental responsibility when choosing accommodations. Sustainability is not just an operational practice but also an effective marketing strategy, offering a critical differentiator in saturated and competitive markets. These examples demonstrate how sustainable entrepreneurship in the hospitality sector, the economic and financial viability of green projects, access to incentives and financing, and competitive positioning can interact to create a robust and attractive value proposition for both investors and consumers.

5. CONCLUSION

Sustainable entrepreneurship in the hospitality sector is presented as both viable and essential for aligning economic productivity with environmental and social responsibility. Simple sustainable practices, such as the use of green technologies and efficient resource management, have proven increasingly effective not only in reducing environmental impact but also in creating economic value and strengthening relationships with consumers. Studies like that of Al-Zoubi et al. (2021) demonstrate that investments in technologies such as photovoltaic systems can yield significant returns, with positive financial indicators such as a high NPV and a relatively short payback period. Additionally, access to financial incentives, subsidies, and green credit lines reduces certain economic barriers, enabling the implementation of pioneering practices. These mechanisms facilitate the inclusion of small and medium-sized enterprises in the sustainability campaign, underscoring the crucial role of public policies in transforming the sector. The competitive position of hotels adopting these sustainable measures is also highlighted as a strategic advantage, attracting an increasingly conscientious audience aligned with the values of environmental responsibility. The integration of ESG (Environmental, Social, and Governance) practices not only enhances brand image but also establishes a differentiator in a highly competitive market. This paper concludes that sustainability in hospitality is not just a trend but a necessity to ensure the sector's longevity. With the support of public policies, adequate funding, and industry commitment, sustainable entrepreneurship can transform the hospitality sector into an exemplary model of responsible, sustainable, and profitable development.
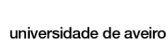
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CIRCULAR ECONOMY AND WOMEN'S EMPLOYABILITY ON THE SOUTHERN SHORES OF THE MEDITERRANEAN

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ABSTRACT

This paper explores the intersection of the circular economy and women's employability in the southern Mediterranean region, with a particular focus on Morocco, Egypt, and Tunisia. The circular economy offers a sustainable alternative to the traditional linear model by promoting reuse, recycling, eco-design, and resource efficiency. In contexts where natural resources are under strong pressure and unemployment rates are high, especially among women, this model creates opportunities for both environmental sustainability and socio-economic empowerment. Historically, women in these regions have been engaged in informal circular practices such as handicrafts, food preservation, and textile repair, which can be transformed into modern entrepreneurial activities. The study highlights several female-led initiatives that demonstrate the potential of circular enterprises in textiles, waste management, sustainable fashion, and ecological crafts. These examples illustrate how women's participation can simultaneously generate income, preserve cultural knowledge, and reduce environmental pressures. Despite these opportunities, women face significant barriers such as limited access to finance, exclusion from professional networks, lack of training, and persistent gender stereotypes. The analysis shows that women are underrepresented in leadership and decision-making roles within the sector, and their contributions often remain undervalued. Overcoming these challenges requires inclusive public policies, targeted training programmes, access to tailored financial mechanisms, and the strengthening of women's professional networks. Furthermore, integrating gender perspectives into circular economy strategies is essential for achieving the Sustainable Development Goals (SDGs) in the region. By empowering women through the circular economy, societies can foster both ecological resilience and social equity. The findings underscore that women's active involvement is not only a matter of social justice but also a key driver of innovation and sustainability in Mediterranean economies.
Keywords: Circular Economy, Women's Employability, Mediterranean, Sustainable Development

1. INTRODUCTION

The circular economy aims to minimize waste by promoting reuse, recycling, repair, and sharing. It replaces the linear "produce-consume" model by encouraging strategies such as repair, reuse, recycling, waste recovery, and eco-design. The circular economy is part of a sustainable development model aimed at extending the life cycle of products. According to a report by the World Bank, this model resonates particularly in Mediterranean countries, which face strong pressure on natural resources and high unemployment, especially among young people and women (World Bank, 2019).

Many countries on the southern shores of the Mediterranean (Morocco, Algeria, Tunisia, Egypt, etc.) face challenges related to resource management and sustainable development. This context offers an opportunity for the circular economy. In this regard, the circular economy can address several challenges:

• Environmental: waste management, pollution reduction, protection of ecosystems.
• Social and economic: job creation, reducing inequalities, strengthening local communities.

2. THE ROLE OF WOMEN IN THE CIRCULAR ECONOMY

Historically, women in these regions have often been involved in domestic activities that are directly linked to the principles of the circular economy, such as handicrafts, repairing clothes or objects, preparing food using natural preservation techniques, and transforming materials into new useful products. In the modern circular economy, these skills can be professionalized, industrialized, or turned into real business opportunities and integrated into contemporary circular models (Benería, L., Berik, G., & Floro, M., 2015). For example:

• Textiles and sustainable fashion: Women traditionally have great expertise in sewing, knitting, and textile recycling. This know-how can be harnessed to create businesses in the sustainable fashion sector, such as making clothes from recycled materials.

• Waste management and recycling: Women can play a crucial role in waste collection and management, particularly in rural areas. For example, some women's cooperatives in Egypt specialize in recycling organic waste to produce natural fertilizers (Charmes, J., 2019).

• Craft production: By reusing materials such as plastic, paper, or metals, women can create innovative and environmentally friendly craft products, enabling them to enter the market as entrepreneurs.

For instance, in its 2016 report, the United Nations Environment Programme examines how gender inequalities influence environmental policies and practices, including in the circular economies of developing countries. The report emphasizes that the circular economy could be a vector for female employability (UNEP, 2016). Indeed, the circular economy is a model that promotes the creation of new jobs, often linked to the transformation of waste into reusable resources or the production of ecological goods. This can benefit women on several levels:

• Social enterprises and cooperatives: Many circular economy initiatives in the region take the form of cooperatives or social enterprises, which are more accessible to women and promote collective entrepreneurship. For example, in Tunisia, several cooperatives run by women transform recycled textiles into fashion items.

• Job-creating sectors: The circular economy has potential in a wide range of sectors: waste management, repair and maintenance, urban agriculture, and craft production. These are areas where women can easily integrate and develop specific skills.

In these sectors, the integration of women can result in stable, environmentally friendly jobs, while contributing to more responsible management of local resources.

3. A FEW INITIATIVES
3.1. Morocco
In Morocco, the circular economy is a fast-growing field, and several initiatives led by women are actively contributing to this sustainable transformation.

Here are some outstanding examples of women's initiatives in the circular economy in Morocco:

Chari des femmes du Rif: In the Rif region, a women's collective has launched a project to recycle plastic and textile waste into craft products such as carpets and accessories. Besides reducing local waste, this initiative has created jobs and enhanced traditional craft skills.

Al Karama Cooperative: The Al Karama cooperative, located in the Marrakech region, is run by women who transform agricultural produce into natural cosmetics and essential oils, while adopting practices that recycle agricultural waste. For example, plant residues are used as natural fertilizer, creating a virtuous cycle in production.

Jardin Om Brahim in Marrakech: This project was created by Fatima Zahra El Filali and focuses on transforming organic waste into compost. Its aim is to promote urban agriculture through the recycling of food waste. The women involved in the project collect organic waste from local markets and transform it into fertilizer for urban gardens and vegetable patches.

Toudarte Cooperative: The Toudarte cooperative, located in the Agadir region, is an example of a women's initiative dedicated to the production of argan oil. The women who work there recover the hulls of the argan fruits to make fuel, as well as producing ecological cosmetics from the oil. This project helps to reduce pressure on natural resources while generating income for the women in the cooperative.

Baggou: Created by Moroccan designer Yasmina Filali, Baggou is a project that recycles plastic bags to create fashion objects, including handbags and accessories. The project gives new life to materials that would otherwise be thrown away, while helping to empower women in rural areas who are involved in production.

Association Lalla Aouda Saadia: This non-profit association, set up by women in Fez, works to recycle textile waste from weaving and sewing workshops. The recovered fabrics are used to create clothes and accessories, promoting ethical and sustainable fashion. It also provides a source of income for the women involved.

Adrar Cooperative: This cooperative, located in the Atlas Mountains, is run by women who are committed to developing local medicinal plants. They use sustainable harvesting methods and transform the residues into compost to maintain soil fertility. Their products are also packaged in recyclable materials.

These women's initiatives demonstrate the commitment of Moroccan women to the circular economy. They not only help combat environmental problems such as waste management and pollution but also promote economic empowerment and improved living conditions in local communities.

3.2. Egypt

In Egypt, several women's circular economy initiatives are emerging, reflecting women's growing commitment to sustainable development. Here are some examples of initiatives led by women or involving women in this field:

Up-Fuse: Founded by Rania Kamel and Yara Yassin, Up-Fuse is a sustainable fashion brand that creates bags and accessories from recycled plastic. This social enterprise not only reduces plastic waste but also supports women in local communities by providing employment opportunities in the recycling and manufacturing processes. The bags and accessories are made from collected, cleaned, and recycled plastic bags, transforming waste into value-added products.

Reform Studio: Reform Studio was founded by Hend Riad and Mariam Hazem. Their initiative aims to recycle unused plastic bags by weaving them to create a sustainable material called "Plastex." This material is then used to make handcrafted products such as bags, furniture, and fashion accessories. Reform Studio employs local craftspeople, often women, providing them with opportunities to improve their economic conditions while helping reduce plastic pollution.

The Neya Initiative: The Neya Initiative, while not specifically focused on the circular economy, implements projects in sustainable development and social inclusion. Neya connects businesses, NGOs, and communities to promote sustainable practices, including recycling and upcycling, while highlighting women-led projects in the circular economy. The platform also helps raise awareness of environmental issues and encourages women to become entrepreneurs in these sectors.

Banlastic Egypt: Although founded by a man (Islam Elghazaly), Banlastic Egypt is an ecological initiative fighting plastic pollution in Alexandria. The initiative includes many women activists and entrepreneurs in its efforts to raise awareness and develop solutions to reduce single-use plastic. It also strives to promote women's participation in local environmental campaigns.

Recyclobekia: Although Recyclobekia, a company specializing in e-waste recycling, is not exclusively female-led, many women are involved at different levels. The circular economy around e-waste recycling is a growing sector in Egypt, and women are beginning to play an increasingly important role both in technical operations and management.

VeryNile: VeryNile is an initiative that aims to clean up the Nile while promoting the circular economy. Although run by men, it actively involves women, particularly in recycling and transforming the waste collected. The initiative also raises awareness among the local community, including women, about the importance of sustainable resource management and reducing plastic waste.

These initiatives show not only how women in Egypt are actively participating in the transition to a circular economy but also how they play a crucial role in promoting sustainability and environmental protection. They help empower women economically while tackling environmental challenges.

3.3. Tunisia

Aimed at promoting female entrepreneurship and integrating women into activities linked to sustainable resource management, recycling, and the reuse of materials (El Karoui, M., 2020), here are some notable experiences and initiatives in this area:

Women in the Environment and Circular Economy (FEEC): This programme, supported by local and international NGOs, aims to support women in projects linked to the circular economy. The project seeks to train women and raise their awareness of sustainable practices while helping them develop economic activities around recycling and waste management. The women receive technical and entrepreneurial training to help them launch their own initiatives to recycle plastics, textiles, and other materials.

SEEDS – Support for Circular Economy Initiatives by Women in Rural Areas: This initiative specifically targets women living in rural areas in Tunisia. It aims to raise their awareness of the importance of the circular economy and offers practical training in sustainable management of natural resources, such as the reuse of agricultural waste (olive residues, straw, etc.) to create value-added products. The programme also provides tools to start small businesses, giving access to finance to transform these raw materials into marketable products (biofuels, compost, handicrafts).

"CIRCULAR ECONOMY CLUSTER" from the SwitchMed programme: SwitchMed, a programme supporting the transition to sustainable production and consumption practices, has set up initiatives in Tunisia to promote the circular economy, particularly through the creation of industrial clusters. These clusters include women entrepreneurs and aim to encourage sustainable practices in sectors such as textiles, building materials, and electronic waste. The programme offers training, access to networks, and funding for women involved in transforming waste into new products.

Women's cooperatives in plastic waste recycling: In some regions of Tunisia, women's cooperatives have emerged around plastic recycling and solid waste management. These cooperatives, often supported by local NGOs or international programmes, enable women to collect, sort, and sell plastic waste to transform it into recycled materials. These initiatives are often located in marginalized neighborhoods or rural areas, offering women economic opportunities while helping to reduce waste.

Circular farming projects for rural women: Circular farming initiatives encourage rural women to adopt sustainable farming practices, such as composting, using agricultural waste to produce energy (biogas), or producing natural fertilizer. For example, in olive-growing regions, some women are being trained to use the by-products of olive oil production (such as olive pomace) to create by-products or produce renewable energy.

The "Green Works" project: Launched by local actors with support from the European Union, this project aims to promote the green and circular economy in Tunisia. It offers training and support opportunities for women, involving them in projects related to natural resource management and recycling. Women are encouraged to develop green businesses, particularly in sustainable textiles or the production of handicrafts from recycled materials.

Handicraft initiatives based on recycling: Several associations in Tunisia, such as the Association Femme et Développement and the Association des Femmes Tunisiennes pour la Recherche sur le Développement, encourage craftswomen to use recycled materials in their production. This includes handicrafts made from used textiles, old newspapers, or other recycled objects to create items sold on local and international markets. These projects not only help reduce waste but also enhance women's craft skills.

Women in the management of electronic waste: Another notable initiative in Tunisia concerns the involvement of women in managing electronic waste (e-waste), an increasingly important sector in the circular economy. Training is being offered so that women can get involved in recycling and reusing electronic components, enabling them to contribute to a growing sector while creating income.

These initiatives show that the circular economy offers great potential for the economic empowerment of women in Tunisia. However, challenges remain, such as the need for better access to finance, training, and awareness-raising. Continued support from NGOs, governments, and international organizations is essential to ensure the sustainability and expansion of these projects for women.

4. SPECIFIC CHALLENGES FOR WOMEN IN THE CIRCULAR ECONOMY

Despite these opportunities, women in the region face a number of obstacles: Women operating in the circular economy in southern Mediterranean countries face a series of specific challenges. These challenges are socio-economic, cultural, and linked to public policies. Here are the main obstacles encountered:

4.1. Limited access to finance

In some Arab countries, women who want to become entrepreneurs in the circular economy face several obstacles related to access to finance (Bakari, S., & El Harbi, S., 2019). Here are the main specific problems they face in this region:

Banking prejudices: Women entrepreneurs in Arab countries face implicit discrimination when seeking bank loans. Financial institutions tend to perceive women as riskier clients than men, due to stereotypes related to their role in society or their ability to manage business, particularly in innovative sectors such as the circular economy.

Collateral requirements: Women often have fewer assets or property to pledge as collateral for loans, which limits their access to sufficient finance to launch or develop their circular economy projects.

Lack of venture capital investment for women: In Arab countries, venture capital and investment funds have limited access to women, especially in emerging sectors such as the circular economy (Damianova, Z., & Sedlackova, M., 2016). The majority of funds are run by men, and women are often marginalized in these investor networks. This reduces their chances of securing investment for circular projects that require riskier financing, such as recycling or renewable energy innovations.

Specialised funds not widely available: Funds that specifically target women's projects or circular businesses are rare in the region. The creation of funds dedicated to the circular economy remains an emerging field, and those that do exist do not always focus on the inclusion of women.

Insufficient microfinance programmes for circular projects: Although microfinance is present in several Arab countries on the southern shore of the Mediterranean, microfinance institutions are often not adapted to the specific needs of circular economy projects. The amounts lent may be too small to finance more ambitious initiatives such as industrial recycling or circular agriculture.

Microcredit biased towards other sectors: Microfinance programmes in certain Arab countries on the southern shore of the Mediterranean often focus on traditional sectors such as handicrafts or small-scale agricultural production, neglecting innovative circular economy initiatives that require investment in technology or infrastructure.

Limited access to banking services: In several Arab countries, particularly in rural areas, women have limited access to banking and financial services. They may not have bank accounts, credit cards, or relationships with financial institutions, which is a direct barrier to obtaining finance for circular economy projects.

Insufficient financial education: Many women do not benefit from training or resources in financial or banking management, which prevents them from properly structuring their funding applications and complying with the requirements of financial institutions.

Lack of targeted government support: Governments in countries on the southern shore of the Mediterranean often have policies to support general entrepreneurship, but they do not specifically target women in the circular economy. There are not enough grants or public funds dedicated to women entrepreneurs in this field, which limits their ability to obtain financial support.

Limited tax incentives: Tax incentives or support programmes to encourage investment in the circular economy, such as tax exemptions or tax reductions for green businesses, are still underdeveloped and not specifically geared towards female entrepreneurship.

Male-dominated professional networks: Women entrepreneurs in the circular economy often have less access to formal or informal financial networks, which are generally male-dominated. These networks are crucial for obtaining financing or advice on how to raise funds.

Weak connections with international institutions: Although international funds exist to support the circular economy, women on the southern shore of the Mediterranean may find it difficult to access this funding due to a lack of connections with international partners or donors.

Lack of awareness: Women entrepreneurs in Arab countries may be less informed about the funding opportunities available for circular economy projects. They may not know how to access grants, soft loans, or international green business support programmes.

Lack of specific training: There are few targeted training programmes to help women structure their funding applications, understand funding providers' selection criteria, or develop bankable projects in the circular economy.

Lower priority projects for banks: In some Arab countries, circular economy projects, which are often perceived as innovative and risky, are a lower priority for banks than traditional sectors such as commerce or real estate. Banks may consider these projects to be less profitable or too complex to evaluate, which limits women's chances of receiving loans for green initiatives.

Higher perceived risk: Circular projects, such as waste management or renewable energy, can be seen by lenders as high-risk sectors due to the lack of proven business models in the region. This discourages banks from providing finance, particularly to women entrepreneurs who often have less of a financial track record. The limited access to finance for women in the circular economy in Arab countries is therefore the result of a combination of structural factors, ranging from gender discrimination to financial bias to the lack of circular economy-specific support. Greater efforts by governments, financial institutions, and international organisations are needed to overcome these obstacles and enable women to play a key role in the transition to a circular economy in the region.

4.2. Gender inequalities and social stereotypes

Gender inequalities and social stereotypes in the circular economy are topics that deserve special attention, as they influence not only how this sector evolves, but also the participation of women and other marginalized groups (Ibrahim, F., & Amraoui, K., 2021).

Under-representation of women in the sector: In many technological and industrial fields, including the circular economy, women are under-represented, particularly in leadership roles, project design, and technical occupations. These areas include recycling, waste management, eco-design, and industrial processes related to sustainability. Women also have less access to decision-making positions, which limits their influence on key strategies and decisions relating to circular practices.

Sectoral segregation: There are divisions between the roles traditionally assigned to men and women in the circular economy (Attia, S., & Mahmoud, M., 2020). For example, jobs related to waste management, often perceived as physical or dirty, are often reserved for men, while women may be more confined to administrative or social roles.

Unequal pay: As in many other sectors, gender pay gaps also exist in the circular economy, even when women hold equivalent positions. This reflects general trends in the industry but remains a barrier to gender equality.

Gender roles and unpaid work: The circular economy often incorporates activities related to waste reduction, product reuse, and resource management—areas where women are often already involved, for example in household chores (repair, domestic recycling). This work is generally invisible and unpaid, which perpetuates the undervaluing of women's contributions in the transition to a circular economy.

Lack of recognition of traditional female knowledge: In some communities, particularly rural ones on the southern shores of the Mediterranean, women possess traditional knowledge of natural resource management, recycling, and sustainable farming practices. This knowledge, often passed down from generation to generation, is not always valued in the context of the circular economy, which tends to favor modern technological or commercial approaches.

Gender mainstreaming in the circular economy is crucial to ensure a sustainable and inclusive transition. For this economy to be truly circular, it must include and value all contributions, regardless of gender. In some southern Mediterranean cultures, women are still perceived through traditional domestic roles, limiting their opportunities to fully participate in the entrepreneurial sector (Union for the Mediterranean (UpM), 2018). Even when women are actively involved in circular initiatives (recycling, reuse, etc.), their work is often undervalued or perceived as informal.

4.3. Restricted access to professional networks and training

Women's limited access to professional networks and training in the field of the circular economy (CE) in southern Mediterranean countries is a complex issue that reflects socio-economic and cultural challenges. In this region, which mainly comprises countries in the Middle East and North Africa (MENA), the circular economy represents an opportunity for sustainable development through the management and reuse of resources.

However, women face significant barriers that limit their participation in this promising sector: **Male-dominated networks:** In many countries in this region, the energy, recycling, and waste management sectors—at the heart of the circular economy—are largely male-dominated. This makes it difficult for women to find mentors, business partners, or networking opportunities.

Social and cultural conventions: Cultural norms can restrict women's mobility and freedom of interaction in some countries, often preventing them from participating in professional events and industry associations.

Lack of specialised training: The circular economy requires technical skills (in recycling, waste management, renewable energy) that are often lacking in training courses aimed at women. What's more, the training that does exist is poorly adapted to women's needs in terms of flexibility or content.

Disparities in education: Particularly in rural or disadvantaged areas, women have less access to technical and scientific training. Yet these fields are crucial to their integration into jobs linked to the circular economy.

Lack of targeted incubation programmes: Although incubation programmes are a pillar for developing projects in the circular economy, very few specifically target female entrepreneurs. The few that do exist do not always receive the funding or mentoring they need to be effective. These difficulties require a series of actions:

International and local support: International organisations (World Bank, UN, EU) support circular economy projects, some with a gender component, to promote the inclusion of women in this economy. However, this support often remains limited or lacks scope.

Promoting cooperatives and social entrepreneurship: The establishment of cooperatives or social entrepreneurship initiatives in the CE field, where women often play a central role, is an encouraging solution to overcoming some of the structural barriers.

Education and awareness-raising: By integrating specific training into education and awareness-raising programmes on the importance of CE, it would be possible to encourage a more inclusive environment for women in this sector.

In short, to encourage greater participation by women in the circular economy in southern Mediterranean countries, it is essential to strengthen access to inclusive professional networks and to promote appropriate and accessible training.

5. WHAT CAN I DO?

The circular economy is a developing sector, and many women are not yet aware of the economic opportunities it offers. This lack of information is compounded by the absence of awareness campaigns or educational programmes targeting women. Another handicap lies in the fact that the circular economy is largely based on technological innovation. However, women's access to these technologies may be limited by financial constraints or a lack of technical infrastructure in certain regions (Arab Women's Centre for Training and Research, 2020).

In the same vein, another obstacle lies in the fact that many women in these countries work in waste management on an informal basis. This means that they have no legal status, social protection, or financial support to sustain their activities, even though their work is crucial to the circular economy. To overcome these problems, a number of approaches could be put in place:

Institutional support and incentives: More inclusive public policies and specific economic incentives for women entrepreneurs in the circular economy.

Training and awareness-raising: Targeted training programmes to equip women with the technical and entrepreneurial skills they need to thrive in the circular economy.
Access to finance: Encourage the creation of specific funds for women in the circular economy, as well as microfinance initiatives or grants.

Strengthening networks: Facilitating women's access to professional networks, business incubators, and specialist mentoring.

These challenges are of course contextual and vary by country and region, but they represent the broad outlines of the barriers faced by women in the circular economy in this part of the world.Looking ahead, the circular economy offers immense potential for social, environmental, and economic transformation in the region. The circular economy can be a lever of empowerment for women, enabling them to gain financial independence while helping to preserve the environment. Including women in circular economy models can have a positive impact on both their economic situation and the Sustainable Development Goals (SDGs).
Here are a few points to consider:

Strengthen training and skills: It is crucial to develop specialised training programmes for women, so that they can acquire skills in waste management, recycling, repair, and eco-entrepreneurship. Circular economy projects must integrate a gender dimension to enable women to play a key role in this transition.

Create support networks: Cooperatives, business incubators, and mentoring programmes specifically for women in the circular economy can play a decisive role in strengthening their economic integration.

Changing attitudes: Raising awareness of the importance of the circular economy and the role of women in this model can help to change attitudes and remove socio-cultural barriers.

6. CONCLUSION

In conclusion, the circular economy is a powerful vector for social and environmental change, with a potentially significant impact on the employability of women in the Mediterranean region. Local initiatives, supported by international partnerships, are essential to maximise the benefits of this model for women and contribute to more inclusive and sustainable development. The circular economy represents a major opportunity to improve the employability of women on the southern shore of the Mediterranean, offering them economic opportunities while contributing to the transition towards more sustainable economies. However, this requires greater support in terms of public policies, training, and funding to overcome existing obstacles.

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INFLUENCE OF ORGANIZATIONAL STRUCTURE ON INNOVATION - EXAMPLE OF THE COMPANY "OPREMA INC. LUDBREG"

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ABSTRACT

T This paper analyzes the impact of organizational structure on innovation using the example of the company Oprema Inc in Ludbreg. Organizational structure shapes the way employees are organized, how decisions are made, and how communication takes place within the company. The paper includes a theoretical overview of different types of organizational structures, including functional, divisional, matrix, and network structures, and their advantages and disadvantages. The practical part examines the organizational structure of Oprema Inc, which is based on a formal hierarchy and various functional departments. A survey of 60 employees examined the level of satisfaction with the organizational structure, as well as the perception of the effectiveness of various types of structures in dynamic industries. The results show a high level of employee satisfaction, confirming that matrix and network structures provide greater flexibility and better adaptation to changing market conditions. The paper highlights the importance of continuous modernization and investment in technology as key to the long-term sustainability of the company.

Keywords: Innovativeness; Matrix structure; Network structure; Organizational structure; Oprema Inc

1. INTRODUCTION

In today's globalized and competitive business environment, shaping the organizational structure is a key strategic decision that affects the success and sustainability of organizations. The organizational structure defines how resources, tasks, and people are organized within the company and shapes decision-making processes and communication between employees. There is a variety of structural models, including hierarchical, functional, matrix, and network structures, which reflect the complexity of modern business. The aim of this paper is to gain a deeper understanding of different organizational structures, analyze their advantages and disadvantages, and explore their application in a contemporary context. The paper will include theoretical frameworks, empirical studies, as well as a practical part related to the organizational structure of the company Oprema Inc. The research will cover the history, theoretical foundations, and practical application of organizational structures and their impact on innovation, agility, and competitive advantage. Research assumptions include that organizations in dynamic industries do better with a network structure (IP1) and that matrix structures provide greater flexibility than functional or divisional structures (IP2).

Research methods include systematic literature analysis, content analysis, comparative analysis, and descriptive analysis, which will enable a comprehensive understanding of the topic. The paper consists of several chapters that explore the theoretical and practical aspects of organizational structures, including methodology, survey results, and their discussion.

2. RESEARCH

The research consists of a theoretical and practical part, combining existing knowledge with empirical data. The theoretical part includes a literature review, definitions of key terms, different approaches to organizational structure, and the differences between formal and informal organizations, while the practical part focuses on a survey conducted in the company "Oprema Inc." Here, the survey results are analyzed and the confirmation of the research assumptions is discussed, which allows conclusions to be drawn about the effectiveness of the organizational structure in this company.

2.1. Theoretical part

A review of the field of research on organizational structure highlights the definitions and significance that different authors have given to this concept. Mintzberg defines organizational structure as a framework of relationships between jobs and people who strive to achieve goals, while Hall and Tolbert emphasize its role in shaping organizational processes and internal relationships. Arnold and Feldman emphasize that structure facilitates the flow of information and decision-making, and Daft adds that it governs internal relationships and reporting.

Since the 1980s, the focus has shifted towards organizational culture, which has become an important area of research. Although the concepts of shared values in organizations were recognized earlier, the more modern theory of corporate culture and its aspects were developed through the works of researchers such as Elton Mayo, Pettigrew, Deal and Kennedy, and E. Schein. Increased interest in organizational culture arose from the recognized inadequacy of traditional mechanistic management models in ensuring organizational efficiency, which led to the need for new concepts that better reflect human nature and improve the work efficiency of organizations.

2.1. 1. Organization

Organization is a key aspect of human activity, from various forms of collective work throughout history to contemporary social structures. It reflects the need for efficient management of resources to meet life's needs, enabling greater results with less effort. The evolution of organization, from hunting groups to complex systems, shows how the quality of organization contributes to efficient coordination and the achievement of goals that would be inaccessible to an individual. The concept of organization includes both the process of organizing activities and the results of that process in the form of various organizational units. This duality emphasizes its fundamental role in the productivity and progress of human society, making the organization not only a tool, but also a key factor in society's ability to act and progress (Arabi, 2007). The importance of organizations surpasses economic activity, including a wide spectrum of life and work activities. Organization allows people to realize complex tasks, expanding their individual strength into society's strength, accelerating processes and reducing expenses. Nevertheless, there are also negative aspects of organization, such as too narrow specializations which can burden individuals or imposed tasks that are not in line with their abilities (Sikavica, Novak, 1999). As a scientific discipline, organization is studied at almost all higher education institutions, with emphasis on the social component. The organization not only strives for economic efficiency, but also the establishment of appropriate socio-economic relationships.

The term organization can be seen through four key aspects: universal (systemic), institutional, structural, and functional. Mintzberg (1972) defines organizational structure as a framework of relationships among jobs and people who strive to achieve goals, while Hall and Tolbert (1991) emphasize its influence on organizational processes. Apart from achieving economic goals, organization can be defined as both a science and a skill for achieving optimal results, but also as a process that involves changing organizational control status processes, including selection, motivation, and elimination of obstacles, which are key for the organization, enabling rational use of human and material resources (Sikavica, Novak, 1999). The term organization is rooted in the Greek word "organon," which denotes an instrument that performs functions in society life. The human organism is often cited as an example of perfect organization because of its decentralized and stable nature, while contemporary organizations evolve according to team and project models that reflect the information era (Sikavica, Novak, 1999).

2.1. 2.Organizational structure

The organizational structure includes several key elements (Medina, 2011; Neck, Houghton and Murray, 2017; Colquitt, Lepine and Wesson, 2017):

1. Job specialization – refers to the division of work into defined tasks, which increases efficiency but can lead to narrow skills and boredom among employees.
2. Segregation – involves grouping jobs by function, product, geographic area, or type of client, thereby facilitating oversight and use of shared resources (Robbins & Judge, 2018).
3. Chain of command – denotes a continuous flow of authority from the top to the lowest employees, although modern organizations increasingly rely on decentralization and employee empowerment.
4. Authority pattern – describes the extent to which employees can make decisions without approval from superiors, and can be centralized or decentralized (Robbins & Judge, 2018).
5. Scope of control – refers to the number of employees under the leadership of one superior, and it can be narrow or wide, with a wide scope enabling faster decision-making.
6. Formalization – describes the degree to which standard rules and procedures are established within an organization, which improves control and coordination (Robbins & Judge, 2018).

Designing an organizational structure is crucial for any company, with different approaches such as "top-down," "bottom-up," and combined approaches (Sikavica, Novak, 1999). The key challenge is to find a balance between stability and flexibility. A quality organizational structure must support the organization's goals, encourage teamwork, and ensure good communication. Entrepreneurs use analytical and process methods to design a structure that best suits the needs of their organization, while continuously monitoring changes in the environment (Sikavica, Hernaus, 2011).

2.1. 3. Formal and informal organization

In the establishment of organizational structures, a key role is played by formal structures, which define jobs, group them by relationships, and connect resources like materials and equipment. The formal structure represents the foundation of each company, ensuring the organization of working positions and the status of members, including managers. In addition to the formal, there is also the informal organization, which develops spontaneously through interactions among employees and can include informal groups.

This informal group structure can bring advantages, such as additional emotional support and communication, but can also reduce control over work and increase the time necessary for task performance (Sikavica, Novak, 1999). Informal organization was first defined by F.J. Roethlisberger and co-workers during the Hawthorne experiment, and later different scientists elaborated the concept. Informal organization creates additional structures which enrich the personal and professional possibilities of employees (Murugesan, 2014; Biancani et al., 2014). Organizational structure defines the way the organization organizes operations, resources, and people in order to achieve key objectives. Key aspects include work specialization, departmentalization, which groups tasks into teams, chain of command that regulates hierarchy and authority, and level of formalization, which regulates rules and procedures within organizations. Centralization and decentralization relate to the place of decision-making, and each of these aspects shapes organizational structure and its functioning (Pitts, Clawson, 2008). Principles that shape organizational structure include defining formal relationships, positioning employees, and designing coordination systems. Organizational activities and structure are dynamic and can be adjusted according to changes in the environment, strategy, and goals, and different variables influence their shape (Ahmady et al., 2012). Differentiation and integration of tasks are key elements of organizational structures; each organization needs a unique combination of these aspects that corresponds to its needs. Quality differentiation and integration enable efficient division of work, encourage creativity, and faster performance. It is important to achieve a balance between these processes in order for the organization to ensure success and efficiency in work (Žugaj et al., 2004).

2.1. 4.Types organizational structures
Organizational structure can be established in different ways and according to different criteria (Sikavica, Novak, 1999). The first way is to divide based on "simple numbers," which determines the minimal number of people necessary for carrying out tasks. Another way groups activities according to weather intervals, while the third separates tasks according to business functions, which characterizes the functional structure. The fourth way groups tasks according to product or geographical area, which is characteristic of the divisional structure. There is also procedural-oriented division and mixed structures that combine more criteria. The functional organizational structure organizes work according to business functions, while the divisional structure decentralizes business functions by divisions and is oriented towards products or markets. Advantages of functional structures include high specialization, while divisional structures allow greater autonomy but can result in duplication of jobs (Ibid.). Territorial organizational structure is formed according to area of action, while a structure oriented according to consumers focuses attention on customer needs. The project structure is used for implementation of specific tasks, while the matrix structure connects functions and projects through double responsibility of team members (Sikavica, Novak, 1999). Mixed organizational structure combines functional and divisional elements. Since the 1980s, managers have experimented with new structures, such as team models and virtual organizations, in order to improve efficiency and flexibility. These innovative structures focus on reducing hierarchies and encouraging autonomy in decision-making (Gholam et al., 2016).

2.1.5. Centers responsibilities in the organization
In companies, different responsibility centers are formed, including cost, revenue, profit, and investment centers, and each type corresponds to different aspects of budgeting (Aksu, Tursun, 2021). Cost centers focus on controlling costs, while revenue centers generate income. Profit centers have control over both income and expenses, while investment centers monitor the return on invested capital. All these centers are mutually connected, and collaboration among them is key to success.

Traditional management accounting methods in companies are often not sufficient for decision-making; therefore, new methods such as dynamic systems are used, which allow analysis of interactions within organizations (Mahmud, Anitsal, and Anitsal, 2018).

Dynamic systems provide tools for better coordination and informed decision-making. Different studies emphasize the importance of responsible management and strategic accounting decision-making and their role in assessing the performance of responsibility centers (Mojgan, 2012; Magablih, 2017; Biswas, 2017). These methods enable companies to improve cost control and establish connections between activities and results. In modern organizations, responsibility centers play a key role in management. Cost centers control expenses, revenue centers generate income, profit centers focus on profitability, and investment centers manage investments and assess the return on investments (Mahmud, Anitsal, and Anitsal, 2018). These structures enable organizations to effectively manage their own resources and achieve business goals.

2.1.6. Contemporary organizational trends

In today's business environment, organizations face many challenges that require adaptation and innovation to remain competitive. Digitalization and technological transformation are becoming key aspects of organizational trends, enabling process automation, improved communication, and adaptation to the digital environment. Flexible working arrangements are also receiving significant attention to meet employees' needs for work-life balance. Agile approaches are becoming mainstream in business, enabling faster reactions to market changes and strategy adjustments. The social responsibility of organizations is growing, with a focus on their impact on the environment, community, and working conditions. In addition, diversity and inclusion are becoming important values that encourage the creation of a stimulating work environment for all employees (Sikavica et al., 2008).

2.2. Practical part

In the town of Ludbreg, at Gospodarska Street 5, is located the company *Oprema Inc*, specialized in the development, production, sale, and servicing of catering equipment. This company, with 45 years of experience, focuses on high-quality products and processes in order to achieve a competitive advantage, with around 91% of its production exported to the European market and other global markets. *Oprema Inc* produces a wide range of devices, primarily cooling devices for cooling and dispensing beverages, including beer, juices, and water. Their products are characterized by high quality, modern design, and meet the needs of small restaurants as well as large consumer venues such as halls and stadiums. More than 75% of the range consists of devices for cooling and dispensing beer, and the entire production process takes place within the company. The management board consists of a president and a member, and the company has gone through various economic challenges, including crises and the Covid-19 pandemic. *Oprema Inc* remains true to its own knowledge and quality, and the synergy of experience and innovation enables its further development. They plan to modernize, develop new products, and implement ecological solutions, with the most important value being its employees and business partners.

2.2.1. Organizational structure

Company *Oprema d.d.* in Ludbreg has a functional, formal, and hierarchical organizational structure which consists of several organizational units: administration, production department, sales, procurement, research and development, quality management, financial accounting, and IT departments. Management of the company is essential for delegating responsibilities for decisions and activities, integrating social responsibility into all processes.

Company management has several tasks, including development and approval of business strategy, regular reporting to the supervisory board, adoption and implementation of procedures, and evaluation of work management. The organizational structure directs resources and tasks according to clearly defined goals, ensuring order and harmony within the organization.

Management is based on the principles of accountability, transparency, and respect for human rights. *Oprema d.d.* continues with modernization and development of new products, with special emphasis on ecological solutions. The organizational structure allows efficient transformation from functional to process (Figure 1).
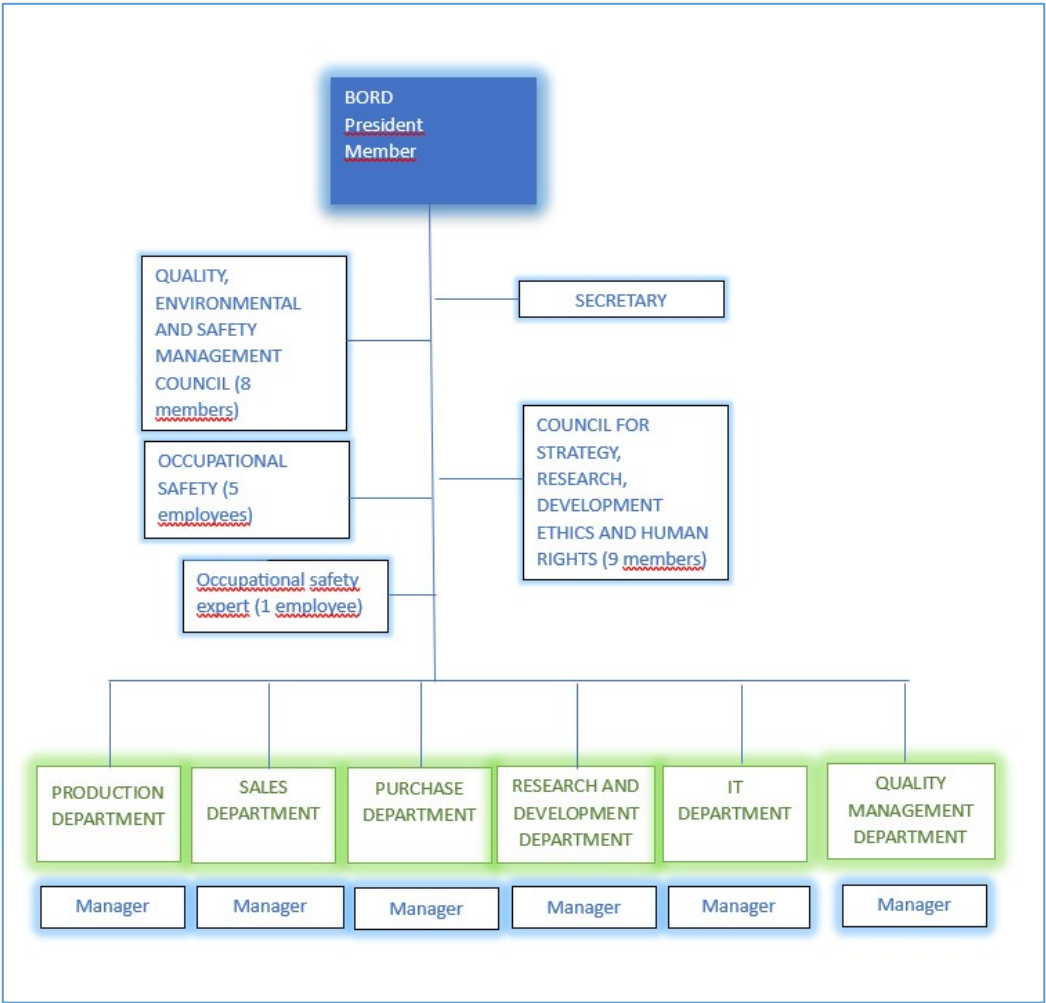
Figure 1: Organizational chart of the company Oprema Inc

Source: internal documents

2.2.2 And research organizational structures companies equipment dd

The survey was conducted among 60 employees of Oprema Inc from various departments (production, sales, purchasing, research and development, quality management, financial accounting, and IT) from 17.06.2024 to 27.06.2024. The age of the respondents ranged from 20 to 70 years, and the level of education ranged from secondary education to doctoral studies. Sixty percent of the respondents were male, and 40% female.

The aim of the survey was to collect information on employees' familiarity with the company's organizational structure, their satisfaction with the existing structure, and their opinions on research assumptions related to the success of network and matrix organizational structures compared to traditional hierarchical and functional structures. The questions also related to investment in digitalization and technological development. The survey questionnaire was posted on Google Forms and contained 10 mandatory closed-ended questions (yes/no). It was conducted anonymously to protect the identity of the respondents and ensure honesty of the answers, and was used exclusively for the purposes of researching the final thesis.

2.2.3. Research results
Results research they give insight into demographics characteristics respondents, their organizational knowledge structure companies Oprema d.d., satisfaction the same, and perception tied with investing in digitalization.

1. Demographic data 60% of the participants were men and 40% were women. The largest number respondents (35%) belong to age group of 31-40 years old. From educational achievements, 40% of respondents has high school education, while 30% have university diploma.
2. Knowing organizational structures -
o 43.3% of respondents considers that they are familiar with the organizational structure, and 40% partially.
o 16.7% of respondents it is not familiar with the organizational structure Equipment dd
3. Type organizational structures -
o 95% of respondents claims that organizational structure formal, while 5% state that in exceptional cases cases they mix formal with informal structure.
4. Satisfaction organizational structure -
o 71.7% of respondents is satisfied with the current one organizational structure, while 28.3% believe that it it is not optimal.
5. Network vs. hierarchical structure -
o 88.3% of respondents supports the assumption that the network structure leads to greater success in dynamic industries.
6. Flexibility matrices organizational structures -
o 90% of respondents confirms that the matrix organizational structures provides bigger flexibility and adaptation market conditions of functional or divisional structure.
7. Investing in digitalization -
o 68.3% of employees believes that investing in digitalization adequately, while 31.7% think it is not enough.
8. Foundation organizational structures -
o Also, 68.3% of employees believes that organizational structure contributions healthy processes adoption decision and successful communication in the company.

Overall, the results indicate on most satisfied employees with organizational structure, but also the need for additional by informing and advising about this structure within companies. Also, there is high percentage support for modernization through digitalization, which can significantly improve business processes.

2.3. Discussion

The results of the survey questionnaire conducted among 60 employees of the company Oprema d.d. provide insight into employees' perceptions of the organizational structure and its efficiency. The research includes employees from the sales, procurement, technology, production, construction, research and development, quality management, finance, and accounting departments. Out of a total of 230 employees, 60% of the respondents were men and 40% women, with the majority of women working in the finance department. The largest percentage of respondents belongs to the 31–40 age group. The goal of the research was to assess employees' knowledge of the organizational structure, satisfaction with the current structure, and collect opinions on the research assumptions regarding the performance of network and matrix organizational structures. The responses show that 43.3% of employees are familiar with the organizational structure, while 40% partially understand it. According to the survey, 95% of respondents believe that the organizational structure is formal, and 71.7% are satisfied with it. Responses related to the research assumptions show that 88.3% of respondents believe that a network structure offers greater flexibility, while 90% give preference to the matrix structure due to its better adaptability to market conditions. In addition, 68.3% of respondents believe that the company invests sufficiently in digitalization, though there is still room for improvement. Finally, 68.3% of respondents believe that a good organizational structure contributes to effective decision-making processes and better communication within the company.

3. CONCLUSION

The theoretical part of the paper covered different types of organizational structures, including traditional hierarchical, functional, matrix, and network structures. Each of these structures has its own advantages and disadvantages, and their adaptability depends on the type of industry and its specific characteristics. The practical part analyzed the organizational structure of the company **Oprema Inc** through a survey questionnaire, the results of which provided insight into employees' perceptions and their attitudes toward the current structure. Research assumptions IP1 and IP2 were confirmed, with the findings showing that network and matrix structures provide the necessary flexibility in dynamic business conditions. Key factors for successful business include good communication among employees and organizational agility. However, the survey had certain limitations, such as the sample size and a short implementation period. Future research could involve a larger number of respondents, an extended observation period, as well as comparisons with organizations from other sectors. Adapting organizational structures to new technologies and innovations is essential for maintaining competitiveness and improving employee satisfaction. Through continuous adaptation and innovation, companies can preserve their market position and ensure long-term sustainability and business success.

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AI TOOLS FOR PERSONALIZATION IN MARKETING COMMUNICATION: SYSTEMATIC REVIEW

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ABSTRACT

One of the sectors experiencing significant benefits from the development of Artificial Intelligence (AI) is the marketing industry. Starting in the early 2000s, brands began to utilize data mining techniques to gain a better understanding of customer behavior. This trend gained momentum with the public launch of ChatGPT at the end of 2022, which brought AI into widespread conversation. The rapid advancement of AI solutions is transforming marketing, particularly within the digital landscape. The emergence of chatbots and virtual assistants has been a turning point for personalizing marketing communications, enabling immediate and tailored interactions with consumers like never before. To explore how AI solutions are reshaping the personalization of marketing communications, a systematic review was conducted following a defined search strategy. Strict selection criteria were established to identify relevant studies on AI tools in marketing communication, which were sourced from the Web of Science database. The analysis included 188 articles examining the application of AI tools in marketing communication from 2021 to 2025, focusing on the keywords "AI tools" and "marketing communication." The findings reveal the types of AI-based tools commonly used for personalization in marketing communications, as well as the benefits, challenges, and limitations associated with implementing these tools. This paper offers valuable insights into the evolving role of AI in contemporary marketing communication, filling gaps in our understanding of AI-based tools for personalized consumer interactions. Additionally, it formulates questions for future research on implementing AI-based tools in marketing communication.

Keywords*: Artificial Intelligence (AI), customer personalization, marketing communication*

1. INTRODUCTION

Since artificial intelligence (AI) became publicly available, researchers have increasingly focused on this exciting new topic. The marketing industry was one of the first to take advantage of AI, with early applications of data mining in the early 2000s (Kumar et al., 2024). However, as AI tools became more widely accessible, interest in the topic has grown significantly. A comprehensive analysis of more than 400 use cases across 19 industries and nine business functions, conducted by the management consulting company McKinsey, shows that in the retail sector, marketing and sales represent the areas with the most significant potential benefits from AI. Within this function, pricing and promotions, as well as customer service management, are the key areas expected to benefit most from AI adoption (Chui et al., 2018). Today, AI is transforming marketing communications by enhancing personalization, automation, and content optimization (Haleem et al., 2022; Rust, 2020).

Based on these findings, this paper focuses on identifying the current state of research on the use of AI in marketing. This paper systematically reviews the use of AI in marketing, following a structured search strategy with strict selection criteria, to explore how AI solutions are reshaping the personalization of marketing communications (Okoli & Schabram, 2015; Tranfield et al., 2003). Relevant studies on AI tools in marketing communication were sourced from the Web of Science database. The study aims to address the following research questions:

RQ1: What are the current trends in publications about AI tools and marketing communication?
RQ2: What are the most relevant AI tools used in personalized marketing communication?
RQ3: What are the predominant topics and trends in this research area?

The article is structured as follows: it provides a theoretical background on AI and personalization in marketing communications, explains the methodology used, presents the research findings, and finally discusses and concludes the results. This paper aims to provide valuable insights into the evolving role of AI in modern marketing communications and to fill gaps in the literature concerning AI-based tools for personalized consumer interactions. Furthermore, based on the conclusions, the paper formulates questions for future research on the use of AI-based tools in marketing communication.

2. ARTIFICIAL INTELLIGENCE FOR PERSONALIZATION IN MARKETING COMMUNICATION

There is almost no field of activity in which we cannot talk about the action of AI and AI tools. The term "Artificial Intelligence" was first coined by John McCarthy in 1956 during a conference known as the *"Dartmouth Summer Research Project on Artificial Intelligence"* (Trappl, 1986). Since its introduction and early development, AI has advanced significantly, and today, various AI technologies coexist. Marketing and consumer behavior represent a crucial niche for applying artificial intelligence tools. By leveraging AI, businesses can analyze vast amounts of consumer data to gain deeper insights into purchasing patterns, preferences, and behaviors. As a result, the effective integration of AI into marketing strategies improves decision-making processes and fosters stronger connections between brands and their audiences. Strycharz et al. (2019) point out that personalization as a construct lacks a unified definition in academic research; however, when comparing definitions provided by academics and the one that comes from practice, personalized marketing communication includes *"reaching the right person with the right content at the right time."* Personalization in marketing involves tailoring products, services, and communications to match individual customer preferences and needs (Glazunova and Ščeulovs, 2024). It aims to build long-lasting relationships, increase customer satisfaction, and reduce cognitive load (Chandra et al., 2022). The concept encompasses various themes, including personal recommendations, advertising, and customer insights (Chandra et al., 2022). The Internet has significantly advanced personalization applications, providing an information-rich and interactive environment (Montgomery and Smith, 2009). Modern technologies, such as artificial intelligence and big data, enable treating each customer as a unique segment (Glazunova and Ščeulovs, 2024). Future research directions in personalized marketing include exploring new-age technologies to curate personalized experiences across online and offline channels (Chandra et al., 2022). Researchers agree that technological trends have shaped marketing (Rust, 2020). The most important long-term trends can be grouped into three areas: first, the increasing ability of companies to communicate with customers; then, the increasing ability to collect and store information about customers; and finally, the increasing ability to analyze customer information (Rust and Huang, 2014). In all of these areas, AI is expected to improve marketing practices.

In the dynamic world of marketing communications, AI has become essential for driving personalized marketing and targeted advertising strategies. This integration of AI technologies has brought about a new era in which marketing messages and advertisements are no longer generic broadcasts, but rather carefully curated content tailored to individual consumers. AI's significant impact on personalized marketing starts with its capability to analyze vast datasets, extracting insights into unique customer profiles (Senyapar, 2024). In the early 2000s, brands began using data mining to better understand customer behavior, marking the start of AI in marketing (Kumar et al., 2024). Soon after, as Kumar et al. (2024) explain, AI was integrated into email marketing, SEO, PPC, and programmatic advertising. The rise of social media platforms like Facebook was a major milestone, as AI enabled the analysis of user behavior to refine marketing strategies and boost engagement (Al-Ghamdi, 2021). The 2010s saw the introduction of AI-powered chatbots and virtual assistants, allowing for immediate, personalized customer interactions (Kaplan and Haenlein, 2019; Verma et al., 2021). Advances in machine learning and deep learning have since enabled more complex AI applications, such as analyzing unstructured data for improved content and visual recognition (Qin and Jiang, 2019). Since the 2020s, AI has evolved from a technological tool to a widely accessible marketing strategy. Speaking specifically about AI applications to improve personalization in marketing communications, recent research mentions tools such as convolutional neural networks (Alipour et al., 2024), large language models (Lee et al., 2024), and causal machine learning models (Gubela et al., 2024). With these technologies, marketers can analyze consumer behavior, create personalized content, and optimize the effectiveness of campaigns. While these AI tools improve personalization, concerns about privacy, data security, and potential bias remain critical issues that marketers must address to maintain consumer trust and ethical standards in their practices (Kumar et al., 2024).

3. METHODOLOGY

This systematic literature review (SLR) utilizes papers from the Web of Science database to highlight key trends and authors at the intersection of AI tools and personalized consumer interaction. For this purpose, papers from the Web of Science scientific database were analyzed to gather information on the research topic, showcasing major trends, findings, institutional affiliations, and authors who have focused on the use of AI tools in personalized marketing. The findings have both practical and academic implications, revealing key hotspots and trends in the application of Artificial Intelligence in marketing communication. The SLR was conducted using the Web of Science citation database. Web of Science, known for its strict journal selection criteria, ensures that only high-quality, peer-reviewed papers are included. This database covers a wide range of disciplines, including economics, sociology, and political science. Such an interdisciplinary approach is essential for gaining a deeper understanding of this complex topic.

The search was conducted using specific keywords applied to categories, keywords, topics, and titles. In the initial stage of the search, using the keywords "AI tools" and "marketing communication," a total of 237 articles were identified for the period 2020–2025. Descriptive analysis was carried out using the Bibliometrix web application, based on the R Studio platform (Aria and Cuccurullo, 2017). Search limitations in this study: The literature review was conducted exclusively within the Web of Science database and included only papers published in English. This represents a significant methodological limitation. Relevant studies published in other databases or languages may have been omitted, highlighting a potential area for future research. Data generated: April 18, 2025.After elimination, 188 papers remained for analysis. The primary research questions for this study and its application are:

RQ1: What are the current publication trends about AI tools and marketing communication?

Application: Bibliometric analysis by analyzing publications over a set period (e.g., 2020–2025) to identify key trends. Classify papers based on publication year and number of publications per year, and identify growth patterns in AI-related topics.

RQ2: What are the most relevant AI tools in personalized marketing communication?

Application: Analyze the journals and conferences where most significant studies are being published.

RQ3: What are the predominant topics and trends in this research area?

Application: This question focuses on understanding the key research themes and topics being investigated. By using text mining techniques such as keyword co-occurrence analysis, topic modeling, and clustering, we can uncover major research topics.
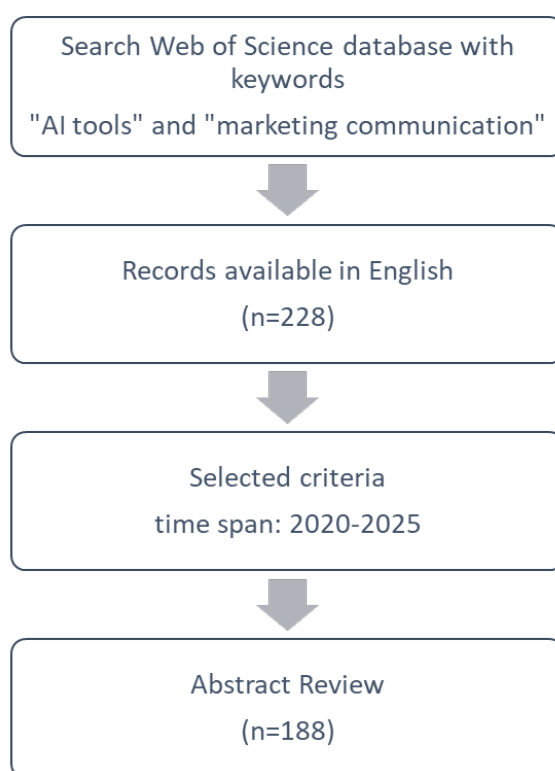
Figure 1. Search strategy (*Source: Author's work*)

4. RESULTS

Between 2020 and 2025, the academic landscape demonstrated growth and diversity, encompassing 141 distinct sources, including journals, books, and other scholarly publications. During this period, 188 documents were produced, with an annual growth rate of 6.79%. The age of these documents averages 1.89 years. Each document within this dataset has garnered an average of 19.6 citations, summing up to an impressive total of 10,026 references cited across all publications. This suggests an active engagement with existing literature, a robust academic discourse, and a big interest in this subject.

Figure 2. Main information - data set
(Source: Authors work with Bibliometrix software)

In examining the document contents, the dataset reveals a significant use of terminology, with 360 entries classified as "Keywords Plus" and 935 categorized under authors' keywords. This diversity of keywords reflects a broad range of topics and areas of focus among the publications. From the authorship perspective, a total of 4,286 individuals contributed to these works, with only 19 authors having single-authored documents. This highlights a strong collaborative approach to research, further underscored by an average of 32.6 co-authors per document. Regarding the types of documents produced, the dataset includes 107 journal articles (the majority), three book chapters, six early access articles, two proceedings papers, two retracted publications, one editorial, and an additional 53 proceedings papers. This diversification reflects the multifaceted nature of academic research and publishing practices, addressing various audiences and formats within the scholarly community.
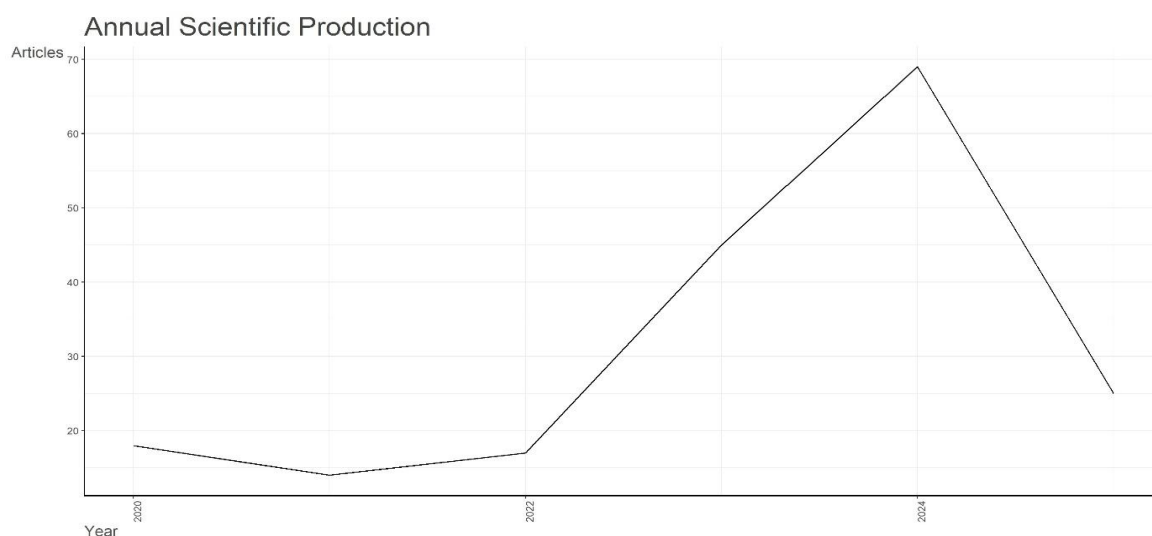
Figure 3. Annual Scientific Production
(Source: Authors work with Bibliometrix software)

Figure 3 illustrates a dynamic and collaborative academic environment from 2020 to 2025, characterized by a rapid increase in output and a strong emphasis on high-quality, well-cited research. The production of academic documents began with 18 publications in 2020, followed by a slight decline to 14 in 2021. This trend of relatively modest output continued in 2022, with 17 documents published, indicating a period of stability but limited research activity. In 2023, the number of published documents rose significantly to 45, and in 2024 it reached a peak with 69 publications—marking a particularly productive phase for scientific exploration and dissemination. However, in 2025, the number of documents decreased to 25, suggesting a normalization of publication rates following the previous year's peak.

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This paragraph addresses the findings related to **RQ1**.
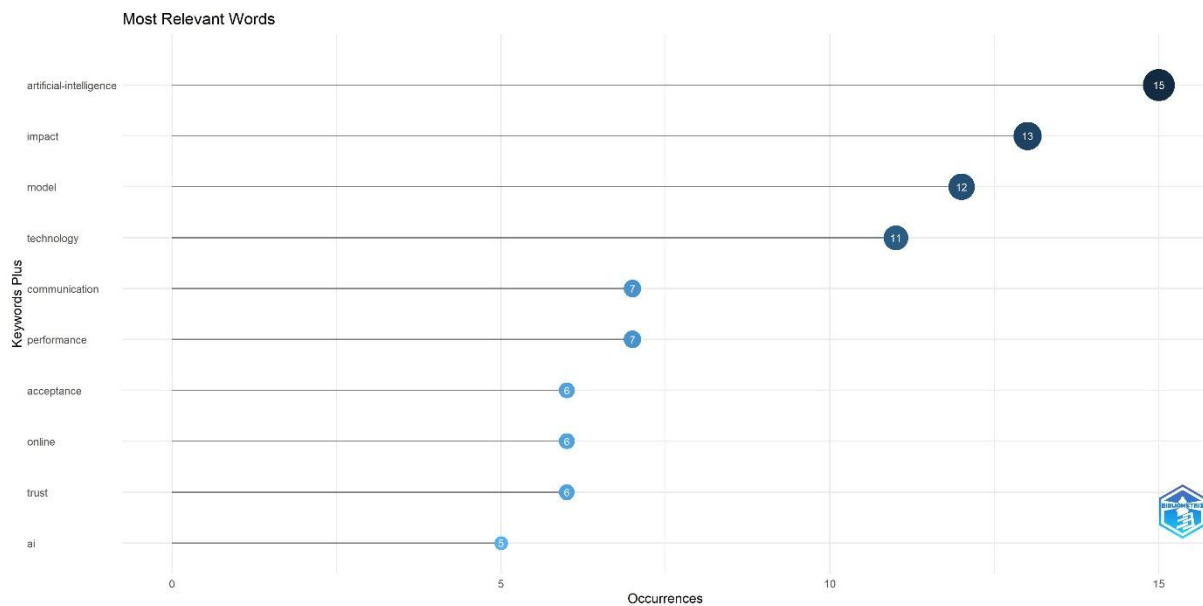
Figure 4. Most Relevant Words
(Source: Authors work with Bibliometrix software)

The dataset in Figure 4 shows the most relevant words. **Artificial intelligence** (AI), indicates its central role across various discussions and applications. **Communication** is another key theme, underscoring the importance of interaction and information exchange, particularly in digital formats. Artificial Intelligence (AI) transforms marketing communications and social media strategies, offering personalized experiences, improved efficiency, and enhanced customer engagement (Şenyapar, 2024). AI applications in marketing include content creation, customer service, predictive analytics, and campaign optimization (Cogoljević et al., 2024). The mention of **ChatGPT** suggests a focused exploration of this AI model, emphasizing its capabilities and varying applications. ChatGPT, a prominent AI-powered chatbot, has sparked discussions about its potential roles in marketing education and practice (McAlister et al., 2024). While AI integration brings numerous benefits, such as increased efficiency and better consumer understanding, it also raises ethical concerns and privacy issues (Cogoljević et al., 2024). **Marketing** refers to significant discussions regarding strategies and approaches for promoting products and technologies in a competitive landscape. **Social media** is illustrating its critical role in digital interaction and marketing strategies. The future of AI in digital marketing points towards autonomous marketing systems, advanced hyperpersonalization, and integration with emerging technologies (Cogoljević et al., 2024). As AI continues to evolve, businesses must strategically incorporate these technologies while addressing ethical considerations to navigate the changing landscape of digital marketing successfully (McAlister et al., 2024). Other relevant themes include **customer relationship management (CRM)** and **education,** indicating the significance of AI in organizational strategies and learning environments. The mention of **management** and **research** underscores these fields' essential roles in the ongoing exploration and application of AI technologies.
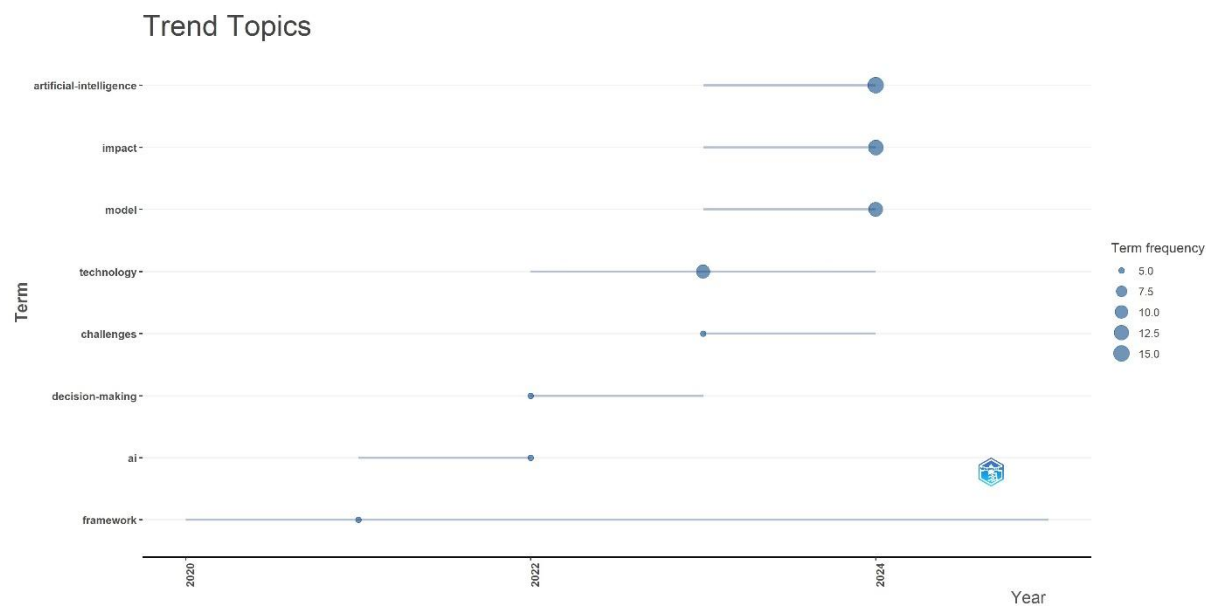
Figure 5. Trend Topics
(Source: Authors work with Bibliometrix software)

The analysis of term frequency reveals important trends in research topics. The term **"artificial intelligence"** stands out prominently with 15 occurrences, primarily in the years **2023** and **2024**. This indicates a heightened focus on AI as a pivotal area of research and discourse during this period. Other significant terms include **"technology,"** which appears 11 times from **2022** to **2024**, reflecting ongoing discussions around technological advancements and their implications across various fields. The term **"impact"** is also noteworthy with 13 occurrences throughout the same timeframe, highlighting concerns regarding the effects of advances in AI and technology on different sectors. The term **"decision-making"** was recorded with a frequency of 5 occurrences specifically in **2022** and underscores the role of AI in enhancing decision-making processes. Similarly, the term **"framework"** has a frequency of 5, which was noted in **2020**, indicating foundational discussions surrounding the construction of methodologies in AI and related technologies. Emerging concepts such as **"challenges"** were mentioned five times in 2023, emphasizing the obstacles faced in implementing and developing AI technologies. The high frequency of these terms suggests an active and evolving academic interest in understanding both the benefits and limitations of artificial intelligence and technology. This paragraph contains the answer to RQ 3.

5. DISCUSSION AND CONCLUSION

This systematic literature review analyzes the use of artificial intelligence tools for personalized consumer interaction, based on data from the Web of Science database. It highlights significant trends in AI research from 2020 to 2025, noting an increase in publication activity and a variety of scholarly contributions. The analysis highlights the central role of artificial intelligence in academic discourse, focusing on themes like machine learning, digital marketing, and decision-making. The field's collaborative nature is evident through diverse authors and international co-authorships, reflecting a dynamic academic community. The articles reviewed explore various applications of Artificial Intelligence (AI) in marketing and business, focusing on customer interaction and behavior. (Kupec et al., 2021) examine the role of web personalization and AI in marketing communications, addressing their distinctions and interrelations within business and strategic marketing processes. The study proposes a framework for effectively integrating these technologies, providing insights for online content creators.

Likewise, (Khoa, 2021) investigates the impact of chatbots on integrated marketing communication (IMC) and consumer behavior, particularly in the context of online purchasing. His findings suggest that chatbots enhance consumer engagement and influence both impulse purchases and repurchase intentions. Additionally, (Miklosik et al., 2021) conduct a systematic literature review to explore the role of chatbots in digital business transformation, summarizing research trends and identifying gaps in the literature for future exploration. Beyond marketing applications, AI's role in human behavior analysis is also discussed. (Jansom et al., 2022) investigate the impact of chatbot e-service marketing on communication credibility and customer satisfaction. Their research concentrates on four key functions of chatbots—interaction, entertainment, trendiness, and problem-solving—and examines how these factors shape consumers' perceptions. Utilizing structural equation modeling based on survey responses from 400 Thai consumers, the study reveals that interaction, trendiness, and problem-solving positively contribute to customer satisfaction, whereas entertainment does not. Additionally, the findings indicate that communication credibility significantly enhances customer satisfaction, surpassing the effects of entertainment or interaction alone. This highlights the necessity of providing reliable and helpful chatbot experiences in the realm of digital retail. Pátík et al. (2024) explore how educational institutions can leverage AI to enhance their marketing communications. The article emphasizes AI's ability to automate tasks, analyze data, and personalize messaging, allowing institutions to operate more efficiently and engage their audiences more effectively. (Lacerda and Nogueira, 2025) focus on the skills and tools that marketing professionals need in the AI era. Their qualitative study reveals that AI enhances both creativity and strategic decision-making. It also highlights the necessity for continuous learning to keep pace with rapidly evolving technologies, while still valuing essential human traits such as empathy and creativity. (Turlakova and Shumilo, 2025) examine how AI influences consumer behavior in digital marketing. Through experiments utilizing Meta Ads, they demonstrate that AI tools outperform manual configurations in driving user engagement, including clicks and conversions. Their findings suggest that AI leads to more effective advertising and higher returns on investment. (Trgovac et al., 2024) discuss the transformational power of AI tools within the digital marketing communication space. The article evaluates how AI enhances the traditional PESO model (Paid, Earned, Shared, Owned media) and proposes a framework for integrating AI to improve marketing efficiency and personalization. (Amnoun et al., 2024) analyze how AI-driven content marketing influences company decision-making. By exploring the capabilities of generative AI in creating personalized, engaging content, the authors demonstrate that AI not only boosts productivity but also enhances consumer interaction and campaign effectiveness, introducing innovations such as virtual influencers. These articles highlight the increasing impact of AI on customer-facing business processes and the enhanced understanding of human behavior, emphasizing its varied applications across different industries. As we look ahead, the implications of these findings are manifold. From an academic perspective, understanding the current trends and prominent research topics can guide future inquiries and foster deeper exploration of AI's potential in marketing communications. It identifies key themes such as machine learning, digital marketing, and decision-making, highlighting AI's central role in marketing and its interdisciplinary nature through diverse authorship and international collaboration. The findings synthesize findings from multiple empirical studies, proposing frameworks for integrating AI and, for example, web personalization or analyzing chatbot impacts on consumer behavior and satisfaction. By mapping current research trends, identifying literature gaps, and outlining practical implications, the findings advance academic understanding and provide actionable insights for marketing professionals leveraging AI for personalized consumer engagement. Ultimately, it underscores the necessity of interdisciplinary approaches and ongoing research to navigate AI's evolving challenges and opportunities in marketing communication.

This review highlights the importance of interdisciplinary approaches to fully grasp the complexities and opportunities presented by artificial intelligence in marketing communication. As the landscape continues to evolve, ongoing research will be critical in navigating the challenges and maximizing AI technologies' benefits in enhancing consumer experiences and engagements.

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THE IMPACT OF BUDGET TRANSPARENCY ON TAX REVENUE FORECASTS: EVIDENCE FROM CROATIAN LOCAL GOVERNMENT UNITS

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ABSTRACT
The tax revenues collected by local government units (LGUs) for a fiscal year frequently differ from what is planned in their enacted budgets. Despite the literature on budget credibility, little is known about the effect of budget transparency (BT) on budget forecasting deviations and errors. This paper analyses whether online local budget transparency (OLBT) affects tax revenue forecasting for all 556 Croatian LGUs from 2016-2022. This paper also analyses public budget cycles in tax revenue planning at the Croatian local level. The results show that in LGUs where OLBT increases, the underestimation of tax revenues is lower, while overestimation is higher. With increased OLBT, underestimation of tax revenues is lower in election years; and in post-election years, underestimation is higher.
Keywords: *budget credibility, budget transparency, Croatia, local government units, public budget cycles*

1. INTRODUCTION

Local government units' (LGUs') executed (actual) tax revenues for a fiscal year frequently differ from what they planned (forecasted) in their enacted budgets. This paper examines tax revenue forecasting using two measures to analyse deviations in budget planning. The first measure, tax revenue deviation, is the share of planned minus actual tax revenue in planned tax revenue. This measure is used, for example, by Benito et al. (2015), Ríos et al. (2018), Cuadrado-Ballesteros et al. (2021), Prijaković et al. (2023). The second is tax revenue error, which is the share of planned in the actual tax revenue. For example, this measure is used e.g., by Bischoff & Gohout (2010) and Goeminne et al. (2008). Tax revenue overestimation arises from planned amounts being greater than executed amounts, and tax revenue underestimation results from planned amounts being lower than executed amounts. The constitutions of many countries and LGUs limit budget deficits and debt. Budgets that do not adhere to these limitations should not be approved by the legislative authority or carried out by the executive authority. Public and legislative budget oversight is a key component of fiscal discipline in these governments (Bischoff & Gohout, 2010). The budgetary process must be open for control to succeed (Alt & Lassen, 2006), explicitly calling for accurate and objective future tax revenue collection. Enacted budgets are the plans that all governments use to outline the goals set by decision-makers to state how resources will be acquired and how they will be used to achieve the goals. Enacted budgets often include some years beyond the current fiscal year, allowing governments to progress towards their objectives over time systematically. Forecasting the resources of revenues or expenditures is a key component of budgeting since financial planning requires perspective (Williams & Calabrese, 2016). Conservative tax revenue forecasting means underestimating tax revenues; such biases make it more straightforward to fulfil the statutory and constitutional financial obligations arising from the prevalent balanced budget requirements. These pessimistic biases also ensure that there will be money for budget revisions, which might be useful for incumbent politicians (to win over either other elected officials or the general public). In contrast, optimistic tax revenue forecasting means overestimating tax revenue, which might make tax or policy choices that will develop and/or hide structural deficits feasible.

Researchers and practitioners across various policy sectors recognise the importance of budget transparency (BT). The roots of public sector BT are the policies, institutions, and practices that disseminate budget information in ways that increase political effectiveness, improve knowledge of public policies, and lessen policy uncertainty. Taxpayers who provide the majority of funding for the public sector need open budget information to keep track of the operations of LGUs that use budgets to carry out specified policy goals each fiscal year. Incumbent politicians might not be motivated to use a transparent budget process because they might try to hide the proper budget balance to mislead voters (Alesina & Perotti, 1996). In reality, consistently implemented budgets are essential to maintain the legitimacy of choices in policy. Forecasting mistakes occasionally reflect political decisions and technical shortcomings, leading to systemic errors. These systematic budget deviations could indicate that independent auditors or other third parties should monitor the budget process, especially if the budget deviations confuse budget users. In view of the methods politicians employ to influence the budget, budget deviations may also indicate that legislation requiring a balanced budget needs to be reevaluated (Mayper et al., 1991). BT may be a strategy for fiscal responsibility regarding budget credibility planning during the electoral cycle, given that budget openness is necessary for effective political control and public sector monitoring. The definition of BT, according to Bronić et al. (2023: 3), is as follows: it "… implies providing an insight into complete, accurate, timely and comprehensible information regarding the budget. This information enables citizens to participate and potentially impact the efficiency of collection and spending of public funds, to demand more accountability from national and LGUs and, consequently, to reduce potential corruptive acts." Previous research has examined how BT affects many fiscal performance indicators, including budget balance, debt and expenditures (e.g., Aguiar-Conraria et al., 2019; Alt & Lassen, 2006; Arbatli & Escolano, 2015; Bronić et al., 2022; Cuadrado-Ballesteros & Bisogno, 2022; Mačkić, 2021; Montes et al., 2019; Mourão et al., 2023; Prijaković, 2023; Vicente et al., 2013). However, the impact of financial transparency on tax revenue forecasting has been tested empirically by Ríos et al. (2018); they only included the pre-election year dummy, and the sample was the 100 largest Spanish municipalities from 2008-2014. Our paper contains an online local budget transparency (OLBT) index for all 556 Croatian cities and municipalities during the newest period, 2016-2022, and tests for election cycles (pre-election, election, and post-election years). Our paper aims to answer the following research questions: (1) does the level of OLBT affect tax revenue forecasting in Croatian LGUs, and (2) does the election cycle affect tax revenue forecasting in Croatian LGUs. According to the Open Budget Survey 2021 conducted by the International Budget Partnership, the Croatian government only provides barely sufficient budget information to citizens, furthermore, Croatia has an index OLBT to measure BT at the local level. Due to the unavailability of this index in other countries at the local level, Croatia was chosen. Also, Croatia is one of the post-communist countries where we want to research the public sector, i.e., the impact of BT on tax revenue forecasts. Hence, we analyse all Croatian LGUs – 128 cities and 428 municipalities – during 2016-2022. Results show that in Croatian cities and municipalities where OLBT increases, the underestimation of tax revenues is lower, while overestimation is higher. With increased OLBT, underestimation of tax revenues is lower in election years; and in post-election years, underestimation is higher. On the contrary, with increased OLBT, overestimation of tax revenues is higher in pre-election years; and in election years, overestimation is lower. Unlike their practice in pre-election years, in election and post-election years, LGUs plan tax revenues too optimistically rather than conservatively, allowing them to plan higher expenditures. This introduction is followed by the second part, which offers a literature review and theory; the third explains the data and methodology; the fourth gives the results and discussion; and the fifth contains the conclusions, limitations, and suggestions for further research.

2. LITERATURE REVIEW AND THEORY

Underestimation or overestimation of tax revenues may result from poor forecasting or/and ineffective tax revenue collection. Therefore, to understand forecasting deviations, there is a need to identify the factors that hinder government efforts to accurately predict future revenue sources and/or those that result in ineffective tax collection. This paper argues that a government's political and institutional characteristics may influence (or encourage) deviations in tax revenue forecasting. To our knowledge, only one article analyses the influence of an index of local BT on budget forecast tax revenue deviations – Ríos et al. (2018). They used a sample of the 100 largest Spanish municipalities during the period 2008-2014, showing that BT influences budget forecast tax revenue deviations. Less BT municipalities tend to overestimate their tax revenues, which enables them to expand public goods and services without raising taxes immediately. These municipalities may spend less than they planned since they are aware of the overestimation of their tax revenues. While less BT municipalities overestimate their tax revenues, more BT municipalities appear to be more conservative in their estimates and underestimate their tax revenues, allowing them to spend more than projected. In this regard, we formulate the first test hypothesis:

H1: The level of OLBT has a significant impact on tax revenue forecasting.

Lee & Kwak (2020), using 15 upper-level Korean LGUs for 2022-2016, showed that conservative governments have a negative effect on revenue forecast errors (i.e., overestimation of acquisition tax, local education tax, and total tax revenue). This indicates that progressive governments tend to underestimate, contradicting the view that conservative governments pursue relatively small governments. One possible explanation is that progressive governments seek to assuage residents' concerns about government expansion and fiscal weakening by conservatively forecasting results that counter general knowledge. A more careful interpretation is that the accuracy of revenue forecasts does not have much to do with political ideology. Bischoff & Gohout (2010) used ten West German states during the period 1992-2002 and found that governments commonly overestimate tax revenue during election years because these governments are unsure whether they will be re-elected. The uncertainty of re-election induces governments to tolerate deficits to accelerate expenditures initially budgeted for later periods and/or impose more debt on future governments. Governments that overestimate tax revenues can incorporate increased expenditures without obviously increasing debt levels if they disclose exaggerated tax revenues. In contrast, they can lower explicit deficits without reducing expenditures. According to the literature, an incumbent party may benefit from this potential in two ways. It can first exploit overestimated forecast tax revenues to boost its chances of winning re-election. Second, it may advance future expenditures that benefit its constituency or put financial constraints on future governments if re-election appears questionable or improbable. Boukari & Veiga (2018), using a sample of 95 French departments for 2004-2015 and 308 Portuguese municipalities for 1998-2015, showed that Portuguese municipalities overestimate revenues from direct taxes in pre-election years. Furthermore, all local governments opportunistically and overestimate revenue from direct taxes in election years. Furthermore, Benito et al. (2015), using 2,644 Spanish municipalities with populations of over 1,000 during 2002-2010, examine electoral cycle-influenced opportunism in the drivers of municipalities' budget forecast quality. In their efforts to gain popularity and electoral support, incumbents overestimate revenue to spend more and underestimate expenditures. Their findings demonstrate that opportunistic behaviour is influenced by the electoral cycle. Lastly, Sedmihradská & Čabla (2013), using 198 Czech municipalities for 2022-2011, showed that municipalities with more fragmented municipal councils approve more optimistic tax revenue forecasts, especially overestimated tax revenues in election years.

Goeminne et al. (2008), using a sample of 242 Flemish municipalities from 1992-2002, conclude that two-party governments are more optimistic than single-party governments. Governments with at least three parties are much more cautious (or less optimistic) in their forecast revenues than single-party or two-party governments. Chatagny (2015) used 26 Swiss cantons during 1980-2007 to show a positive effect of the ideology of the finance minister on tax revenue forecasting, i.e., the left-wing finance minister produces relatively more conservative forecasts. Hence, left-wing finance ministers must reduce deficits comparatively greater to signal the same level of competence to the voters as right-wing finance ministers. Cuadrado-Ballesteros et al. (2021), using a sample of 140 Spanish municipalities for 2008-2018, examine the impact of the gender of the mayor and the proportion of female councillors in the local council on tax revenue deviations. They showed that the strength of the government isn't relevant, but ideology positively affects tax revenue deviations, which means that right-wing governments tend to overestimate tax revenues. Political budget cycles (PBCs) play a role in tax revenue planning. In this regard, we formulate a second test hypothesis:
H2: The political budget cycle has a significant impact on tax revenue forecasting.

According to two theories, incumbent politicians typically choose to be ambiguous. First, fiscal illusion theory suggests that uninformed and naive voters frequently underestimate the costs of ongoing and upcoming public projects, especially when budgets are not fiscally transparent. However, governments can distort budget estimates to suit their preferences due to a lack of transparency. Politicians may, therefore, be influenced by incentives to be either optimistic or pessimistic (Mayper et al., 1991; Chatagny, 2015; Goeminne et al., 2008). Governments might enhance services without raising taxes right away or meet the need for a balanced budget by being too optimistic about revenues. Additionally, optimistic revenue projections have a smaller political cost than higher taxes in terms of votes lost. The second, principal-agent theory, claims that voters and incumbent politicians may not have the same goals in mind since politicians occasionally prioritise their interests, which do not always maximise voters' welfare. Voters can likewise not assess incumbents' competency, which is their capacity to offer particular service levels at the lowest taxes. To enhance their chances of being re-elected, incumbents make an effort to demonstrate their competence to the public, especially when elections are close. As a result, a lack of BT may provide politicians with a competitive advantage in attaining their objectives and allow LGUs to customise budget predictions according to their preferences to appear competent to voters and, as a result, increase their chances of re-election. The models of PBCs suggest that LGUs would try to implement more popular policies shortly before an election. Similarly, more unpopular policies are implemented shortly after elections. To increase their prospects of winning elections or gaining re-election, politicians may make overly optimistic projections of budget variables, which causes revenues to be overestimated (Drazen, 2008). On the one hand, they can predict optimistic revenues and receive more support from the public and politicians before elections (but they also run the danger of damaging their brand if they do not fulfil their forecasts). On the other hand, they might offer gloomy budget revenue forecasts, which have a negative impact on both ex ante and ex post reputations. Pessimistic revenue projections (underestimation) may provide a buffer for unforeseen costs or revenue shortfalls and demonstrate that wise management produces year-end operational savings.

As previously stated, although certain theories contend that some politicians lack the motivation to provide financial information, BT is increasing due to, among other things, outside demands and limits. However, there are meaningful variations in the level of OLBT and the precision of budget forecasts between LGUs, which raises the possibility that these discrepancies are not accidental (Williams & Calabrese, 2016). The lack of BT may give politicians more chances to use optimistic or pessimistic budget forecasts to persuade voters.

3. DATA AND METHODOLOGY

OLBT has been calculated annually for all Croatian LGUs since 2014. The OLBT can serve as an indicator of local politicians' political responsibility because it measures whether the management of public funds is in accordance with the principles of good governance. The OLBT shows the availability of five key budget documents on the official websites of LGUs at the time of the research and assigns a score ranging from 0 to 5, depending on the number of budget documents available on the official website while researching their websites. For example, OLBT for 2023 is measured by the number of key budget documents published on the official websites of Croatian local governments, which include the following: the 2021 end-year and 2022 mid-year budget execution reports, and 2023 budget proposal, enacted budget, and citizens' budget. More can be found in Bronić et al. (2023).
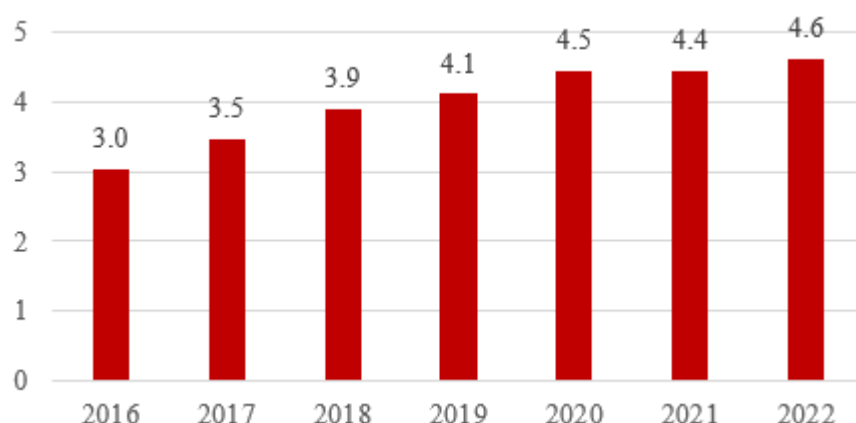
Figure 1: OLBT, all 556 LGUs, 2016-2022, number of online published budget documents

BT for all Croatian cities and municipalities from 2016-2022 has been continuously improving except in 2021 when there is a slight decrease compared to the previous cycle (Figure 1). The average number of budget documents published during the observed period is 4.0.
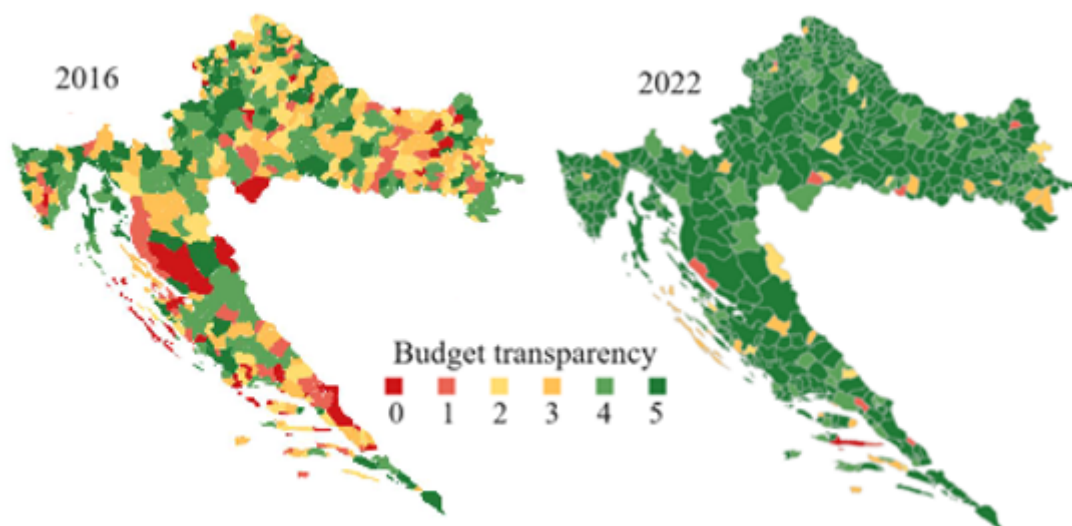
Figure 2: OLBT, all 556 LGUs, 2016-2022

Figure 2 best illustrates the increasing OLBT among Croatian cities and municipalities during the observed period. In 2016, there were 43 LGUs with no budget document available on their official websites, while in 2022, there was one such LGU. In 2022, there were 417 LGUs with all five budget documents available, in comparison with only 106 in 2016. OLBT values from 0 to 3 refer to LGUs with low OLBT. In 2016, there were 322 LGUs with low OLBT, and there were only 44 in 2022. Furthermore, OLBT values of 4 and 5 indicate high OLBT. In 2022, there were 512 LGUs with high OLBT, in comparison to 234 in 2016.
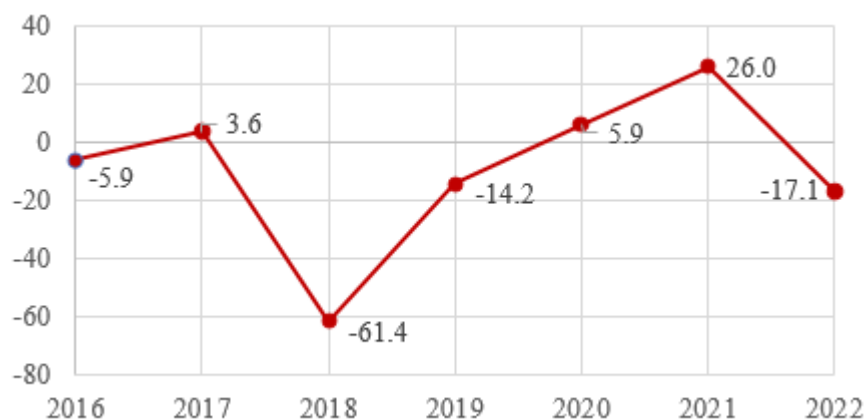
Figure 3: Tax revenue deviation, all 556 LGUs, 2016-2022, in %

In Figure 3, presenting a measure of tax revenue deviation, the overestimation of tax revenues is the highest in the election years (2017 and 2021), while underestimation is the highest in the post-election year (2018). In the pre-election year (2016), there is an underestimation of tax revenues, while in (2020), due to the pandemic, tax revenues are overestimated.

Figure 4: Tax revenue error, all 556 LGUs, 2016-2022, in %

Figure 4, presenting a measure of tax revenue error, shows the highest overestimation of tax revenues due to the coronavirus pandemic in the election year (2021). This measure moves around one during the other years (collected tax revenues tend to plan tax revenues).

The paper's primary goal is to conduct a regression model with panel data to test the impact of OLBT on tax revenue forecasting in Croatian LGUs. Fixed-effects (FE) regression (within the regression estimator) and random-effects (RE) regression were conducted using the generalised least squares (GLS) estimator (producing a matrix-weighted average of the between and within results) (Baltagi, 2013).

After applying a Hausman test on estimates from the FE and RE models, this paper reports the results of the FE regression. Besides using static models, we check the robustness of results with dynamic models in which we included lagged dependent variables. To estimate these model specifications presented with equation (1) below, we apply the system Generalized method of moments (GMM) technique (Arellano & Bover, 1995; Blundell & Bond, 1998; Roodman, 2009). This approach is helpful to control for the endogeneity of the lagged dependent variable, i.e., when there is a correlation between the explanatory variable and the error term. In addition, measurement errors, autocorrelation, heteroskedasticity, omitted variable bias, and unobserved panel heterogeneity are considered. Table 1 gives all variables used according to previous research and theory. Budget balance, income pc, population, ideology, and strength are the control variables used to explain tax revenue forecasting.

Variable	Definition	Source
Dependent variables		
tax revenue deviation (*devtax*)	Tax revenue deviation is defined by equation (2) (in %).	Data on actual tax revenues from the Ministry of Finance – MoF (2022) and planned tax revenues from Enacted budgets on the official websites of LGUs.
tax revenue error (*errortax*)	Tax revenue error is defined by equation (3) (in %).	
Independent key variable		
OLBT	BT is measured annually as the online availability of five key budget documents on the official websites of LGUs, ranging from 0 to 5.	Bronić et al. (2023)
PBC variables		
pre-election	Dummy variable: 1 in a pre-election year (2016, 2020); 0 otherwise.	Author
election	Dummy variable: 1 in an election year (2017, 2021); 0 otherwise.	
post-election	Dummy variable: 1 in a post-election year (2018, 2022); 0 otherwise.	
Independent control variables		
balance	The budget balance is current revenues minus current expenditures divided by current revenues. It could be positive (surplus) or negative (deficit).	MoF (2022)
income pc	Residents' average monthly income pc in thousands HRK.	Ministry of Regional Development and EU Funds – MRRFEU (2022)
population	Logarithm value of the number of inhabitants in LGUs. The population estimate for years 2016-2020, 2022. Census of population for 2021.	Croatian Bureau of Statistics – CBS (2022)
ideology	Political ideology, dummy variable: 1 left wing; 0 otherwise.	State Electoral Commission – SEC (2022)
strength	Political strength is the measure of fragmentation of local councils, calculated using the following equation: $\sum_{i=1}^{n} \frac{S_i^2}{S^2}$, where S is the total number of seats in the local council and S_i is the number of mayor's party councillors in the council. Values range from 0 (no councillors belong to the mayor's party) to 100 (all councillors belong to the mayor's party).	SEC (2022)

Table 1: Definitions of variables
Note: All variables refer to the period 2016-2022.
Source: Author.

To analyse the impact of the level of OLBT on tax revenue forecasting, the estimated model is as follows:

$$dependent_{it} = \beta_0 + \beta_1 OLBI_{it} + \beta_2 balance_{it} + \beta_3 incomepc_{it} + \beta_4 population_{it}$$
$$+ \beta_5 ideology_{it} + \beta_6 strength_{it} + \beta_7 PBC_{it} + \beta_8 \delta_i + \varepsilon_{it}, \quad (1)$$

where i indicates LGU, t indicates time period, β_0 is constant, $\beta\_1,...,\beta\_8$ are parameters to be estimated, δ_i is time dummies and ε_it is the error term. In the model time dummies are included. Our dependent variables are calculated as follows:

$$devtax_{it} = \frac{plan_{it}\text{-}actual_{it}}{plan_{it}} \quad (2)$$

and

$$errortax_{it} = \frac{plan_{it}}{actual_{it}} \quad (3)$$

where planned tax revenue refers to the value of the planned collection of tax revenue in the enacted budget, and actual tax revenue refers to the value of collected tax revenues in the year-end report. If the value of tax revenue deviation is higher than 0 (tax revenue error higher than 1), then the planned collection is higher than the actual collection of tax revenue; i.e., the LGU is overestimating or optimistically planning tax revenues. On the other hand, if the value of tax revenue deviation is lower than 0 (tax revenue error lower than 1), the planned collection is lower than the actual tax revenue collected; i.e., the LGU underestimates or conservatively plans tax revenues.

To isolate the impact of BT, we need to control the effect of other variables on tax revenue forecasts. Some research studies have used budget balances (e.g., Boukari & Veiga, 2018; Cuadrado-Ballesteros et al., 2021). According to Boukari & Veiga (2018), the budget balance is a proxy of the fiscal pressure the LGUs face, and they proved that lowering the deficit leads to underestimating tax revenue. Cuadrado-Ballesteros et al. (2021) showed that municipalities with a surplus tend to underestimate tax revenues, which results in a favourable financial situation. Hence, we expect a negative sign of the balance.

Income pc or economic level of LGUs was used in research by Benito et al. (2015), Cuadrado-Ballesteros et al. (2021), Ríos et al. (2018), Boukari & Veiga (2018) and Sedmihradská & Čabla (2013). Public choice literature considers that low-income levels reduce government popularity. Thus, governments could manipulate budgets to offset their loss in popularity. All those studies showed that higher income leads to underestimating tax revenues; therefore, we expect a negative sign of the income pc variable.

The influence of population measured by the number of inhabitants or population growth was used in some papers analysing tax revenue deviations, but the relationship was non-significant (Boukari & Veiga, 2018; Goeminne et al., 2008; Lee & Kwak, 2020; Sedmihradská & Čabla, 2013). On the one hand, larger LGUs may benefit from economies of scale, so these LGUs tend to have a larger administration, and performance is likely to be better. As a result, collected tax revenues are relatively higher than planned tax revenues (Cuadrado-Ballesteros et al., 2021; Ríos et al., 2018). On the other hand, Benito et al. (2015) find that smaller LGUs underestimate tax revenues to a higher extent. Right-wing governments overestimate their tax revenues (Cuadrado-Ballesteros et al., 2021), and left-wing governments in pre-election years tend to underestimate tax revenues (Kauder et al., 2017). Chatagny (2015) proved that a left-wing finance minister needs to curb deficits relatively more and thereby produce more conservative forecasts than a right-wing finance minister to compensate for the negative signal sent by their ideology to the voters and to be considered at least competent by the voters.

The last control variable is strength because weak governments are assumed to face higher deficits and expenditure levels (Roubini & Sachs, 1989). In this way, weak governments may be tempted to overestimate tax revenues to increase their expenditures. Fragmented governments tend to make more optimistic revenue estimates compared with majority governments, given that the difficulty of reaching agreements between various parties within a coalition is associated with a greater propensity for revenue overestimation, as it allows the fragmented government to delay decisions on budgetary consolidation (Goeminne et al., 2008; Sedmihradská & Čabla, 2013; Ríos et al., 2018).

Hence, we expect positive signs for both political variables. LGUs in Croatia generate tax revenue from various sources. Tax revenues are recorded in the report on revenues and expenditures, receipts and outlays. The Law on Local Taxes (2023) defines LGUs' taxes and other sorts of own revenues. The personal and income tax (PIT) and surtax, as well as taxes on local consumption, vacation homes, the use of public lands, and real estate transactions, are examples of municipality or city taxes. A municipal piggyback tax that is paid on top of the PIT (imposed by the central government) is known as a surtax. The central government's tax PIT base serves as its tax base, while LGUs choose the surtax rate. The LGU where taxpayers reside (and not where they work) collects the surtax.

All municipalities and cities may implement the surtax. Municipalities may impose the surtax at a rate of up to 10%, cities with fewer than 30,000 residents may do so at a rate of up to 12%, and cities with 30,000 or more residents may do so at a rate of up to 15%. Zagreb may impose up to 18%. In the continuation of the paper, an analysis of the tax revenues is made.

4. RESULTS AND DISCUSSION

Table 2 presents descriptive statistics for all used variables and interaction variables. The mean values for the dependent variables are different due to different measurements; tax revenue deviations are negative (underestimation), while tax revenue errors are higher than one (overestimation). This is because of the enormous amount of tax revenues; deviations are centred around zero, while errors are centred around one. Furthermore, numerous LGUs exhibit high OLBT. Table 2 shows larger forecasting deviations and errors in election years than in non-election years, which Bohn & Veiga (2021) proved.

According to rational expectations theory, LGUs want to increase their forecasts of additional revenues until the marginal deficit cost and the punishment effect (which are very small for low levels of forecast manipulation) exceed the marginal benefit from expenditures on public goods and services, which translates into a marginal benefit from increasing the chances of being re-elected. This implies higher deficits, which have to be paid for in non-election years. Correlation matrix is available upon request.

It can be concluded that there is no high correlation between the used variables. Furthermore, there is no multicollinearity problem in the presented models. Figure 5 presents an interpretation of dependent variables easier to understand the overestimation and underestimation of tax revenues. Also, the Note of Table 3 explains the conceptual model.

Table 2: Descriptive statistics, 2016-2022

Variable	Mean	Std	Min	Max	N
devtax	-0.089	0.687	-10.62	0.91	3,867
pre-election·devtax	0.001	0.322	-5.27	0.67	1,100
election·devtax	0.150	0.436	-9.15	0.91	1,106
post-election·devtax	-0.392	0.992	-10.48	0.83	1,107
errortax	1.139	0.724	0.09	10.91	3,867
pre-election·errortax	1.066	0.267	0.16	3.02	1,100
election·errortax	1.542	1.133	0.10	10.91	1,106
post-election·errortax	0.906	0.466	0.09	5.86	1,107
OLBT	4.004	1.294	0	5	3,892
balance	0.285	0.172	-1.25	0.88	3,892
income pc	2,623.63	677.76	760.78	5,318.01	3,892
population	8.040	1.000	4.86	13.60	3,892
ideology	0.234	0.423	0	1	3,892
strength	42.724	14.305	16.44	100	3,892
pre-election	0.286	0.452	0	1	3,892
pre-election·OLBT	3.739	1.437	0	5	1,112
Election	0.286	0.452	0	1	3,892
election·OLBT	3.956	1.283	0	5	1,112
post-election	0.286	0.452	0	1	3,892
post-election·OLBT	4.262	1.148	0	5	1,112

Source: Author.

Tables 3 and 4 present the results for tax revenue deviations and errors during 2016-2022 calculated with the fixed effect static panel model, respectively. This paper examines OLBT and PBC in terms of tax revenue forecasting. The mean value for tax revenue deviations is negative (-0.09), which indicates underestimation or conservative planning. Models (2) and (3) suggest that in election years, LGUs' underestimation of tax revenues is lower; i.e., collected tax revenues are closer to planned values. On the contrary, models (8) and (9) suggest that in election and post-election years, LGUs' overestimation of tax revenues is higher; i.e., optimistic planning of tax revenues.

Models (3) and (4) suggest that in the pre-election and election years with increasing OLBT, LGUs' underestimation of tax revenues is higher, i.e., conservative planning of tax revenues. On the contrary, models (9) and (10) suggest that in pre-election and election years with increasing OLBT, LGUs' overestimation of tax revenues is lower; i.e., collected tax revenues are closer to planned values. Model (8) proves that in the pre-election years, LGUs' overestimation of tax revenues is lower. Lastly, models (9) and (12) suggest a positive and significant relation between OLBT and tax revenue deviations, i.e., higher BT implies a higher overestimation of tax revenues, especially in post-election years.

Table 3: Results of fixed effects static panel models – devtax, 2016-2022

	(1)	(2)	(3)	(4) pre-election	(5) election	(6) post-election
OLBT	0.005 (0.42)	0.005 (0.42)	0.03 (0.64)	-0.03** (-2.36)	0.02 (1.11)	0.09 (1.49)
pre-election		-0.09 (-1.31)	0.08 (0.44)			
election		0.48*** (9.31)	0.84*** (4.19)			
post-election		0.16 (1.55)	-0.24 (-0.76)			
pre-election·OLBT			-0.05 (-1.24)			
election·OLBT			-0.08* (-1.82)			
post-election·OLBT			0.09 (1.42)			
balance	-0.38*** (-4.00)	-0.38*** (-4.00)	-0.39*** (-4.10)	-0.22** (-2.35)	-0.07 (-0.56)	-0.61* (-1.79)
income pc	-0.0003*** (-2.72)	-0.0003*** (-2.72)	-0.0004*** (-2.97)	-0.00006 (-0.67)	-0.0004*** (-4.23)	-0.001*** (-4.54)
population	-0.47 (-1.53)	-0.47 (-1.53)	-0.51* (-1.67)	0.004 (0.01)	-1.18*** (-2.75)	-4.27*** (-3.60)
ideology	0.06 (1.58)	0.06 (1.58)	0.06 (1.60)	-0.06** (-2.28)	0.09* (1.93)	0.26** (2.30)
strength	-0.0005 (-0.43)	-0.0005 (-0.43)	-0.0002 (-0.16)	-0.002 (-1.28)	-0.001 (0.78)	-0.002 (-0.59)
constant	4.53* (1.81)	4.62* (1.86)	4.88** (1.97)	0.27 (0.08)	10.26*** (2.90)	36.87*** (3.86)
Observations	3,867	3,867	3,867	1,100	1,106	1,107
R-squared	0.168	0.168	0.181	0.111	0.156	0.181
No. of groups	555	555	555	555	555	555
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000

Note: t-statistics in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. The mean value of variable devtax is negative – underestimation. A positive sign indicates lower underestimation (collected tax revenues tend to be planned), while a negative sign indicates higher underestimation (conservative planning). On the contrary, the mean value of errortax is positive – overestimation. A positive sign indicates higher overestimation (optimistic planning), while a negative sign indicates lower overestimation (collected tax revenues tend to be planned).
Source: Author.

In almost all tested models, balance has a negative and significant relationship with tax revenue forecasting (tax revenue deviations and errors). This implies that in LGUs in which surplus is growing, underestimation of tax revenue is greater (too conservative planning), and overestimation is lower (collected tax revenues are closer to planned values).

Table 4: Results of fixed effects static panel models – errortax, 2016-2022

	(7)	(8)	(9)	(10)	(11)	(12)
				pre-election	election	post-election
OLBT	0.008	0.008	0.06***	-0.02**	0.04	0.08***
	(0.66)	(0.66)	(3.29)	(-2.28)	(0.99)	(2.58)
pre-election		-0.20***	-0.02			
		(-3.37)	(-0.22)			
election		1.10***	1.63***			
		(14.70)	(10.03)			
post-election		0.40***	0.35***			
		(5.16)	(3.05)			
pre-election·OLBT			-0.04***			
			(-2.79)			
election·OLBT			-0.12***			
			(-3.93)			
post-election·OLBT			0.006			
			(0.33)			
balance	-0.37***	-0.37***	-0.38***	-0.26***	-0.40	-0.43**
	(-3.62)	(-3.62)	(-3.67)	(-3.13)	(-1.10)	(-2.37)
income pc	-0.0006***	-0.0006***	-0.0006***	0.00002	-0.002***	-0.0006***
	(-5.96)	(-5.96)	(-5.99)	(0.29)	(-4.90)	(-6.39)
population	-1.42***	-1.42***	-1.44***	0.13	-6.84***	-1.72**
	(-2.77)	(-2.77)	(-2.79)	(0.38)	(-3.58)	(-2.44)
ideology	0.06	0.06	0.05	-0.04	0.16	0.05
	(0.98)	(0.98)	(0.95)	(-1.31)	(1.11)	(0.54)
strength	0.0001	0.0001	0.0002	-0.0007	-0.002	0.001
	(0.08)	(0.08)	(0.12)	(-0.56)	(-0.61)	(0.70)
constant	13.79***	13.99***	13.99***	0.09	60.37***	15.94***
	(3.28)	(3.34)	(3.32)	(0.03)	(3.82)	(2.76)
Observations	3,867	3,867	3,867	1,100	1,106	1,107
R-squared	0.282	0.282	0.289	0.153	0.322	0.190
No. of groups	555	555	555	555	555	555
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000

*Note: t-statistics in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.*
Source: Author.

Furthermore, income pc has a negative and significant relationship with tax revenue forecasting (tax revenue deviations and errors) in almost all tested models. This implies that in LGUs where income pc is growing, underestimation of tax revenues is higher (too conservative planning) and overestimation is lower (collected tax revenues are closer to planned values). This is in line with it being better to underestimate revenues, for in this way planned expenditures are lower than in the case in which revenues are overestimated, when planned expenditures are higher but are not matched by the necessary revenues.
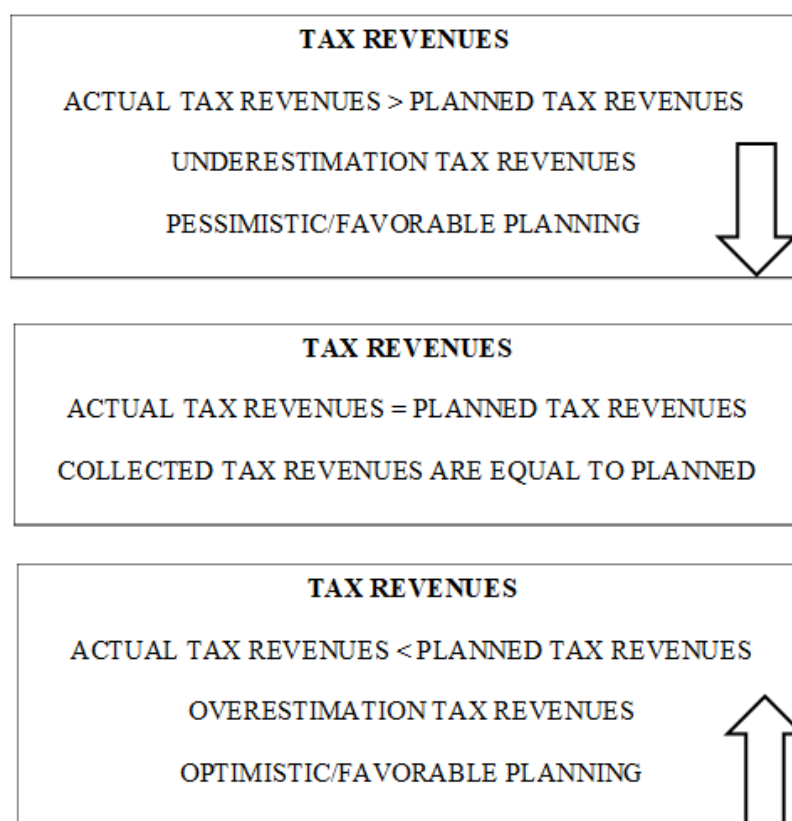
Figure 5:. Interpretation of tax revenue dependent variables
Source: Author.

In contrast, in most of the tested models, the population has a negative and significant relationship with the forecasting of tax revenues (tax revenue deviations and errors). This implies that in LGUs where the population is growing, the underestimation of tax revenues is higher (conservative planning) and overestimation is lower (collected tax revenues are closer to planned values). Political variables, ideology and strength seams don't significantly relate to tax revenue deviations.

Tables 5 and 6 display the results of tax revenue deviations and errors during 2016-2022, calculated using the dynamic panel model – system GMM method, respectivelly. Models (4'), (7'), (8'), and (10') don't have significant dependent lagged variables, while other models show a negative and significant relationships meaning that the higher the overestimation of tax revenues in the previous year smaller will be in the current year. Models (1'), (2'), (9') and (12') suggest a positive and significant relation between OLBT and tax revenue deviations, i.e. higher BT implies lower underestimation of tax revenues (collected tax revenues are closer to planned values); and higher overestimation of tax revenues (optimistic planning) – especially in election and post-election years. Models (3') and (9') suggest that in the pre-election with increasing OLBT, LGUs' overestimation of tax revenues is higher, i.e., optimistic planning of tax revenues; and in post-election years with increasing OLBT, LGUs' underestimation of tax revenues is lower, i.e., collected tax revenues are closer to planned values. Furthermore, they also suggest that in election years with increasing OLBT, LGUs' underestimation of tax revenues is higher; i.e., conservative planning, and overestimation is lower, i.e. collected tax revenues are closer to planned values.

Table 5: Results of dynamic panel models – system GMM method – devtax, 2016-2022

	(1')	(2')	(3')	(4')	(5')	(6')
				pre-election	election	post-election
dependent lag	-0.43**	-0.43**	-0.25***	0.004	-0.30**	-2.28***
	(-2.42)	(-2.42)	(-3.73)	(0.07)	(-2.00)	(-2.68)
OLBT	0.40*	0.40*	0.35	-0.16*	-0.15	1.14
	(1.76)	(1.76)	(1.38)	(-1.86)	(-1.04)	(1.46)
pre-election		-0.16	-			
		(-0.59)				
election		-	-			
post-election		-	-			
pre-election·OLBT			-0.09			
			(-0.33)			
election·OLBT			-0.52***			
			(-3.02)			
post-election·OLBT			0.31*			
			(1.69)			
balance	-3.14***	-3.14***	-0.25	-0.53**	-0.04	-3.49
	(-3.77)	(-3.77)	(-1.01)	(-2.48)	(-0.24)	(-1.03)
income pc	-0.0006	-0.0006	-0.001**	-0.0005	-0.0004	-0.002
	(-1.42)	(-1.42)	(-2.31)	(-1.40)	(-0.86)	(-1.46)
population	0.11	0.11	1.77	0.24	0.96	0.23
	(0.23)	(0.23)	(1.42)	(0.87)	(0.92)	(0.32)
ideology	-0.10	-0.10	0.28	0.32***	0.02	2.07
	(-0.35)	(-0.35)	(0.77)	(2.70)	(0.04)	(1.07)
strength	0.006	0.006	0.007	0.002	0.005	-0.03
	(0.94)	(0.94)	(0.75)	(0.89)	(0.53)	(-0.45)
constant	-0.10	-0.10	-13.40	-0.55	-6.54	0.02
	(-0.03)	(-0.03)	(-1.45)	(-0.33)	(-0.79)	(0.00)
Observations	3,311	3,311	3,311	1,100	1,100	1,105
AR (1)	0.007	0.007	0.000	0.000	0.006	0.020
AR (2)	0.014	0.014	0.090	0.177	0.415	0.013
Sargan test	0.000	0.000	0.000	0.000	0.000	0.519
Hansen test	0.000	0.000	0.005	0.000	0.147	0.650

Note: t-statistics in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.
Source: Author.

To conclude, it is shown that in LGUs with growing surplus pc, the underestimation of tax revenue is higher (excessively conservative planning) and overestimation is lower (collected tax revenues are closer to planned values), in line with Cuadrado-Ballesteros et al. (2021) and Boukari & Veiga (2018). Additionally, it is shown that in LGUs with growing income pc, underestimation of tax revenues is higher and overestimation is lower, as in Bohn & Veiga (2021), Cuadrado-Ballesteros et al. (2021), Ríos et al. (2018), Boukari & Veiga (2018), Benito et al. (2015), and Sedmihradská & Čabla (2013). Furthermore, in LGUs with a growing population, the underestimation of tax revenues is higher (conservative planning), and overestimation is lower (collected tax revenues are closer to planned values), in line with Cuadrado-Ballesteros et al. (2021), and Ríos et al. (2018).

Table 6: Results of dynamic panel models – system GMM method – errortax, 2016-2022

	(7')	(8')	(9')	(10')	(11')	(12')
				pre-election	election	post-election
dependent lag	-0.08	-0.08	-0.22**	0.40***	-0.74***	-0.21*
	(-0.85)	(-0.85)	(-2.02)	(3.36)	(-12.50)	(-1.92)
OLBT	0.29	0.29	1.14***	-0.04	-0.15	0.80***
	(1.56)	(1.56)	(3.10)	(-0.13)	(-0.94)	(3.59)
pre-election		0.01	-			
		(0.05)				
election		0.40**	4.18***			
		(2.18)	(4.27)			
post-election		-	-			
pre-election·OLBT			0.49*			
			(1.77)			
election·OLBT			-0.91***			
			(-3.13)			
post-election·OLBT			-0.11			
			(-0.41)			
balance	-3.37***	-3.37***	-2.74*	-5.14***	-0.17	-0.06
	(-2.59)	(-2.59)	(-1.91)	(-5.36)	(-0.29)	(-0.15)
income pc	-0.0003	-0.003	-0.00007	-0.0006*	-0.0007	-0.0002
	(-0.82)	(-0.82)	(-0.09)	(-1.81)	(-0.93)	(-0.89)
population	-0.76	-0.76	-1.48	-0.44	-0.51	-0.50
	(-0.86)	(-0.86)	(-1.05)	(-1.36)	(-0.87)	(-0.97)
ideology	0.08	0.08	0.007	-0.10	0.41	0.10
	(0.27)	(0.27)	(0.02)	(-0.32)	(0.36)	(0.15)
strength	0.002	0.002	0.006	0.01	0.04	0.02
	(0.31)	(0.31)	(0.59)	(1.37)	(1.24)	(1.49)
constant	7.93	7.93	9.30	6.39***	6.51	1.44
	(1.23)	(1.23)	(0.98)	(3.03)	(1.21)	(0.33)
Observations	3,311	3,311	3,311	1,100	1,100	1,105
AR (1)	0.000	0.000	0.000	0.009	0.040	0.000
AR (2)	0.400	0.400	0.688	0.001	0.222	0.079
Sargan test	0.000	0.000	0.000	0.000	0.000	0.000
Hansen test	0.000	0.000	0.000	0.000	0.000	0.000

Note: t-statistics in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.
Source: Author.

In conclusion, the impact of the OLBT on tax revenue forecasting is positive and significant, which means that in LGUs where BT increasing tax revenue forecasting tends to be favourable, i.e., collected tax revenue tends to be equal to actual. This result confirmed the first hypothesis, which aligns with Ríos et al. (2018). The impact of the OLBT and PBCs on tax revenue forecasting is revealed. In the pre-election years, LGUs' overestimation of tax revenues is lower; i.e., collection of tax revenues is closer to planned values. This is in line with the results by Benito et al. (2015) and Boukari & Veiga (2018). Moreover, the results prove that in election years, LGUs' underestimation of tax revenues is lower; i.e., collected tax revenues are closer to planned values.

Our results are in line with research by Boukari & Veiga (2018), Sedmihradská & Čabla (2013), and Bischoff & Gohout (2010). In pre-election and election years, LGUs with higher OLBT overestimate tax revenues less. While in post-election years, LGUs with higher OLBT underestimate tax revenues less.

5. CONCLUSION

The paper uses data from all 556 Croatian cities and municipalities during 2016-2022 to analyse the impact of OLBT and PBCs on budget forecasting deviations and errors. The results indicate that higher levels of OLBT entail lower underestimation and higher overestimation of tax revenues. It is better for LGUs to underestimate revenue because planned expenditures are higher in the case of overestimation, which leads to higher deficits and debt. Moreover, the results indicate that higher levels of OLBT imply a lower underestimation of tax revenues. Regarding the results of the PBC, dummy variables of pre-election, election, and post-election years were used, as were interaction variables described above. PBCs in Croatian LGUs regarding tax revenue forecasting are revealed. In pre-election years, they exhibit a lower overestimation of tax revenues. PBCs also indicate a lower underestimation of tax revenues in election years. The aforementioned findings suggest that there is no power in local councils, citizens (voters), or national revisor agencies to stop Croatian LGUs from providing inaccuracies in tax revenue forecasting. BT is good, but citizen participation is poor because the public and legislative debate on the budget process is predicated on faulty inputs in the crucial process of tax revenue plans. What are the policy implications of these results? In Croatian LGUs, BT is good, considering the availability of key budget documents on official websites. In contrast, there is not enough citizen participation in the budget process. This could be improved with simple institutional reforms. Participating citizens and media can compare tax revenue forecasts with those of other LGUs. LGUs must explain any deviation publicly, mainly if it is higher than tax revenue forecasting. This also improves the efficiency of the state auditing ex-post control. According to Alt and Lassen (2006), these actions are crucial for maintaining discipline and promoting BT. From a broader standpoint, the results emphasise the significance of having independent tax revenue forecasts. Assigning the duty of tax revenue forecasting to an impartial organisation and making their projections a mandatory component of the budget process is a practical means of guaranteeing this. Inaccurate revenue tax forecasts are still far too commonly generated at present, as tax projections are a crucial factor in deficit estimates. The main policy implication of this paper is for LGUs to carefully plan tax revenues, especially in election and post-election years. There is a need for some regulation of budget planning because, on the local level, projected revenues and expenditures are way too high. Nevertheless, we know that wrong forecasts will exist, but if there are some issues, why are they in the election and post-election years? The reasons to analyse overestimation or underestimation maybe lie in technical shortcomings, political motivation for re-election, unexpected circumstances, etc. Finally, it is important to monitor the budget process from independent institutions to ensure political independence. One limitation of this research might arise from the OLBT measurement, which depends on the number of key budget documents published on the official websites of LGUs and ranges from 0 to 5. Future studies could examine the impact of qualitative OLBT measures on tax revenue deviations. A second limitation concerns the short seven-year time period in which the impact of BT on tax revenue forecast is analysed. Since 2016, LGUs have been obligated to make consolidated budgets, i.e., including budget users in LGUs' budgets. Even though OLBT was available in 2014, we couldn't do an analysis of the period before 2016. The third limitation is that not all control variables were included in the model. Hence, future research could use different methods and variables to examine the impact of OLBT on tax revenue forecasting. It would also be interesting to see comparable research on a different country with distinct fiscal regulations and variables.

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EMOTIONAL INTELLIGENCE OF MANAGERS IN THE CONTEXT OF HUMAN RESOURCE MANAGEMENT IN THE DIGITAL ERA

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Human resource management is one of the key aspects of successful business operations, and the role of managers in this process is extremely important. Modern business challenges, increasing emphasis on teamwork, motivation and interpersonal relationships, lead to increased interest in emotional intelligence as a fundamental managerial competence. This paper explores how the emotional intelligence of managers affects human resource management processes, with special emphasis on communication, employee motivation, conflict resolution and creating a positive organisational climate. The theoretical part of the paper presents the concepts of emotional intelligence, its components (self-confidence, self-regulation, empathy, social skills) and the connection with effective leadership of people. The empirical part of the paper is based on a survey conducted among managers and employees within various sectors in the Republic of Croatia, to examine the perception of emotional intelligence of managers and its impact on employee satisfaction and team efficiency. The research results indicate that managers with developed emotional intelligence lead teams more successfully, resolve conflicts better, achieve better communication and contribute to greater employee satisfaction and engagement. Based on the findings, the paper proposes guidelines for the development of emotional intelligence through the education and training of managers as an important step in improving human resources management.
Keyword*s: emotional intelligence, teamwork, human resources management, digital age, digital transformation*

1. INTRODUCTION

In the modern business environment, characterised by dynamism, global competition and constant organisational changes, the importance of the "human factor" as a key resource in achieving sustainable competitive advantage is increasingly recognised. Human resources, or employees, are no longer understood exclusively as task performers, but as carriers of knowledge, skills, creativity and innovation. In this context, the role of managers as leaders and motivators of employees is gaining increasing importance, especially in the field of human resources management. Traditional managerial skills, such as planning, organising and controlling, are no longer sufficient for effective people management. Increasing emphasis is placed on interpersonal and emotional competencies, and in particular on emotional intelligence - the ability to recognise, understand and manage one's own emotions, as well as the emotions of other people. Emotional intelligence is becoming the foundation for successful team leadership, conflict resolution, developing trust and encouraging cooperation and a positive organisational climate. The theoretical part of the paper discusses the basic components of emotional intelligence and their role in managerial practice, while the empirical part conducts research among managers and employees in Croatia to examine the connection between emotional intelligence and the quality of human resources management. The results obtained should confirm the increasing need for the development of "soft skills" among managers to achieve successful and sustainable business. This paper aims to investigate the extent to which the emotional intelligence of managers affects the quality of human resources management, i.e. employee relations, motivation, productivity and overall organisational effectiveness.

The paper starts from the assumption that emotionally intelligent managers not only better understand the needs and feelings of their employees, but also significantly contribute to the development of their potential and a people-oriented organisational culture.

2. LITERATURE REVIEW: THEORETICAL FRAMEWORK FROM THE ADOPTION OF THE CONCEPT OF EMOTIONAL INTELLIGENCE OF MANAGERS TO THE TIME OF THE DIGITAL ERA

The role of management in human resources management is becoming increasingly complex and demanding, especially in the context of digital transformation, changes in working conditions and the need for greater employee engagement. Modern managers must be strategic partners, change leaders and human resources experts to successfully withstand new challenges. Self-awareness is the foundation of emotional intelligence and refers to the ability to recognise one's own emotions and their effects on personal thoughts and behaviour. Self-aware managers have a clearer insight into their strengths and weaknesses, which allows them to make better decisions and manage stress more effectively. Self-aware managers can also recognise how their emotions affect others, which helps them maintain professional behaviour and create a positive work atmosphere. In modern business, human resources management plays a key role through the management of talent, intellectual capital, knowledge and diversity, which strengthens organisations' innovation, resilience and competitiveness in the market (Bahtijarević-Šiber, 2023). In doing so, the emotional intelligence of managers becomes a crucial factor, because the ability to recognise, understand and manage one's own emotions, as well as the emotions of others, directly affects employee motivation, the creation of a positive work climate and the successful management of teams. Emotions are often defined as complex feelings that include subjective experiential components, physiological reactions and expressive patterns (Barret et al., 2007). A thorough understanding of emotions is crucial for understanding their impact on human thinking, behaviour and interpersonal relationships, with different theories of emotions providing diverse views and explanations of this complex process. Evolutionary theories emphasise the adaptive function of emotions in survival and reproduction. Cognitive theories emphasise the importance of mental processes in interpreting and experiencing emotions (Gu et al., 2013). According to Carnegie (2014: 11), the most important characteristic of an effective leader is not his or her ability to manage, intelligence, kindness or courage, but the ability to make friends, which ultimately represents the ability to see the best in others. This ability reflects the developed emotional intelligence of the leader, which enables the establishment of authentic relationships, recognition and encouragement of the potential of associates and the creation of an organisational culture based on trust, cooperation and mutual respect. This means that leaders truly care about each individual in their team (Cimapa and Watkins, 2007). They strive to get to know them and adapt their leadership style to each individual. Given the differences in teams, employees can perceive information in different ways. Thus, it is not possible to delegate in a completely equal way to all employees, but it is necessary to make differences. It is necessary to adapt to the character of the employee (Carnagie, 2014: 17). According to Buble (2006: 6), a manager is a person whose basic responsibilities arise from the management process, and include planning and decision-making, organising work and business activities, engaging and leading employees, and managing human, financial, physical and information resources. According to certain definitions, a manager accomplishes his tasks in cooperation with other people, including both those over whom he has formal authority (subordinates) and those over whom he does not have such authority. The manager, therefore, acts as a team leader, using various methods and approaches with the aim of achieving organisational goals. For the successful implementation of these activities, it is crucial to have specific abilities, as well as appropriate knowledge and skills.

Digital transformation not only changes tools and technologies, but also profoundly affects organisational culture, communication methods and employee expectations, which brings emotional competencies to the forefront. Emotional intelligence, defined as the ability to recognise, understand and manage one's own emotions and the emotions of others, allows managers to effectively manage change, build trust and strengthen team cohesion in unstable and often unpredictable conditions. The ability to empathise helps managers recognise the emotional reactions of their associates to change, while self-regulation enables balanced decision-making in stressful situations that often accompany digitalisation processes. In addition, managers with a high level of emotional intelligence are more likely to communicate a vision for change, motivate employees, and reduce resistance to new technologies.

Their ability to create a positive and supportive atmosphere is key to developing agile and innovative teams, which are the foundation of sustainable success in the digital economy. In the context of digital transformation, emotional intelligence is increasingly perceived not just as an additional skill, but as a strategic capability that allows managers to not only adapt, but also proactively shape change within the organisation. Digital leadership, the need for developing managerial competencies in the areas of digital communication, socialisation, change management, team dynamics, technological expertise, and digital trust building is increasingly emphasised (Tuerk, 2023). Employee empowerment, shaped by organisational policies, human resource management practices, and social network structures, plays a key role in unlocking employees' inner potential and enriching their psychological resources, resulting in improved work performance. First, digital leadership at the middle management level that respects, values, and acknowledges employees' participation in digital processes (Heyden et al., 2017), encourages employees to perceive their work roles as valuable and meaningful, creating a heightened sense of psychological meaning. Second, increased perceptions of employee empowerment contribute to a stronger sense of power, control, and influence within the organisation, which reduces fears and concerns about negative outcomes in their work roles and fosters a strong sense of psychological safety (Weber et al., 2022).

With the support of digital leadership from middle managers, employees improve their perception of their capabilities, organisational status, and autonomy, while simultaneously gaining decision-making rights and access to digital information resources (Monje-Amor et al., 2021). Social exchange theory suggests that an individual's power reflects their ability to obtain additional resources in exchange for their resources. As a result, empowering measures of digital leadership from middle managers enable employees to improve their resource-return capabilities, which increases the likelihood that employees will reciprocate by increasing their cognitive, emotional, and physical investments in their work roles. While senior managers are the creators of abstract visions of superior digital leadership, digital leadership from middle managers predominantly excels in connecting digital strategies with specific teams and individuals, thereby striving to translate them into actionable plans.

Through the support of leadership and management and leadership among employees, this approach empowers employees to engage in change and digital transformation, extending a message of appreciation and trust from middle managers to their employees (De Waal et al., 2016). In addition, the digital leadership of middle management places special emphasis on the continuous adoption, application and innovation of knowledge in the field of digital technologies, whereby managers actively guide and educate employees during the digital transformation process, thereby further strengthening their perception of empowerment (Liu et al., 2020).

3. RESEARCH METHODOLOGY

Considering the increasing importance of emotional intelligence as a key managerial competence in the modern business environment, the research aims to analyze the impact of emotional intelligence of managers on various aspects of human resources management, including motivation, employee satisfaction, productivity, and the creation of a positive organizational climate, especially in times of digital transformations. The main objectives of this research are:

- To examine the extent to which managers' emotional intelligence affects employees' perceptions of their work environment, motivation, and engagement, with a special emphasis on digital transformation.
- To analyse how emotionally intelligent managers influence the creation of a positive organisational climate and successful team management in the context of digital changes and technologies.
- To assess the relationship between managers' emotional intelligence and the quality of interpersonal relationships in the organisation, taking into account the challenges of the digital era.

Based on the previous theoretical framework and empirical findings, the following hypotheses were set:

Hypothesis 1: Managers' emotional intelligence has a significant positive impact on employee motivation and satisfaction in organisations undergoing digital transformation.

Hypothesis 2: Managers with higher levels of emotional intelligence achieve better results in managing teams, including more effective conflict resolution and improved interpersonal relationships, which contributes to a positive organisational climate in a digital.

Research on such a specific sample can provide useful insights into how different levels of management, in the context of different types of organisations, perceive their emotional abilities and how these abilities can affect business results. It would be important to analyse the data in the context of different sectors and management levels, to understand how emotional intelligence and emotion regulation vary among managers in different positions and different types of companies. "To confirm or refute the hypotheses set, a study was conducted on a carefully selected sample of 350 managers of different levels (lower, middle and higher), who are employed in state-owned enterprises, large organisations employing more than 500 employees, and medium-sized enterprises employing between 50 and 500 employees. This intentional sample allows for a deep understanding of the specific dynamics of emotional intelligence and its effects on business results in different organisational structures."

Table 1. *Socio-demographics structure of respondents, managers in the Republic of Croatia*

Category	Subcategory	Number of respondents	(%)
Sex	Men	280	80%
	Women	70	20%
Age	25-30 years	30	8.6%
	31-40 years	100	28.6%
	41-50 years	120	34.3%
	51-60 years	90	25.7%
	Preko 60 years	10	2.8%

Category	Subcategory	Number of respondents	(%)
Industrial sector	Industrial companies	140	40%
	Shop	80	22.9%
	Tourisam	50	14.3%
	Education	40	11.4%
	Food industry	40	11.4%

Source: author's work

A survey of the socio-demographics structure of managers in Croatia was conducted on a sample of 350 respondents to understand the key factors shaping managerial positions in different industrial sectors. The survey results provide valuable insight into the distribution of managers by gender, age and industrial sector, thus enabling a better understanding of the labour market and management dynamics in Croatia. These data not only illustrate the social and demographic aspects of management, but can also serve as a basis for further research that will examine the causes and consequences of such patterns. One of the most striking insights of this study is the gender distribution among managers. Namely, out of the 350 respondents, as many as 80% are men, while women make up only 20%. This significant gap in percentages indicates that managerial positions in Croatia remain largely dominated by men. Although women are increasingly present in the workforce and taking on positions of responsibility, there are still obvious challenges in achieving gender balance in management, especially in industrial sectors. This phenomenon may be the result of various social, cultural and organisational factors, including stereotypes, barriers to advancement and uneven distribution of responsibilities in family life. The age distribution of respondents provides additional insight into the careers of managers in Croatia. The largest number of respondents belongs to the age groups from 31 to 50 years, which make up more than 63% of the total sample. This group includes managers in middle and mature years, when they have already gained significant experience and knowledge of the industry, while at the same time, they are still at a stage in their careers in which they can exert a high influence on organisational change. At the other end of the spectrum, the age group from 25 to 30 years includes only 8.6% of respondents, which indicates a relatively low representation of young managers in Croatian companies. This data may suggest that managerial positions in most sectors require a greater number of years of experience, which may limit the opportunities for young people to access senior managerial roles. Less than 3% of respondents over 60 also indicate that management in Croatia remains largely in the hands of middle-aged people, with older managers likely to retire or enter a less active phase of their careers. Although the number of such managers is decreasing, their role can be crucial in transferring knowledge and mentoring younger colleagues, especially in industrial sectors. One of the most interesting insights from this research is the distribution of managers by industrial sector. The largest number of respondents is employed in industrial companies, which account for as much as 40% of all respondents. The industrial sector is a constant source of employment for managers, as it requires specific skills in managing large operations, production processes and a large number of employees. This sector, therefore, dominates managerial positions in Croatia. The trade sector ranks second with 22.9% of respondents, which also reflects the importance of management in retail and organisations that distribute products to the general public. Store managers face challenges related to managing warehouses, retail operations and teams that interact directly with consumers, which requires specific skills in managing and motivating employees.

The tourism sector, which accounts for 14.3% of respondents, reflects the importance of this industry in Croatia, which is one of the country's key economic branches. Managers in tourism manage destinations, hotels and travel agencies and face the challenges of seasonality, the need for innovations in the offer and the maintenance of high-quality services. The education and food industry sectors occupy the same percentage (11.4%), which indicates the importance of management in these sectors as well. Managers in education manage academic institutions, while managers in the food industry coordinate the production and distribution of food, which is critical to ensuring product safety and quality. The socio-demographic structure of managers in Croatia, according to the research results, points to several key factors. Men dominate in managerial positions, while women make up a smaller percentage of respondents. Also, the largest number of managers belongs to middle and mature age, and the lower representation of young managers suggests the need for greater investment in the development of young talent. The industrial sector remains the dominant source of managerial positions, but other sectors such as trade, tourism, education and the food industry also have a significant share. These results provide insight into the dynamics of the labour market in Croatia, but also indicate the need for further research, especially in the context of gender balance and opportunities for young managers. Emotional intelligence (EI) is a key component in professional life, as it enables individuals to better understand, recognize, and manage their own emotions, as well as the emotions of others. In today's dynamic business environment, emotional intelligence plays a significant role in work performance, interpersonal relationships, and organisational success. This analysis will focus on three key variables of emotional intelligence that affect business results, namely: a) Self-assessment of one's emotional intelligence abilities, b) Regulation of one's own and others' emotions to achieve business results, and c) Connection to digital transformation.

- **Self-assessment of one's emotional intelligence** abilities refers to how individuals assess their ability to recognise, understand, and manage their own emotions. Through this variable, it is investigated how self-awareness and self-assessment of emotional skills can affect work performance, relationships with colleagues, and overall business success. Managers and employees who are highly emotionally intelligent often demonstrate better decision-making and conflict resolution abilities, which directly contributes to their effectiveness in the workplace.
- **Regulating one's own and others' emotions to achieve business** results explores an individual's ability to effectively manage their own emotions, but also to influence the emotional state of their colleagues or clients. This variable plays a key role in leadership, teamwork, communication and decision-making. Managers who successfully regulate their own emotions and the emotions of their employees can create a productive and positive work atmosphere, reducing stress and improving interpersonal relationships. Emotional stability can also help in solving problems, which contributes to better organisational performance.
- **The connection with digital transformation** refers to how emotional intelligence, especially in the context of emotion regulation, plays a key role in the successful adaptation to digital changes within organisations. Given the rapid development of technology and business models, the ability to manage emotional reactions to change can facilitate the implementation of new technologies, reduce resistance to change and reduce stress that can arise due to new demands or uncertainty in the work environment.

By combining these variables, this analysis explores how emotional intelligence and the ability to regulate emotions can positively influence business results, especially in the context of the challenges associated with digital change. Understanding this connection can help organisations better adapt their employee development strategies and achieve long-term success in a dynamic business environment.

Table 2. *Correlation between self-awareness and self-regulation*

Category	Subcategory	(N)	Number of respondents%	Self-awareness	Self-regulation
Sex	Men	280	80%	4.1 (r = 0.65)	4.3 (r = 0.60)
	Women	70	20%	4.2 (r = 0.62)	4.1 (r = 0.58)
Age	25-30 years	30	8.6%	3.8 (r = 0.42)	3.9 (r = 0.48)
	31-40 years	100	28.6%	4.0 (r = 0.67)	4.2 (r = 0.65)
	41-50 years	120	34.3%	4.1 (r = 0.72)	4.3 (r = 0.70)
	51- 60 years	90	25.7%	4.2 (r = 0.76)	4.3 (r = 0.74)
	60+	10	2.8%	4.0 (r = 0.61)	4.2 (r = 0.60)

Source: author's work

In the first part of the analysis, which concerns self-awareness and self-regulation, data on gender and age differences among respondents were considered. Correlations obtained from the data clearly show that with age and experience, respondents become more emotionally aware and more successful in managing their emotions. This is evident in the increase in self-awareness and self-regulation among older respondents, which suggests that with age comes greater emotional maturity. In terms of gender differences, we see that men have a slightly higher score in self-regulation, while women show a slightly higher score in self-awareness. This difference, although not significant, may indicate that women tend to have a deeper understanding of their own emotions, while men, on the other hand, show greater control over their emotional reactions. These differences may be related to social norms and educational experiences that shape emotional skills throughout life.

Table 3. *Correlation between motivations, empathy and social skills*

Kategorija	Subkategorija	Broj ispitanika (N)	%	Motivation	Empathy	Social skills
Sex	Men	280	80%	4.2 (r = 0.55)	4.0 (r = 0.70)	4.1 (r = 0.63)
	Women	70	20%	4.3 (r = 0.59)	4.2 (r = 0.66)	4.3 (r = 0.64)
Age	25-30 years	30	8.6%	4.0 (r = 0.53)	4.1 (r = 0.49)	4.0 (r = 0.45)
	31-40 years	100	28.6%	4.3 (r = 0.63)	4.2 (r = 0.69)	4.1 (r = 0.68)
	41-50 years	120	34.3%	4.4 (r = 0.68)	4.2 (r = 0.75)	4.2 (r = 0.72)
	51-60 years	90	25.7%	4.4 (r = 0.72)	4.3 (r = 0.79)	4.2 (r = 0.74)
	60 +	10	2.8%	4.1 (r = 0.62)	4.2 (r = 0.64)	4.1 (r = 0.63)

Source: author's work

The conclusion of this part of the research indicates a significant connection between emotional intelligence, age and gender of the respondents.

Through the analysis of various aspects of emotional intelligence, such as self-awareness, self-regulation, motivation, empathy and social skills, it is evident that emotional skills develop with age, which suggests that age has a significant impact on the ability of managers to recognize and manage their own emotions, as well as the emotions of others. Age has proven to be a key factor in the development of emotional intelligence, with older respondents showing better results in most variables. This may be related to greater professional experience, life maturity and the ability to adapt to different challenges, which allows for better management of emotional states in stressful situations. Given this, older managers have a more developed ability to self-awareness and self-regulation, which allows them to make more stable and thoughtful decisions in leading teams and organizations. Gender also plays a role in emotional intelligence, although it is not always expressed as a key factor. Women showed a somewhat stronger correlation in aspects such as empathy and social skills, which suggests that women better recognize and understand the emotions of others, thus successfully building interpersonal relationships. Given the importance of these skills in management, this can be a significant factor in leading teams and building a positive work atmosphere. On the other hand, men showed slightly higher self-regulation, which may indicate a stronger ability to control their emotions in challenging situations. Although both categories — age and gender — have an impact on the development of emotional intelligence, age seems to be a more important factor in this research. With age and experience comes greater emotional maturity and the ability to manage emotions, while gender brings certain specific differences in the way managers manage the emotions of others and their emotional reactions. Overall, age and gender together constitute a significant component in the development of emotional skills, but age seems more crucial for a deeper understanding of emotional dynamics in management.

Table 4. *Summary of the correlation relationship by items related to self-regulation of one's own emotions*

Constructs	Questions / Particles	Correlation with age	Correlation with gender
Self-awareness (recognizing one's own emotions)	I am often aware of my emotions in different situations.	Positive correlation with age	Women show a stronger correlation
	I can recognise when my emotions are influencing my decisions.	Weak correlation with age	Men show a slightly higher correlation
	I can recognise my emotional reactions in stressful situations.	Strong correlation with age	Women show a higher correlation
Self-regulation (managing one's own emotions)	I manage to calm myself down when I feel frustrated.	Positive correlation with age	Men show a higher correlation
	When I feel anger, I find it easy to deal with it constructively.	Moderate correlation with age	Similar correlation between genders
	When I am stressed, I can keep control of my emotions.	Strong correlation with age	Men show a higher correlation

Constructs	Questions / Particles	Correlation with age	Correlation with gender
Motivation (intrinsic motivation and goal setting)	I can motivate myself, even when I encounter obstacles	Weak correlation with age	Žene pokazuju nešto višu korelaciju
	I feel great internal motivation to achieve my goals.	Moderate correlation with age	Similar correlation between genders
	I don't let failures discourage me from achieving my goals.	Moderate correlation with age	Men show a slightly higher correlation
Empathy (recognizing and understanding the emotions of others)	I often understand how others feel, even when they don't say it.	Positive correlation with age	Women show a higher correlation
	I know how my words or behaviour can affect the feelings of others.	Strong correlation with age	Women show a higher correlation
	I am satisfied when I can help others feel better.	Strong correlation with age	Women show a stronger correlation
Social skills (focus on relationships and cooperation)	I easily establish good relationships with colleagues.	Weak correlation with age	Women show a higher correlation
	When there is a disagreement, I easily find a way to resolve it.	Moderate correlation with age	Similar correlation between genders
	I feel good in team environments and often motivate others.	Positive correlation with age	Women show a higher correlation

Source: author's work

The analysis of the presented data allows for a deeper understanding of how different aspects of emotional intelligence vary with the age and gender of the respondents. The table includes the key dimensions of emotional intelligence: self-awareness, self-regulation, motivation, empathy and social skills, and shows their mutual connections with the mentioned demographic variables. The results show that self-awareness increases with age. Older respondents show a more developed ability to recognise and understand their own emotions and their influence on everyday decision-making. Interestingly, women show a slightly more pronounced correlation in this segment, which may indicate their greater tendency to introspection and emotional reflection. Self-regulation, or the ability to manage one's emotional reactions, also shows a positive trend with increasing age. Older respondents control their own emotions more effectively, especially in stressful situations. In this area, men achieve a slightly stronger correlation, which may suggest that they are more inclined to maintain emotional stability in challenging business circumstances. In the construct of motivation, a weaker, but still present, positive relationship with age is visible. Although the differences are not drastic, the data indicate that older respondents find it easier to maintain intrinsic motivation, especially in situations of facing obstacles and failures.

Women are slightly ahead in this aspect, which may be related to their greater emotional resilience and consistency in achieving goals. Empathy shows a strong correlation with age, especially among female respondents. Older managers develop better skills in recognising and understanding the emotions of others, which is a key component of successful interpersonal communication and team leadership. Women are particularly pronounced in this area, which may indicate their greater emotional sensitivity and tendency to create harmonious relationships. Finally, social skills also correlate positively with age. Older respondents show a better ability to build and maintain quality relationships with colleagues, resolve disagreements more easily, and operate more effectively in team environments. Women again show a slightly stronger correlation, which further emphasises their social competence and orientation towards cooperation. Overall, the results suggest that age plays a more significant role in the development of almost all aspects of emotional intelligence. Gender, although less influential in the overall trend, still shows certain specificities, especially in the areas of empathy and social skills, where women show more pronounced results.

Table 5. *Correlation with adaptation to digital transformation*

Group	Korelacija s prilagodbom na digitalnu transformaciju
Sex	
Women(20%)	0,62
Men(80%)	0,54
Age	
25-30 years (8,6%)	0,45
31-40 years (28,6%)	0,55
41-50 years (34,3%)	0,64
51-60 years(25,7%)	0,66
60+ godina (2,8%)	0,58

Source: author's work

The table shows the relationship between emotional intelligence and the success of adapting to digital transformation in organisations, concerning the gender and age of the respondents. The results show that women, with a correlation of 0.62, have a slightly stronger relationship between emotional intelligence and adaptation to digital transformation compared to men, who correlate 0.54. This result suggests that women, thanks to more developed emotional and social skills, may be better able to manage the emotional challenges brought about by the digital transformation process, such as stress, uncertainty and the need to quickly learn new technologies. In terms of age, it is evident that the ability to adapt increases with age. Respondents aged 51-60 achieve the highest correlation (0.66), indicating that experience, emotional stability and maturity play a key role in successfully accepting the changes that come with digitalisation. Respondents aged 41-50 also show a very strong correlation (0.64). This may mean that the middle-aged and older working population, despite stereotypes about difficulties in adopting new technologies, uses developed emotional capacities for better adaptation. On the other hand, the youngest group (25–30 years old) has the lowest correlation (0.45), which may indicate a lack of emotional experience or a lower need for conscious management of emotions during adaptation to technology, as young adults are often already naturally attuned to the digital environment.

Overall, the results show that age has a more significant impact on the connection between emotional intelligence and adaptation to digital transformation than gender, although women are on average somewhat more successful in emotionally responding to changes. While the results of this study provide valuable insights into the relationship between emotional intelligence, emotion regulation, and adaptation to digital transformation, it is important to highlight several limitations that should be considered when interpreting the findings. First, the sample was significantly unbalanced in terms of gender, with women accounting for only 20% and men for 80% of the total number of respondents. This uneven representation makes it difficult to draw general conclusions about gender differences and reduces the possibility of generalising the results to the wider population. Furthermore, although the study included a variety of age groups, certain categories, especially younger (25–30 years) and older respondents (60+ years), were numerically underrepresented. This fact reduces the reliability of statistical analyses and makes more precise interpretations in these age segments difficult. Another important limitation relates to the use of exclusively self-report questionnaires to measure emotional intelligence. Self-reports are subject to various forms of bias, including socially desirable responding, and therefore may not fully reflect the actual emotional abilities of respondents. Also, the context of the organisations and sectors from which the respondents come was not precisely differentiated. The participants came from different industries, but the extent to which sector-specificities, such as the technology industry versus traditional industries, can affect emotional intelligence and adaptation to digital transformation was not explored. In addition, the research had a cross-sectional design, meaning that the data were collected at a single point in time. This approach provides insight into the connections between variables, but does not allow for the establishment of cause-and-effect relationships, which limits a deeper understanding of the dynamics between emotional intelligence and the adaptation process. In line with the above limitations, recommendations for future research are also possible. First of all, it is recommended to ensure an equal representation of men and women in the sample, which would enable a more reliable analysis of gender differences. It is also important to expand the sample, especially in age groups that were poorly represented, to ensure greater representativeness and enable a more detailed analysis of the impact of age. To increase the validity of emotional intelligence measurements, future research should use a combination of self-reports and objective measures, such as emotional intelligence aptitude tests. In addition, it would be useful to analyse differences across sectors in more detail, as work context can have a significant impact on emotional management abilities during digital transformation.

4. CONCLUSION

The results of the study indicate a strong connection between emotional intelligence, the ability to regulate emotions, and adaptation to digital transformation in an organisational context. Respondents who demonstrated higher levels of self-awareness, self-regulation, motivation, empathy, and social skills also demonstrated a greater ability to successfully adapt to technological and organisational changes. It was particularly noted that with increasing age, the development of emotional skills also increases, which has a positive effect on the ability to adapt, while gender differences were more pronounced in the areas of empathy and social skills. Despite valuable insights, the study had certain limitations, including uneven gender representation, a smaller number of respondents in certain age groups, and reliance exclusively on self-assessment measures. Also, the lack of precise sectoral analysis and the cross-sectional nature of the study limit the scope of possible conclusions about cause-and-effect relationships. Based on these findings, future research should aim for a more balanced and broader sample, a combination of self-reported and objective measures of emotional intelligence, and a more detailed consideration of organisational and industry contexts.

Longitudinal approaches and the use of qualitative methods could further enrich the understanding of how emotional intelligence contributes to successful adaptation in conditions of increasingly rapid digital change. In conclusion, emotional intelligence is an important factor in the process of organisational transformations, and its development in employees can be crucial for successfully overcoming the challenges brought by the digital age.

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SOLOW RESIDUAL AS A MEASURE OF TOTAL FACTOR PRODUCTIVITY AND THE ROLE OF TECHNOLOGICAL PROGRESS AND HUMAN CAPITAL

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ABSTRACT

In researching the phenomenon of economic growth, the focus has shifted in recent decades to the area of human capital, and the role of technological change and innovation as key determinants. The most important measure of total factor productivity (TFP) is the Solow residual. It is used to estimate the share of economic growth that is not explained by changes in labour and capital input. The most frequently mentioned limitations in the use of Solow residuals are the shortcomings in the case of incomplete capacity utilization, the problem of the credibility of data for the (initial) state of capital, and the influence of the degree of imperfection of the market structure. The most well-known alternative methods for measuring TFP are the Index Number Approach, the Data Envelopment Analysis (within it the Malmquist Index), Input-Output Analysis, Firm-Level Models, and the Resource Utilization Coefficient. Human capital and technological progress are interdependent. Key components of technological progress are innovation, research and development, adoption and diffusion of technology, human capital development, infrastructure development, digital transformation, automation and robotics, sustainability and green technologies, collaboration and knowledge sharing, regulatory and policy frameworks. The key components of the human capital that influence TFP are education, health, skills and training, labour mobility, social capital, social relationships. However, human capital is "more" than technological knowledge. Unlike technological knowledge, human capital is non-transferable, competitive, irreplaceable. By investing in human capital, it increases its value, but there are factors that irreversibly drain it.
Keywords: *Economic Growth, Human Capital, Solow Residual, Technological Change, Total Factor Productivity*

1. INTRODUCTION

The Solow residual is a measure of the economic growth that cannot be explained by increases in labour or capital input. It represents the total factor productivity (TFP). It is a central concept in Solow's growth model, the fundamental model of long-term analysis of economic growth. The Solow residual thus reflects all sources of growth other than capital accumulation and labour: it comprises technology advancement, organizational enhancements, institutional efficacy, human capital, and other challenging-to-quantify efficiency determinants.

Starting from the Cobb-Douglas production function, with constant returns on scale:

$$Y(t) = A(t) \cdot [K(t)]^{\alpha} \cdot [L(t)]^{1-\alpha}$$

where: *Y*=production (e.g. GDP), *K* =Capital, *L*=Work, *A*=Total Factor Productivity (TFP), Solow Residual, *α*=Capital elasticity of output, t=time. Allowing for growth and rearranging, we obtain following expression:

$$\frac{\dot{Y}(t)}{Y(t)} - \frac{\dot{L}(t)}{L(t)} = (1-\alpha)_K(t)\left[\frac{\dot{K}(t)}{K(t)} - \frac{\dot{L}(t)}{L(t)}\right] + R(t)$$

where R(t) denotes Solow residual (Romer, 2006). It elucidates why certain nations experience accelerated growth despite comparable levels of capital and labour. The above formula refers to the change in one year. Therefore, it is necessary to observe the sequence of years to find a statistically significant pattern in the changes of the variables and to calculate the value of the Solow residual. The most simple calculation technique bases on the assumption of constant rates of change in all variables; regression analysis is used to estimate those rates in historical observations. However, there are practical problems in calculating the Solow residual. In chapter two, we will summarize the most common objections and criticisms to the practical application of the Solow concept. In the third chapter, through a literature review, we will consider alternatives in measuring TFP and make a small comparison. In the fourth chapter, we will discuss the components of human capital and technological progress and how they influence the Solow residual.

2. CHALLENGES IN MEASURING THE SOLOW RESIDUAL

The literature identifies and discusses several types of problems in using Solow residual as a measure of factor productivity. Based on simplifications such as the assumption of uniform technological progress in all sectors, Solow residual ignores variations in the adoption of innovations between sectors. As an overall measure, it does not distinguish between the share of technological progress and the share of human capital growth, which in turn depends on the inclusiveness of institutions in the country and their policies, progress in managerial efficiency, and external factors such as political and natural factors. As another important limitation, the authors identify problems with the calculation of capital and labour inputs: difficulties in quantifying capital stocks, especially at the initial level K_0, as well as the problem of outdated infrastructure. The state of the capital is not directly visible, so it is calculated as the sum of the estimate of the initial state, which is unknown, and past investment expenditures, from which the estimate of written-off, obsolete, capital is subtracted. All these estimates are made with great uncertainty, so the risk of wrong measurement is high. (Burda, Severgnini, 2014). Mismeasurement of capital growth is a problem especially for developing and transition countries, particularly for economies still far from their steady state, and when introducing new types of capital, such as research and development (R&D), information and communication technology (ICT), intangible and public capital (Young, 1995) (Dadkhah, Zahedi 1986). The Solow residual ignores the efficiency of factor capacity utilization, the reason why suitable measures of inputs are required to construct the Solow residual appropriately and obtain a reliable result on the degree of return to scale and competition in the economy (Paquet, Robidoux, 2001). Furthermore, several authors dispute the thesis of the exogeneity of the Solow residual, so its use as a measure of exogenous productivity shocks that contribute to the creation of business cycles is questionable (Cozier, Gupta, 1993) (Evans 1992). The next group of objections relates to conceptual issues: Solow residual ignores externalities, since it ignores environmental costs and the degree of institutional inclusiveness (Chou, Chuang, Shao, 2014).

Imperfect competition introduces various distortions that affect the accuracy of the Solow Residual as a measure of technical change. These distortions arise from price normalization, labour hoarding, model structure, welfare costs, and sector-specific impacts. Adjustments to the Solow Residual are necessary to account for these factors and provide a more accurate measure of productivity and technological progress under imperfect competition (Ritzberger, 2007). Some authors state that imperfect competition, characterized by changes in margins and economies of scale, can positively affect TFP growth. However, the Solow residual will not fully capture these effects, and it is suggested to take market imperfections into account in TFP analyses (Azzam, Lopez, E., Lopez, R.A. 2004). Monopolistic competition can reduce productivity, due to misallocation of resources. Thus, one study shows that distortions in input and output markets in the Indian manufacturing sector contribute significantly to the misallocation of aggregates, affecting TFP (Kabiraj, 2020). Furthermore, there is evidence of a non-monotonic inverse relationship between competition and productivity, suggesting that both high and very low levels of competition can have a negative impact on productivity (Polemis, 2020). In a market structure characterized by monopolistic competition, the elasticity of TFP with respect to input costs is significantly higher, indicating that barriers to entry can reduce productivity (Bento, 2014). One study showed that in monopolistic markets in China's manufacturing industry, capital misallocation directly reduces TFP growth, due to the suppression of innovation (Zhang, X-Y., Zhang, M.-Z., 2022). Monopolistic competition can also lead to higher mark-ups, which reduces the incentive to innovate, further distorting TFP calculations (ten Raa, Mohnen, 2008). To improve TFP, policies should aim to reduce market distortions and promote competitive market structures. This includes lowering entry barriers and encouraging innovation through better allocation of resources (Zhang, X-Y., Zhang, M.-Z., 2022). Additionally, understanding the sector-specific impacts of monopolistic competition can help tailor policies that address unique challenges in different industries (Jung, Lee, 2010).

3. ALTERNATIVE MEASUREMENTS OF TOTAL FACTOR PRODUCTIVITY

While the Solow Residual remains a fundamental tool for productivity analysis, its limitations, such as oversimplifying assumptions and measurement challenges, have fuelled some notable alternatives (table 2). These alternatives offer nuanced insights by relaxing restrictive assumptions and addressing measurement deficiencies. The choice depends on data availability, sector complexity, and whether inefficiencies or market imperfections are critical to the analysis. Direct Substitution is an investment-based measure that eliminates capital stock by directly substituting current investment expenditures. It aims to reduce errors associated with capital stock measurement, particularly in economies far from their steady state (Burda, Severgnini, 2014). Generalized Differences Approach is investment-based measure that uses generalized differences of detrended data and the Malmquist index, which can exhibit lower root mean squared errors compared to the Solow-Törnqvist method (Burda, Severgnini, 2014). However, Malmquist index is primarily associated with Data Envelopment Analysis or Index Number Approach. Index Number Approach uses price and quantity data to calculate TFP growth, avoiding production function assumptions (ten Raa, Shestalova, 2006) (Nordhaus, 2001). This approach includes Tornqvist, Fisher, and Färe-Primont index. The Törnqvist index aggregates input/output growth rates using logarithmic averages of value shares, while the Fisher ideal index represents the geometric mean of the Laspeyres (base period weights) and Paasche (current period weights) indices. Färe-Primont Index (FPI): This index satisfies transitive and multiplicative properties, providing more realistic figures for global comparisons of agricultural productivity (Le Clech,, Fillat-Castejón, 2020). The advantage of index number approach lies in circumventing the Solow assumption of uniform technological progress and the fact that it is suitable for multi-input/multi-output economies.

The disadvantage of this approach is the requirement for competitive market prices to justify value shares (ten Raa, Shestalova, 2006). Data Envelopment Analysis (DEA) is a non-parametric method that measures efficiency limits without the assumption of perfect competition (ten Raa, Shestalova, 2006) (Dandan, Doudou, 2020). Its advantages are in adjusting for inefficiency and imperfect competition because it does not require price data; it relies on physical input/output quantities. The limitations are computational intensity and sensitivity to outliers (ten Raa, Shestalova, 2006). Typical DEA measures efficiency at a single point in time and does not inherently decompose efficiency into different components. The Malmquist index is used to measure productivity changes over time by comparing the efficiency of decision-making units across different periods. While Malmquist index is primarily linked to DEA, it also incorporates elements of the index number approach, because it involves constructing an index that reflects changes in productivity. More specifically, it decomposes TFP growth into technical change (moving the frontier) and efficiency change (catching up to the frontier). Due to the above-mentioned distinguishing characteristics, typical DEA is used for cross-sectional analysis to compare the efficiency of decision-making units a single time point, and Malmquist Index for longitudinal analysis to track productivity changes and identify trends over time. Firm-level models address endogeneity in microdata by using investment or intermediate inputs as substitutes (OP/LP models), by working with imperfect competition (de Loecker's model). Within the OP/LM model, there are the following two approaches: Olley-Pakes and Levinsohn-Petrin. Olley-Pakes (1996) uses investment as a proxy for unobserved productivity shocks, whereas Levinsohn-Petrin (2003) relies on indirect inputs as proxies, paying attention to endogeneity in input selection.

Measure	Key Feature	Assumption Relaxation Regarding Solow Residual
Index Numbers	uses price/quantity data	no production function assumption
DEA	non-parametric, efficiency-focused	allows for inefficiencies
Input - Output Analysis	captures sectoral linkages	accounts for intermediate inputs
Firm-Level Models	addresses endogeneity in microdata	models firm-specific productivity shocks
Resource Utilization Coefficient	non-parametric; separates technology gains from efficiency improvements	no production function assumption, allows for inefficiencies

Table 1: Key features of the most important Solow residual alternative measurement and the assumption relaxation regarding Solow residual
(Source: prepared by the authors)

De Loecker's model, on the other hand, includes imperfect competition and variation in markups. The advantages of the firm model are that it mitigates bias in microdata by modelling decisions at the firm level. It reveals heterogeneity in productivity across firms (ten Raa, Shestalova, 2006). The resource utilization coefficient (Debreu's coefficient) is a method based on the work of Debreu, measuring how efficiently resources are used relative to an optimal reference value, the benchmark, explicitly accounting for inefficiencies. The advantages are evident in directly quantifying inefficiencies in resource allocation. It determines whether growth results from innovation (pushing boundaries) or from better use of resources (increasing efficiency). It integrates welfare issues into productivity analysis. (ten Raa, Shestalova, 2006).

Domar Aggregation Method consolidates various approaches to measure and decompose TFP growth, linking general technology TFP growth measures to industry Solow residuals and inefficiency (ten Raa, Shestalova, 2021). Multifactor Productivity Method uses quality-adjusted labour inputs and capital services to estimate TFP. It complements traditional measures by considering changes in labour composition over time (Long, Franklin, 2008). Lagrange Multipliers method defines factor productivities as Lagrange multipliers to a program that maximizes domestic final demand, encompassing the Solow residual, efficiency change, and terms-of-trade effect (ten Raa, Mohnen, 2009). Input-output analysis includes cross-sector linkages to measure productivity spillovers. This method measures TFP growth by accounting inter-sectoral linkages and inter-inputs. It accounts the effects of technological spillovers between sectors and integrates shadow prices from general equilibrium models. An important advantage of this method is that it captures productivity dynamics across the economy. It is also compatible with market and shadow prices. The limitations are the complex implementation and data intensity (ten Raa, Shestalova, 2006). Recently, new methods have been developed that incorporate undesired outputs and spatial spillover effects, providing a comprehensive measure of green TFP: Bayesian Stochastic Frontier Analysis and Spatiotemporal Econometric Solow Residual Method (STE-SRM). The STE-SRM integrates undesired outputs and spatial spillover effects into the Solow framework, (Xiang, Fan, 2024).

4. THE ROLE OF TECHNOLOGICAL PROGRESS AND HUMAN CAPITAL

Technological progress is a significant contributor to economic growth, often measured using the Solow residual method. In various regions, technological progress has shown substantial impact on productivity and economic growth. The contribution rate of technological progress can vary significantly across different regions and periods. In Guizhou Province, China, the contribution rate of technological progress to agricultural production was found to be 40.35%, though it fluctuated annually (Lingjun, Xinlei, Dongbing, Jianfeng, 2021). In central China provinces, the average contribution rate was 34.81% from 1990 to 2005, which is below the national average (Hu, Lan, 2007). The Solow model traditionally considers technological progress as exogenous, but modern approaches often treat it as endogenous, recognizing its dynamic nature and interaction with other economic factors. Human capital plays a crucial role in enhancing technological progress and economic growth. It is not only about the quantity of labour but also the quality, including education, skills, and health. Human capital contributes to economic growth by improving labour productivity and fostering innovation. It has both level and structural effects on technological progress. For instance, in Korea, post-1997 financial crisis, the contribution rate of human capital innovation to economic growth was 15.82%, indicating a shift towards a dual impetus of investment and innovation (Li, Zhao-Hua, 2008). In Southeast Asian emerging economies, human capital significantly boosts labour productivity, especially when integrated with ICT (Salim et al. 2024). It is a long – term and bi-directional relationship between human capital, technological innovation, and economic growth. Improvements in technology and economic growth can lead to better human capital development, which in turn fosters further economic growth. Effective allocation and development of human capital are essential for maximizing the benefits of technological progress. Policies promoting education, training, and efficient use of human resources are crucial for sustaining economic growth.

4.1. The key components of human capital that influence the Solow residual

The Solow residual, which measures TFP is influenced by various components of human capital. First, we must note that human capital is "more" than technological knowledge. Unlike technological knowledge, human capital is non-transferable, competitive, irreplaceable. By investing in human capital, it increases its value, but there are factors that irreversibly drain it.

In addition to formal institutions, the formation of human capital is influenced by all informal or semi-formal institutions to which human life is exposed from birth. In this sense, the formation of human capital, in addition to formal institutions, is influenced by family upbringing, the character of the near and distant environment in which he grows up, the dynamics of informal relationships that he achieves during growing up and maturing. The totality of these relationships determines the individual's trust in the benefit of dedicated work, motivation to work and learn, honesty in business relationships and the will to compete in the free market. This is why in politically and legally unregulated systems, TFP is low. In the existing literature, there is no systematic analysis of these factors of human capital. The following key components have been identified: education, health, skills and training, labour mobility, social capital, social relationships (see table 2). Higher levels of education, including average years of schooling, significantly impact TFP.

Component	Impact on Solow Residual
Education	enables technology adoptions, enhances TFP through higher educational attainment and quality
Skills and Training	positive externalities, such as better resource allocation and innovation contributes to technological progress and innovation
Health	improves labour efficiency and productivity
Labour Mobility	optimizes use of human capital
Social Capital	enhances human capital performance
Institutional Quality	supports human capital development
Technological Progress	leverages human capital for TFP improvement

Table 2: The key components of human capital that influence the Solow residual
(Source: prepared by the authors)

Countries with better educational systems tend to have higher contributions to TFP growth (Li, Xia, 2013). Higher levels of education enable workers to adopt and adapt technologies from more advanced economies. Countries with higher average years of schooling experience faster technology catch-up. Educated workers produce more and better outputs, expanding the technological frontier. It is proved that secondary and tertiary education completion rates and government investments in education are positively associated with TFP growth, especially in developing countries (Kim, Loayza, 2019). Furthermore, the quality of education, measured by specialized skills and test results, also plays a crucial role in enhancing TFP (Avdeeva, 2022). It creates positive externalities, such as better resource allocation and innovation; studies have shown that human capital accumulation amplifies TFP differences across countries (Kim, Loayza, 2019). Continuous labour retraining and skill development are essential for maintaining and improving TFP. Skilled workers contribute more effectively to technological progress and innovation (Li, Xia, 2013). Health improvements of the workforce, both physical and mental, can lead to better labour efficiency and higher TFP (Li, Xia, 2013). Reductions in mortality rates among the working-age population contribute positively to TFP (Akindinova, N., Chekina, K., Yarkin, A. (2017). Work experience, including foreign experience and tenure in specific positions, enhances the productivity of human capital (Đukec, Miroslav, 2017) (Tran, Phung, Phan, Luong, 2021). Efficient allocation and mobility of labour across sectors and regions can optimize the use of human capital and improve TFP (Li, Xia, 2013). The integration of social capital, including networks and relationships, can enhance the performance of human capital and subsequently TFP (Tran, Phung, Phan, Luong, 2021).

High-quality institutions and policies that support human capital development, such as freedom to trade internationally and structural changes, positively impact TFP (Le Clech, Fillat-Castejón, 2020). Investment in research and development (R&D) and innovation are crucial for leveraging human capital to improve TFP.

4.2. The role of technological progress and influence on Solow residual

To better understand technological progress, we break it down into its various components and dimensions. Technological progress encompasses a wide range of innovations in products, technology, knowledge of how to use technology, and skills in managing and directing production processes, which increase productivity and efficiency in various sectors. Key components of technological progress are innovation, research and development, adoption and diffusion of technology, human capital development, infrastructure development, digital transformation, automation and robotics, sustainability and green technologies, collaboration and knowledge sharing, regulatory and policy frameworks (see table 3). Product innovations, such as improvements in design, functionality, and usability, meet consumer needs more effectively. Improvements in production processes lead to increased efficiency and reduced costs. Investing in R&D is key to driving technological progress. It includes basic research, applied research and experimental development aimed at creating new technologies or improving existing ones. The process of adopting and disseminating new technologies across industries and regions implies the transfer of technology from research institutions to companies and the wider market. Furthermore, as we have already established, technological progress and human capital are interrelated and interdependent: improvements in the skills and knowledge of the workforce that enable better use of new technologies. Education and training have an important role to play in facilitating technological progress. It is therefore of great importance to improve the physical and digital infrastructure that supports the implementation and use of new technologies. This includes advancements in transportation, communication, and energy systems. Digital transformation implies the integration of digital technologies into all areas of business and society, which leads to fundamental changes in business, greater added value in the delivery of value and interaction with customers. Automation and the use of robotics to improve production processes, reduce labour costs, improve precision in production, and increase efficiency. The development of technologies aimed at reducing environmental impact, such as renewable energy, energy-efficient systems and sustainable agricultural practices, improves green TFP.

Component	Description
Innovation	development of new/improved products and processes
Research and Development (R&D)	investment in creating new and improving existing technologies
Adoption and Diffusion	spread of new technologies across industries and regions
Human Capital Development	enhancements in workforce skills and knowledge
Infrastructure Development	improvements in physical and digital infrastructure
Digital Transformation	integration of digital technologies into business and society
Automation and Robotics	use of automated systems to enhance production efficiency
Sustainability and Green Technology	development of technologies to reduce environmental impact
Collaboration and Knowledge Sharing	partnerships to foster innovation and technological advancement
Regulatory and Policy Frameworks	government policies that influence technological progress

Table 3: The key components / dimensions of technological progress
(Source: prepared by the authors)

Collaboration and joint efforts among businesses, governments, and research institutions to share knowledge and resources, foster an environment conducive to innovation and technological advancement. Government policies and regulations that encourage technological progress, including intellectual property rights, innovation funding, and support for R&D initiatives, lead to the improvement of TFPs. Government policies and regulations can unfortunately hinder technological progress, and because of this, any new and existing policies and regulations must be checked to see how they work on TFP. Governments often focus on allocating public spending funds as well as staying in power in the next election cycle, without considering the long-term consequences of their policies.

4.3. How Solow residual captures the impact of technological progress and human capital on economic growth

Technological advancements are a primary driver of the Solow residual, representing improvements in TFP, beyond capital and labour inputs (see table 4). Adjustments for sectoral input redistribution and variable input utilization help to accurately measure the Solow residual by accounting biases due to imperfect competition and return increases. Sectoral shifts, especially in manufacturing, can have a significant impact on the overall growth rate of technology. Stable economic conditions and a developed financial sector facilitate better absorption and implementation of new technologies (Akanbi, 2011). Demand-side factors, as emphasized by Kaldor-Verdoorn's law, suggest that technological progress can be driven by economic growth itself, rather than exclusively exogenous growth (Nabar-Bhaduri, Vernengo, 2024). This perspective emphasizes the role of demand in driving technological progress and productivity growth.

Factor	Influence on Solow Residual
Technological Progress	primary driver
Sectoral Reallocation	adjustments for sectoral shifts and input utilization
Macroeconomic Stability	facilitates technological absorption and implementation
Human Capital and Labour Dynamics	enhances labour productivity, influenced by labour costs
Demand-Side Factors	economic growth stimulates technological advancements
Environmental and Regulatory	influences green technological progress and productivity
Capital and Structural Changes	significant contribution, especially in capital-intensive industries

Table 4: The key factors that influence Solow residual
(Source: prepared by the authors)

5. CONCLUSION

Since there are difficulties in the practical calculation of Solow residuals, many authors have designed alternative measures that make it easier to bring the result of TFP. The choice of measure depends on the available data, the complexity of the sector, the degree of impact of imperfect competition, i.e. the existence of market concentration, the distance of the country's economy from its steady-state, and others. The paper identifies the components of technological progress and human capital cited in the existing literature.

In the context of human capital, no studies have been done that systematically address the factors of formal, informal and semi-formal institutions to which individuals are exposed from birth, and are influenced by social and political factors, and affect the individual's confidence in dedicated work, willingness to learn and adopt new technologies and his motivation.

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