Varazdin Development and Entrepreneurship Agency and **University North, Croatia**
in cooperation with
Faculty of Economics, Uzhhorod National University, Ukraine
Lusofona University – Lisbon, Portugal
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Book of Proceedings
Special Issue

Economic and Social Development in Period of Global Instability

Editors:
Ana Lorga da Silva, Vitaliy Serzhanov, Andrey Zahariev, Sime Vucetic

Selected Papers:

118th esd Conference
Hosted by: Faculty of Economics, Uzhhorod National University, Ukraine

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November, 2024

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*This book consists of selected papers from two international scientific conferences: 118th "esd" conference in Uzhhorod, Ukraine, and 119th "esd" conference in Lisbon, Portugal. Hosts and main co-organizers were Faculty of Economics, Uzhhorod National University from Ukraine and Lusofona University – Lisbon from Portugal. The main topic of the roundtable at the Uzhhorod conference was "Global Instability, Deviations and Disruption" while in Lisbon it was "Entrepreneurship and Innovation". With late information, this Book is dedicated to our closest Associate, Friend and Scientific Committee Member, **Professor Ayuba A. Aminu** from Nigera, who passed away on 19.09.2022.*

Thank You for everything, dearest brother.

Domagoj Cingula, Organizing Committee President

Prof. Marijan Cingula and Prof. Ayuba A. Aminu

CONTENTS

118th International Scientific Conference on Economic and Social Development

Uzhhorod, Ukraine, 15-16 November 2024

FINANCIAL DIGITAL PLATFORMS AND THEIR IMPACT ON THE INCLUSIVE DEVELOPMENT OF THE BANKING SYSTEM OF UKRAINE

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ABSTRACT
In the current realities of Ukraine, especially after the full-scale war began, the digitalization of financial services has become critically important for economic stability and social support. The military actions have significantly affected traditional banking infrastructure, creating a need for innovative solutions to ensure access to financial services. Digital platforms play a key role in overcoming these challenges, enabling people to access banking services even in remote or temporarily occupied regions where physical bank branches may be unavailable.

Digital financial services contribute to the inclusiveness of the banking system, which is especially important for small and medium-sized enterprises (SMEs). These businesses have become the main drivers of economic activity during the crisis, providing jobs, creating added value, and supporting economic stability at the local level. Thanks to online platforms, businesses can more quickly access financial tools such as loans, leasing, factoring, and conduct operations with minimal time and resource costs. Moreover, digital financial services offer crucial support to citizens by allowing them to make payments, receive social benefits, and access aid, even in conditions where traditional banking services may be limited. These changes not only help the country adapt to the difficult conditions of war, but also lay the foundation for sustainable development after its conclusion.

Keywords: *banking system, inclusion, digital financial platforms*

1. INTRODUCTION AND RESEARCH METHODOLOGY

The purpose of the study is to study the role of financial digital platforms in promoting the inclusive development of the banking system of Ukraine during the war, as well as their impact on the country's economic stability and recovery process. The research used the method of secondary data analysis, in particular statistical reports of the National Bank of Ukraine, the World Bank, as well as analytical publications on financial platforms. The collected data were processed in order to identify key trends in the development of digital platforms in Ukraine and their impact on banking inclusion.

2. STATEMENT OF THE PROBLEM

Modern challenges that are suffocating in Ukraine are the COVID-19 pandemic, war, crises - they have created significant obstacles for the functioning of the banking system. Collapsed infrastructure, limited access to physical banking institutions and growing uncertainty have forced the public and businesses to look for new ways to obtain financial services. In such conditions, traditional channels of providing banking services have become unreliable, which emphasizes the need for a rapid transition to digital platforms. Financial digital services can provide access to banking services for all segments of the population, including internally displaced persons (IDPs) and socially vulnerable groups who are especially in need of financial support in times of crisis.

However, despite the obvious advantages of digitalization, there are numerous challenges, such as insufficient financial literacy of the population, cybersecurity risks, unequal access to the Internet and digital technologies etc. In studies devoted to the role of digital financial platforms, various aspects of their impact on the banking system and the economy are highlighted by Dolishnia, Sydorenko, Kovalenko, Demirgüç-Kunt, Baker and others.

3. SEPARATION OF PREVIOUSLY UNSOLVED PARTS OF THE GENERAL PROBLEM

Investigating the relevance of the topic of the influence of financial digital platforms on the inclusive development of the banking system of Ukraine, several unresolved aspects can be identified. First, access to digital financial services for socially vulnerable segments of the population remains limited due to weak internet coverage in remote regions and low levels of digital skills. In addition, cybersecurity needs more attention, as existing data protection mechanisms raise concerns among platform users. Regulatory regulation is a separate challenge: the lack of clear rules for financial technologies creates legal uncertainty and risks for their implementation. Financial inclusion of internally displaced persons (IDPs) remains insufficiently provided, as banking services are not fully adapted to their needs. Also, regional banks often face limited resources for the implementation of modern digital solutions, which inhibits the inclusive development of the banking system at the national level.

4. OUTLINE OF THE MAIN MATERIAL

The current challenges faced by Ukraine, including the COVID-19 pandemic, the war, and ongoing crises, have created significant obstacles to the functioning of the banking system. The destruction of infrastructure, limited access to physical banking institutions, and increasing uncertainty have forced both the population and businesses to seek new ways to access financial services. In such conditions, traditional banking channels have become unreliable, highlighting the need for a swift transition to digital platforms. Digital financial services can provide access to banking services for all segments of the population, including internally displaced persons (IDPs) and socially vulnerable groups who particularly need financial support in times of crisis. However, despite the obvious benefits of digitalization, there are numerous challenges, such as insufficient financial literacy, cybersecurity risks, and unequal access to the internet and digital technologies.

5. ANALYSIS OF RECENT STUDIES, PUBLICATIONS AND IDENTIFICATION OF PREVIOUSLY UNSOLVED PARTS OF THE GENERAL ISSUE

Research on the role of digital financial platforms highlights various aspects of their impact on the banking system and the economy, as seen in the works of Dolishnya, Sydorenko, Kovalenko, Demirgüç-Kunt, Baker, and others. When examining the relevance of the impact of digital financial platforms on the inclusive development of Ukraine's banking system, several unresolved issues emerge. First, access to digital financial services for socially vulnerable groups remains limited due to weak internet coverage in remote areas and low levels of digital literacy. Additionally, cybersecurity requires more attention, as existing data protection mechanisms raise concerns among platform users. A specific challenge lies in regulatory oversight: the lack of clear rules for financial technologies creates legal uncertainty and risks for their implementation. Financial inclusion for internally displaced persons (IDPs) remains insufficiently addressed, as banking services are not fully adapted to their needs. Moreover, regional banks often face resource limitations when implementing modern digital solutions, which slows down the inclusive development of the banking system at the national level.

6. PRESENTATION OF THE MAIN MATERIAL

Digital financial platforms in Ukraine have become an integral part of the economic life of the population, particularly during the armed conflict, when access to traditional banking services is restricted due to the destruction of physical bank branches. In such conditions, digital platforms not only provide stability and convenience for financial transactions but also actively promote financial inclusion, granting access to services for internally displaced persons (IDPs) and other vulnerable groups. This has been made possible through the active implementation of innovative solutions in the financial sector, such as mobile apps, e-wallets, and remote client identification systems.

Digital platforms, on the one hand, are based on IT infrastructure, and on the other, serve as the foundation not only for e-commerce and e-business but also for the entire spectrum of communications in the interaction between businesses, consumers, and the state. The use of digital platforms increases market transparency, builds trust among counterparties through transaction transparency, and creates opportunities for the revival of free competition on a fundamentally new technological basis. At the same time, digital platforms are becoming the core of global digital information ecosystems, bridging the virtual and real worlds. This signifies a shift in the paradigm of creating and developing successful businesses. [4, p. 38]

Platform \ Years	Number users (million)			Growth (%)
	2021	2022	2023	
Privat24	14	15.5	17	21.4
Oleksandriv Bank	0.8	0.9	1	25
Monobank	6.5	7.2	8	23
Kuna Exchange	0.25	0.35	0.5	100
RiaMoneyTransfer	0,1	0.12	0.15	50

Table 1. Key financial institutions and platforms in Ukraine for the period 2021-2023, mln [2]

From Table 1, the data show a continuous increase in the number of users of digital financial platforms, which is a direct indicator of the success of the financial inclusion policy. Kuna Exchange, a cryptocurrency platform that has demonstrated a 100% increase in users, attracts special attention. This indicates an increase in interest in cryptocurrency and other financial innovations in Ukraine. At the same time, such traditional platforms as Privat24 and Monobank continue to be market leaders due to the ease of use and the wide range of services they provide. Despite the rapid development of digital financial services, Ukraine faces a number of challenges on the way to achieving full financial inclusion. Regulatory regulation of the financial sector in Ukraine faces numerous challenges, especially in the current difficult economic and social situation caused by military aggression and the need to adapt to European standards. The study reflects several key aspects that are critical for the further development of financial technologies and ensuring financial inclusion, especially for internally displaced persons (IDPs):

- Legal uncertainty for fintech. Given the rapid development of financial technologies, legal regulation in Ukraine has not yet kept up with the pace of change, which leads to legal uncertainty and complicates the implementation of innovative solutions. The lack of a clear regulatory framework for companies in the FinTech sector increases risks for businesses and consumers, creating obstacles to the development of the industry.

There is also a lack of conditions for the implementation of open banking and modern standards in the field of payment services, such as the PSD2 directive. Regulatory levers that would allow testing innovative products with minimal restrictions are not fully implemented in Ukraine, which delays the development of financial technologies in the national economy.

- Financial inclusion for IDPs. The full-scale war in Ukraine led to a significant increase in the number of internally displaced persons, which brought the issue of their financial inclusion to the fore. Banking services were not fully adapted to the needs of this category of citizens. One of the key challenges is the difficulty in accessing financial services due to strict requirements for personal identification. For IDPs, opening bank accounts becomes problematic due to the lack of supporting documents or the lack of a permanent residential address. In addition, many internally displaced persons do not have a credit history, which significantly limits their access to credit resources, including mortgage lending. The lack of special financial education programs for this population group also hinders their financial literacy and effective integration into the economic system.

- Adaptation to international standards. The first challenge is the implementation of European directives in the financial system of Ukraine. Compliance with EU directives such as PSD2 [3] and anti-money laundering (AML) regulations, requires comprehensive changes in legislation and regulatory practices. Crypto-asset service providers and crowdfunding platforms are prone to misuse of new channels for the movement of illegal money and have every opportunity to detect such movement and reduce risks. Therefore, the scope of Union legislation should be extended to cover such entities, in accordance with the FATF standards on crypto-assets. At the same time, progress in innovation opens new ways to commit crimes and launder proceeds from them [4]. In other words, there are formal adaptations and changes in the ways of interaction between financial institutions, government bodies and service users.

Ukrainian legislation needs significant modernization for the implementation of these standards, which includes changing approaches to financial supervision and compliance with international norms in the field of data protection and combating money laundering. Problems with risk management. The martial law causes unprecedented challenges for financial risk management, which are not yet fully reflected in the current regulatory and legal acts. There is a need to update the liquidity and creditworthiness management mechanisms of financial institutions, which significant economic instability must be taken into account. In addition, international aid operations require a high level of transparency and accountability. The management of these funds requires clearly defined norms and standards that would ensure the efficient distribution and use of resources, which is critically important in the current conditions. To overcome regulatory barriers and promote the development of financial technologies in Ukraine, it is necessary to take certain measures:

- create and integrate regulatory levers that will allow companies to test innovative financial products within a controlled environment with minimal legal restrictions. This will facilitate the rapid implementation of new technologies and reduce risks for consumers;
- with half-time work with European regulators;
- the introduction of regulatory incentives for FinTech companies will attract investors and contribute to the creation of innovative solutions that will improve the availability of financial services, in particular for internally displaced persons;
- develop educational programs aimed at increasing digital literacy, as well as invest in the infrastructure of internet coverage in the regions.

Government and private companies are already taking steps in this direction, but more resources are needed to create an accessible digital environment for all segments of the population. The development of digital financial platforms in Ukraine, especially in the period of armed conflict, acquires strategic importance for ensuring economic inclusion and stability of the financial system. In a situation where access to traditional banking services is limited due to the destruction of physical infrastructure, digital platforms play the role not only of financial transactions, but also become tools of social and economic support for the population, in particular vulnerable groups and internally displaced persons (IDPs). The trends demonstrate the rapid development of financial digital platforms that provide access to various services, contributing to the growth of the inclusiveness of the financial system of Ukraine. This is especially important for socially vulnerable population groups, including internally displaced persons (IDPs), for whom traditional banking services often remain inaccessible.

7. CONCLUSION

In summary, overcoming regulatory barriers and introducing modern financial technologies will have a positive impact on economic stability and the recovery process of Ukraine. First, providing a clear regulatory framework and integrating European standards will help strengthen confidence in the financial system and attract investments. This will provide financial support to small and medium-sized enterprises, contributing to their growth and increasing competitiveness. Second, the development of open banking and the FinTech sector will create new opportunities for financial inclusion, particularly for internally displaced persons, which will allow more citizens to access financial resources and services. These measures will create prerequisites for sustainable economic development, ensuring efficient use of resources and contributing to the long-term stability of the country in the post-war period.

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INFORMATION FLOW AND TRANSACTION COSTS IN SOCIAL NETWORKS

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ABSTRACT

This paper delves into the complexity of social and professional networks, emphasizing their crucial influence in decision-making within organizations and societies. By studying network topology, dynamics, and change over time, it aims to understand how information distribution affects transaction costs among members. The universal structure of complex networks allows insights from various disciplines to be applied universally. This exploration specifically delves into how network placement and connections influence transaction costs tied to information access. It reviews literature on information asymmetry, transaction costs, and networking. Conclusions reveal the universality of network dynamics, emphasizing preferential attachment, homophily's role in shaping networks, and the significance of network topology in information dissemination. The resource component's importance in achieving objectives is highlighted, but disparities in knowledge and uneven information dissemination can disrupt network functionality and market efficiency. Future steps involve an in-depth network analysis of real-world systems, dynamic modeling, and case studies. These steps aim to validate theoretical concepts empirically, offering insights crucial for practical network design and management.
Keywords: *social networks, information asymmetry, information distribution, transaction costs*

1. INTRODUCTION

Social and professional networks have become important parts of people's lives mostly due to the increased complexity of the internal and external environments of their members: companies, public institutions, non-profit organisations, and social enterprises. Information distributed in these networks does have significant influence on the decision-making of their members. For making correct decisions, it is important that decision makers get to accurate information in a timely manner. In the paper, I will define the roots of information asymmetry in social networks and answer the question whether it's reduction would lead to changes in transaction costs of members of the network. I will review the literature about scale free networks, information asymmetry, and transaction costs. Network science is a new academic field that studies complex networks. It got created with the definition of scale free networks in 1999. Since then, the concept had been proved through mapping of big networks in different fields, for example the websites on Internet, human cells, or research papers. This led to the definition of universality of the structure of complex networks that enables to use research results in the field across different areas. In the first part of the literature review, I will define the structure of networks and the dynamics of their interlinkages, incl. information flows, especially the work of Albert-László Barabási, who had discovered the concept of scale-free networks. In the second part I will look at the connection of information availability and transaction costs, based on the work of Robert D. Weaver on microeconomics of collaboration, and of Zeinab Saghati Jalali on information flow and fairness in social networks. After the discovery of the scale free attribute of big networks, the centre of attention of most research in the last more than twenty years lied in mapping these networks. Only recently has the focus been shifting towards researching the relationships between members of networks and the dynamics of networks. At the same time, management and sustainability theories had defined networks as essential means for success, while facing the absence of tools for measuring their added value or impact.

This paper defines one topic, through which the impact of social networking could be measured, the magnitude of transaction costs and its management through governance of information flows in social networks and provides the theoretical background for future empirical studies and modelling.

2. LITERATURE REVIEW

Collaborative relationships formed in networks have been replacing command-control coordination in recent years (Weaver, 2009). The benefits of networks and networking for innovation include risk sharing, access to new markets and technologies, faster market entry, the use of complementary skills, and the availability of external knowledge (Pittaway, Robertson, Munir, & Denyer, 2004).

A network in social science is a "group of interdependent actors and the relationship between them" (Britannica.com, n.d.). Research in recent decades has proved that real networks, whether being biological, social, or technological, have similar architectures. This universality of the network topology is the reason, why is it possible to use research results on networks across different disciplines (Barabási, Scale-Free Networks: A Decade and Beyond, 2009).

Network science deals with complex systems or complex networks. While simple systems have a "small number of well-understood components", complicated systems have many components that "interact through predefined coordination rules", "complex systems typically have many components that can autonomously interact through emergent rules". (Amaral & Uzzi, 2007). Simple systems are extremely predictable and in complicated systems one can also predict the outputs based on the inputs. In a complex system, the same inputs can lead to different outputs, depending on the interactions of the elements of the system (Sargut & McGrath, 2011).

Complex social networks are characterized by their nodes and edges and are often captured as graphs as shown in Figure 1. Nodes are individuals or organisations, and edges are the links describing the interactions between them (Barabási, A hálózatok tudománya [Network Science], 2016). The graph is directed, if the edges are directed and it is undirected if they are undirected or bidirectional (Saxena, Jadeja, & Verma, 2021).
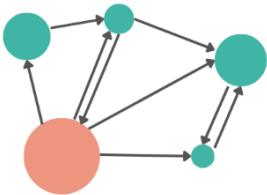
Figure 1: A network of four nodes illustrated as a directed graph
(Source: own depiction)

The probability that a node has exactly k links (degree k) follows a power law distribution (Barabási, A hálózatok tudománya [Network Science], 2016) as defined in Equation 1.

$$P(k) \sim k^{-\gamma}$$

Equation 1: Power law distribution

When entering a network, nodes will attach to the nodes with more connections. This process is known as preferential attachment and will naturally lead to the evolvement of "highly connected hubs" in any given network (Barabási, Scale-Free Networks: A Decade and Beyond, 2009), while "the more connected a network node is, the more links it will acquire in the future" as it's happening e.g. on Facebook, Google, or WWW (Barabási, Luck or reason, 2012). Due to new nodes entering and new linkages developing, networks change constantly, while their structure and evolution are inseparable (Barabási, Scale-Free Networks: A Decade and Beyond, 2009).

Another dimension of attractiveness alongside popularity is similarity (Papadopoulos, Kitsak, Serrano, Boguña, & Krioukov, 2012). Similar nodes, even when not popular, have a higher chance of getting connected. In social sciences, this effect is known as homophily. Preferential attachment will emerge as a result of an optimisation trade-off between popularity and similarity.
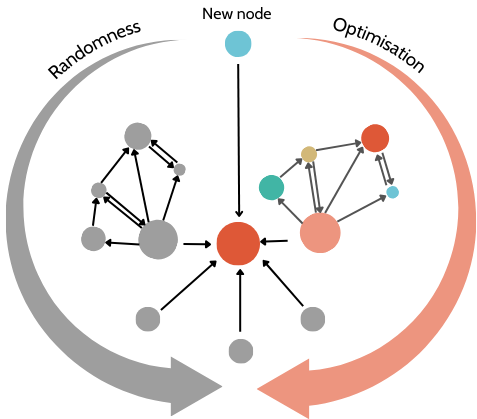
Figure 2: Randomness or optimisation?
(Source: depiction based on Barabási, Luck or reason, 2012)

Figure 2 illustrates two families of models on how a new node entering a network connects to already existing nodes. One family of model, depicted as the left grey side of the circle in the figure, states that new nodes will connect to existing nodes randomly following the Power law distribution described in Equation 1. The other family of models illustrated as the right red side of the circle assumes that the new nodes will optimise their positioning in the network through connections to the most similar nodes with the largest degree *k*. The central red node with the most links and the most similar one will be the one with highest chance for being selected (Barabási, Luck or reason, 2012).

The topology of the network determines its threshold. Pastor-Satorras and Vespignani discovered, that in scale-free networks, infections can spread whatever spreading rates they may have. While only viruses the spreading rates of which exceed a critical threshold will survive in the population, this threshold is determined by the topology of the network in which they spread (Pastor-Satorras & Vespignani, 2001). Saxena et. al. modelled two scenarios, with the objectives to see how information can spread quickly in a large network and how to minimize the path length by minimizing the number of visited nodes. They identified high out-degree and low out-degree nodes in the network that influence the speed of spreading information in the network (Saxena, Jadeja, & Verma, 2021).

Davern defined four basic components of social networks, (1) the structural component, (2) the resource component, (3) the normative component, and (4) the dynamic component (Davern, 1997). The structural component describes the configuration of actors and their ties with each other, while the network structure defines the exchange among actors. The structure considers the geometry of the network and the strength of social ties between the actors, e.g., the number of businesses they do together, or time spent together, etc. The resource component contains everything that can help actors to reach their objectives, e.g., estate, ability, knowledge, etc. including the actor's own resources as well as the resources of his or her contacts. Thus, an actor with high status contacts will have access to more resources and so most probably will gain favourable outcomes in socioeconomic processes. The normative component consists of norms, rules, sanctions, and level of trust that govern the behaviour of actors that can facilitate or hinder processes of exchange in a network. The dynamic component of social networks underlines the fact that networks change due to new ties and to dissolved ties.

Type	Description	Example owner	Example contractor
Search costs	Searching for transaction partners	Search for designers, contractors	Search for contract opportunities
Information costs	Getting all required information	Information about designers, contractors, materials	Information about prices, innovation
Contract costs	Setting up a contract	Design and construction contract	Subcontracts, materials, labor, equipment
Bargaining costs	Negotiating a contract	Negotiations for all types of goods	Negotiations for all types of goods
Decision costs	Concluding a contract	Agreeing to a design or construction technology	Defining a construction technology
Agency costs	Monitoring a contract	Quality control and assurance Meetings, team building	Material control, claims Management
Coordination costs	Coordinating the daily transactions	Progress, invoices and payments	Earned value analysis
Measuring costs	Quantitative assessment	Owner's project office Handover, commissioning	Project supervision from head office
Governance costs	Running the organization	Example owner	Handover, maintenance costs
Transfer costs	Handover of the project	Search for designers, contractors	Example contractor

Table 1 Transaction costs for contract goods in construction
(Source: Brockmann, 2003)

Transaction costs play a significant role in economic activities, contrary to the assumptions of the neoclassical model. These costs encompass obtaining information, market participation, and transportation, especially affecting exchange goods and more so for contract goods like construction materials. Ambiguity, uncertainty, and risk contribute to these costs, with higher risk aversion leading to increased transaction expenses.

In construction, these costs mainly consist of management activities such as planning, organizing, directing, and controlling. Roughly 30% of contract costs in construction projects are attributed to transaction costs. Owners tend to add layers of control, hiring consultants and managers, which can both unnecessarily increase spending in successful projects or save money in problematic ones (Brockmann, 2023). Table 1 shows a list of examples for transaction costs.

In a complex system, the same inputs can produce different outputs depending on the actual interactions of its links (Sargut & McGrath, 2011). The different interlinkages patterns may lead to asymmetries in the knowledge in the network (Barucca, Caldarelli, & Squartini, 2018). Weaver analysed different organizational structures within enterprises (Weaver, 2009), particularly within a three-tiered system involving manufacturers, retailers, and consumers, using a food system as an analogy. He introduced three types of costs related to product movement: transformation, procurement and distribution, and transactions, each affected by various technologies and institutional characteristics. He explored scenarios where changes in transaction costs influence efficiency and the shift from autonomous to network-based organizational forms. He demonstrated that agent decisions and their interdependence determine how flows persist within a network. These flow patterns shape the optimal network architecture by defining transaction structures and their persistence through inter-organizational relationships. Bellalah and Aboura developed an asset pricing model that includes asymmetric information and transaction costs as separate types of costs. The empirical test they conducted explained the expected rate of return, the transaction costs, and the information costs. The test showed a negative correlation between the expected rate of return and information costs and have an asymmetric evolution with transaction costs (Bellalah & Aboura, 2006).

In his information asymmetry theory Akerlof (Akerlof, 1970) highlighted how uneven information between buyers and sellers can disrupt markets. He demonstrated that when one party possesses more information than the other, particularly in situations where sellers know more about the quality of goods than buyers, it leads to adverse selection. In markets with information asymmetry, high-quality goods may be indistinguishable from lower-quality ones, causing buyers to be hesitant and offering lower prices or withdrawing from the market altogether. This situation, known as the "lemons problem," can result in a market breakdown where only lower-quality goods are exchanged, leading to inefficiency and a loss of overall welfare. Akerlof emphasized the importance of information in market transactions and highlighted how information gaps can significantly impact market outcomes, causing inefficiencies and market failures. The spreading of information is closely connected to learning. Golub and Jackson (Golub & Jackson, 2010) studied naïve learning in social networks and found that naïve agents can often be misled by prominent groups of opinion leaders and through the substantial amount of direct or indirect attention of network members destroy efficient learning. However, as long as there are many different segments of society with different leaders and with some interconnections, it is possible to obtain wisdom.

Information asymmetry is closely connected to fairness in social networks. Jalali (Jalali, 2022) studied fairness in social and professional networks from two perspectives: group-based and individual-based. In the group-based perspective, the concept of "information unfairness" was introduced to measure access to information within networks, demonstrating its existence in computer science co-authorship networks. Shifting to an individual-based perspective, the study examined network evolution and fairness. The concept of "stratification assortativity" got developed to measure social stratification's impact on network fairness and demonstrate the emergence of highly stratified states in co-authorship networks over time. An agent-based model was introduced to explain the emergence of stratification and its implications.

Network analysis is often connected with prediction. Recent interest in link prediction within complex networks spans various scientific fields, including social and biological sciences. The objective is to forecast absent or probable future connections within a network snapshot. This task holds both theoretical and practical significance: it streamlines the identification of missing links without resource-intensive experimental processes and facilitates the study of network evolution over time. To tackle this challenge, several approaches leveraging local and global network properties have emerged (Aziz, Slater, Bravo-Merodio, Acharjee, & Gkoutos, 2023).

3. RESULTS
The complex dynamics within networks transcend disciplinary boundaries, showcasing a universal architecture across biological, social, and technological realms. This universality fosters the cross-disciplinary applicability of research findings, enabling insights that resonate across diverse fields. Central to network dynamics is the intrinsic complexity where identical inputs can yield divergent outputs within complex systems. This phenomenon underscores the significance of interactions among system elements, driving variations in outcomes. Moreover, preferential attachment mechanisms within networks contribute to the emergence of highly connected hubs, emphasizing the interplay between node connectivity and future link acquisition. Homophily, the propensity for similar nodes to connect, regardless of popularity, further shapes network structures. This phenomenon holds significance in social sciences, emphasizing the relevance of shared traits in network formation. The network topology plays a crucial role in setting thresholds and determining the speed of information dissemination, significantly influenced by nodes with varying degrees of connectivity. The resource component within networks holds paramount importance, encompassing the diverse elements aiding actors in achieving their objectives. Access to resources, including high-status contacts, affords favorable outcomes in socioeconomic processes, underscoring the significance of resource allocation and utilization within networks. However, asymmetries in knowledge and uneven information dissemination between network actors can disrupt market equilibrium. These disparities can hinder efficient interactions between buyers and sellers, posing challenges in network functionality and market efficiency.

4. CONCLUSION
This mix of theoretical concepts holds practical significance. It streamlines the identification of missing links in networks without resource-intensive experimentation and facilitates the study of network evolution over time. The recognition of the dynamics between network topology, preferential attachment, homophily, and resource allocation offers a blueprint for optimizing social network design. Recommendations for social network design based on these findings revolve around fostering inclusive connectivity while mitigating asymmetries in information and knowledge distribution. Design interventions should prioritize mechanisms that encourage diverse connections and address disparities in access to information and resources. Promoting mechanisms that encourage connections based on similarity, beyond mere popularity, can foster a more inclusive network. Implementing measures to minimize asymmetries in knowledge distribution among network actors becomes imperative, facilitating equitable information exchange and reducing market disruptions. Moreover, employing strategies to enhance resource accessibility for network actors, particularly those with limited access, can create more balanced and efficient socioeconomic processes within networks. Incorporating mechanisms for ongoing monitoring and evaluation of information distribution can further refine network design, ensuring equitable access to information and resources for all network participants.

In essence, leveraging these theoretical underpinnings offers a roadmap for social network design that prioritizes inclusive connectivity, equitable resource allocation, and balanced information dissemination. Embracing these recommendations can fortify network resilience, foster innovation, and bolster socioeconomic interactions within networks. The next steps in this research involve a multifaceted exploration that merges theory and empirical validation. In an in-depth network analysis of real-world systems specific concrete networks with the focus in scrutinizing their complex structures, connectivity patterns, and growth dynamics. These empirical investigations seek to verify theories, such as preferential attachment, power-law distributions, and the influence of homophily. The aim will be to uncover how these networks' structures affect information dissemination, the emergence of influential hubs, and overall robustness. Beyond static observations, dynamic modelling and simulation beckon. Constructing dynamic models that mirror the evolution of concrete networks over time stands as a pivotal endeavour. These models will serve as a canvas to test hypotheses surrounding network evolution in response to mechanisms like preferential attachment, homophily, and external influences. Through simulated scenarios, the impact of alterations in network structures on critical facets such as information flow, network resilience, and the genesis of highly connected nodes could be defined. Case studies and comparative analyses would offer a grounded perspective. By examining specific concrete networks and their structural features and behaviours, we would gain invaluable insights. The exploration of concrete networks will blend theoretical foundations with empirical validation, thus formulating recommendations for social network design and management.

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SUSTAINABILITY, CAPABILITY AND DEPRIVATION CAUSALITY IN A CONTEXT OF EMERGENCE

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ABSTRACT

Inventors of quantitative estimation of national income, which received much attention, attempted to explain that their ultimate and main interest was the wealth of human existence, although what impressed were their indices, rather than their motivations. Yet, such deep and underlying motivation has often been ignored in economic analysis where means of existence are the centre and fruit of research. It is, however, important not to confuse the means and ends. Therefore, one should not focus on the intrinsic importance of income, but rather assess it depending on what it builds, particularly lives that are worthy of living. Having a decent income helps to avoid early death. Such an enterprise depends also on other characteristics, namely the organization of society, including public health, medical care, the nature of education and educational system, the scope of social cohesion and harmony, etc. Considering only means of existence or directly observing the type of life people lead constitutes a real difference.[1] These observations and findings reveal a contrast between the approaches based on utility and resources and the approach based on capabilities, of which the initiator is Amartya Sen (Nobel Prize of economics in 1998). The capabilities approach, therefore, attempts to put things right by focusing on the possibility of effective ends concrete freedom of attaining reasoned ends, rather than focusing on means.
Keywords: *Capability, Depriviation, Sustainability*

1. INTRODUCTION

The present paper falls into two parts. The first part will try to highlight the imperfection of traditional monetary indicators as well as the difficulties to measure the different dimensions of poverty, particularly in emerging countries, such as Morocco. We argue that poverty is not merely an idea of inadequacy of economic means of an individual, but rather a fundamental shortage that deprivation entails_ minimum adequate capability. The second part deals with a reorientation towards capabilities in order to explain the extent to which the latter (the capabilities approach) could serve as a basis for the assessment of the level of deprivation and not that of resources, which focuses on income and wealth. The nature of real existence has always been of interest to social thinkers over the centuries. If the current criteria of economic progress, reflected by a swarm of "turnkey" statistics, focused on growth of inanimate "comfort objects" (such as GNP and GDP at the heart of innumerable economic studies on development), this focus can only be justified, if at all, by the impact of the said objects on human lives that they directly or indirectly affect.. The interest of replacing them by direct indicators of the quality of life, wellness and freedom that human lives enjoy is more and more recognized.

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[1] SUDHIR A. and RAVALLION M (1993), "Human Development in poor countries: On the Role of Private Incomes and Public Services" *Journal of Economic Perspectives*, vol. 7.

Even inventors of quantitative estimation of national income which attracted much attention and adherence tried to make it clear that the ultimate interest was the richness of human existence, although it is their indices, rather than their motivations which had a great impact. William Petty, for example, the pioneer of the measure of national income in 17th Century (He suggested means to assess it so much through the 'income' method as through that of expenses, as is said today) formulated his intention as follows: to examine whether *« the subjects of the kind »* lived *« in as bad a condition as that of discontented people »*. Based on this, he explained the different determinants of people's conditions, including *« common safety»* and *« the particular happiness of every man»*[2].

This underlying motivation was often ignored in economic analysis where means of existence were the centre and fruit of research. It is, however, important not to confuse the means and ends. Therefore, one should not focus on the intrinsic importance of income, but rather assess it depending on what it builds, particularly lives that are worthy of living. Having a decent income helps to avoid early death. Such an enterprise depends also on other characteristics, namely the organization of society, including public health, medical care, the nature of education and educational system, the scope of social cohesion and harmony, etc. Considering only means of existence or directly observing the type of life people lead constitutes a real difference. These observations and findings reveal a contrast between the approaches based on utility and resources and the approach based on capabilities, of which the initiator is Amartya Sen (Nobel Prize of economics in 1998). In his work entitled *« A New Economic Model»,* Sen suggests that focus on means of existence should be abandoned in favor of concrete possibilities to live. This also results in a change with regard to means-oriented assessment methods, namely those laying emphasis on what John Rawls refers to as the *« primary goods »*, which are general means, such as income, wealth, powers and prerogatives of functions, social bases for self-respect, etc. The capabilities approach, therefore, attempts to put things right by focusing on the possibility of effective ends and on concrete freedom of attaining reasoned ends, rather than focusing on means. Thus, the present paper is divided into two parts. The first part will try to highlight the imperfection of traditional monetary indicators as well as the difficulties to measure the different dimensions of poverty, particularly in emerging countries, such as Morocco. We argue that poverty is not merely an idea of inadequacy of economic means of an individual, but rather a fundamental shortage that deprivation entails_ minimum adequate capability. The second part deals with a reorientation towards capabilities in order to explain the extent to which the latter (the capabilities approach) could serve as a basis for the assessment of the level of deprivation and not that of resources, which focuses on income and wealth.

2. ANTINOMIES OF TRADITIONAL INDICATORS

After World War II, economic growth was the centre in the fight against poverty. In fact, growth was considered as a means to achieve development. Thus, the growth of the GDP per capita became the only measure of poverty. Pigou was the first to rely on income to measure prosperity and welfare. He descibed economic prosperity as the measurable part of human wellness, the part that can be compared to money standard or benchmark.

However, the production and distribution process impacts the income of individuals and households. Income is, then, is also an indicator of economic activity. Income nationwide, GNP, as it was referred to, was transformed into a measure of the acitivty of the total mass of produced goods and services, weighted by their respective quantities and prices, rather than a measure of individual welfare.

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[2]HUL C.H. (1899), *The Economic Writings of Sir William Petty*, Cambridge, Cambridge University Press,

GNP per capita is obtained by dividing GNP by the country's number of inhabitants. Consequently, a country's GNP may increase from one year to another, and its GNP per capita may decrease if the population of this country increases more rapidly than its production. For OECP (Organisation for Economic Cooperation and Development) countries, international trade relations are such that it was necessary to replace GNP by GDP, which is the sum of added values created within the borders, whatever the nationality of the people who create them. It is the critieria of residence that is prioritized.

It should be noted that GNP or GDP indicate a *« production»* and not *« a living standard »*. According to certain stakeholders, in order to obtain a country's standard of living depending on its GNP, it is necessary to apply coefficients ranging from minus three to five as per the weight of capital in accumulated in the past, the country's political and economic systems, its geographical and climatic elements, the value of the currency and the weight of the informal sector.

In any event, there exists a certain correlation between poverty and low income. Income is the source of tpurchasing or spending power, access to consumption and saving. In societies where market values are dominant, *« a low income restricts access to the market and can determine a less valorized social status; it is a factor of a more or less marked exclusione»*[3].

Nevertheless, one cannot put forward that there exists a high causality between a low GNP per capita and poverty. One cannot claim that that a person dependent on a low income is automatically considered poor. On the one hand, income is but the monetary element of the allocation of each individual's resources. Various elements can intensify or attenuate the consequences of low income: self-subsistence, reciprocal counter-services, existence of property, constitution of family or extra-family solidarity networks, etc. On the other hand, income is not a necessarily determining component of a poverty condition. From the *« resources»,* point of view, income level at a given time has no indication as to prospects of future income, which would undoubtedly be more legitimate. Moreover, as Amartya Sen, in his book *« A New Economic Model»* shows, the same income can have different meanings depending on age, status, aspirations, etc.

The calculation of GNP per capita is subject to many statistical difficulties. In his work *«Towards a new measuring system»,* elaborated jointly with Sen and Jean Paul Fitoussi, Joseph Stiglitz raises asks the following question: *« What significance does the the calculation of the importance of a physical production flow take on if account is taken of the conditions of its production and distribution between the concerned persons?»*[4]. It is , thus, necessary to underline the problem of distribution of national wealth poses major difficulties. In fact, a growth rate of the GNP per capita can give a flattering image on effective development and ultimately on the poverty combatting strategies. Added to this is the fact that the contradiciton between national health and human wellness is very striking. It is apparent in countires where income arising from exports increased significantly due to the rise in oil prices since 2003. For many Arab countires, GNP abruptly increases to levels superior to those of the richest of Western States. However, these same countires sometimes have the poorest communities worldwide.

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[3] MILANO S. (1988), *La pauvreté absolue*, Paris, Hachette.
[4] STIGLITZ J., SEN A., FITOUSSI J-P. (2009), *Vers un nouveaux système de mesure*, Paris, Odile Jacob.

For Joan Robinson, *« Economic growth, when it occured, rarely solved urgent social problems and , most often, did not cover mass population of emerging countries. By making economic inequalities worse and not solving problems, such as unemployment, malnutrition, diseases and housing dificiency, economic growth always excerbated social problems and tensions»*[5]. In their work, *« Ruins of development »* Wolfgang Sachs and Gustavo Esteva support the same point of view. According to them, *« Since the rise of prolitariat and, later in the welfare state, poverty was interpreted as lack in purchasing power, which should be eliminated by economic growth. Under the banner of combatting poverty, forcible transformation into moeny economies can be conducted as a moral crusade, which could give way to a so justified appeal to economic expansion»*[6]. Besides inequalities concealed by measuring poverty based on GNP per capita, the latter includes all the goods and services produced and marketed, including harmful and noxious products that pollute the atmosphere and affect health.GNP per capita measures production, but provides little information on populations. If deterioration of the environment causes deseases, thus leading to an increase in health expenses and, subsequently, in GNP, such a GNP decrease will be interpreted as a sign of growth and, therefore a drop in poverty, when in fact the population's real conditions and their environment have detriorated.

According to the 2010 world report on human development, there were many attempts to recalculate the figures of national income taking into account the natural capital deprciation. One of the first studies carried out to this effect, in Costa Rica, shows that from 1970 to 1990, cumulative depreciation of its forests and oil reserves amounted to over $ 5billion. , i.e., about 6% of Costa Rica's total GNP for that period. In the case of Indonesia, the same report shows that during the period between 1971 and 1984, cumulative depreciation of forests, soils and oil resources amounted to $96 billion, i.e., 9% of its GNP for the same period. It is, therefore, commonly accepted that the income-based monetary approach to poverty rests on a narrow idea of welfare or wellness and, because it is indirect, limits our understanding of this phenomenon to what individuals have and what they do not have. Poverty is a larger phenomenon that is apparent in different domains as various forms of deprivation and unsatisfied needs that prevent individuals from leading a normal and descent life or take part in the ordinary activities of society. (Dickes, 1989 ; Alcock, 2006 ; UNDP, 1997). For this reason, it was concluded that adopting multidimensional and direct approaches can prove more satisfactory as to how to perceive poverty, for they have a much broader objective. At this level, it is necessary to distinguish two approaches. First, the approach of situated poverty, which focuses on the prevalence of social construction of poverty since, contrary to what utilitarians pretend, we cannot isolate a phenomenon, such as deprivation, of the environment in which it occurred and developed. This broader concept, which is applies, as apriority, to developing countries, makes it possible to integrate certain dimensions that are not used by Townsend (1979) in the assessment of poverty, such as culture, beliefs and social capital.

The second trend derives from the works of Amartya Sen(1980) on the capabilities approach, and which served as the basis for the elaboration by the UNDP of concepts of human development and human poverty. In this case, poverty is defined as a shortfall or dificiency in terms of basic capabilities likely to make it possible for a person to reach what Sen has called fulfilment or achievements. Amartya Sen's am is tp question the relevance of the *« income»* variable in the assessment of poverty. This crtitical examination holds true for all the different measures which , sharing this vision, perceive poverty in terms of weak or low income.

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[5] ROBINSON J. (1980), *Development and underdevelopment* Paris, Economica.
[6] WOLFGANG S. and GUSTAVO E. (1996), Ruins of development, Montréal, Ecosociété.

3. SITUATED POVERTY

In order to better understand situations like that of deprivation, we started with the following question: *Can we limit ourselves to the standard market model to understand the underlying nature of poverty?*

Several times, the determinism of Bretton-Wood's strategies of institutions met with the complexity of the studied fields and facts, a fact which translates into wide poverty in the poorest countires of the globe. Suffice it to remember that Amartya Sen's works confirm the reductionism of the utilitarian idea of the market as to the way of dealing of the nature and causes of the prosperity of nations.

Initially, all development policies had as slogan the following slogan: « *« in the name of combatting poverty as sologan»[7]*. For Hassan Zaoual, poverty is understood in a simplistic way. For experts of Breton-Woods' institutions, the concern is a simple *« economic category»* that can be calculated from the *« income» parameter* ». However, in an investigation we conducted in the region of Sefrou (Morocco), we came up with the conclusion that poverty is multidimensional by its very nature.

The assessment and analysis of poverty requires adaptation to the diversity of the studied individuals and populations. This is incidentally the reason why we have introduced the concept of *« situated poverty»*. Amartya Sen paid special attention to the principle of diversity, as is clear from its recurrence in his arguments. He began his work *« Rethinking Inequality»* by the following formula: *« Human beings are different fro each other. We are distinguished from each other by charcteristics that are not only external ((inherited wealth, the natural and social environment where we live), but also personal (age, gender, vulnerability to diseases, physical and intellectual aptitudes). To determine what equality requires, it is necessary to take into account this human diversity»[8].*

The remarks of Ibn Khaldoun, *« the father of history»,* clarify this point. This great historian of the 14th century, through a comparative analysis between the eating habits of the populations of Hijaz (Saoudi Arabia) and those of Shanhajas, veiled people of the South of the Maghreb, puts forward that hamine is a blessing for the life of the former so much from the physical as on the mental point of view.According to Majid Rahnema *« In general, Ibn Khaldoun argues, people who lack grains and condiments and live in the desertsare in better health than the inhabitants of the plains and heights who lead an easy life : their complexions are purer, their bodies helthier, their huamn types better porportioned and more beautiful, their behaviournot disporportionate, their faculties more receptive and more perpicacious in knowledge. It is a remark that has been confirmed for generations»[9].* This justifies the point of of view of the sitologi approach to poverty, according to which, poverty cannot come down to a general and universal formula where only the *« income»* variable"intervenes, to be later interpretaed as a sign of deprivation. It is the individual's life and environment that should be taken into consideration. It is, therefore, necessary to adapt economic analysis of poverty to the context of each location. According to its *« soft relativism»* principle, the situated poverty approach states that each location or site, while open to changes, exhibits peculiarities that impregnate people's individual and collective behavior within a given location.

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7 ZAOUAL H. (2000), *« La pensée économique plurielle : une révolution scientifique en marche» , Séminaire de culture de développement*, DEA Changement social, Université des Sciences et Technologies de Lille.
8 SEN A. (2000), *Repenser l'inégalité*, Paris, Seuil.
9 RAHNEMA M. (1991), La pauvreté globale: Une invention qui s'en prend aux pauvres, *Revue Interculture*, Volume XXIV, N°.2.

« Development policies made numerous « site errors» in so far as they tend to be dropped on from the summit to the base instead of favouring listening to and free participation of concerned populations »[10].

The 2010 world report on human development stresses that: *« the sectors of media, information and leisure, which, thanks to theirconsiderable means, ar epresent worldwide, can powerfully help eradicate or, at least, reduce poverty.They shape not only information, but also new culture and values. We need values that tolerate cultural diviersity and respect dignity of the poor so as to reinforce their solidarity and mobilize individuals and communities, companies and others against poverty»[11]. It equally stipulates that « Well-focused strategies are necessaryso that the growth model could beneficial for the poor and so that generated resourcese could be invested in human potentials. Growth is not enough.La croissance ne suffit pas. On its own, it can be without regards (the losers find themselves in grinding poverty), without jobs (almost no job is created), swithout participation (individuals are not associated to decision-making processes), with no future (the environment of future generations is destroyed) and without roots (history and cultural traditions die out »*. Like Amartya Sen, Hassan Zaoual assumes that it is necessary that the poor have an area of freedom so that they can better act, since the crowding out (l'effet d'éviction) will sooner or later end up recuring in the form of non participation which is detrimental to economic performance and local accummulation of skills through economic projects meant to respond to the causes of poverty. According to the same author, the assumed skills of *« experts »* sustain the site stakeholders' unskilfulness. The poor , thus, are not citizens, but rather customers of instituions and social security. The latter use their expertise without solving the problems that justify their existence.

Therefore, there is a new tendency based on the awareness of the role that local cultures and beliefs can play in combatting poverty, a fact which proves to be a first step towards a new concept of combatting poverty and which claims to *situated* and therefore open on new anthropological and cultural dimensions of the concerned location. This confirms the contributions of the capabilities for which a better analysis of deprivationassumes a better understanding of the area and populations studied.

4. CAPABILITIES APPROACH

During the last few years, there has emerged a growing interest in the idea of *« capabilities »* introduced by Amartya Sen (1980, 1985, 2000, and 2003). If the Nobel Prize that Sen obtained in 1998 is a symbolic proof, it is certainly the more and more widespread use of this approach among researchers and institutions in their understanding of questions related to wellness, poverty and inequalities that is better evidence for this. The capabilities approach is based on ethical concerns related to social equity. In fact, at the beginning of his reasoning, Amartya Sen poses the question of what attribute a society should equalize to achieve social equity. Starting from a thorough and well-founded criticism to the proposals of the two dominating ethical approaches at the time, i.e., utilitarianism (Bentham, 1789) and Rawlsian theory of equity (Rawls, 1971), he suggested a space of functionings and capabilities, such as adequate assessment of questions related to welfare, poverty and inequalities. Thus, in the field of social equity, this approach constitutes a new paradigm and a real alternative to utilitarian orthodoxy.

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10 ZAOUAL. H. (2002), « La pensée économique peut-elle être flexible », in Granier R. et Robert R (sous la dir.), *Culture et structures économiques. Vers une économie de la diversité ?,* Paris, Economica.
11 PNUD (2011), *Rapport mondial sur le développement humain 2010*, Paris, Economica.

The capabilities approach is an expanded and normative framework for the assessment of issues related to individuals' welfare, social arrangements, policy implementation and societal changes based on individuals' actual ability to do or to be something and the scope of freedom they enjoy to promote and achieve their objectives. This approach starts from the simple remark that an individual's living standard is directly related to the different states and acts they can accomplish or achieve. Sen makes use of the term "*functionings*" or achievements to refer to these states and acts that individuals effectively attain. For Sen, *« the thesis is that functionings are constituents of the person's existence and that the assessment of their welfare should necessarily be a judgment of these components »[12]*. The ability to function constitutes all the real opportunities the individual if offered and represents the various combinations of functionings (states and actions) that the individual can accomplish. Capability is, therefore, a set of vectors of functionings which indicate that an individual is free to lead this or that type of life. Thus, on the conceptual level, the main innovation of the capabilities approach is the adoption of an expanded informational space, wider than that of the traditional approach, to deal with a set of normative questions (Farvaque, 2003). As is stressed by Robeyns (2005), the two focal points of this approach are the focus on the distinctions between means and ends, on the one hand, and between real freedom (capabilities) and functionings (outcomes), on the other.

Resources are goods and services (commodities), be they mercantile or not, that the individual has at their disposal, as, for instance, food or a bike. These goods have an instrumental value rather than an intrinsic or inherent value, for what really matters is the way we can use them. Also, like Gorman (1956) and Lancaster (1966), Sen (1985a) draws a line between resources and their characteristics which constitute their desirable properties and determine the uses to which the good can be put. It is these functionings that constitute the intrinsic value. A bike enables its owner to move; food does not only make it possible to satisfy hunger, but also brings the pleasure to eat and to create a social support through the organization of meals (Sen 1985). Therefore, the characteristics of goods (bike) provide individuals with the possibility to implement the related functioning (movement).

However, Sen (2003, 150) points out that there is nothing automatic, permanent or inevitable about the relationship between income (and other resources), on the one hand, and individual achievements and freedoms, on the other. In fact, owning a good is different from the ability to benefit from its characteristics. It is not enough to know the quantity of food an individual has to judge the way they are fed. Sen's well-known example is that of an individual suffering from a parasitic disease that makes the digestion of food difficult. This person can suffer from malnutrition, even if they have at their disposal a quantity of food that would enable an individual without such disease to be well fed. Thus, information of goods ownership proves insufficient to judge someone's living standard or welfare, for it does not take into account of the relationship between goods and functionings. To be able to take account of such contingent relationship, Sen introduces, at the heart of his approach, a set of internal and external conversion factors, which determine the possibility to convert the characteristics of resources into functionings. First of all, such transformation will be influenced by personal conversion factors related to the individual's internal characteristics (physical, intellectual aptitudes, metabolism, etc.). A person suffering from physical disability will not be able to achieve the characteristic *« movement »* that the good has *« bike »*. In the case of food, metabolism, age, gender, activity level or health conditions are conditions that will influence the way the individual will indeed convert resources (food) into functionings (to be well-fed).

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[12] Sen A. (1999), *L'économie est une science morale*, Paris, La Découverte.

Besides, age and gender determine specific needs that income does not take account of (young children, old people, maternity, family obligations). The other conversion factors are external and highlight the influence of social characteristics (politics, social norms, power relationships) and environmental characteristics (climates, infrastructures, public goods) may exert. A country(s social rules and traditions may constrain women's behavior, thus reducing all their potential functionings. Likewise, riding a bike may depend on climatic conditions and usability of a country's roads, the ability to be well-fed may depend on drought or flood problems and the ability to be in good health depends on risks of contagious diseases in the region of residence. Therefore, taking account of these different conversion factors will make it possible to consider interpersonal variations, which enables individuals with identical resources may have two different living standards. This last point is particularly important within the framework of the elaboration and assessment of public policies aiming at reducing poverty (Sen, 2003).

In the course of Sen's reasoning, it is important to understand the distinction between functioning and capabilities. Functionings are individuals' different states and acts. They form what a person, given a set of conversion factors, can do or be. They can be elementary (i.e., to be well-fed and in good health) or complex, such as the ability to take part in community life, take a rest, be respected, have self -esteem, etc. Assessment of welfare, therefore, takes the form of an assessment of functioning vectors (i.e., individuals' valued states and acts). Reference to functionings makes Sen's approach a direct and multidimensional one. Indeed, although he considers that an individual's welfare should depend deeply on the nature of their existence, that (i.e., accomplished functionings), at the heart of his approach, he places capabilities rather than functionings.

As is highlighted by Robeyns (2003), while a functioning is an achievement, a capability represents the possibility of achievement and refers to all potential functionings. Consequently, Sen's emphasis is not on what people have or do, but on what they have the choice to do or do not have the choice to do. Based on all the characteristics of the resources at their disposal and on the conversion factors, an individual can determine vectors of potential functionings that represent the different combinations of potential functionings they can achieve. This set represents all the individual's capabilities and gives an image of the scope of the choices at their disposal. It, therefore, precedes all functionings which constitute all the states and acts that an individual achieves. Moving from the space of capabilities to that of functionings is shown by the individual's real choice, which, in turn, depends on the individual's history as well as on the mechanisms of preferences; these mechanisms themselves depend on the social context. In Sen's view, functionings are more related to living standards, whereas capabilities result in a dimension of freedom and choice.

In fact, capabilities refer to an individual's real freedom and real opportunities, and the freedom, in the positive sense of the term, which an individual has to promote or achieve a functioning they would like to enhance. To illustrate the importance of the difference between capability and functioning, we can cite the example of two people who cannot sufficiently provide for their needs in terms of food. However, one is a person suffering from famine where as the other is a person who has chosen to be on hunger strike as a sign of protest. Regarding the good "*food*", both people realize the functioning of being "malnourished", but not through the same path.; while one of them was forced into such a situation, the other one has made a choice. The notion of choice is not easy to understand. One finds the same questions asked in works on deprivation an which involve determining whether choices are forced or deliberate.

Based on these considerations, Sen suggests a distinction between living standard, welfare *and « agency»*. For him, the living standard is the broadest notion and is connected with information related solely to the individual. The difference between the living standard and welfare emerges from the possible influence of external sources on a person's welfare. Thus, pain (joy) caused by sorrow (happiness) of a relative reduces (increases) welfare, but does not affect the living standard. Agency is much broader and rests on the idea that an individual can have objectives and values other than the search of their personal comfort. An example is a person's commitment towards the issues of their community through the participation to anti-globalization protests, being persuaded that this globalization has harmful effects (Robeyns, 2003).

These various concepts constitute the backbone of the capabilities approach, of which the use, as a framework of thought, is very wide and is confined to studies of poverty. The capabilities approach to poverty constitutes a way to move from the analysis of means to the analysis of ends. In this context, Sen (2003, 36) considers that *« it is just to consider poverty as deprivation of the basic capabilities, rather than merely a low of income»*. This definition of poverty refers to a shortfall or deficiency of basic capabilities. The latter constitute a subset of the set of "capabilities" and refer to the freedom to achieve basic things that are necessary to survive and to avoid or escape poverty.

Thus, while capabilities can cover a vast and varied field, basic capabilities refer precisely to the real possibility to avoid poverty. They concern the ability to satisfy minimum and adequate levels of certain crucial functionings. The identification of these minimum and acceptable levels constitutes the basis of Sen's approach to poverty. For Robeyns (2005, 101), basic capabilities are crucial to analyze poverty and, in more generally, to study the welfare of the majority of the population in a developing country, whereas in rich countries, welfare focuses rather on capabilities that are more or less necessary for physical survival. Therefore, from the outset, this definition is broader than given by……, but it is more subtle and delicate to make operating. The capabilities approach is the development paradigm that is underlying the concepts of human development and poverty introduced by the UNDP (1990, 1997). One of the major changes that this new paradigm offers is the possibility of analyzing the different questions regarding poor countries and individuals within a flexible framework, rather than imposing political or other prescriptions in the name of a rigid neoliberal orthodoxy (Fukuda-Parr, 2003). Within the framework of this approach, human development is geared towards the expansion of capabilities, whereas human poverty reduction involves ensuring that individuals who should have to primary resources have a set of basic capabilities likely to help them achieve these resources.

The main difference between the concepts of human development and human poverty is that the former focuses on the living conditions of all individuals in society while the latter lays emphasis on those of poor individuals. Thus, as part of the overall view of human development, the disadvantages of the poorest people can, in an aggregated level, be made up for by the gains of the well-to-do ones. The concept of human poverty and poverty indices were introduced in order to focus on the situation of the most underprivileged people. In this case, lack of progress in the reduction of disadvantages of people in deprivation cannot be made up for by the significant progress of the well-to-do. Subsequently, Anand and Sen (1997) consider that the two approaches are useful for understanding the development process, and that they are not exchangeable. The human poverty approach was introduced by the UNDP's 1997 Human Development Report. This report seeks to focus on the challenges of poverty eradication in the world with a view towards human development.

For this purpose, it does not simply focus on poverty, in the monetary sense of the term, but rather on a multidimensional approach to poverty. (Anand and Sen, 1997). It draws its inspiration, to a large extent, from Sen's capabilities approach, as is shown by the introductory phrase of the first chapter of the 1997 Human Development Report., which stipulates that *« It is the deprivation lives that people may lead that poverty can be seen. Poverty implies not only low income or deficiency in elements necessary to well being, but also denial of and deprivation in opportunities and basic choices for living a tolerable life"*. These choices and opportunities refer to basic capabilities. This means that, in this approach, poverty is not merely a state of deprivation currently lived by an individual, but also the absence of real opportunities, due to social constraints or to personal characteristics, for living a life that they reasons to valorize. Nevertheless, with poverty being a state that everyone one wishes to avoid, it may be said that its study can disregard this notion of freedom and focus on the individual's real functionings. This approach largely exceeds the physiological model of deprivation, for « *capabilities » mean, « to be in good health, have access to knowledge, have access to resources necessary to have a decent standard of living and be able to take part in the community's social life »* (PNUD, 2001).

From a political point of view, the objective is, therefore, the *« removal of obstacles in what one can do in life, obstacles such as illiteracy, diseases, insufficient access to resources, or insufficient political and civic rights »* (Fukuda-Parr, 2003). Fukuda-Parr (2003) evokes a five-point strategy for development and poverty reduction: (1) give priority to social development with a spread of opportunities of education and health care., (2) economic growth creating resources for multidimensional human development, (3) social and political reforms in view of establishing a democratic governance to secure all people's rights, (4) foster equality in the three preceding points, namely for the poorest people (5) global political and institutional reforms to create an economic environment where access to markets, technology and information would be easier for poor countries. Within these diverse components, one can notice the rise of the concept of empowerment (World bank, 2000 ; Narayan, 2002) and the increasingly accrued taking into account of questions related to gender equality.
The capabilities approach has led to clear conceptual advances in the field of poverty studies, both as to the debate on the absolute or relative aspect of poverty and as to its role in the appearance of the concept of human poverty. These conceptual advances are nevertheless are confronted with important operationalization problems, which are partly due to the scope of this approach.

5. OPERATIONALIZATION OF THE CAPABILITIES APPROACH
The great riches and complexity of Sen's approach are not easy to express empirically, for the capabilities approach is much more demanding on the informational and methodological level than on the monetary level of poverty. If for some people, the problems facing this approach seem to be insuperable, for others they are simply a reflection of the intrinsic and irreducible complexity of the concepts it makes possible to understand. Such is Chiappero Marinetti's (2000) point of view, who stresses that the empirical applications of the capabilities approach require an adequate space for the evaluation of capabilities (or functioning), a pertinent list of capabilities and functionings, a set of indicators for each of the dimensions of wellness taken into account, the way, if necessary, to combine the elementary indicators to obtain an assessment on each dimension of wellness and the way to add information on the different dimensions and achieve a comprehensive assessment of wellness. Assessment of capabilities requires that, on the one hand, valuable items be selected and, on the other hand, the value of these items be determined (Sen, 2000). In fact, beyond the preceding, there emerges the problem of the list of elements to consider and their relative importance.

This question is related to the horizontal imprecision of the capabilities approach. Sen's reference to the different states and acts, which a person has reasons to valorize suggests that this approach is inherently multidimensional and refers to a multitude of functionings/ capabilities, which can impact individuals' wellness. In the case of the study of poverty, confining oneself to a set of basic functionings makes it possible to limit their number. However, even at the level of basic functionings, Sen's capabilities approach does not provide a list of functionings/ dimensions, nor does it provide a clearly defined selection method. This question is of paramount importance and is recursively at the heart of the current debates on the operationalization of this approach (Robeyns, 2005). Indeed, although Sen's theory is theoretically attractive, as long as one does not have clearly defined criteria for the selection of value functionings, one will face a series of criticisms. In particular, the absence of a list makes Sen's approach is not fully specified.

Absence of a list makes Sen's approach not completely specified. For some researchers, this incompleteness poses a problem. Nussbaum (2003) considers that as long as Sen has not explicitly determined a list, his approach will lack percussion. Alkire (2001, 2002) shares the same point of view. She considers that lack of a procedure for the identification of pertinent capabilities (dimensions) makes the implementation of this approach difficult. These two authors agree that, in this case, the approach may be not understood and may give free reins to all sorts of deviations. In fact, without a list or a transparent selection method, numerous works aligning themselves with this theory may adopt different approaches or steps, which will lead to more confusion than clarity.
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Other authors leveled stronger criticisms. Townsend (1985, 667), for instance, argues that the absence of scientific criteria for the selection of dimensions is *« scientifically unacceptable »*. For him, *« one should consider the question of knowing how capabilities are selected and in what way they are absolute »*. In the same vein, Sugden (1993) raises the following question: *«given the large number of functioning that Sen considers as pertinent, given the scope of disagreement between reasonable people as to the nature of what is a descent life and given the unsolved problem of the way in which sets should be assessed, it is natural to raise the question of knowing the extent to which Sen's framework of analysis is operational »*.
In reply to these criticisms, Sen admitted that it is necessary not only to identify the capabilities and classify them into the most central ones and the most trivial ones, but also to assess their relative weight. However, he thinks that any subsequent specification on his part would be controversial. In fact, while he is not averse to the idea of determining that, in some specific cases, certain capabilities are more important than others, he refuses to endorse the a predetermined and definite list of capabilities. The reason for this is that the capabilities approach is not confined to a sole objective. It was elaborated as abroad framework of thought. Consequently, Sen believes that each application necessarily depends on its context and it for this reason that his approach was deliberately incomplete. The selection of capabilities should therefore be geographically contextualized.

Thus, from a methodological point of view, *« they are applications to specific questions, context-sensitive and limited by data, which can give birth to a pertinent list »* (Farvaque, 2003). Besides, the elaboration of the list pertains to a value judgment that should be explicitly made through a democratic and participative method. It is not the work of a theorist. It is, therefore, clear that if the malleability of this approach makes it evasive in the eyes of certain people, Sen considers it as an asset and thinks that this approach cannot be made more specific without carrying out a universal assessment, which will make it possible to choose the valuable items and their relative weight.

Thus, while this incompleteness is the point which leaves this approach wide open to the most ferocious criticisms, it is one of the reasons of its success. If he refuses to give a list of basic functionings, Sen nevertheless lays tracks that will help understand the scope he intends to give to his approach. These tracks are in the form of domains that one can take into consideration and the form of two selection criteria, based on consensus, which will make it possible to select the set of pertinent, basic capabilities without having recourse to value judgments.

6. CONCLUSION

In spite of incompleteness that Ammatya Sen's approach exhibits, it should be nevertheless admitted that anypoverty reduction policy that does not take into consideration the capabilities of individuals or groups of population increasesdeprivation. In other words, any person's emancipation and *« well being»* depends on their capability to change their situation. Increase in income does not automatically lead to the improvment of*« well being»* when the individual as well as their environment are not able to develop relying on their endogeneous capabilities. Therefore, the problem lies in the inadequacy and not the lowness of income. Having an adequat income does not mean having an income that is inferior to a poverty threshold set from outside. Instead, it is having an income lower to what a person should have to ensure a specific level of capability. This means that, to analyse poverty, one should not confine oneself to data on income [13] ; it is necessary to pay particular attention to the diversity of environments and social phonemena. According to Sen, *«Ana analysis of poverty based solely on income will only say half the truth»*.

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[13] Instead of measuring poverty based on income, Sen suggests calculating one can achieve with this income, while taking into account the fact that these achievements can vary from one individual to another and from one place to another. Otherwise, how can we explain that there exist poverty pockets inside middle classes in rich countries?

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STIMULATION OF THE OPERATION AND DEVELOPMENT OF INDUSTRIAL PARKS: NATIONAL AND SUBREGIONAL LEVEL

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ABSTRACT
The article examines the processes of creating and supporting the development of industrial parks (IP) in the countries with transition economy on the example of Ukraine. The legislative framework for the functioning of industrial parks is studied. The tools and mechanisms of state support for IP at the state and local level are determined. Using the example of Zakarpattia region, the experience of the rear regions of Ukraine regarding the creation of industrial parks under martial law is analyzed. Based on the study of scientific literature, the international experience regarding the role of industrial parks in the development and use of "education-science-production" chains and their role in the development of the economy at the national and subregional level is summarized.
Keywords: *industrial parks (IP), special economic zone (SEZ), state support, national, local and subregional levels, rear region, relocation, technoparks*

1. INTRODUCTION

In Ukraine, the processes of deindustrialization became a manifestation of the degradation of the national industrial potential, which pushed the domestic economy back a decade compared to the initial positions. After the amendments to the Tax Code of Ukraine regarding the functioning of the simplified system of taxation, accounting and reporting in the field of tax legislation, the fundamental issue regarding the functioning of special economic zones (SEZ) remained unresolved *(Galasyuk, 2018)*. As noted by O. Moldovan "today, in Ukraine, the concept of SEZ is completely discredited and is associated, as a rule, with colossal tax benefits, corruption and lost budget funds. This practice really took place, although there are also examples of quite successful projects that made it possible to attract investments in high-tech production and create jobs" (Moldovan, 2011). In February 2011, a draft law was submitted to the Verkhovna Rada of Ukraine for consideration, in which it was proposed to formalize another type of SEZ into a separate mode of economic activity – industrial parks, which are one of the most common types of SEZs, which were created both in economically developed countries, as well as in developing countries *(Moldovan, 2011)*. The domestic investment climate is characterized by a number of serious shortcomings, and according to the attractiveness of the tax system, according to 2018 data, Ukraine ranked one of the last in the world: 133 out of 138 (Schwab, 2017).

The situation became much more complicated in the conditions of martial law. At the same time, during the war, "the industrial parks themselves became one of the key tools for business relocation. These sites allow businesses to use certain relaxations and state support, even in economic crisis conditions" *(Konoplyova, 2023).*

2. INSTRUMENTS AND MECHANISMS OF STATE SUPPORT OF IP IN UKRAINE

Industrial parks are one of the effective mechanisms for successful decentralization, which involves creating conditions under which territorial communities have understanding, interest and tools for the development and increase of the well-being of residents through the release of entrepreneurial initiative, attraction of investments, creation of jobs, development of production and filling of budgets *(Dnipropetrovsk investment agency, 2017).* Today, there are about 15,000 industrial parks operating in the global economy. The largest number of them is concentrated in China, the USA, Turkey, the Czech Republic and Korea. There are also a large number of technology parks in neighboring Poland *(Marchuk, 2021).* There are over 70 industrial parks in Ukraine, and in total, 14 new industrial parks were created in the country during the war with investments more than UAH 200 million *(Konoplyova, 2023; Prysyazhna, 2024).*

2.1. Legislative basis for functioning and stimulating of IP development

The rapid development and growth of the number of analyzed subjects was facilitated by the introduction of amendments to the Law of Ukraine "On Industrial Parks" dated on August 9, 2023, which provided for the introduction of a number of incentives to attract investments. In accordance with Clause 2 of the first part of Article 1 in the version of the Law of Ukraine dated 06.30.2023 N 3220-IX it is determined that the industrial park is the territory defined by the initiator of the creation of the industrial park in accordance with the urban planning documentation, equipped with the appropriate infrastructure, within which the participants of the industrial park can carry out economic activities in the field of processing industry, processing of industrial and/or household waste (except waste disposal), alternative energy, energy storage, as well as scientific and technical activities, activities in the field of information and electronic communications under the conditions specified by this Law and the contract on the implementation of economic activities within the industrial park *(On industrial parks, Law of Ukraine, 2012).* The aforementioned Law emphasizes that "the production of excise goods cannot be carried out on the territory of industrial parks (with the exception of production of biological fuels (biofuel), production of biocomponents, production of energy from alternative energy sources, production of passenger cars, their bodies, trailers and semi-trailers, motorcycles, vehicles, intended for the transportation of 10 people or more, vehicles for the transportation of goods) and economic activity subject to licensing in accordance with clauses 18, 181, 20-22, 32 of the first part of Article 7 of the Law of Ukraine "On Licensing Types of Economic Activity". In accordance with paragraph 3 of part one of article 1 of the Law of Ukraine "On Industrial Parks" (as amended according to Law from 24.11.2015p. №818-VIII, from 16.12.2020p. №1089-IX, in the edition of the Laws of Ukraine from 07.09.2021p. №1710-IX, from 30.06.2023p.№3220-IX) it is determined that "the initiator of the creation of an industrial park is a state authority, a local self-government body, which, according to the Constitution of Ukraine, exercises the right of the owner to the land on behalf of the Ukrainian people and, in accordance with the law, is empowered to dispose of the land, as well as a legal entity or an individual – the owner or lessee of a plot of land that can be used and is offered by him for the creation of an industrial park" *(On industrial parks, Law of Ukraine, 2012).* The managing company of the industrial park is a legal entity created in accordance with the legislation of Ukraine, regardless of the organizational and legal form and selected in accordance with this Law, with which the initiator of the creation concluded an agreement on the creation and operation of the industrial park.

The analyzed Law also provides a definition of the term cross-border industrial park, the prospect of the creation of which becomes relevant for the border regions of our country, in particular the Zakarpattia region. In particular, according to the Law "On Industrial Parks", a cross-border industrial park is created and functions on the basis of an international agreement of Ukraine, which is concluded between the governments of the states or the initiators of the creation authorized by them. The procedure for the creation and operation of such industrial parks is regulated by international treaties of Ukraine *(On industrial parks, Law of Ukraine, 2012)*. On June 4, 2024 the Government has approved a new Procedure for providing state incentives for the creation and operation of industrial parks. It provides for the provision of funds for the construction of engineering and transport infrastructure facilities necessary for the creation and operation of industrial parks, as well as compensation for joining engineering and transport networks *(Ministry of economy of Ukraine, 2024)*. According to the Law of Ukraine "On Industrial Parks", the functioning of industrial parks is aimed at: attracting investments and developing the economy of Ukraine; equalization of the economic development of the regions and improvement of the quality of life of the population of Ukraine; introduction of innovative and energy-saving technologies; creation of new jobs; sustainable development and protection of the natural environment *(On industrial parks, Law of Ukraine, 2012)*. At the same time, as noted by O. Moldovan the prevalence of industrial parks in the world is due to the following factors:

1. Industrial parks contribute to the increase of investment activity in the economy, because the very essence of the functioning of industrial parks is to increase investments.... In addition, production within the industrial park automatically expands the demand for the products of adjacent industries, which stimulates their development. An additional source of investment is budget expenditures for the development of infrastructure and logistics within industrial parks.

2. Industrial parks make it possible to legitimately subsidize priority industries, in particular, high-tech, which belong to the complex of industries that can bring significant economic benefits, even if they pay quite small amounts of taxes. Such benefits can be investments, jobs, inflow of foreign currency, increase in income of the population, demand for education, etc.

3. The development of industrial parks makes it possible to economically, ecologically and aesthetically structure settlements, "purifying" cities from industrial production. In the last decade, there is a tendency to expand the average area of industrial parks, which is connected with the desire of the authorities to concentrate in them both newly established enterprises and existing industrial enterprises (in fact, to move them outside the territory of the settlement). The concentration of industrial production on limited areas outside residential, historical, cultural and recreational areas not only makes the economy of the community more efficient due to the reduction of transaction costs, but also improves the quality of life and ecological condition in the respective settlement *(Moldovan, 2011)*.

2.1.1. Tools and mechanisms of IR development: national and local level
The United Nations Industrial Development Organization (UNIDO) conducted a study that showed that the role of the government in the development of industrial parks gradually changed from passive – from simply providing a plot of land, to active – providing effective incentives and preferences both at the local and national level (*United Nations Industrial Development Organization, 2024)*.

Thus, according to the UNIDO study, the incentives of industrial parks can include:
- loans at special preferential rates;
- exemption from taxes and duties;
- subsidizing rent;
- provision of land on preferential terms;
- subsidizing electricity and water tariffs;
- preferential tariffs for telecommunication services;
- simplified regulatory procedures/single window;
- collective use of services and assets;
- creation of residential and communal infrastructure for employees *(Dnipropetrovsk investment agency, 2017)*.

The information in Table 1 shows the main directions of state support for the creation and operation of industrial parks.

State support of industrial Parks on the national level	Support of industrial parks on the local level (local communities)	Other possibilities of the state support
- exemption from equity participation in the development of local infrastructure in the case of construction of objects by the entities of the IP within the limits of the respective IP; - exemption from payment of import duty upon importation by IP subjects of equipment and components for it, materials that are not produced in Ukraine and are imported for the purpose of arranging the IP and carrying out economic activities within them; - channeling funds from the State Fund for Regional Development to finance projects for the creation of industrial park infrastructure, subject to co-financing from local budgets at the level of 10% of their estimated cost; - for IP subjects to receive state support provided for by law, the corresponding IP must be included in the Register of IPs. However, if the initiator does not foresee receiving state support, the industrial park may not be registered, because the fact of its creation is the decision of the initiator.	- granting, by decision of local self-government bodies, benefits from land tax and real estate tax for private equity entities that take into account the public interests reflected in the program documents of economic and social development; - establishment by state bodies and local self-government bodies of the minimum rental rate for the lease of state and communally owned lands (from 0.1% to 3% of their normative monetary value); - assistance at the local level in the preparation of all permits and other documents necessary for the implementation of projects; - allocation of funds from the local budget to finance works to provide engineering infrastructure for certain land plots or create conditions for access to these plots; - organizational and financial participation in the recruitment and organization of training of potential and current employees of IP companies.	- exemption from payment of import duty for the purpose of investment on the basis of registered agreements (contracts) or as a contribution of a foreign investor to the authorized capital of an enterprise with foreign investments. (Law of Ukraine "On the Foreign Investment Regime" and the Customs Code of Ukraine); - importation at preferential import duty rates (up to 0%) of goods originating from states that are members of the World Trade Organization, or from states with which Ukraine has concluded bilateral or regional agreements regarding the most favored nation regime, including with the EU and Canada; importation without payment of import duty of equipment that works on renewable energy sources, energy-saving equipment and materials, means of measurement, control and management of consumption of fuel and energy resources, equipment and materials for the production of alternative types of fuel or for the production of energy from renewable energy sources. (Customs Code of Ukraine).

Table 1: Tools and mechanisms of the IP support at the national and local levels
(Source: Dnipropetrovsk investment agency, 2017)

By applying a certain combination of the above-mentioned measures of state and local support, it is possible to achieve the attractiveness of industrial parks in Ukraine. At the same time, it is worth considering that the main goal of economic and, in particular, fiscal incentives within the framework of the functioning of industrial parks is not to provide their participants with more favorable non-market advantages, but to reduce the burden on income and profit, which will allow increasing investments and production *(Dnipropetrovsk investment agency, 2017)*. The mechanism of industrial parks is an effective model for the success of newly created, and in modern business conditions, also relocated enterprises. Since the beginning of the war, 305 enterprises from different regions of the country have moved to the territory of the Transcarpathian region, which is almost 50% of all relocated enterprises in Ukraine. The creation of new industrial parks is aimed at developing the processing industry, supporting Ukrainian exports, creating new jobs and filling local budgets, and for relocated businesses, the format of industrial parks solves several key issues: they are provided with a land plot, communications are provided, significant benefits are determined in the case of importing equipment for profit tax, if they invest the corresponding amounts in the development of production, and others. According to calculations, the average cost of creating one industrial park is UAH 250 million, along with this – 1 hectare of land for an industrial park at full load provides up to 50 jobs, each dollar of state investment provides $5-6 of private investment *(Guz, 2023)*. Objectively, since the beginning of the war in Ukraine, a significant part of industrial parks has been created in the territory of the rear areas of the state, one of which is the Transcarpathian region. Today, 5 industrial parks operate in this region, the activities of which are aimed at the development of the processing industry, professional, scientific and technical activities. The creation and operation of industrial parks in the region dates back to 2014, when the first industrial park "Solomonovo" was included in the Register of Industrial Parks in the region. The purpose of creating an industrial park was to create a high-tech territory, an analogue of the best world models, for the placement of medium and precision engineering industries. The functional purpose of the industrial park is to accommodate production facilities in the medium and precision engineering sectors (automotive industry, instrument-making, electronic industry, etc.). A developed transport and logistics network allows the park to be connected to European business centers in the shortest possible time and opens up new opportunities for launching export programs in industrial high-tech sectors *(Guz, 2023)*. The Maramures Industrial became one of the first industrial parks to be registered under the new procedure during martial law. The main area of activity of the analyzed IP is the forest and furniture industry; machine-building industry; production of high-tech products and products with high added value, etc. The industrial facilities of the industrial park are located on an area of 126,120 sq.m., technical zones occupy about 6,750 sq.m., along with this, a significant territory of the technopark is allocated for a customs terminal and bonded warehouses - 29,440 sq.m. *(Kyrylko, 2021)*. The Friendly Wind Technology Industrial Park is located in the city of Perechyn, Uzhhorod district, Zakarpattia region. According to the concept of the industrial park, it was planned to create 745 new jobs in the processing industry, professional, scientific and technical activities. The industrial park specializes in power engineering; strengthens energy security in the region and Ukraine as a whole; provides everything necessary for the manufacture of components and assemblies of multi-megawatt class wind turbines; it is an integral part of the national program for wind generation in Zakarpattia – "Energy Independence and Green Course" *(Friendly Windtechnology, 2024)*. On June 2, 2023 "Western Industrial" IP was included the Register of Industrial Parks. The industrial park with an area of 21.7 hectares is located in the town of Bushtyno, Tyachiv district, Zakarpattia region. On the basis of the new industrial park, it is planned to create 1,100 jobs in the processing industry, which will contribute to increasing the level of added value of products and diversifying Ukrainian exports.

New jobs are planned to be created in the field of furniture production, sawmilling and planing production, production of wood products, production of building metal structures and products, production of glass and glass products, production of clay building materials, etc. *(Ministry of Economy of Ukraine, 2023).* On January 12, 2024, the Cabinet of Ministers entered the industrial park "BF Terminal", located in the Beregov district of Zakarpattia region, into the register of industrial parks. About 2,000 jobs are planned to be created on the territory of the park, which will represent a group of industrial enterprises for wood processing and manufacturing of wood products. The specialization of "BF Terminal" will be the production of MDF and CLT boards, laminate and parquet. A transshipment complex will operate on the territory of the park, and waste from local woodworking enterprises can be used to manufacture products *(Official webportal of Parliament of Ukraine, 2024).* Despite the rapid growth in the number of industrial parks in the Transcarpathian region in recent years and their positive impact on the functioning of the regional economy, the process of their functioning and creation is to some extent spontaneous in nature, and is also characterized by a number of shortcomings. First of all, the activities of most industrial parks only partially correspond to the local priorities of socio-economic development specified in the Regional Development Strategy of the Transcarpathian region until 2027, in particular, regarding ensuring the sustainable development of rural and mountainous areas in the context of systemic reforms; ensuring environmental protection, ecologically balanced and rational use of nature and spatial harmony; building local knowledge economies and smart specialization, including supporting innovative research and technologies in industry based on the use of the "education-science-production" chains and stimulating cooperation between educational institutions.

3. THE ROLE OF INDUSTRIAL PARKS IN THE DEVELOPMENT AND USE OF «EDUCATION-SCIENCE-PRODUCTION» CHAINS

The economic combination of science and production is achieved through the following mechanism:

- leading scientists and engineers of universities, being owners of industrial enterprises, sell shares of their enterprises to those firms in cooperation with which they are interested, thereby expanding their production;
- industrial firms sell shares to those scientists in cooperation with which they are interested, inviting them to work as laboratory managers or consultants;
- the university leases various facilities and equipment to firms;
- industrial firms finance new university departments, pay scholarships, and act as employers for university graduates.

Thus, a mutual interest arises in the final result – the creation and implementation of science-intensive products. In the stud of Kanhukamwe, Q. & Chanakira, M. note that universities can play a decisive role in the dynamics of the growth of a science and technology park, as well as in the economic development of the country *(Kanhukamwe, Chanakira, 2013).* The research prowess of most universities has enabled them to generate R&D outputs that have led to the creation of new high-tech enterprises. Some companies have been able to exploit new technologies, new ideas and new processes, while new products and services continue to be produced. The researchers note that while there is a need to strengthen the capacity of most universities in developing countries, it is necessary to ensure that they function properly and contribute to the development of the technology park. The innovation systems in these countries also need to be continuously strengthened and improved. The study identifies critical success factors in creating successful IPs, the advantages of the university's location, the level of qualification of research staff, R&D expenditure and successful public-private partnerships.

Thanks to a favorable environment, new investments, new companies, new jobs can be created, as evidence of the influence and role of universities in the growth and development of science and technology and industrial parks *(Kanhukamwe, Chanakira, 2013)*. In the study of Olcay, G. & Bulu, M. argue that universities can make significant contributions to regional development and the innovation capacity of a city if the knowledge acquired in universities can be properly transferred back to the city in the form of technological innovations. Industrial parks and technology transfer offices, as urban knowledge and innovation spaces, are two important channels for creating research platforms with enterprises where universities can disseminate knowledge *(Olcay, Bulu, 2018)*. While technology parks create spaces for knowledge and innovation generation in the city, university technology transfer offices play a crucial role in enhancing knowledge dissemination and creating new start-ups. The analyzed study highlights the contribution that universities can make to the socio-economic development of Istanbul to become an innovative city that contains successful urban knowledge and innovation spaces. By interviewing heads of technology parks and technology transfer offices in Istanbul, Olcay, G. & Bulu, M. investigate how the existence of technology parks and technology transfer offices at universities influences the success of technology transfer mechanisms *(Olcay, Bulu, 2018)*. In addition, a study by Radosevic, S., & Myrzakhmet, M analyzed the role of technology parks as tools for promoting innovation in Kazakhstan using firm survey data and interviews *(Radosevic, Myrzakhmen, 2009)*. In their work, the researchers investigate three specific questions: first, the overall effectiveness of technology parks in promoting innovation development in Kazakhstan, second, the basic innovation model of Kazakhstani technology parks, and third, whether technology parks can compensate for the missing elements in the technological infrastructure and environment. The conclusions of the study by Radosevic, S., & Myrzakhmet, M. are that technology park firms are not more innovative than other firms. They are mostly focused on the local market and operate in traditional sectors, and the frequency and intensity of their external connections are more developed than their internal connections. The researchers also emphasize that, in general, Kazakhstani technoparks seem to be successful in terms of promoting business incubation, but much less so in terms of promoting innovation and economic diversification. Focusing on technoparks as the main mechanism for economic diversification seems to be an ineffective and uncertain policy option at this stage of the country's economic development *(Radosevic, Myrzakhmen, 2009)*. The results of the analyzed study can be applied to other countries with developing economies, including Ukraine.

4. CONCLUSION

The study confirmed that industrial parks are one of the effective mechanisms of successful decentralization, which involves creating conditions under which territorial communities have interest and tools for development, attracting investments, creating jobs, developing production and filling budgets. It was determined that in wartime conditions, industrial parks became one of the key tools for business relocation, allowing enterprises to use state preferences even in crisis economic conditions. It was determined that the main instruments for supporting the development of industrial parks at the state and local levels are exemption from taxes and duties; provision of land on preferential terms; loans at special preferential rates; subsidizing rent, utility tariffs; simplified regulatory procedures; creation of appropriate social infrastructure for IP employees. Based on the generalization of international experience, it has been determined that industrial parks play a key role in the development of the "education-science-production" chains with the active involvement of universities and scientific institutions, which contributes to the maximization of the positive effect of the economic combination of science and production both at the national and subregional levels.

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DIGITAL DIPLOMACY IN THE CONTEXT OF THE THEORY OF INTERNATIONAL TRANSACTIONS

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ABSTRACT
This paper explores the evolving role of digital diplomacy in the context of modern international relations, focusing on the technological advancements and strategic initiatives employed by the United States. It examines various platforms and tools, such as DipNote, the U.S. State Department's Diplopedia, and the role of social media in shaping diplomatic communications. The study highlights the increasing significance of digital diplomacy in promoting foreign policy objectives, public diplomacy, and engaging with global audiences. The U.S. government has pioneered the integration of digital technologies into its diplomatic strategies, fostering real-time interaction and enhancing the effectiveness of diplomatic outreach. Additionally, it addresses the challenges and risks associated with digital diplomacy, including cybersecurity threats and the spread of extremist ideologies. The analysis suggests that, despite these challenges, digital diplomacy remains a crucial tool for modernizing international relations and shaping global perceptions, offering a platform for direct engagement, timely responses, and the promotion of national interests.
Keywords: *Digital Diplomacy, Social Media, U.S. State Department, International Relations, Foreign Policy, Public Diplomacy, Cybersecurity, Soft Power, U.S. Government Strategies, International Communication, Digital Technologies, National Security*

1. INTRODUCTION

With the development of information and communication technologies, there has been a rapid shift from traditional methods of diplomacy to modern approaches involving the use of the internet as a powerful platform for advancing a nation's interests. The concept of digital diplomacy encompasses the active use of new media, social media, blogs, and media diplomacy. Digital diplomacy originates from the expansion of public diplomacy but operates in a different realm, within the global informational space of the internet. Public diplomacy can be divided into traditional and modern, often referred to as digital diplomacy. Alongside the term "digital diplomacy," related terms such as "cyber diplomacy," "net diplomacy," and "virtual diplomacy" are used. These terms may appear in various countries to indicate the effective use of information and communication technologies in foreign relations. For example, in the United Kingdom, it is called electronic diplomacy; in Germany, digital diplomacy; in Canada, cyber diplomacy; and in the United States, network diplomacy.

The United States Institute of Peace suggests referring to 21st-century diplomacy as virtual diplomacy. Virtual diplomacy is characterized by its strong association with the rapid advancement of information and communication technologies. In a narrower sense, it encompasses decision-making, coordination, communication, and the practice of international relations conducted through these technologies. From the above, it can be concluded that the same phenomenon can have different names in various countries. However, at this stage, only a comprehensive approach to using the tools of digital diplomacy provides the most effective results for fulfilling the communicative function between governments and civil society, both within the national information space and beyond it.

2. CHALLENGES AND MANIPULATIVE STRATEGIES IN DIGITAL DIPLOMACY

Before the rapid adoption of digital diplomacy in foreign policy, international actors primarily relied on public diplomacy to address key aspects of a state's international activities. These included:

- Conducting information and communication campaigns through traditional media such as television and radio to project influence beyond the country's borders
- Educating specific social and professional groups to develop a loyal elite
- Promoting political culture through exhibitions, films, and similar activities.

However, with today's rapid technological advancements, these objectives can now be achieved more efficiently and swiftly via the Internet. The spread of the Internet has enabled influencing foreign target audiences using methods such as:

- Posting radio and television broadcasts online
- Distributing literature about one's country in digital formats
- Monitoring discussions within the blogosphere of foreign countries
- Creating personalized social media pages for government officials and disseminating information through mobile phone communications.

The need to define the term "digital diplomacy" emerged within the realm of international relations in the post-bipolar world, driven by several factors, including:

- The growth of information flows
- The integration of diplomatic communication into the global framework of networked interaction
- The use of new communication channels and tools, the increased pace of communication, and the development of new methods of influencing audiences in diplomatic practice.

At present, diplomacy that incorporates the use of information and communication technologies (ICTs) and the internet has multiple interpretations. It is commonly referred to as:

- E-diplomacy
- Digital diplomacy
- Diplomacy 2.0
- Twitter diplomacy.

The term "e-diplomacy" is often linked to the work of Fergus Hanson. His research includes two key publications: "Revolution and the State Department: The Spread of E-diplomacy" and "Baked and Sent: E-diplomacy and the State Department", published six months apart. Hanson defines digital diplomacy as the utilization of mass information and communication technologies to achieve diplomatic objectives.

He emphasizes that digital diplomacy involves leveraging online platforms and other ICT tools for promoting and fulfilling a country's foreign policy goals and interests. Furthermore, Hanson outlines eight key areas of virtual diplomacy:

- Knowledge and information management
- Public diplomacy
- Information management
- Consular assistance
- Emergency response
- Internet freedom
- External resources
- Strategic policy planning.

He also notes several focal points within digital diplomacy, including knowledge management, consular communication and response, information management, and advocacy for internet freedom. Researcher D. Lewis posits that information and communication technologies (ICTs), particularly the internet, significantly influence the trajectory of international relations. He argues that digital diplomacy leverages virtual ICT tools in public administration to facilitate communication in an information society. According to Lewis, the number of actors involved in global processes increases when critical political decisions are being made, which inversely affects the state's role as a major controller of such decisions. In this context, the internet acts as a catalyst for spreading both accurate and false information about events, while also providing the means to efficiently deliver traditional diplomatic services to both domestic citizens and international counterparts. A. Fisher highlights the advantage of social media, emphasizing its capacity to engage citizens of other countries in real-time. Social media serves as a pivotal channel for influencing the youth, a key target in public diplomacy. This perspective is shared by American political scientist E. Potter, who views digital diplomacy as an ICT tool that enables purposeful interaction with the public in the realm of public administration. Analyzing publications on this topic suggests that ICT advancements elevate public diplomacy to a new stage-digital diplomacy, which represents an innovative approach to conducting diplomatic activities. Currently, one of the most prominent elements of digital diplomacy is the use of social media, which serves not only personal objectives but also broader international purposes. Many scholars and experts regard social media as an effective tool for implementing "soft power," a concept introduced by political scientist Joseph Nye. He described it as the art of persuasion without coercion, where the primary instruments of soft power include international collaboration in science, information, education, and innovative projects. Social media has evolved beyond being a platform for entertainment and informative content aimed at specific audiences - it has become a tool for political influence. Researcher A. A. Kozyrova identifies key reasons for the rapid growth of social media's role in diplomacy and politics:

1. Social media, as a widely-used medium, allows political leaders to easily disseminate information that promotes national interests. This is facilitated by the vast number of users, ease of access, mobility, and rapid information distribution.
2. The primary user base of social media consists of young people, a crucial demographic known for its radicalism and active involvement in various spheres, including politics.
3. Social media provides users with an illusion of participation in global events and the feeling of being at the heart of real-time developments. Through online technologies, users can directly reach out to political figures or diplomatic representatives via official accounts to share ideas, express protests, or lodge complaints. Consequently, many socially significant issues are often addressed on these platforms.

It is also crucial to note the shift from traditional diplomatic practices to a digitized approach that incorporates new media tools and social networks. Before the advancement of information and communication technologies, the institution of diplomacy was relatively closed and restricted to a narrow circle of information holders. However, following rapid globalization, diplomats around the world recognized the need to engage with the public through communication channels such as:

- Media outlets
- Social networks
- New media platforms.

In the context of digital diplomacy, the media plays a significant role in shaping the nature of communication. The use of media platforms enables parallels to be drawn between digital diplomacy and media discourse. Thus, the spaces of virtual diplomacy and media can overlap, as journalists frequently reference official diplomatic sources when reporting on international events. Media channels have long been classified by scholars as tools of public diplomacy aimed at discrediting or promoting foreign policy agendas against opponents. Importantly, digital diplomacy is carried out not only in the media landscape but also within the Web 2.0 space, which influences the key characteristics of diplomatic discourse on the Internet. With the development and global spread of the World Wide Web, new platforms for diplomatic activity on the international stage have emerged, along with new digital diplomacy tools and changes in the status of communicators. The variety of this new communication practice reflects its targeting of different social groups and highlights the growing role of digital diplomacy in everyday societal life. At present, several segments of digital diplomacy can be distinguished:

1. Government-to-Government Diplomacy (G2G) – aimed at facilitating communication between the governments of two or more countries.
2. Government-to-Foreign Public Interaction (G2F) – focused on engaging foreign audiences.
3. Non-Governmental to Foreign Public Interaction (N2F) – involving interactions between non-governmental organizations and citizens with international communities.
4. C2F – involves ensuring the communication function between non-governmental organizations of foreigners and foreign citizens.

It is also important to highlight the flexibility of digital diplomacy and the desire of state representatives to be creative and develop new tools for conducting foreign policy activities in the online sector. Diplomats who are driven by innovation and creativity are not only capable of making systemic, comprehensive changes to their professional activities but also of developing effective communication tools with civil society. These diplomats of the new generation are characterized by an arsenal of creativity and potential, combined with a sense of responsibility for promoting their country's national interests on the international stage, thus advancing the country's information and communication strategy. Despite the obvious positive aspects of the active use of digital diplomacy in international relations, it also has some latent shortcomings. Among these are the propagandistic and manipulative functions, which are often used in conjunction with communicative, informational, and representational functions of soft power. Well-known American political scientist, researcher, and professor at the Massachusetts Institute of Technology identifies the following key methods of mass manipulation in the context of digital diplomacy:

- The strategy of distraction, which is based on diverting attention from important socio-economic and political issues in order to reduce the public's interest in truly important matters.

- The "problem-reaction-solution" method, which involves creating a problem to prompt society to propose a solution that benefits the government from a foreign policy perspective.
- Gradual acceptance strategy, where a chain reaction of events occurs that benefits interested international actors.
- Disinformation and data distortion.
- Deliberate spread of fake news.

3. STRATEGIC DEVELOPMENT AND TECHNOLOGICAL INTEGRATION IN VIRTUAL DIPLOMACY

It is important to emphasize that such mass manipulation tools are negatively perceived by the European community, whose conceptual foundations are based on the values of protecting human rights and freedoms. The image of a diplomat performing representative functions for their state should be positively received by the European audience, which is directly connected to the state's image. The creation of such an image can be achieved by using posts and comments on social media that express a positive connotation. From an organizational perspective, the influence of the initiator in traditional diplomatic methods is vertical, meaning one addressee (Ministry of Foreign Affairs, diplomat) collectively disseminates information to a large number of recipients, excluding the possibility of feedback. In digital diplomacy, a slightly different horizontal process is observed, where information exchange occurs equally between all participants in the virtual space, aiding in the promotion of international policy formation. Thus, digital diplomacy becomes a key and effective tool of "soft power," where the government uses its political attractiveness and authority to foster international dialogue and cooperation, achieving expected outcomes in foreign relations. The main task of digital diplomacy advisors is to raise awareness about foreign policy and the country's image, particularly by informing the target audience and commenting on actions to achieve national interests and protect citizens' rights and freedoms abroad. The digital diplomacy strategy, aimed at influencing public opinion and the masses, is closely linked to the field of strategic communication. Digital diplomacy has become an effective tool for the government to respond swiftly to political challenges and international situations, promoting the country's strategic interests in the information environment in which it operates. It is also advisable to highlight specific criteria that contribute to the popularization of digital diplomacy on the international stage, namely:
- Openness for mass consumption;
- Accessibility of new technical means, which ensure public contact with an unlimited circle of consumers;
- Communicative orientation;
- One-way interaction from the sender to the recipient, with no possibility of role reversal;
- The need to generate interest among the audience and attract new potential listeners, viewers, and readers.

Thus, the transformation of traditional diplomatic methods into the online sector, as well as the transition of foreign policy actors into the digital communicative sphere, forms the virtual discourse of diplomacy, which, similar to media discourse, can also be interpreted as a powerful tool of media propaganda culture. The virtual space of digital diplomacy does not always reflect all the realities of the state's foreign policy activities. It should also be noted that digital diplomacy is a complex, multifunctional mechanism that, through online tools, integrates various ways of presenting content on information platforms in the form of printed text, audio/audio-visual materials (photos, videos, graphics, drawings). However, it is important to note that the foundational element of digital diplomacy in the communicative space is the textual format.

In this case, a text message is viewed from the perspective of social constructivism, as it is assumed that the text is the result of practical activities in a particular field. In the context of the rapid development of foreign policy tools in the online domain, the most structurally similar to digital diplomacy in terms of communicative-textual space are electronic mass media, which until recently served as the primary "voice" of foreign policy in the global network. The rapid use of the internet and ICT tools is driven by the technological process of societal development, which is reflected in all areas of society's activities, including politics. Thus, globalization and digitization have played a significant role in the transition from traditional diplomacy to virtual diplomacy. The system of digital diplomacy has emerged relatively recently. The term "digital diplomacy" initially referred to the U.S. government's policy based on digital technologies (terms like "internet diplomacy," "social media diplomacy," and "Web 2.0 diplomacy" are also frequently used). The concept of digital diplomacy involves the active use of various tools for conducting information-communication policies and advancing national interests, such as social media, blogs, forums, websites, and other media platforms.

The history of digital diplomacy traces its origins to the United States, beginning in 1996. It was at this time that the U.S. Information Agency (USIA) was established, and the first online magazine, *Washington Files*, was created. One of the earliest stages of digital diplomacy development can be considered the publication of electronic files and materials on the official websites of U.S. diplomatic missions. After some time, these materials began to be consolidated into the U.S. Government's electronic journals. Since October 1, 1999, following the 1998 reform law concerning the restructuring of organizations engaged in international policy matters, the functions of the dissolved U.S. Information Agency (USIA) were transferred to the U.S. Department of State. Specifically, responsibilities related to informing U.S. citizens about the foreign policy activities of the government, explaining the objectives and tasks of foreign policy, and organizing feedback mechanisms from citizens to policymakers were reassigned to the U.S. Department of State's Bureau of Public Affairs. Among the primary methods used by the Bureau to carry out its functions are:
- Strategic and tactical planning to promote the priority objectives of U.S. foreign policy
- Conducting briefings for local and foreign media representatives
- Organizing media events that allow U.S. citizens, regardless of their location, to directly learn about the positions of key State Department officials through interviews in local, regional, and national media
- Responding to public inquiries regarding current foreign policy issues via phone, email, or correspondence
- Preparing meetings with local communities to discuss U.S. foreign policy and clarify its importance for the entire population of the country
- Creating and distributing audiovisual products and services for the public, media, Secretary of State, and State Department units both within the U.S. and abroad
- Supporting the U.S. Department of State's websites
- Preparing historical studies on American diplomacy and international relations issues.

As of 2021, the U.S. Department of State has 25 divisions dedicated to digital diplomacy initiatives. Some of these focus on researching the current issues related to the functioning of digital diplomacy at the national level, while others, such as regional bureaus, adapt its mechanisms to the contemporary realities of the country's foreign policy activities. In early 2001, an international conference titled "Internet Diplomacy 2001" was held in Washington. The main objective of this conference was to address the role of new information and communication technologies aimed at ensuring U.S. global leadership in the area of foreign policy on the international stage.

This sparked the public association of the term "digital diplomacy" with the public policy of the United States, which was based on the conceptual foundations of virtual information and communication technologies. The U.S. government defined digital diplomacy as the use of social media in diplomatic practice to facilitate interaction between U.S. diplomats and foreign users of the World Wide Web. Subsequently, digital diplomacy was adopted by the diplomatic services of leading countries worldwide, attracting increased attention from scholars. The intense development of digital diplomacy was marked by the active involvement of then-President George W. Bush in 2002-2003, during which radio and television broadcasting transitioned to online platforms. Over time, digital diplomacy was adopted by the diplomatic services of leading countries, sparking increased academic interest in this phenomenon.

The rapid development of digital diplomacy was marked by the active efforts of then U.S. President George W. Bush during 2002-2003, which saw the transition of radio and television broadcasting to online formats. It was during this period that the U.S. Department of State launched its official blog, initiated by former Secretary of State Condoleezza Rice. She also introduced a government portal and several digital magazines. This marked the beginning of the active use of blogs, social media, new media, and government portals in the online sphere to disseminate information to the public, improve the nation's image, and implement effective strategic communications to reach potential target audiences beyond national borders. Soon, this became not only a nationwide public diplomacy effort for the United States but also laid the foundation for the development of digital diplomacy's conceptual framework worldwide.

In 2004, a new virtual service called "Search State" was created for U.S. government agencies to search internal databases. In 2005, the corporate platform "Communities State" was launched, consisting of approximately 70 virtual forums where employees could discuss key issues of administration and policy, with the option to create individual blogs on the platform. By 2006, recognizing the impact of digital diplomacy on both domestic and foreign policy relations, the U.S. government established the Digital Engagement Group, initiated by Secretary of State Condoleezza Rice. The group's role was to monitor and analyze information published on social media, ensuring the accuracy of this information and combating disinformation. That same year, the first official U.S. Department of State blog was launched, alongside an open government portal and several electronic magazines.

In 2007, President George W. Bush outlined the concept of "smart power," which combined the hard power methods of military, economic, and political intervention with the softer power of diplomacy to safeguard national interests. This framework redefined diplomatic tools, acknowledging the continued importance of hard power while also recognizing the necessity of not promoting the U.S. image in countries where such efforts would be ineffective. While this concept did not radically change U.S. public diplomacy or foreign policy overall, it introduced new methods of public diplomacy, with a strong focus on network contacts, forums, and online television. The system also prioritized new regional focus areas in U.S. public diplomacy, such as strengthening ties with countries like India and China.

In 2007, the U.S. Department of State created a diplomatic platform for communication between its employees and foreign participants, called the "DipNote" blog. This platform facilitates discussions on public diplomacy within the U.S. A key element of the portal's philosophy is the targeted collection of both positive and negative feedback from participants in the discussions, followed by analysis to assess the foreign public's perception of the U.S.

Soon after, a reform was implemented following the signing of the U.S. State Department's "Statecraft of the 21st Century" document, which was integrated into the open online forum "The Sounding Board." This information portal allowed U.S. State Department employees to discuss and propose projects for integrating innovative technologies into diplomatic practices, with the opportunity to secure further funding from investors through the "IT Innovation Fund" (ITIF). Established in 2006, ITIF is an independent, non-profit, and nonpartisan research and educational institute. Its mission is to formulate, evaluate, and promote policy solutions that accelerate innovation and improve productivity to drive growth, opportunities, and progress. ITIF's goal is to provide policymakers around the world with high-quality information, analysis, and recommendations that they can trust. To achieve this, ITIF adheres to rigorous research standards and an internal code of ethics based on analytical precision, original thinking, political pragmatism, and independence from external guidance. ITIF focuses on a range of critical issues at the intersection of technological innovation and public policy. These include economic concerns related to innovation, productivity, and competitiveness; technological challenges in fields such as information technology, data, broadband telecommunications, advanced manufacturing, life sciences, agricultural biotechnology, and clean energy; and general policy tools related to government investments, regulation, taxation, and trade. This platform actively participates in political discussions, both directly and indirectly, by providing policymakers and influential individuals with compelling data, analysis, arguments, and proposals to advance effective innovation policies and counteract unproductive ones. Current research programs and educational initiatives include:

1. Setting the policy agenda on technologies, innovation, and global competition by producing original research reports and analytical commentary;
2. Shaping public discourse through organizing events, delivering speeches and presentations, and serving as expert analysts in news media;
3. Advising policymakers through direct interaction in Washington, D.C., and other national and regional capitals around the world. ITIF analysts have traveled to forums on effective policy-making in more than 30 cities across five continents in recent years.

Thanks to the strength and influence of its work, the University of Pennsylvania recognized ITIF as a think tank that has set a global standard for best practices in science and technology policy, and it was also named one of the top 40 think tanks in the U.S. overall. The next major steps for the United States in developing virtual diplomacy involved creating a strategic concept for the further implementation of research projects with a practical focus, dedicated to studying information and communication technologies in the context of foreign policy. This includes research centers at Harvard University and the George H. W. Bush Institute in Texas, where significant attention was given to developing virtual spaces as environments for strategic competition for foreign policy influence in international relations. Later, the U.S. Department of Defense, the Pentagon, was also involved in these developments. New media and information and communication technologies have become key components in the digital diplomacy agenda, representing a functional system. Digital diplomacy has increasingly become more dialogical, aiming to maintain feedback with the target audience. A pressing issue now is the development of specialized software and service programs in the field of digital diplomacy that will assess and analyze diplomatic discourse in real-time.

4. CONCLUSION

Diplopedia, as presented on the U.S. Bureau of Diplomatic Security's main page, is a corporate wiki system developed by the U.S. Department of State and integrated into the department's online network. This system encompasses a unique database focused on diplomacy and international relations, offering valuable insights derived from the Department of State's

extensive experience. According to Diplopedia, digital diplomacy can be used to effectively conduct foreign policy activities within the online domain by providing access to U.S. federal executive agencies both domestically and internationally. Additionally, Diplopedia is accessible to the U.S. intelligence community and other U.S. organizations involved in national security. At present, this informational resource includes approximately 15,000 articles related to various aspects of foreign policy and international relations. It can be concluded that Diplopedia is an excellent informational portal for obtaining reliable data, which can be rapidly distributed through the appropriate mass communication channels when necessary.

The efficient operation of such networks allows for several key outcomes:
- The ability to request specific information and receive instant responses to necessary queries
- The facilitation of experience exchange, the sharing of knowledge, and the dissemination of current information and news
- The ability to identify highly qualified specialists possessing specific knowledge and experience in specialized fields
- The formation of collaborative networks to address issues in international relations, supported by real-time informal communication among like-minded professionals.

In addition, under the framework of the U.S. Department of State's central management structure, specialized services have been created to focus on the training and support of personnel in the practical application of digital information and communication technologies in virtual diplomacy. These systematic training programs are conducted by the Foreign Service Institute, where the Hub of Social Media functions successfully. Its objectives include:
- Advising U.S. Department of State personnel on key issues related to the use of social media and new media
- Addressing emerging problems, such as account hacking and cyberattacks
- Preparing timely analytics and statistics regarding social media users' behavior
- Monitoring the global online space in real time and tracking target audience reactions to subsequent U.S. foreign policy initiatives. This monitoring is carried out by a dedicated public relations team.

At the current stage, according to the "World Leaders" publication released in 2019, during 2018, governments and leaders of 182 countries were officially present on Facebook, representing 94% of the 193 UN member states. This marks an increase of seven countries compared to 2017. Only 11 countries do not have a presence on Facebook, including Laos, Mauritania, Nicaragua, North Korea, Eswatini, Turkmenistan, and several Pacific island nations. It is also worth noting that over 188 national leaders and 88 foreign ministers have official accounts on the social media platform. The total audience of these accounts is significantly larger than the number of followers of the corresponding governmental institutions on social networks. For instance, from March 1, 2018, to March 1, 2019, global leaders' pages on Facebook registered over 345 million views and 767 million interactions. The modernization of technology and the extensive use of digital tools have shaped particular trends in foreign policy strategies, as evidenced by the results of the Portland Digital Diplomacy Research Center, an international consulting firm. The analysis employs a comparative method with the use of a "soft power" indexing technique, assessing over thirty developed countries. It is no coincidence that leaders from various countries and representatives of national foreign policy institutions have gained significant attention through social media and the public. The ability to directly engage with Internet users and follow important diplomatic discussions in real time has shifted modern diplomacy away from the traditional model, where it was primarily used for communication between heads of state.

Foreign ambassadors used to address the public in the host country through newspapers, books, and public speeches. However, with the advent of modern Internet technologies, they can now communicate interactively and informally with the public of the host country, without intermediaries, 24/7. Recognizing the importance of the Internet and understanding the inherent advantages of digital technologies, politicians and civil servants continue to view the development of digital diplomacy through the lens of potential risks and threats. As previously mentioned, the Internet is seen as a channel for the spread of extremism and terrorism, the imposition of foreign ideologies and political propaganda, and a means for launching information warfare. However, digital diplomacy should not only be viewed in terms of "soft power" and "smart power"; it should also be considered as a tool for building a national brand. Therefore, given the significant efforts of the U.S. Secretary of State in promoting digital diplomacy, the U.S. Department of State is well ahead of foreign ministries of other countries in embracing this form of diplomacy. Currently, U.S. digital diplomacy programs are implemented through various agencies, including the State Department, the Department of Defense, and the U.S. Agency for International Development. Modern U.S. public diplomacy has shifted away from the previous concept of one-way communication and now embraces a so-called dialogue model that ensures feedback and facilitates a quick response to the shaping of public opinion among online users—the target audience. This approach has led to the widespread creation of personal pages by U.S. government officials on social media platforms.

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FINANCIAL DIGITAL PLATFORMS AND THEIR IMPACT ON THE INCLUSIVE DEVELOPMENT OF THE BANKING SYSTEM OF UKRAINE

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ABSTRACT

In the current realities of Ukraine, especially after the full-scale war began, the digitalization of financial services has become critically important for economic stability and social support. The military actions have significantly affected traditional banking infrastructure, creating a need for innovative solutions to ensure access to financial services. Digital platforms play a key role in overcoming these challenges, enabling people to access banking services even in remote or temporarily occupied regions where physical bank branches may be unavailable. Digital financial services contribute to the inclusiveness of the banking system, which is especially important for small and medium-sized enterprises (SMEs). These businesses have become the main drivers of economic activity during the crisis, providing jobs, creating added value, and supporting economic stability at the local level. Thanks to online platforms, businesses can more quickly access financial tools such as loans, leasing, factoring, and conduct operations with minimal time and resource costs. Moreover, digital financial services offer crucial support to citizens by allowing them to make payments, receive social benefits, and access aid, even in conditions where traditional banking services may be limited. These changes not only help the country adapt to the difficult conditions of war, but also lay the foundation for sustainable development after its conclusion.
Keywords: banking system, inclusion, digital financial platforms

1. INTRODUCTION AND RESEARCH METHODOLOGY

The purpose of the study is to study the role of financial digital platforms in promoting the inclusive development of the banking system of Ukraine during the war, as well as their impact on the country's economic stability and recovery process. The research used the method of secondary data analysis, in particular statistical reports of the National Bank of Ukraine, the World Bank, as well as analytical publications on financial platforms. The collected data were processed in order to identify key trends in the development of digital platforms in Ukraine and their impact on banking inclusion.

2. STATEMENT OF THE PROBLEM

Modern challenges that are suffocating in Ukraine are the COVID-19 pandemic, war, crises - they have created significant obstacles for the functioning of the banking system. Collapsed infrastructure, limited access to physical banking institutions and growing uncertainty have forced the public and businesses to look for new ways to obtain financial services. In such conditions, traditional channels of providing banking services have become unreliable, which emphasizes the need for a rapid transition to digital platforms. Financial digital services can provide access to banking services for all segments of the population, including internally displaced persons (IDPs) and socially vulnerable groups who are especially in need of financial support in times of crisis.

However, despite the obvious advantages of digitalization, there are numerous challenges, such as insufficient financial literacy of the population, cybersecurity risks, unequal access to the Internet and digital technologies etc. In studies devoted to the role of digital financial platforms, various aspects of their impact on the banking system and the economy are highlighted by Dolishnia, Sydorenko, Kovalenko, Demirgüç-Kunt, Baker and others.

3. SEPARATION OF PREVIOUSLY UNSOLVED PARTS OF THE GENERAL PROBLEM

Investigating the relevance of the topic of the influence of financial digital platforms on the inclusive development of the banking system of Ukraine, several unresolved aspects can be identified. First, access to digital financial services for socially vulnerable segments of the population remains limited due to weak internet coverage in remote regions and low levels of digital skills. In addition, cybersecurity needs more attention, as existing data protection mechanisms raise concerns among platform users. Regulatory regulation is a separate challenge: the lack of clear rules for financial technologies creates legal uncertainty and risks for their implementation. Financial inclusion of internally displaced persons (IDPs) remains insufficiently provided, as banking services are not fully adapted to their needs. Also, regional banks often face limited resources for the implementation of modern digital solutions, which inhibits the inclusive development of the banking system at the national level.

4. OUTLINE OF THE MAIN MATERIAL

The current challenges faced by Ukraine, including the COVID-19 pandemic, the war, and ongoing crises, have created significant obstacles to the functioning of the banking system. The destruction of infrastructure, limited access to physical banking institutions, and increasing uncertainty have forced both the population and businesses to seek new ways to access financial services. In such conditions, traditional banking channels have become unreliable, highlighting the need for a swift transition to digital platforms. Digital financial services can provide access to banking services for all segments of the population, including internally displaced persons (IDPs) and socially vulnerable groups who particularly need financial support in times of crisis. However, despite the obvious benefits of digitalization, there are numerous challenges, such as insufficient financial literacy, cybersecurity risks, and unequal access to the internet and digital technologies. Research on the role of digital financial platforms highlights various aspects of their impact on the banking system and the economy, as seen in the works of Dolishnya, Sydorenko, Kovalenko, Demirgüç-Kunt, Baker, and others.

5. IDENTIFICATION OF PREVIOUSLY UNSOLVED PARTS OF THE GENERAL ISSUE

When examining the relevance of the impact of digital financial platforms on the inclusive development of Ukraine's banking system, several unresolved issues emerge. First, access to digital financial services for socially vulnerable groups remains limited due to weak internet coverage in remote areas and low levels of digital literacy. Additionally, cybersecurity requires more attention, as existing data protection mechanisms raise concerns among platform users.

A specific challenge lies in regulatory oversight: the lack of clear rules for financial technologies creates legal uncertainty and risks for their implementation. Financial inclusion for internally displaced persons (IDPs) remains insufficiently addressed, as banking services are not fully adapted to their needs. Moreover, regional banks often face resource limitations when implementing modern digital solutions, which slows down the inclusive development of the banking system at the national level.

6. PRESENTATION OF THE MAIN MATERIAL

Digital financial platforms in Ukraine have become an integral part of the economic life of the population, particularly during the armed conflict, when access to traditional banking services is restricted due to the destruction of physical bank branches. In such conditions, digital platforms not only provide stability and convenience for financial transactions but also actively promote financial inclusion, granting access to services for internally displaced persons (IDPs) and other vulnerable groups. This has been made possible through the active implementation of innovative solutions in the financial sector, such as mobile apps, e-wallets, and remote client identification systems. Digital platforms, on the one hand, are based on IT infrastructure, and on the other, serve as the foundation not only for e-commerce and e-business but also for the entire spectrum of communications in the interaction between businesses, consumers, and the state. The use of digital platforms increases market transparency, builds trust among counterparties through transaction transparency, and creates opportunities for the revival of free competition on a fundamentally new technological basis. At the same time, digital platforms are becoming the core of global digital information ecosystems, bridging the virtual and real worlds. This signifies a shift in the paradigm of creating and developing successful businesses. [4, p. 38]

Platform \ Years	Number users (million)			Growth (%)
	2021	2022	2023	
Privat24	14	15.5	17	21.4
Oleksandriv Bank	0.8	0.9	1	25
Monobank	6.5	7.2	8	23
Kuna Exchange	0.25	0.35	0.5	100
RiaMoneyTransfer	0,1	0.12	0.15	50

Table 1. Key financial institutions and platforms in Ukraine for the period 2021-2023, mln [2]

From Table 1, the data show a continuous increase in the number of users of digital financial platforms, which is a direct indicator of the success of the financial inclusion policy. Kuna Exchange, a cryptocurrency platform that has demonstrated a 100% increase in users, attracts special attention. This indicates an increase in interest in cryptocurrency and other financial innovations in Ukraine. At the same time, such traditional platforms as Privat24 and Monobank continue to be market leaders due to the ease of use and the wide range of services they provide. Despite the rapid development of digital financial services, Ukraine faces a number of challenges on the way to achieving full financial inclusion. Regulatory regulation of the financial sector in Ukraine faces numerous challenges, especially in the current difficult economic and social situation caused by military aggression and the need to adapt to European standards. The study reflects several key aspects that are critical for the further development of financial technologies and ensuring financial inclusion, especially for internally displaced persons (IDPs):

- Legal uncertainty for fintech. Given the rapid development of financial technologies, legal regulation in Ukraine has not yet kept up with the pace of change, which leads to legal uncertainty and complicates the implementation of innovative solutions. The lack of a clear regulatory framework for companies in the FinTech sector increases risks for businesses and consumers, creating obstacles to the development of the industry. There is also a lack of conditions for the implementation of open banking and modern standards in the field of

payment services, such as the PSD2 directive. Regulatory levers that would allow testing innovative products with minimal restrictions are not fully implemented in Ukraine, which delays the development of financial technologies in the national economy.

- Financial inclusion for IDPs. The full-scale war in Ukraine led to a significant increase in the number of internally displaced persons, which brought the issue of their financial inclusion to the fore. Banking services were not fully adapted to the needs of this category of citizens. One of the key challenges is the difficulty in accessing financial services due to strict requirements for personal identification. For IDPs, opening bank accounts becomes problematic due to the lack of supporting documents or the lack of a permanent residential address. In addition, many internally displaced persons do not have a credit history, which significantly limits their access to credit resources, including mortgage lending. The lack of special financial education programs for this population group also hinders their financial literacy and effective integration into the economic system.

- Adaptation to international standards. The first challenge is the implementation of European directives in the financial system of Ukraine. Compliance with EU directives such as PSD2 [3] and anti-money laundering (AML) regulations, requires comprehensive changes in legislation and regulatory practices. Crypto-asset service providers and crowdfunding platforms are prone to misuse of new channels for the movement of illegal money and have every opportunity to detect such movement and reduce risks. Therefore, the scope of Union legislation should be extended to cover such entities, in accordance with the FATF standards on crypto-assets. At the same time, progress in innovation opens new ways to commit crimes and launder proceeds from them [4]. In other words, there are formal adaptations and changes in the ways of interaction between financial institutions, government bodies and service users.

Ukrainian legislation needs significant modernization for the implementation of these standards, which includes changing approaches to financial supervision and compliance with international norms in the field of data protection and combating money laundering. Problems with risk management. The martial law causes unprecedented challenges for financial risk management, which are not yet fully reflected in the current regulatory and legal acts. There is a need to update the liquidity and creditworthiness management mechanisms of financial institutions, which significant economic instability must be taken into account. In addition, international aid operations require a high level of transparency and accountability. The management of these funds requires clearly defined norms and standards that would ensure the efficient distribution and use of resources, which is critically important in the current conditions. To overcome regulatory barriers and promote the development of financial technologies in Ukraine, it is necessary to take certain measures:

- create and integrate regulatory levers that will allow companies to test innovative financial products within a controlled environment with minimal legal restrictions. This will facilitate the rapid implementation of new technologies and reduce risks for consumers;
- with half-time work with European regulators;
- the introduction of regulatory incentives for FinTech companies will attract investors and contribute to the creation of innovative solutions that will improve the availability of financial services, in particular for internally displaced persons;
- develop educational programs aimed at increasing digital literacy, as well as invest in the infrastructure of internet coverage in the regions.

Government and private companies are already taking steps in this direction, but more resources are needed to create an accessible digital environment for all segments of the population.

The development of digital financial platforms in Ukraine, especially in the period of armed conflict, acquires strategic importance for ensuring economic inclusion and stability of the financial system. In a situation where access to traditional banking services is limited due to the destruction of physical infrastructure, digital platforms play the role not only of financial transactions, but also become tools of social and economic support for the population, in particular vulnerable groups and internally displaced persons (IDPs). The trends demonstrate the rapid development of financial digital platforms that provide access to various services, contributing to the growth of the inclusiveness of the financial system of Ukraine. This is especially important for socially vulnerable population groups, including internally displaced persons (IDPs), for whom traditional banking services often remain inaccessible.

7. CONCLUSION

In summary, overcoming regulatory barriers and introducing modern financial technologies will have a positive impact on economic stability and the recovery process of Ukraine. First, providing a clear regulatory framework and integrating European standards will help strengthen confidence in the financial system and attract investments. This will provide financial support to small and medium-sized enterprises, contributing to their growth and increasing competitiveness. Second, the development of open banking and the FinTech sector will create new opportunities for financial inclusion, particularly for internally displaced persons, which will allow more citizens to access financial resources and services. These measures will create prerequisites for sustainable economic development, ensuring efficient use of resources and contributing to the long-term stability of the country in the post-war period.

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EXPLORING THE RELEVANCE OF GREEN GDP:
A MULTIDIMENSIONAL TOOL FOR ASSESSING ECONOMIC PROGRESS AND ENVIRONMENTAL PROTECTION

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ABSTRACT

This research paper explores the relevance of Green GDP as a multidimensional tool for assessing the complex relationship between economic progress and environmental protection. The hypothesis posits that while Green GDP is an essential instrument for monitoring interactions between political, economic, environmental, and social forces, it must not be limited to a single dimension. The research evaluates the necessity of such a concept, reviewing the identification, assessment, and selection of Green GDP indicators, and the challenges in data collection and measurement. The GDP has long served as the primary indicator of a country's economic health, reflecting the total monetary value of all goods and services produced within a nation. However, its limitations, particularly its failure to account for environmental degradation and social welfare, have led to the growing call for more comprehensive measures. Green GDP emerged as one such alternative, aiming to include the environmental costs of economic activities, such as pollution and resource depletion. A discussion of the advantages and limitations of Green GDP such as the absence of standardized methodologies and the complexity of quantifying social costs is presented, alongside an exploration of its relationship to economic, social, and environmental domains. Additionally, the paper evaluated key differences between the Green Growth Index and Green GDP. The central hypothesis of this paper is that Green GDP serves as a valuable instrument for monitoring the complex relationships between political, economic, environmental, and social forces. However, it should not be confined to a single-dimensional interpretation but should be seen as part of a broader framework for assessing sustainable development. We explore the necessity for such a measurement, the challenges in its application, and its potential as a critical indicator of sustainable progress.
Keywords: Green GDP, Green Growth Index, green growth, sustainability, economic indicators, cross-country

1. INTRODUCTION

The attainment of targeted sustainability levels has largely depended on the capacity of individuals and communities to adapt to emerging challenges, embrace transformative initiatives, and integrate innovations effectively. This involves leveraging advanced technologies, robust databases, systemic frameworks, and efficient information and communication channels. Efforts are directed toward achieving precise, quantifiable objectives designed to eliminate barriers and reduce delays in the transition toward green growth. These initiatives are grounded in the principles of environmental ethics, emphasizing the equitable treatment and respect for all forms of life and non-living entities within the ecological system (Ekonomou and Halkos, 2023). Green GDP emerged as an alternative economic indicator designed to address the shortcomings of traditional Gross Domestic Product (GDP) in accounting for environmental degradation. This research examines the critical need for the Green GDP concept by exploring its identification, assessment, and selection of indicators, as well as addressing the challenges associated with data collection and measurement.

While GDP has traditionally been the primary metric for assessing a country's economic performance capturing the total monetary value of goods and services produced it falls short in accounting for environmental degradation and social well-being. These shortcomings have spurred demand for more holistic measures, with Green GDP emerging as a promising alternative. Green GDP incorporates the environmental costs of economic activities, such as pollution and resource depletion, providing a more nuanced understanding of economic growth's impact. The study highlights both the benefits and limitations of Green GDP, including issues such as the lack of standardized methodologies and the complexity of quantifying social costs. It also explores how Green GDP interconnects with economic, social, and environmental dimensions, emphasizing its role in fostering sustainable development. Furthermore, the research enters into a comparative analysis of Green GDP and the Green Growth Index, shedding light on their distinct approaches and contributions to measuring sustainable progress. This paper hypothesizes that Green GDP provides a valuable tool for monitoring complex, multidimensional relationships between economic growth, environmental health, and social well-being. The goal is to assess the necessity of this new measurement framework, evaluate the Green GDP indicator, and identify its core challenges and limitations.

2. THEORETICAL BACKGROUND
The concept of Green GDP
Green GDP integrates economic and environmental dimensions into a single metric. By adjusting GDP to account for the environmental costs of economic activities such as air and water pollution, deforestation, and loss of biodiversity Green GDP provides a more holistic assessment of a nation's well-being. Traditional GDP measures only market transactions and economic activity but overlooks the negative externalities associated with these activities (Tomić, 2024; Zheng and Chen, 2024). Green GDP seeks to remedy this by subtracting environmental costs from traditional GDP, thereby presenting a more accurate picture of sustainable economic growth (Stjepanović, Tomić and Škare, 2017). The theoretical foundation of Green GDP lies in its ability to address the "threshold effect" of economic growth. While increasing GDP improves living standards to a certain point, further growth often leads to diminishing returns in terms of social welfare and environmental quality (Tomić, 2024). The Green GDP metric, therefore, challenges the conventional wisdom that economic growth alone can lead to sustainable development. Instead, it emphasizes the need for balanced progress that considers environmental protection and social well-being alongside economic prosperity.

Historical development and applications
The Green GDP concept has gained traction as environmental awareness has increased globally. Over time, international organizations such as the United Nations and the World Bank have adopted Green GDP as part of their sustainability agendas (Nahman, Muhumani and de Lange, 2016). Green GDP's primary advantage is its ability to internalize environmental costs into national accounts. This provides policymakers with a more realistic tool for crafting sustainable development policies. However, significant disadvantages persist, including the complexity of assigning monetary values to non-market environmental goods like clean air and ecosystem services. This challenge is compounded by the lack of a standardized methodology, leading to inconsistencies in cross-country comparisons (Zheng and Chen, 2024). In general, there is a high degree of ambition and political support for the green economy and green growth policies, particularly when these can lead to enhanced social well-being without hindering economic progress. Well-being itself, however, is a controversial and multidimensional concept (Menegaki, 2021).

Today, global economic growth patterns, sustainability issues, perspectives on wealth distribution, concerns about ecological capital degradation, and the lack of international environmental negotiations have become fundamental considerations for policymakers and the political community in understanding the green growth perspective. In recent years, the concept of green growth a term once rarely mentioned, has emerged on the international stage and now occupies a significant place in the political discourse of global economic and development institutions (Jacobs, 2013). Few concepts, following the blueprint of sustainability, have so rapidly entered political and academic discussions as the notion of 'green'. Nevertheless, discussions on green growth in the context of international experiences alleviate concerns about the practical 'greening' of national economies and the priorities agreed upon at the international level. Determining the exact scope of green growth remains a significant challenge for many organizations tasked with promoting it. Currently, numerous indicators tend to link economic, political, social, and environmental aspirations to identify potential synergies, trade-offs, and future prospects revolving around the green economy and growth. It is well known that single-digit aggregate indicators designed for international rankings are not universally applicable. However, until various indicators are integrated into a comprehensive measurement framework, leveraging knowledge from relevant data and statistics essential for tracking progress will not yield satisfactory answers regarding the advancement toward green growth. Without an appropriate measurement framework and robust statistics, the assessment of the green economy is open to subjective interpretations. Reviewing 'green performance' requires reliable statistical data. The task of obtaining relevant information critical for tracking progress and measuring outcomes is further complicated by the lack of recognized methodological principles.

The average difference between Green GDP and GDP across 160 countries, amounting to 7.23%, demonstrates that over a 50-year period, GDP growth was, on average, over 7% higher than Green GDP growth. This indicates that the global economy has indeed been relentless in neglecting environmental concerns, with the ecological dimension of growth largely overlooked in the context of international preoccupation with economic growth. As the statistics reveal, the green perspective has yet to alter global growth patterns and their far-reaching implications for the conventional perception of growth versus green growth (Stjepanović, Tomić and Škare, 2022). The conclusion drawn by Stjepanović, Tomić and Škare (2019) in their study is that the quality of the environment and the levels of economic growth and development vary across stages of development. Specifically, less developed countries tend to achieve higher growth rates at the expense of sustainable economic development. This also implies that not all countries are on the path toward greener growth, regardless of whether their economies are growing in terms of real GDP. In Europe, the picture is clearer: the advanced economies of Northern and Western Europe exhibit very low Green GDP bias, below the average for developed economies in general, while Eastern and Southern Europe show relatively higher bias. Finally, Oceania displays an average difference of 4.87% between Green GDP and GDP, largely due to the disparity in development levels among countries in the region. For instance, Australia and New Zealand have recorded a satisfactory Green GDP bias of 2.30%.

Overview of relevant literature
The empirical literature on Green GDP is growing but remains fragmented. This section reviews key studies on the topic. Numerous international frameworks complement Green GDP by measuring various aspects of the green economy:
- Global Green Economy Index (GGEI): Evaluates 130 countries based on leadership, climate change, market performance, and environmental impact. The index combines expert perception surveys and performance data (GGEI, 2018).

- Green Growth Index (GGI): Developed by the Global Institute for Green Development, this index assesses 115 countries across four dimensions: resource efficiency, natural capital protection, green economic opportunities, and social inclusion. It aligns with global goals like the Sustainable Development Goals (SDGs) and the Paris Agreement (GGGI, 2019).
- OECD Green Growth Indicators: Tracks environmental productivity and quality of life using 26 indicators that span resource use, natural asset base, and economic opportunities (OECD, 2017).
- United Nations Green Economy Progress (GEP): Measures progress using sustainability indicators and weighted comparisons to guide countries toward greener growth (PAGE, 2017).
- European Environmental Indicators: The European Union's Environmental Indicator Report outlines 29 metrics addressing ecological resilience, sustainable growth, and environmental health (Environmental Indicator Report, 2018).

These frameworks, though conceptual and lacking legal mandates, offer valuable tools for addressing global environmental challenges. Methodological diversity ensures their adaptability to national and regional contexts, fostering localized sustainability solutions. Numerous studies have explored Green GDP's development and applications, thus these are just some of the relevant for our study:
- Stjepanović, Tomić, and Škare (2022): Calculated Green GDP for 160 countries, revealing discrepancies between Green GDP and traditional GDP growth rates. They established a methodological foundation for monitoring Green GDP dynamics.
- Qi, Xu, and Coggins (2001): Analyzed environmental damage across 103 countries, noting parallels between GDP and Green GDP growth trends despite varying growth rates.
- Kalantaripor and Alamdario (2021): Studied fossil fuel impacts on Green GDP in China, highlighting fossil fuels' disproportionately larger negative impact compared to renewables.
- Wu and Han (2020): Examined sectoral Green GDP in China, identifying sectors with decreasing environmental impacts over time.
- Islam and Asad (2021): Showed that GDP growth in South Asia could align with Green GDP growth without exacerbating environmental harm.
- Liu (2021): Proposed city-level Green GDP metrics using analytic hierarchy processes (AHP), emphasizing urban-level planning and forecasting as a next step in Green GDP's evolution.

3. DISCUSSION ON THE LIMITATIONS OF THE GREEN GDP INDICATOR

One of the primary advantages of Green GDP is its ability to incorporate the costs of environmental degradation and resource depletion into national accounting. This enables policymakers to better assess the trade-offs between economic growth and environmental sustainability. According to Vimochana (2017), Green GDP helps clarify the role of environmental accounting in economic decisions, promoting policies that enhance long-term sustainability. Additionally, Green GDP can highlight inefficiencies in resource use and encourage the adoption of cleaner technologies, thus fostering green growth.Therefore, we can say that Green GDP is bounded by these challenges:

- *Data availability and quality*: One of the primary challenges in the empirical application of Green GDP is data availability. Many countries lack the detailed environmental data required to calculate Green GDP accurately. Additionally, the quality of data is often uneven, with developed nations having more reliable data than developing countries (Tomić, 2024).

- *Normalization of Variables and Aggregation*: One of the biggest challenges in calculating Green GDP is normalizing diverse environmental and economic variables to make them comparable. Different countries use varying units and methods to measure environmental degradation, making it difficult to aggregate data into a unified framework (Stjepanović, Tomić and Škare, 2022).
- *Lack of standardized methodology*: The absence of a globally standardized methodology for Green GDP is a significant limitation. Without a consistent approach to measuring environmental costs, it is difficult to compare Green GDP figures across countries. This lack of standardization also raises questions about the reliability and accuracy of Green GDP as an economic indicator (Nahman, Muhumani and de Lange, 2016).
- *Subjectivity in assigning weights and values*: Assigning monetary values to environmental goods, such as clean air, water, and biodiversity, introduces a high degree of subjectivity. Different methodologies lead to different results, reducing the objectivity of Green GDP estimates (Zheng and Chen, 2024). This subjectivity undermines the credibility of the indicator, particularly when used for policy-making purposes.
- *Political and institutional resistance*: Green GDP faces resistance from political and institutional actors, particularly in countries where economic growth is prioritized over environmental sustainability. Politicians often prefer to focus on traditional GDP metrics, which show more favourable growth rates, while ignoring the long-term environmental costs of their policies (Tomić, 2024).
- *Trade-offs between economic growth and environmental sustainability*: Green GDP highlights the inherent trade-offs between economic growth and environmental sustainability. While economic growth is essential for improving living standards, it often comes at the expense of environmental health. This trade-off is particularly pronounced in developing countries, where rapid industrialization has led to significant environmental degradation (Stjepanović, Tomić and Škare, 2022).
- *Difficulty in addressing long-term environmental impacts*: Green GDP primarily focuses on current economic activities and their immediate environmental impacts. However, it struggles to capture long-term environmental consequences, such as climate change, biodiversity loss, and ecosystem collapse, which may only become apparent decades after the initial economic activity (Zheng and Chen, 2024).

Despite these challenges, Green GDP offers several advantages over traditional GDP. It provides a more comprehensive measure of economic health by accounting for the externalities of economic activities. This allows policymakers to make more informed decisions that balance economic growth with environmental protection and social welfare. Furthermore, Green GDP can help identify trade-offs between short-term economic gains and long-term environmental sustainability, making it a valuable tool for guiding sustainable development policies (Zheng and Chen, 2024).

4. DIFFERENCES BETWEEN THE GREEN GROWTH INDEX AND GREEN GDP

The differences between the Green Growth Index (GGI) and Green GDP are observed in their specific focuses, methodologies, and purposes in sustainable development analysis. The Green GDP documentation emphasizes the importance of statistical monitoring systems and methodological standards to enable a realistic assessment of green growth in comparison to conventional GDP.

Green Growth Index characteristics

Focus: The Green Growth Index measures countries' progress toward sustainable development through four main dimensions: efficient resource use, natural capital conservation, green economic opportunities, and social inclusion. It aims to assess the level of achievement in alignment with sustainable development goals and international agreements such as the Paris Climate Agreement. *Methodology*: As a composite index, the Green Growth Index integrates various indicators and results from economic, environmental, and social domains. The analysis combines quantitative and qualitative data to provide a comprehensive insight into a country's overall progress toward green growth. *Application*: The index aids in analyzing sustainable development policies by offering a framework for comparing countries in terms of their advancement toward green growth. It enables the identification of synergies and areas requiring further action.

Green GDP characteristics

Focus: Green GDP represents an adjusted version of GDP that incorporates costs associated with environmental degradation and natural resource depletion. It portrays more realistic economic growth by accounting for ecological costs. *Methodology*: The methodological framework for Green GDP involves adjusting traditional GDP by deducting estimated costs of CO_2 emissions, soil degradation, biodiversity loss, and resource depletion. According to research, the calculation of Green GDP uses coherent statistical data on economic and environmental factors to enhance its relevance for sustainable development. *Application*: Green GDP serves as an indicator of economic sustainability, reflecting the extent to which environmental costs are embedded in economic growth. This approach enables policymakers to make decisions that minimize the environmental impact of economic development and ensure the sustainability of natural capital for future generations.

Table 1. Key differences between Green Growth Index and Green GDP

Characteristic	Green Growth Index	Green GDP
Focus	Green growth and sustainable development	Economic growth adjusted for ecological costs
Methodology	Composite index with multiple indicators	Adjusted GDP reduced by ecological costs
Application	Comparative analysis and evaluation of green policies	Analysis of economic growth with ecological adjustments

Source: Author's systematization.

The Green Growth Index is primarily used to monitor progress toward specific sustainable development goals, facilitating cross-country comparisons in their green growth policies. Its purpose involves assessing integrated economic, social, and environmental performance across four dimensions: efficient resource use, natural capital conservation, green economic opportunities, and social inclusion. As such, the Green Growth Index provides a framework for sustainable development and policy evaluation, contributing to the global efforts toward reducing environmental degradation.

Figure 1. Green GDP; cross-country comparison (2019)
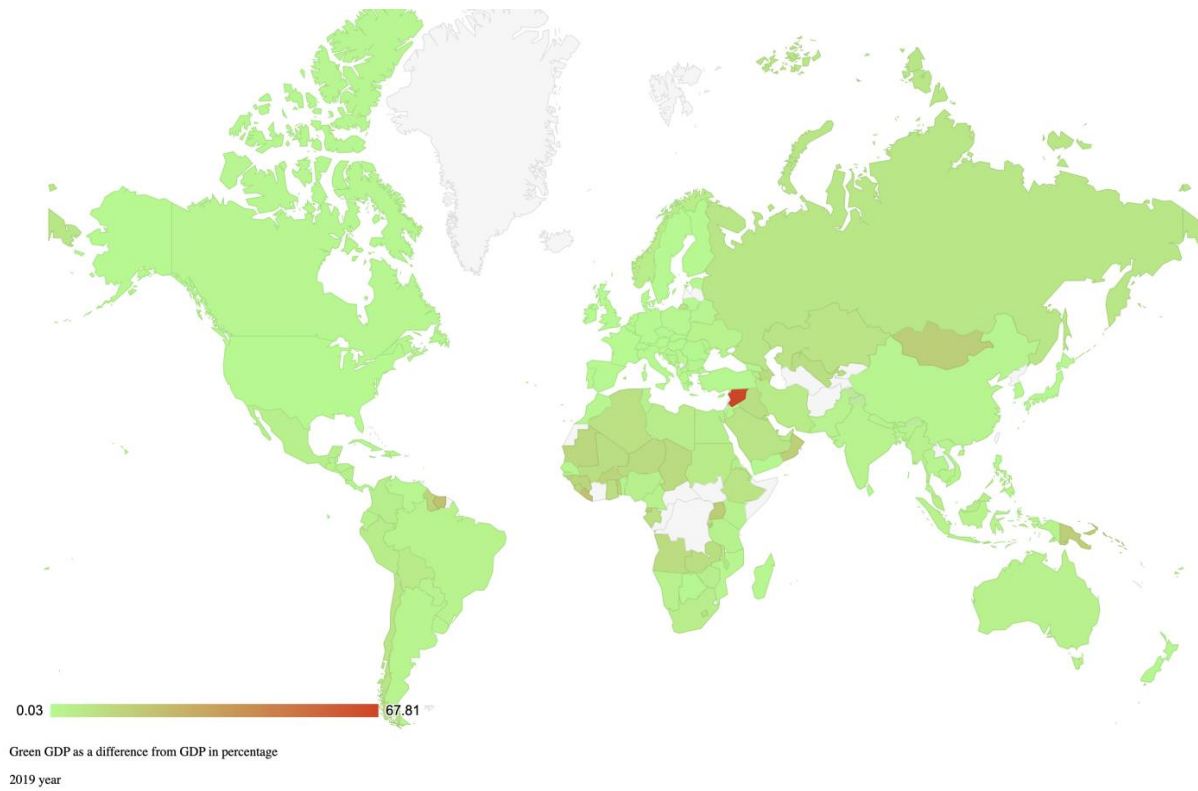
Source: Stjepanović, Tomić and Škare (2022).

Figure 2. Green Growth Index; cross-country comparison (2019)
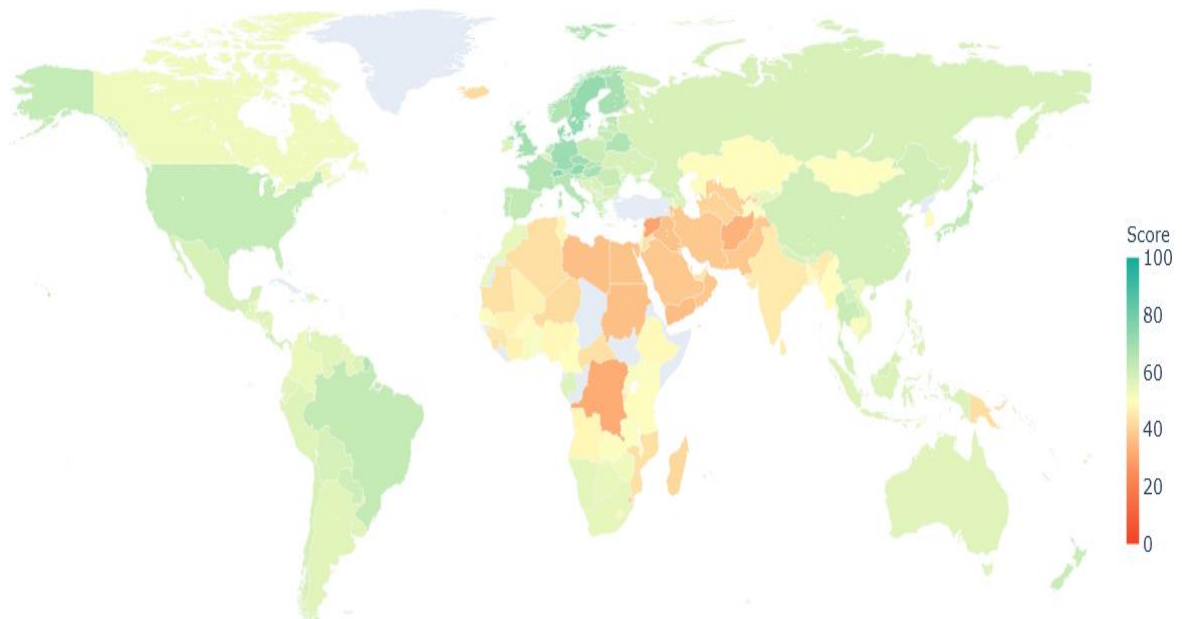
Source: Global Green Growth Index (2019).

A comparison of these indicators for 2019 (and across time) reveals significant alignment in their assessments across countries, reflecting shared trends. Developed countries, such as those in Europe and North America, consistently score higher on both the Green Growth Index and Green GDP. These nations have more resources to invest in clean technologies, enforce strict environmental regulations, and promote sustainable practices. In contrast, developing and underdeveloped countries tend to rely more heavily on natural resources for economic growth, resulting in lower scores for both indicators. For instance, nations in Sub-Saharan Africa and parts of Asia exhibit substantial environmental degradation relative to their GDP output. This relationship underscores a global inequality: wealthier nations generally achieve greater environmental sustainability, while poorer nations face trade-offs between economic advancement and ecological preservation. Bridging this gap requires international cooperation and sustainable development strategies tailored to local contexts.

5. CONCLUDING REMARKS

This paper has explored the relevance of Green GDP as a multidimensional tool for assessing the relationship between economic progress and environmental protection. Green GDP offers significant advantages over traditional GDP by internalizing environmental costs, but it also faces several limitations, including the lack of standardized methodologies and the complexity of measuring social and environmental costs. The widespread adoption of Green GDP would require substantial reforms in how economic and environmental data are collected, measured, and reported. To overcome these challenges, future research should focus on developing more standardized approaches to calculating Green GDP, improving data collection methods, and promoting international cooperation to facilitate cross-country comparisons. Policymakers must balance the short-term gains of economic growth with the long-term benefits of environmental sustainability. Green GDP provides a critical tool for making these trade-offs more transparent and actionable. Additionally, policymakers must recognize the importance of balancing economic growth with environmental sustainability and social well-being to ensure long-term prosperity. Green GDP, despite its limitations, holds the potential to become a critical indicator of sustainable development and should be further refined and adopted as part of a broader framework for assessing national progress. Future research should focus on developing standardized methodologies for calculating Green GDP, improving data availability and quality, and addressing the subjectivity involved in assigning values to environmental goods. Additionally, more empirical studies are needed to test the applicability of Green GDP in diverse economic contexts, particularly in developing countries where environmental degradation is most severe. This topic highlights the need for a newly redefined approach to GDP assessment that incorporates green sustainable development. As a starting point, we focus on the perspective of policymakers, specifically the government of a country, which can leverage the insights from Green GDP to establish far more effective environmental protection policies and address both local and global environmental degradation and climate change. This indicator would provide governments with a clearer picture of real economic development that is not detrimental to ecology and the environment. From the perspective of society and local communities, there is a need to calculate local or regional GDP, including a so-called "live Green GDP," which would enable local governments to respond more quickly and efficiently to specific segments of their local industries and their environmental impact. Green GDP at global, regional, and local levels would also have a significant effect on individuals and consumers. From an individual perspective, consumers could become more aware of the direct impact and scale of their production choices on the environment, potentially influencing their purchasing decisions toward goods that have a lower environmental footprint. Green GDP is not a perfect solution, but it represents a critical step toward addressing the limitations of traditional economic indicators and fostering a more sustainable global economy.

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VALUATION OF SHARES AND THEIR FAIR VALUE OF THE COMPANIES LISTED ON THE WIG-UKRAINE QUOTED ON THE WARSAW STOCK EXCHANGE IN POLAND WITHIN 2015-2024

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ABSTRACT

This paper examines share price of the companies listed on the WIG-Ukraine and their fair value between 2015-2024. Data from Q4 2015 to Q3 2024 was collected from the Stooq.pl (Polish portal of shares). Two hypotheses are tested: (1) value of the shares based on the market price; (2) value of the shares as the fair value of shares. In this paper, the WIG-UKRAINA stock exchange sector companies, which oppose a bad economic situation in Ukraine caused by military actions on its territory, were analysed. These companies were subject to detailed research in order to demonstrate that they have the potential to act on the free market and that they do not lose their financial liquidity. In addition, their fair value was shown, because the current economic and market situation in Ukraine completely deprived it of this value.
Keywords: *stock exchange, share valuation, fair value, companies*

1. INTRODUCTION

Share valuation is one of the most complex processes on financial markets since the value of shares does not depend only on demand and supply on the market, but also on many factors that determine its price, starting from business valuation by using different methods in the given time to the presentation of mechanisms changing the value of shares in a manner either increasing or decreasing its value. For this reason, it is so important to value shares and determine its fair value in a manner that is objective and independent of speculative values that distort share prices and hence of the value of a WSE-listed company, which research conducted on the WIG-Ukraine index applies to. The value of companies listed on this index should be analyzed in terms of estimating their fair value, since presently their value should arouse significant controversies, especially at good operation of companies.

2. UKRAINIAN ECONOMY

A fall in GDP of 29,1% in 2022 in Ukraine was a bad result, because the economic situation has dramatically deteriorated due to the war in Ukraine. Such an index is consistent with the forecast of the International Monetary Fund, which estimates this year's expected current GDP growth of 5.0%. However, according to the Ukraine's central bank, it will rise to 5,5%.
Poland, which has 30-year experience in the economic transformation, offers Ukraine assistance in management, and can pass on this know-how to Ukraine, which is at the beginning of this road. Poland may also economically advise it in terms of reforms. However, the Ukrainians will have to give only the will and desire to take advantage of our experience, which was struggled with success and sometimes mistakes.

Experts from the European Bank for Reconstruction and Development point out the three main tasks they believe Ukraine will face. These are: maintaining macroeconomic stability, necessary to attract foreign capital, reforming the energy sphere, and reforming state-owned banks and their preparation for privatization. However, the war does not allow the implementation of all reforms

3. FAIR VALUE OF LISTED COMPANIES

Share price of the companies listed on the Stock Exchange should reflect also their fair value (Pierce, 2004, pp. 124-145). The fair value can be defined in several ways. In view of the foregoing, the fair value is a value used repeatedly in accounting, and thus in Article 28 (6) of the Accounting Act of 29.09.1994 as "the amount for which a given asset component could be exchanged, and the liability could be paid on market transaction terms between interested and well-informed, unrelated parties.

In view of whether the price of shares that are quoted on the stock exchange corresponds to their fair value, should be found in the value alone, since, after all, the values may be diverse, like the value of a similar company, producing similar goods and operating in the same industry, will also be diverse for various reasons.

The subject of trade covers minority shares, and the main market participants are retail investors or minority institutional investors, thus the price of shares should reflect the fair value characterizing the liquid minority interest (Borowski, 2013, bossa.pl).

The value presented in this way seems righteous, which is confirmed by the premium paid by the investors who announce calls for subscription for shares and plan in this way the purchase of the controlling interest. Then the premium reflects the difference between the level of liquid minority interest and the level of controlling interest. Sometimes the level takes into account benefits resulting from synergy. An investor purchasing the controlling interest in this way receives premiums that appear after taking over control of a company, in the form of funds, business management and making a number of strategic decisions.

The fair value of the share price should be determined in accordance with the idea of capital market, namely the market participants should have equal access to data, information and all messages concerning a given company. However, the investors are divided into three groups:

a) People with access to the most closely guarded information that affects the price and the business value, namely those can the company's management board or shareholders,
b) Institutional investors with blocks of shares with simultaneous access to the company's management board,
c) Individual investors who have access to public information.

At this point, there should be no differences in particular groups, at least officially, however, it happens that a group that is closest to the company has information which can obviously change its value overnight or distort its value artificially, e.g. other data or informal data, and even fictitious data. Worldwide we can also appreciate companies that treat individual investors seriously, namely provide them data concerning a company and treat them as equal and as strategic investors, with a large impact on a company in the present and in the future.

Transactions that are concluded on the Warsaw Stock Exchange relate to transactions between interested parties, namely a purchase or sale order should be submitted. Sometimes there are cases of wrongly submitted orders, but these are marginal orders that do not have a large impact on the transactions conducted on the Warsaw Stock Exchange.

Share liquidity is understood as a percentage quantity of shares in a company that are in the possession of minority shareholders. This is, at the same time, free float and the face value of such shares and the value of average daily trade in shares in a given company (Kufel, 1992, pp. 78-89).

Thus, we may presume that if during a day a large trade in shares takes place and a greater part of shares remains in the hands of minor shareholders, the share price reflects their fair value. We cannot agree with the fact that at small or minimum trade the value of shares is reduced to its daily minimum and it would be its fair value. Then it is only a change in the share price to a lower one and it does not indicate its fair value, as the trade alone suggests that this is only a pure coincidence. Such an impact can be exerted by large shareholders, as they can, by using one block, decrease the share value, preventing smaller players from raising the price for one reason: the capital of smaller shareholders does not enable them to raise the share price (Veale, 2001, pp. 88-125; Frąckowiak, 1998, pp. 34-42).

There is one premise more to determine the fair value of share price. The investors are fond of investing in shares, namely they buy them as in the past they managed to earn on them and they feel that presently the share price is ideal and reflects their fair value and will enable them to obtain fair dividend in the future.

Such a purchase or sale of shares can largely overestimate or underestimate the share value of a quoted company. Here the IT industry may serve as an example, namely shares in technological companies at the beginning of the new millennium, when shares in these companies were being purchased without any analysis in technical terms, but looking at their name and value, which was increasing overnight. In view of the foregoing, this led to excessively high business value above its fair value (Thompson, 2008, pp. 45-67).

The share price should thus reflect the fair value of a company listed on the Warsaw Stock Exchange. For the value of these companies be fair, the market must make available to all investors information regarding companies listed on the Warsaw Stock Exchange. The shareholders should be treated equally; therefore we cannot distinguish majority shareholders as those who should have information unavailable for minority shareholders. First of all, shares should be liquid securities, therefore they should be in free float and have real-time transferability, namely at any moment and at any time during the office hours of the Warsaw Stock Exchange on a business day (The analysis of 233 recommendations or analytical reports issued by broker's offices in the period from January 2011 to January 2019, concerning companies indexes of the Warsaw Stock Exchange).

4. WIG-UKRAINE AND SHARES IN THE COMPANIES LISTED ON IT

The WIG-Ukraine index groups only shares in Ukrainian companies listed on the Main Market of the Warsaw Stock Exchange. This index enables investors to estimate investment demand in a given sector but only for the Ukrainian companies listed on the Warsaw Stock Exchange, and is the basis for assessment of investment results. This is a total return index, which takes into account dividend and preemptive rights and free float. The index has been calculated since 01.01.2011 and its initial value was 1000 points. However, the index value as of 27.11.2024 is 298.26 points, namely it is lower over 70% in relation to the initial value, which shows its downward trend.

Value of the WIG-Ukraine index:

$$\text{WIG-Ukraine}(t) = \frac{M(t)}{M(0) * K(t)} * 1000.00$$

M (t) – index portfolio capitalization at session t
M (0) – index portfolio capitalization on a base day
K (t) – index adjustment factor at session t

Figure 1: WIG-Ukraine index in the years 2011 – 2019 (source: stooq.pl)

The WIG-Ukraine, as the second national index calculated by the stock exchange, is an index showing very expressively operations of the Ukrainian companies. It consists of the companies listed on the Warsaw Stock Exchange seated in Ukraine or whose operations are conducted predominantly in this country. However, the WIG-Ukraine as an a total return index includes both prices of shares contained in it and earnings from dividends and preemptive rights, which should be expressed as the fair value, however, it is not the case (Jajuga K, Jajuga T., 1996, pp. 34-57).

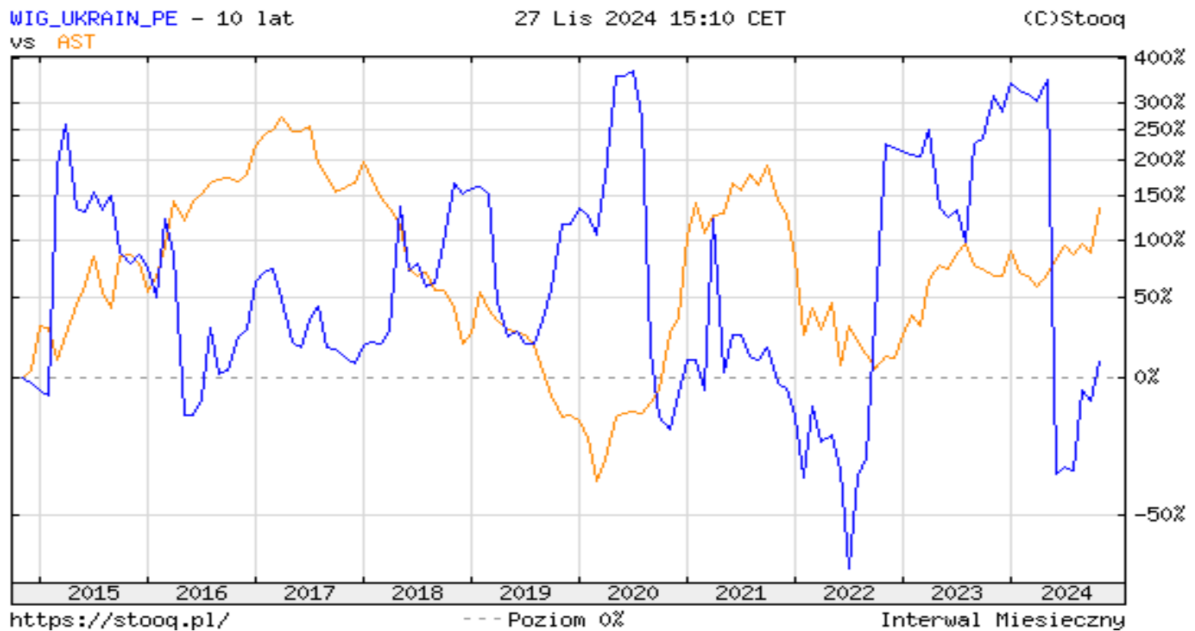*Figure 2: WIG-Ukraine rates of return 2014-2024 (source: stooq.pl)*

The chart WIG-Ukraine P/E presents the present value as of 20.10.2019 of 3.916, which proves that the total price to earnings ratio shows upward trend and it should come back to 12, as those companies have high financial potential, are investing their funds well and have been significantly undervalued and their fair value has been underestimated.

The companies listed on the WIG-Ukraine index have good financial standing:
a) ASTARTA - agricultural and industrial holding, one of leaders of the Ukrainian sugar sector. The company has been focusing its operations on the production and sale of sugar produced from beetroot and on the production and sale of cereals, which results from the need to use crop rotation in the beetroot cultivation.
b) IMCOMPANY - company from the agricultural sector in central-north Ukraine. The operations of IMC are focused on the cultivation of cereals, oil plants and potatoes, and the Company is also one of the largest milk producers in Ukraine.
c) AGROTON - A vertically integrated agricultural group from eastern Ukraine. It deals with the production of agricultural produce (mainly wheat and sunflower) as well as processing, storage and sale of seeds of these cereals. In addition, the group also deals with livestock breeding and food production.
d) MILKILAND - The group is a leading dairy product in Central and Eastern Europe. It specializes in the production of cheese, yogurt, butter and other dairy products. The company has production plants in Poland and Ukraine. Its products are exported to over 30 countries around the world. Dairy product group, focusing on high quality and innovation. Through the provision and available technology, the product is provided by the consumer of products subject to food safety regulations.
e) COALENERG - The group specializes in the extraction, enrichment and sale of thermal and coking coal. It supplies raw material to the largest electricity and heat generating plants and metallurgical plants in Ukraine. The company also exports coal to power plants in Turkey, Moldova, Bulgaria and Slovakia. The group's activities focus on effective coal mining and distribution, responding to the energy and industrial needs in the region.
f) KSGAGRO - The group is a vertically integrated agricultural entity operating in the Dnipropetrovsk Oblast in Ukraine. It operates in key segments of the agricultural market, including pig breeding, pork processing and wheat and sunflower cultivation. The company focuses on three winter crops, two spring crops and breeding pigs of one breed. The group's products are basic food products for which there is constant demand. In the first quarter of 2024, the group sowed sunflowers on an area of 7,700 hectares, wheat on 2,200 hectares and rapeseed on 1,430 hectares.

The current price of shares of the companies listed on the WIG-Ukraine should reflect their business value and their fair value, however, bearing in mind their maximum value, we should note that for well prospering companies their current value differs strikingly from the average or maximum value that was determined during quotations over the last few years, as shown in Table 1 (1).

TABLE 1: Companies listed on the WIG-UKRAINE in Poland as of 27.11.2024 (prepared by the author on the basis of the financial data of the WIG-Ukraine companies)

Name	Average assessment	rating	Current price PLN	Max price PLN
AGROTON	5.0/5.0	AAA	3.90	42.00
ASTARTA	5.0/5.0	AAA	37.40	102.62
IMCOMPANY	5.0/5.0	AAA	12.95	17.36
MILKILAND	3.0/5.0	D	1.15	78.00
COALENERG	3.0/5.0	D	0.75	100.00
KSGAGRO	3.0/5.0	D	2,48	21.50

The share price of some of them has been reduced by 99% (COALENERG) and of some by less than 25% (IMCOMPANY), which proves their diverse structure and diverse financial possibilities. With good financial data and generating earnings per share, the companies should resist crisis and stagnation prevailing currently on the world markets. However, it is unjust to quote rating for some companies in a manner showing their weakness, since those companies generate profit and are capable of surviving on the market and maintaining financial liquidity, which is proved by the financial results in tables 2 and 3. ASTARTA may serve as an example. Table 2 contains the most important ratios that show financial standing of the WIG-Ukraine companies. EBITDA per share is interesting, as it presents operating profit plus depreciation, which shows more effectively the companies with large fixed assets which require a very high capital expenditures characterized by a long period of return. In view of the above, EBITDA is a better ratio than EBIT, as it shows a better image of financial standing of an analyzed company (Parvi R., 2014, 33-36; Parvi R., 2014, pp. 52-60; Copeland, 1997, pp. 65-69, Parvi. R, 2016, 64-67). In view of the so conducted analysis, we can clearly see that only two companies had problem with generating operating profit per share in the 2nd quarter of 2024: IMCOMPANY and KSGAGRO. The remaining 1 company generated operating profit per share as presented in Table 2. Almost all companies (4 companies) reduced assets to equity ratio, which resulted in release of equity and larger investment possibilities.

TABLE 2: Technical assessment of companies listed on the WIG-UKRAINE as of 27.11.2024 (prepared by the author on the basis of the financial data of the WIG-Ukraine companies)

Name	Net profit (net loss) in thousands	Sales per share	Book value per share	EBITDA per share
AGROTON				
IV quarter 2023	No data	No data	0,316	(USD) No data
II quarter 2024	No data	No data	-0,031	(USD) No data
ASTARTA				
IV quarter 2023	(EURO) 1242	(EURO) 0.050	(EURO) 21.562	(EURO) 19383
II quarter 2024	(EURO) 38096	(EURO) 1.524	(EURO) 20.755	(EURO) 57210
IMCOMPANY				
IV quarter 2023	(EURO) -18787	(EURO) -0.529	(EURO) 4.013	(EURO) -10444
II quarter 2024	(EURO) 25779	(EURO) 0.726	(EURO) 5.017	(EURO) 33419
MILKILAND				
I quarter 2020	(EURO) -7618	(EURO) -0.244	(EURO) -1.030	(EURO) -1327
IV quarter 2021	(EURO) -11327	(EURO) -0.362	(EURO) -1.122	(EURO) -7969
COALENERG				
IV quarter 2022	(EURO) -961	(EURO) -0.021	(EURO) -0.018	(EURO) -493
III quarter 2023	(EURO) -76	(EURO) -0.002	(EURO) -0.038	(EURO) 0
KSGAGRO				
IV quarter 2023	(EURO) -2426	(EURO) -0.162	(EURO) -0.056	(EURO) -4938
III quarter 2024	(EURO) -968	(EURO) -0.064	(EURO) 0,121	(EURO) 3239

Price to earnings and price to shares express the value in PLN and it is a value characterized by the results of the companies which affect these values (Parvi R., 2014, pp. 262-267; Parvi R., 2014, pp. 169-177, Parvi R. 2016, 39-44). Similarly, price to book value of a company ranges from PLN 0.37 (ASTARTA) to PLN 4.57 (KSGAGRO). Comparing these values to the maximum values reached by the companies, we should note that the value of PLN as maximum (ASTARTA) and of PLN (COALENERG) were values reached by the companies during their quotations on the market over the last few years (2015-2024).

TABLE 3: Financial ratios of the companies listed on the WIG-UKRAINE as of 27.11.2024 (prepared by the author on the basis of the financial data of the WIG-Ukraine companies)

Name	C/P	P/OE (price/ operating earnings)	P/BV PLN
AGROTON	No data	No data	No data
ASTARTA	0.31	2.46	0.37
IMCOMPANY	0.54	1.02	0.34
MILKILAND	0.51	2.11	0.20
COALENERG	24.28	-6.15	-6.73
KSGAGRO	0.35	-2,57	4,57

In view of the foregoing, we should note that from the above financial data we can calculate fair values of particular companies listed on the WIG-Ukraine.

TABLE 4: Values of the companies listed on the WIG-UKRAINE as of 27.11.2024 (prepared by the author on the basis of the financial data of the WIG-Ukraine companies)

Name	Present value	Maximum value	Fair value
AGROTON	3.90	42.00	28.00
ASTARTA	37.40	102.62	85.00
IMCOMPANY	12.95	17.36	15.80
MILKILAND	1.15	78.00	69.00
COALENERG	0.75	100.00	68.00
KSGAGRO	2,48	21.50	15.60

From table 4 (2), it can be concluded that the fair value is significantly higher than the current share price of the companies listed on the WIG-Ukraine. A particular "pearl" in the index may be a well prospering ASTARTA that is largely undervalued.

TABLE 5: Values of the companies listed on the WIG-UKRAINE as of 27.11.2024 (prepared by the author on the basis of the financial data of the WIG-Ukraine companies)

Name	Deviation from the fair value in PLN	Fair value
AGROTON	24.10	28.00
ASTARTA	47.60	85.00
IMCOMPANY	2.85	15.80
MILKILAND	67.85	69.00
COALENERG	67.25	68.00
KSGAGRO	13.12	15.60

Deviation from the fair value in PLN = DevFV
DevFV = Fair value - current value (table 5).

5. CONCLUSION

The share price of the companies listed on the WIG-Ukraine is largely undervalued by the present financial situation worldwide and even by speculative actions of particular capital groups that "wander around" the world and subsist thanks to speculative actions using only surplus on share purchase and sale and then relocate capital to another place. Such investors are not interested in the business value and in the company's situation, its share price, but only in profit. We can see clearly that the share price of the companies listed on the WIG-Ukraine differs significantly from the fair value that has been calculated and presented in the paper. This is largely due to the ongoing war in Ukraine. In view of the foregoing, we should particularly emphasize that this value should be achieved in the future periods, the proof of which is even growing total value of price to earnings (P/E) on the WIG-Ukraine index, where its minimal level has been already achieved. The fair value of the WIG-Ukraine companies should be achieved in the period of a few years, namely until 2027, given improved situation on world financial markets. It should be noted that there is no measured at fair value of shares and it is not easy to measure the stock shares showing their fair value.

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FORECASTING CORRECTNESS OF INCURRING CREDIT WITH THE AID OF E.I. ALTMAN'S, J. GAJDKA'S AND D. STOS'S DISCRIMINANT ANALYSIS MODELS ON THE EXAMPLE OF 200 STUDIED COMPANIES FROM OPOLE AND PODKARPACKIE PROVINCES WITHIN 2015-2023

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ABSTRACT
The credit risk related to issuing credit for a company is mostly the result of too high amount of the incurred credit, wrong prediction of future periods and repayment of the incurred liability. In order to minimize risk, as part of information about a credited company, there should be technical and economic information enabling to conduct "collective evaluation of the company's activity" with the use of E.I. Altman's, J. Gajdka's and D. Stos's models. Both models were used in the group of the studied companies of Opole and Podkarpackie provinces. The research showed that incurred credit contributed to improvement of the financial liquidity in both groups. However, credits of greater worth led to the lessened increase of net profit and contributed to the small decrease of companies showing net loss. On the other hand, the group of companies, in which credits of lower worth were incurred, could decrease the number of companies suffering from net loss.
Keywords: company, financial liquidity, credit, discriminant analysis, net profit

1. INTRODUCTION

Using the J. Gajdka's and D. Stos's model in practice, it should be noted that the model proves to be perfect for Polish conditions because it reflects the realities of the Polish market, and demonstrates correctness of incurred credit of studied companies. The E.I. Altman's model was also used in research because the research results had to be compared in terms of a difference from the Polish market because this ratio was created for the American market and its needs. 200 micro, small and medium-sized companies were studied in the research, including 100 companies from the Opole province and 100 companies from the Podkarpackie province. Such a big group of the studied companies was used to indicate correctness of the company's decision on incurring credit. The goal was to indicate that the company, which did not have the financial liquidity, or was operating on the border of its maintenance, could improve or regain the financial liquidity after incurring credit (Gabrusiewicz, 2014, pp. 245-261; Jaworski, 2001, pp. 638-641; pp. Nowak, 2014, pp. 185-194; Rutkowski, 2007, pp. 420-429). However, the amount of properly incurred credit and the period of its duration were additionally taken into account because they had significant influence on the company's financial liquidity. Used models also enabled to indicate that the incurred credit influenced development of the subject's running a business positively, and even contributed to improve its financial condition. Nevertheless, it had to be incurred in a proper amount and for a proper period.

2. J. GAJDKA'S, D. STOS'S AND E.I. ALTMAN'S DISCRIMINANT MODELS

The J. Gajdka's and D. Stos's model reflects the best research results because it was developed in Poland, where Polish companies underwent discriminant analysis. The J. Gajdka's, D. Stos's and E.I. Altman's models are comparable, but were developed for different economic realities.

When both models were compared, differences between them were indicated (Parvi, 2015, pp. 141-149; Zarzecki, 2003, pp. 173-181). The E.I. Altman's model has been used for dozens of years. It may distort a picture and a result of the research because it was used as early as in the 1970s. The credit risk related to issuing credit for investments is mostly the result of the credited company's wrong prediction of its realization (Czekaj, 2008, pp. 10-17; Dowgiałło, 2002, pp. 122-124), and as it can also be noticed in the conducted research, the wrong credit amount, either too low, or too high, and the time period, for which it was incurred.

The E.I. Altman's model enables to forecast the course of economic events happening in the company within subsequent two years of its operation. The "Z" value, calculated on the basis of 5 economic and financial ratios, is the basis of this model (Czerwiński, 1980, pp. 44-55; Rutkowski, 2007, pp. 420-429):

TABLE 1: E.I. Altman's guidelines for the company's classification (Source: E.I. Altman).

The "Z" ratio's value	The chance of the company's bankruptcy
Z <= 1.8	Very high
1.8 < Z < 3	Indefinite, but significant
Z => 3	Low

$Z = 1.2 x_1 + 1.4 x_2 + 3.3 x_3 + 0.6 x_4 + 0,999 x_5$

where:

X1 - working capital / assets in total

X2 – net income / assets in total

X3 – EBIT / assets in total

X4 – net market value of the company/liabilities in total

X5 – trade (net sale) / assets in total

These ratios are statistical assessment of performance of not only the manufacturing company, but also other kinds of the company. If the result of "Z" value's calculations is below three, it means that credit ratings of the company's need to be examined and assessed thoroughly because the indefinite or low chance of the company's bankruptcy, or its ability to overcome such situation, should be expected. In calculations of the E.I. Altman's "Z" ratio, attention should be paid on the X_5 ratio's value, which is trade (net sale) to assets in total, if the denominator shows low value in relation to the numerator. It may mean that the company is underfunded. That is why values not exceeding three that is $X_5 <= 3$ are considered to be the proper level of this ratio because, otherwise, the general assessment may be distorted.

By the use of the "Z" ratio, we can predict c. 80-90% of accurate forecasts of the companies' bankruptcy, or occurring problems with companies' maintenance of the financial liquidity. It concerns both one- and two-year periods. E.I. Altman, in his original model, took a sample consisting of 66 companies operating in the same period and sector of economy. Half of these companies was insolvent. At the beginning, he estimated values of 22 financial ratios. Later, the number of these ratios, after conducting statistical tests and verification of their meanings (values), was lessened to 5. These 5 ratios reflect economic and financial situation and predicted credit rating best. The cut-off point in the E.I. Altman's model amounts to 2.675. It is the discriminatory line separating the set of companies into two groups that is companies with high (below 2.675) and low likelihood of insolvency (above the cut-off point). According to E.I. Altman's research, the error of wrong companies' qualification to the set was then the smallest – as many as 94% of companies, which bankrupted in the previous year, reached the "Z" function's value below 2.675.

In the same period, the studied value of 97% of solvent companies was above the cut-off point. Correctness of the classification a year prior to bankruptcy amounted to 95%, and, by analogy, results of the whole sample amounted to 82% two years prior to insolvency. In Poland, D. Zarzecki undertook verification of discriminant analysis's models in 2003.

The result of the analysis of these models conducted by D. Zarzecki shows that the J. Gajdek's and D. Stos's model brings the best research results (Parvi, 2015, pp. 141-149; Zarzecki, 2003, pp. 173-181):

$$Z= 0{,}7732059 – 0{,}0856425 \text{ x } X_1 + 0{,}0007747 \text{ x } X_2 + 0{,}9220985 \text{ x } X_3 + + 0{,}6535995 \text{ x } X_4 – 0{,}594687 \text{ x } X_5$$

where:
X1 – revenues from the sale/assets in total,
X2 – (short-term liabilities/cost of production
sold) x 360,
X3 – net profit/assets in total,
X4 – gross profit from the sale/net revenues,
X5 – liabilities in total/assets in total.

In this model, the cut-off point is 0.45, which means that a studied company is not endangered with bankruptcy, if the above value is reached. This cut-off point is different from the one given by E.I. Altman, but it is related to the used ratios, which are different in particular models. A comparison of these two research methods by E.I. Alrman, J. Gajdka and D. Stos leads to clear conclusions and gives an opportunity to consider both studied methods – the one developed and functioning in the world, and the one used in Polish companies and adjusted to the Polish market's conditions. The other method is a little bit more correlated with Polish companies. However, ratios show that both methods are close to each other, and comply in indicating these companies, which can be included either to the group of companies endangered with bankruptcy, or the one, in which there are successful companies able to compete on the market with incurring credit.

Strengths of the discriminant analysis are:
- the system's easy functioning,
- the assessment's objectivity, in which measurable financial information is the basis,
- effectiveness measured with the forecasts' regularities scale,
- providing early warnings about credit risk.

Weaknesses are:
- effectiveness dependent on the quality of financial data set necessary to estimate values of particular ratios,
- only selected, not complex, quantitative information is taken into account in the model's construction,
- quantitative information is static.

During the study of companies with the use of both models, the method enabling to compare them in a way presenting their financial capabilities unambiguously was constructed. Depicted values of the "Z" ratios were present in conjunction with several variables presenting what differences occur at the chosen amount of contracted credit and its period (Antonowicz, 2013, pp. 11-20; Parvi, 2015, pp. 141-149).

Used models are very useful in assessment of the companies' crediting and are often used in practice (Czerwiński, 1980, pp. 44-55). Nonetheless, conducted analyses are not attempts to estimate specific worth of credit and the period for which the company should go in debt, but the credit's maximum worth and period. It may lead to issuing credit to a company, which may not be able to repay it in future.

3. THE USE OF E.I. ALTMAN'S, J. GAJDKAS'S AND D. STOS'S DISCRIMINANT ANALYSIS MODELS IN ORDER TO INDICATE CORRECTNESS OF A DECISION ON INCURRING CREDIT ON THE EXAMPLE OF 200 STUDIED COMPANIES FROM OPOLE AND PODKARPACKIE PROVINCES within 2015-2023

In the Opole province, companies were studied with a comparison of the net profit in following years: a year prior to issuing credit, in the year of issuing credit and two years after issuing credit. The net income (division into following groups: from PLN 0 to PLN 100,000, from PLN 100,100 to PLN 200,000, from PLN 200,100 to PLN 500,000, and from PLN 501,000 to 1,000,000) and net loss were taken into account. The goal of such an analysis was to study range and opportunities of the obtained credit's amount in relation to the net profit and owned capital. The net profit, or net loss, indicated whether credit contributed to maintenance and improvement of the companies' financial liquidity, or it led to their bankruptcy.

TABLE 2: Profit or loss of studied companies of the Opole province examined, 100 examined companies (Source: own development based on 100 studied companies of the Opole province)

Year	Profit 0-100,000	Profit 100,100 – 200,000	Profit 200,100 – 500,000	Profit 500,100 – 1,000,000	Net loss
2015	30	33	15	4	18
2016	33	35	11	3	18
2017	36	36	10	3	15
2018	37	42	11	3	7
2019	37	41	12	5	5
2020	35	43	11	6	5
2021	37	43	11	5	4
2022	37	43	12	5	3
2023	36	44	10	6	4

In 2015-2020, in the Opole province, companies of lower net profit (from PLN 0 to PLN 100,000 and from PLN 100,100 to PLN 200,000) were the most numerous – there were 82 such companies. In the Podkarpackie province, ranges between PLN 0 and PLN 100,000, and between PLN 100,100 and PLN 200,000 were dominant – there were 68 such companies. It should be noted that the studied companies tended to maintain net profit.

Moreover, incurring credit even led to decrease of the number of companies, in which the loss occurred – from 18 to 4 in the Opole province, and from 16 to 8 in the Podkarpackie province. It proves that the decision on incurring credit, which contributed to improvement of the financial liquidity, was correct. These data were summarized in tables 2 and 3.
In tables 4 and 5, the average net profit, average long-term and current assets, average worth of issued credit, and average loss of the companies that do not have the financial liquidity were presented.

TABLE 3: Profit or loss of studied companies of the Podkarpackie province examined, 100 examined companies (Source: own development based on 100 studied companies of the Podkarpackie province)

Year	Profit 0-100,000	Profit 100,100 – 200,000	Profit 200,100 – 500,000	Profit 500,100 – 1,000,000	Loss
2015	38	30	15	1	16
2016	37	30	17	1	15
2017	40	27	19	2	14
2018	42	26	19	2	11
2019	43	27	19	2	11
2020	40	27	20	3	10
2021	37	29	22	3	9
2022	39	28	21	3	9
2023	37	28	24	3	8

In the table 4, it should be noted that the average value of issued credit amounts to PLN 258,758. It is the working capital facility, revolving in subsequent years, and issued in 2016. The value of credit constitutes c. 1/3 of average values of current assets that is c. 33%. It is the evidence that credit, which is c. 30% of current assets, causes maintenance of the financial liquidity, and does not cause financial destabilization. While analysing the table 5, it should be noted that the average value of issued credit amounts to PLN 322,964. It is the working capital facility, revolving in subsequent years, and issued in 2016 as well.

TABLE 4: Average net profit in relation to value of long-term and current assets of studied companies of the Opole province in PLN thousands (Source: own development based on 100 studied companies of the Opole province)

Year	Average Net profit	Aver7age value of Long-term assets	Average value of Current assets	Average value of assets in total	Average value of the issued credit	Average Loss
Before issuing credit						
2015	195,875 (82 companies)	450,456	608,475	1,058,931	X	225,154 (18 companies)
The year of issuing credit						
2016	202,895 (82 companies)	552,326	698,459	1,250,785	258,758	289,478 (18 companies)
After issuing credit						
2017	240,425 (85 companies)	582,954	721,258	1,304,212	X	198,487 (15 companies)
2018	260,125 (93 companies)	623,745	736,547	1,360,292	X	125,158 (7 companies)
2019	261,254 (95 companies)	639,532	740,128	1,379,660	X	134,578 (5 companies)
2020	292,365 (95 companies)	644,588	755,655	1,400,243	X	134,578 (5 companies)
2021	308,431 (96 companies)	668,602	784,286	1,452,888	X	130,884 (4 companies)
2022	309,431 (97 companies)	695,632	780,025	1,475,657	X	133,295 (3 companies)
2023	310,431 (96 companies)	722,548	788,365	1,510,913	X	132,654 (4 companies)

However, in case of companies of the Podkarpackie province, its worth in relation to current assets is c. 1/2, so it is 45% of the credit's worth in relation to current assets.

In this case, it can be seen clearly that companies maintain the financial liquidity harder with such debts. Moreover, the group of companies suffering loss enlarged from 14 to 9 in the year of incurring credit. As late as in 2017-2023, the group decreased to 9 companies. But in the Opole province, the number of companies suffering loss decreased four times – from 18 to 4 with 30% relation of incurred credit to current assets, while in the Podkarpackie province, the number of such companies decreased from 15 to 8 with c. 50% relation of incurred credit to current asserts. In conclusion, too heavy burden with debt and relying on foreign capital (over 45% of the current assets' value) leads to disturbance of the company's financial liquidity because the company is not able to pay such debt and use obtained funds properly and sensibly. Only these companies where foreign capital is 30% of current assets will use them sensibly and in accordance with their financial opportunities. The credit risk taken by a bank due to granting funds was minimal in case of companies with less credit. It is demonstrated by another calculations and use of E.I. Altman's, J. Gajdka's and D. Stos's methods. Nevertheless, granting funds constituting c. 50% of the company's current assets was too dangerous both for the bank and the company.

TABLE 5: Average net profit in relation to value of long-term and current assets of studied companies of the Podkarpackie province in PLN thousands (Source: own development based on 100 studied companies of the Podkarpackie province)

Year	Average Net profit	Average value of Long-term assets	Average value of Current assets	Average value of assets in total	Average value of the issued credit	Average Loss
Before issuing credit						
2015	193,264 (84 companies)	460,523	610,624	1,071,147	X	312,963 (16 companies)
The year of issuing credit						
2016	200,634 (85 companies)	492,129	624,663	1,116,792	322,964	401,552 (15 companies)
After issuing credit						
2017	210,778 (86 companies)	523,113	639,998	1,163,111	X	342,985 (14 companies)
2018	220,321 (89 companies)	556,447	672,224	1,228,671	X	309,662 (11 companies)
2019	235,394 (89 companies)	589,556	691,913	1,281,469	X	288,995 (11 companies)
2020	265,694 (90 companies)	601,339	701,785	1,303,124	X	269,441 (10 companies)
2021	263,984 (91 companies)	654,652	720,354	1,375,006	X	270,4524 (9 companies)
2022	294,654 (91 companies)	698,246	780,965	1,479,211	X	242,478 (9 companies)
2023	296,324 (92 companies)	699,325	789,648	1,488,973	X	240,964 (8 companies)

Analysing course of economical events since the moment preceding issuing credit (Pomykalska, 2007, pp. 178-189) and subsequent years of the activity's duration, five selected ratios corresponding to particular models were used. The cut-off points for two chosen discriminant analysis models were obtained.

TABLE 6: The use of E.I. Altman's, J. Gajdka'S and D. Stos'S discriminant analysis models on the example of 100 studied companies from the Opole province (Source: Own development on the basis of data of 100 selected companies from the Opole province)

E.I. Altman's model	2015	2016	2017	2018	2019
The number of companies showing profit	82	82	85	93	95
The average "Z" ratio for companies	**3.13**	**3.46**	**3.33**	**4.12**	**4.14**
Absence of risk, values close to and above 3.0	low	absence	absence	absence	absence
The number of companies showing loss	18	18	15	7	5
The average "Z" ratio for companies	**1.97**	**2.34**	**1.93**	**1.70**	**1.78**
Absence of risk, values close to and above 3.0	**High**	**medium**	**high**	**high**	**high**
The J. Gajdka and D. Stos's model	**2015**	**2016**	**2017**	**2018**	**2019**
The number of companies showing profit	82	82	85	93	95
The average "Z" ratio for companies	**0.78**	**0.92**	**0.87**	**1.01**	**1.04**
Absence of risk, values close to and above 0.45	absence	absence	absence	absence	absence
The number of companies showing loss	18	18	15	7	5
The average "Z" ratio for companies	**0.30**	**0.39**	**0.38**	**0.33**	**0.32**
Absence of risk, values close to and above 0.45	**high**	**medium**	**high**	**high**	**high**

TABLE 7: The use of E.I. Altman's, J. Gajdka'S and D. Stos'S discriminant analysis models on the example of 100 studied companies from the Opole province (Source: Own development on the basis of data of 100 selected companies from the Opole province)

E.I. Altman's model	2020	2021	2022	2023
The number of companies showing profit	95	96	97	96
The average "Z" ratio for companies	**4.16**	**4.21**	**4.20**	**4.24**
Absence of risk, values close to and above 3.0	absence	absence	absence	absence
The number of companies showing loss	5	4	3	4
The average "Z" ratio for companies	**1.82**	**1.94**	**1.95**	**1.96**
Absence of risk, values close to and above 3.0	**high**	**high**	**high**	**high**
The J. Gajdka and D. Stos's model	**2020**	**2021**	**2022**	**2023**
The number of companies showing profit	95	96	97	96
The average "Z" ratio for companies	**1.05**	**1.13**	**1.12**	**1.14**
Absence of risk, values close to and above 0.45	absence	absence	absence	absence
The number of companies showing loss	5	4	3	4
The average "Z" ratio for companies	**0.35**	**0.37**	**0.38**	**0.38**
Absence of risk, values close to and above 0.45	**high**	**high**	**high**	**high**

TABLE 8: The use of E.I. Altman's, J. Gajdka'S and D. Stos'S discriminant analysis models on the example of 100 studied companies from the Podkarpackie province (Source: Own development on the basis of data of 100 selected companies from the Podkarpackie province)

E.I. Altman's model	2015	2016	2017	2018	2019
The number of companies showing profit	84	85	86	89	89
The average "Z" ratio for companies	**3.00**	**3.01**	**3.39**	**3.49**	**3.54**
Absence of risk, values close to and above 3.0	low	low	absence	absence	absence
The number of companies showing loss	16	15	14	11	11
The average "Z" ratio for companies	**1.30**	**1.39**	**1.39**	**1.47**	**1.50**
Absence of risk, values close to and above 3.0	**high**	**high**	**high**	**high**	**high**
The J. Gajdka and D. Stos's model	**2015**	**2016**	**2017**	**2018**	**2019**
The number of companies showing profit	84	85	86	89	89
The average "Z" ratio for companies	**0.54**	**0.54**	**0.58**	**0.59**	**0.60**
Absence of risk, values close to and above 0.45	absence	absence	absence	absence	absence
The number of companies showing loss	16	15	14	11	11
The average "Z" ratio for companies	**0.30**	**0.34**	**0.36**	**0.37**	**0.38**
Absence of risk, values close to and above 0.45	**medium**	**medium**	**high**	**high**	**high**

On the example of the studied companies of the Opole province, the Altaman's model shows significant improvement of the ratio in 2016 (3.46), when companies incurred credit, in relation to 2019 (4.14). Improvement of the selected companies' financial condition proves the above. In subsequent years, this value is the same, and in 2023, increases to 4.24. The J. Gajdka's and D. Stos's model also indicates values above the cut-off point from 0.78 to 1.14 in 2015-2023. Only in companies suffering from loss the cut-off's ratio tends to deteriorate with the use of both methods, which proves that even properly selected credit does not improve the companies' financial liquidity. The values described above present research included in the table 6-7.

TABLE 9: The use of E.I. Altman's, J. Gajdka'S and D. Stos'S discriminant analysis models on the example of 100 studied companies from the Podkarpackie province (Source: Own development on the basis of data of 100 selected companies from the Podkarpackie province)

E.I. Altman's model	2020	2021	2022	2023
The number of companies showing profit	90	91	91	92
The average "Z" ratio for companies	**3.60**	**3.79**	**3.80**	**3.84**
Absence of risk, values close to and above 3.0	absence	absence	absence	absence
The number of companies showing loss	10	9	9	8
The average "Z" ratio for companies	**1.61**	**1.64**	**1.67**	**1.74**
Absence of risk, values close to and above 3.0	**high**	**high**	**high**	**High**
The J. Gajdka and D. Stos's model	**2020**	**2021**	**2022**	**2023**
The number of companies showing profit	90	91	91	92
The average "Z" ratio for companies	**0.69**	**0.74**	**0.76**	**0.88**
Absence of risk, values close to and above 0.45	absence	absence	absence	absence
The number of companies showing loss	10	9	9	8
The average "Z" ratio for companies	**0.42**	**0.44**	**0.43**	**0.42**
Absence of risk, values close to and above 0.45	**high**	**high**	**high**	**high**

In turn, in the table 8-9, E.I. Altman's, J. Gajdka's and D. Stos's models were also used during research of companies of the Podkarpackie province. The above research shows that companies, which maintained the financial liquidity with incurring credit, improved their financial condition, but their cut-off point's ratio are different from ones noted in the Opole province.
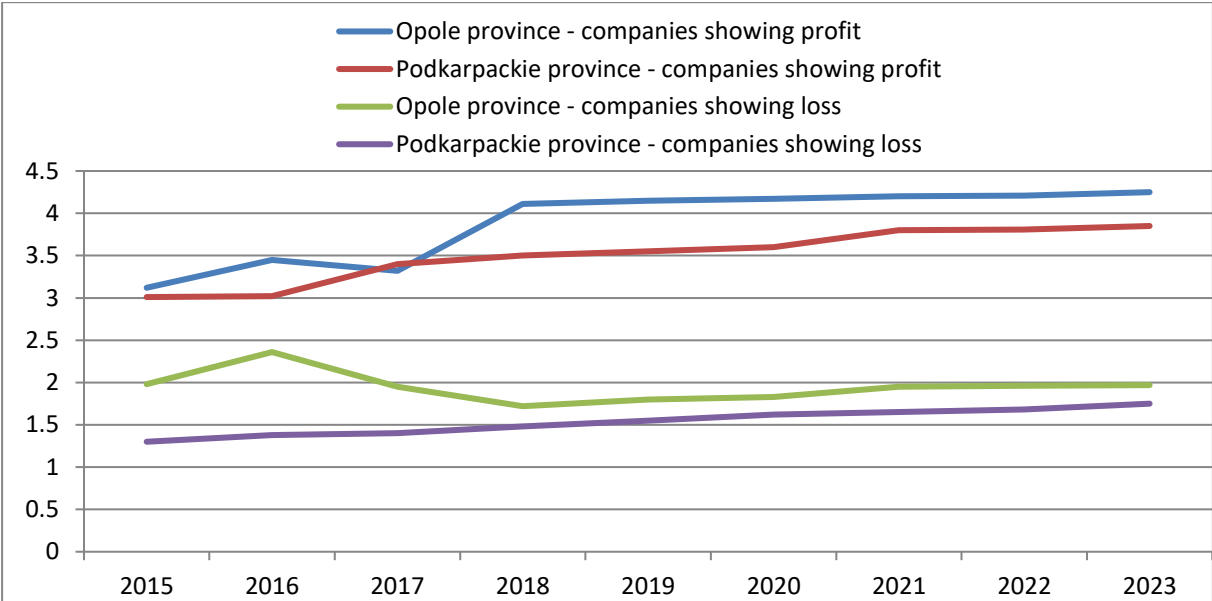
Figure 1. The use of E.I. Altman's model in the analysis of 200 companies of Opole and Podkarpackie provinces showing profit and loss in 2015-2023 (Source: own development on the basis of data of selected companies from Opole and Podkarpackie provinces).

In the E.I. Altman's model, improvement can be seen in 2015-2023 – ratio's value increased from 3.00 to 4.24. Whereas in the J. Gajdka's and D. Stos's model, the ratio's values increased from 0.78 to 1.14. It means that credit's worth constituting 45% of the current assests' worth is too heavy burden, and prevents from significant improvement of the financial liquidity. Moreover, it does not show the ratio similar to the one obtained in research in the Opole province. Furthermore, the cut-off points' values of the companies showing net loss in the Podkarpackie province do not show significant improvement of the financial liquidity, but they slightly vary in 2015-2023. In the E.I. Altman's method, they vary from 1.30 to 1.74, and in the J. Gajdka;s and D. Stos's method – from 0.30 to 0.42.

Figure following on the next page
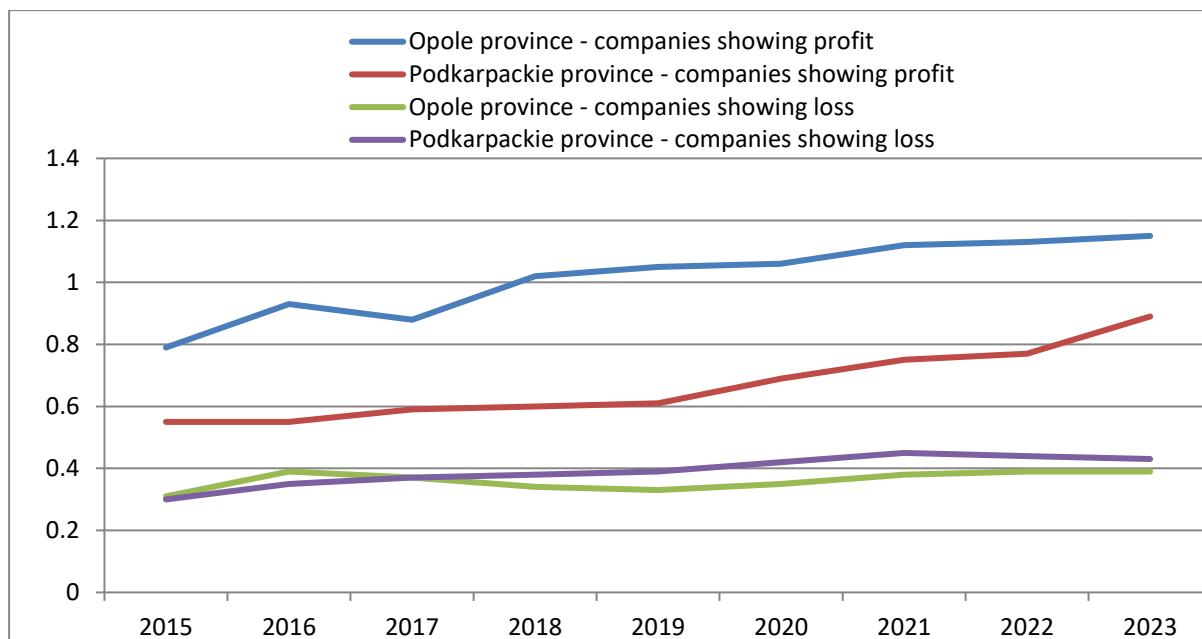
Figure 2. The use of the J. Gajdka's and D. Stos's model in the analysis of 200 companies of Opole and Podkarpackie provinces showing profit and loss in 2015-2023 (Source: own development on the basis of data of selected companies from Opole and Podkarpackie provinces).

It evidences that greater worth of credit could not ensure companies satisfactory improvement of the financial liquidity, but worsened their situation. Analysing net profit of the companies, it can be noted that issued credit influenced their development positively. There, its huge influence on the companies' net income can be seen. Thanks to opportunity to incur credit, companies could develop dynamically and as they planned in their assumptions with credit constituting 30% of the current assets' worth. Only credit constituting 45% of the current assets' worth did not cause major changes in many companies and did not lead to improvement of the financial liquidity of the greater number of companies showing net loss. The sensibly selected credit resulted in the greater increase of net profit and contributed to the increase of net income and profit, without which the company could not develop and reach significant results.

4. CONCLUSION

It should be emphasised that contracted credit in studied companies contributed to improvement of the financial liquidity. However, it was mostly in case of companies, whose credits were c. 30% of the current assets' worth. Furthermore, in case of companies of the Podkarpackie province, whose credits were 45% of the current assets' worth, the financial liquidity was not improved as much as in case of lower credits incurred by the studied companies of the Opole province. Nevertheless, credits enabled companies to settle current liabilities, which is proven by lessened number of companies suffering from net loss because such a phenomenon occurred in the group of 100 studied companies in 2015-2023. Therefore, companies maintained good financial condition after issuing credit. It should be stated clearly that the decision on incurring credit was, indeed, correct. But it should be borne in mind that the amount of incurred credit must not exceed specific worth preventing from repaying incurred credit and settling liabilities, which could lead to the company's inability to debt service. That is why c. 30% of the company's current assets' value, resulting from research of the companies, is the optimal amount. The period, for which credit was incurred, is highly significant, but the studied companies contracted the working capital facility for one year with the possibility to renew it in subsequent years,

which did not affect research and cause its distortion. The companies that had unevenly balanced liquidity or needed additional financial resources for the functioning on the market, and that took up a credit above the value exceeding 45% of the external funds in relation to their current assets, did not maintain the liquidity, and only 6 companies improved it in relation to 15 companies that were at risk of bankruptcy, which was reported in the Podkarpackie Voivodeship. While the number of companies in Opole Voivodeship, which improved their liquidity, is 15, that is several times more than in Podkarpackie Voivodeship, but the improvement occurred thanks to a taken credit, however the debt amounted only to 30% of the external funds in relation to their current assets. Therefore, there must be a firm answer that the credits that are incurred in the form of cash and account for more than 45% of the external funds in respect of current assets will not have a good impact on the financial condition of the studied companies, since such a capital obligation and interest liability constitutes a major burden for the company, which must within next months, after a credit was incurred, pay it back to the bank. The research was conducted based on 100 companies in the Opole province and 100 companies from the Podkarpackie province. The E.I. Altman's model was also applied in the paper and it was demonstrated that the value of the credit and the period for which it was incurred as well as the ratio of the amount of external funds to the working capital are of great importance to a company and its liquidity. The companies that were subject to the research, voluntarily made the research data available, i.e. the balance sheet and income statement.

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ASPECT OF OPEN DATA OF SOCIAL COOPERATIVES AND ILLUSTRATIVE TEST QUALITY: A LITERATURE REVIEW

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ABSTRACT

Our study does not aim to be statistically representative. Its primary objective is to identify and analyze the actions implemented regarding cooperatives. This is why pursuing statistical representativeness makes little sense in qualitative methods, which instead prioritize and encourage diversity. Nonetheless, we conducted econometric modeling of 84 representative Moroccan cooperatives from various regions and diverse sectors. The survey was conducted among cooperatives from various sectors, such as handicrafts, agriculture, argan oil, foodstuffs, the collection of medicinal and aromatic plants, literacy, waste management, labor, e-commerce, tourism, fishing, arts and culture, quarrying, telecommunications, transport, retail, forestry, consulting, and management. In sectors like handicrafts, agriculture, argan oil, and foodstuffs, women are the primary workers. Sectors such as agriculture, literacy, handicrafts, and forestry are primarily operated by cooperatives of young graduates. The methodology applied is a qualitative/interpretative approach, used to address the phenomenon from the subjects' perspective, based on their insights into this social innovation within cooperatives supported by the ADF. Fieldwork was inspired by ethnography and conducted through case studies with small cooperatives (constituting a community of practice) using on-site observations, work experience narratives, semi-structured interviews, and group reflection activities. Our empirical research was carried out within two Moroccan cooperative organizations briefly introduced in the following lines, along with the study of the 84 modeled cooperatives.
Keywords: Agriculture, Cooperatives, Econometrics, Morocco

1. INTRODUCTION

The structural adjustment program (SAP) implemented in Morocco in the 1980s, advocated by international institutions such as the International Monetary Fund (IMF), is considered the "bane" of many populations due to the social effects of these austerity policies. It also led to the state withdrawing from certain economic and social sectors. Moreover, globalization and market liberalization produced disastrous effects on public policies, employment, and purchasing power. These structural adjustment programs were created to support debt refinancing and adjust the economies of countries subjected to these measures. While these policies often stabilized current account deficits, they contributed little to development.

People were frequently sidelined, with these measures inevitably leading to a decline in purchasing power due to stagnant wages recommended by the World Bank and the IMF. The resulting decline in incomes and purchasing power had direct impacts on education, health, and housing. In the specific conditions of Third World countries and without appropriate support, structural adjustment policies exacerbated the misery of populations and fueled migration. To address these numerous problems, it became necessary—even vital—to establish a system placing human welfare at its core. This is the social economy. Morocco owes the establishment of its social economy network to the National Initiative for Human Development (INDH), launched by King Mohammed VI on May 18, 2005. The INDH aims to implement democracy and good governance while contributing to the country's economic, social, cultural, and environmental development. This initiative placed social economy organizations, primarily cooperatives, at the heart of the human development strategy. Cooperatives have mitigated these adverse effects, particularly in rural areas, as their goal is to serve their members and communities rather than solely seek profit. For example, in Morocco, women's cooperatives dominate the argan oil sector, accounting for 93% of the cooperative network. Their numbers grew significantly by 11.5%, from 157 cooperatives on June 30, 2009, to 175 on June 30, 2010, and 274 cooperatives on December 31, 2015, according to ODCO. Globally, the cooperative sector comprises nearly one billion members and more than 100 million jobs. Cooperatives are a key component of Morocco's social and solidarity economy. They play a crucial role in the country's socioeconomic development by fighting poverty and exclusion, improving living conditions in rural areas, and creating jobs. However, these cooperatives face challenges, including internal management issues, competition, difficulties in accessing raw materials, and market entry barriers. Management challenges within cooperatives are highly complex. Even when managers are trained in business management, the cooperative model requires additional consideration of its associative aspect and its impact on organizational dynamics. Additionally, a study showed that cooperatives are capable of producing high-quality goods but lack the knowledge to satisfy market demand or attract potential buyers. They limit themselves to production and storage, waiting for customers to approach them or for an administration to invite them to an exhibition. In a market economy, cooperatives must adopt a marketing approach and establish a marketing mix plan to sell their products and services in line with consumer preferences, competitor pricing strategies, and effective distribution channels. Cooperatives and their groupings are seen as efficient models within the social and solidarity economy and are crucial players in Morocco's new orientations for local socioeconomic development. Furthermore, the cooperative sector promotes income-generating projects and job creation while combating unemployment, particularly in rural areas. Through their values of democracy, solidarity, sharing, and mutual aid, cooperatives play an increasingly important role in Morocco's economic and social development. Their appeal has grown, especially since 2005, the year the INDH was launched, encouraging the creation and sustainability of social and solidarity economy structures.

2. OBJECTIVE OF THE SURVEY

The objective of our study is to present an overview of Moroccan cooperatives at detailed activity levels and fine geographical scales. This domain remains, however, difficult to grasp through the usual sources of cooperative statistics to conduct an in-depth analysis and draw significant conclusions because these data are scattered, insufficient, and sometimes absent for certain periods. The year 2012 was declared the International Year of Cooperatives by the United Nations and highlights the contribution of cooperatives to economic development and their impact on fighting poverty, creating jobs, and social integration. Moreover, this particular year had the slogan: "Cooperative Enterprises Build a Better World," and we will apply the spirit of this motto throughout this research work.

Theoreticians in the field have extensively drawn from their experience to provide us with a methodology for setting up, organizing, and operating a cooperative. The idea is to establish a qualitative study that accurately describes the practices of Moroccan cooperatives. Qualitative methods are well-suited for studying individuals' opinions, behaviors, and practices. Unlike quantitative studies, the goal of qualitative studies is not only to measure but to understand the sequences and logics of individuals' experiences, the interpretations they make, taking into account the contexts specific to each. To establish a diagnosis of the internal environment of cooperatives, we conducted a qualitative study based on case studies in the desire to discover and understand organizational structures. This study focused on semi-structured interviews conducted with officials from the Office for Cooperative Development (ODCO) and a field study with some women's cooperatives and the largest Moroccan cooperative, COPAG, which is seen as a model of success. This survey was conducted based on an interview guide. The theme revolves around the diagnosis of Moroccan cooperatives. However, as we mentioned earlier, it is difficult to find reliable statistics on cooperatives. To conduct an in-depth analysis and draw significant conclusions because these data are scattered, insufficient, and sometimes absent for certain periods. Nevertheless, we were still able to design an econometric model using the data coding method, allowing us to better understand the functioning of a Moroccan cooperative and closely monitor its activity and financial situation to apprehend the many obstacles and limitations surrounding it, and subsequently become more efficient and competitive in the market alongside traditional companies, such as the COPAG cooperative, which managed to do so and is currently seen as a model of hope and success for all cooperatives.

This survey aims to answer the following questions:
- Which sector has the highest capital?
- Which sectors are conducive to the creation of women's cooperatives?
- Does the training received have a significant impact on the cooperative's financial situation?
- Are cooperatives that have benefited from support/subsidies female or male?
- Do participation in events and training received have a positive impact on the cooperative's activity situation?
- Does a given region favor the creation of cooperatives more than another?
- Is there a significance between capital and the number of members?
- Does the gender factor have a significant impact on regions?
- Does the gender factor have a significant impact on the cooperative's activity situation?
- To delimit our study, we chose three main regions, namely: the Rabat region, the Oriental, and the Souss-Massa-Draa region. What are the main activity branches in the different listed regions?

3. QUESTIONNAIRE DEVELOPMENT

To collect data concerning the functioning of a Moroccan cooperative to be surveyed, two solutions are available: on the one hand, using a questionnaire with closed questions. These are used to obtain certain factual information, to judge the approval or disapproval of a given opinion, the position on a range of judgments, etc. Moreover, the responses are predetermined, and the respondent must absolutely choose from the options offered. This solution has the advantage of allowing better processing and facilitating the analysis of responses: since the responses are anticipated, there can be no ambiguity. However, it has the disadvantage of "dictating" the respondent's answer: the respondent will tend to choose the response that seems most in line with the surveyors' expectations rather than the one closest to what they think.

Thus, closed questions cannot and should not be used to collect nuanced information corresponding to deep-seated attitudes but to collect objective characteristics. On the other hand, designing a questionnaire with open-ended questions. As the name suggests, this type of question will allow the interlocutor to respond without constraint. In this context, the response is not predetermined, and the respondent is free to express themselves. If the questions are well-formulated, they allow for collecting interesting and more relevant information. The only and main disadvantage of this method is the difficult processing. We opted for a mix of both methods to better target our research and achieve better results. Our objective is to analyze as best as possible the functioning of the Association du Docteur Fatiha (ADF), which cooperates exclusively with rural women and allows them to improve their economic situations. The questionnaire includes 17 open and closed questions at the same time, which led us to have better visibility of this association that helps women in the Oriental region to create their own cooperatives. Moreover, thanks to this questionnaire and the field survey conducted over two months with the ADF, we were able to better understand the functioning of this association/cooperative. To discover the various ecological products these cooperative members resold, which were handcrafted, ultimately helping to preserve this cultural heritage. As a result, we were able to witness the fulfillment and emancipation of rural Moroccan women and their socio-economic development, but also to discover the limits and obstacles they face daily.

4. CHOICE OF SAMPLE

The main characteristic of a sample is that it should reflect the population's characteristics as much as possible. Great importance should be attached to it since it determines the precision of the results obtained. Our study does not claim to represent the situation of the Moroccan cooperative as a whole; it simply aims to shed light on its diversity. To carry out this project successfully, we opted for a selection of companies. We believe that this selection, concerning our objective, is better than statistical representativeness: this research is simply exploratory. This choice should allow covering a wide range of practices and representations. The selection involved initial exploration and contact work. We primarily contacted the Office for Cooperative Development (ODCO). The 84 cooperatives were selected with great difficulty from this organization, which took 24 months of intense work.

5. SURVEY RESULTS
The first question asked: Which sector has the highest capital?

ANOVA with One Factor
Capital (DH)

	Sum of Square	df	Mean square	F	Significance
Between Groups	2,106,043,386,936.7684	40	52,651,084,673.4192	162.325	.000
Within Groups	1,427,163,348,039.5880	44	32,435,530,637.26336		
Total	2,120,315,020,417.1644				

Average Capital by Sector - Activity Branch (Adjusted Proportions)
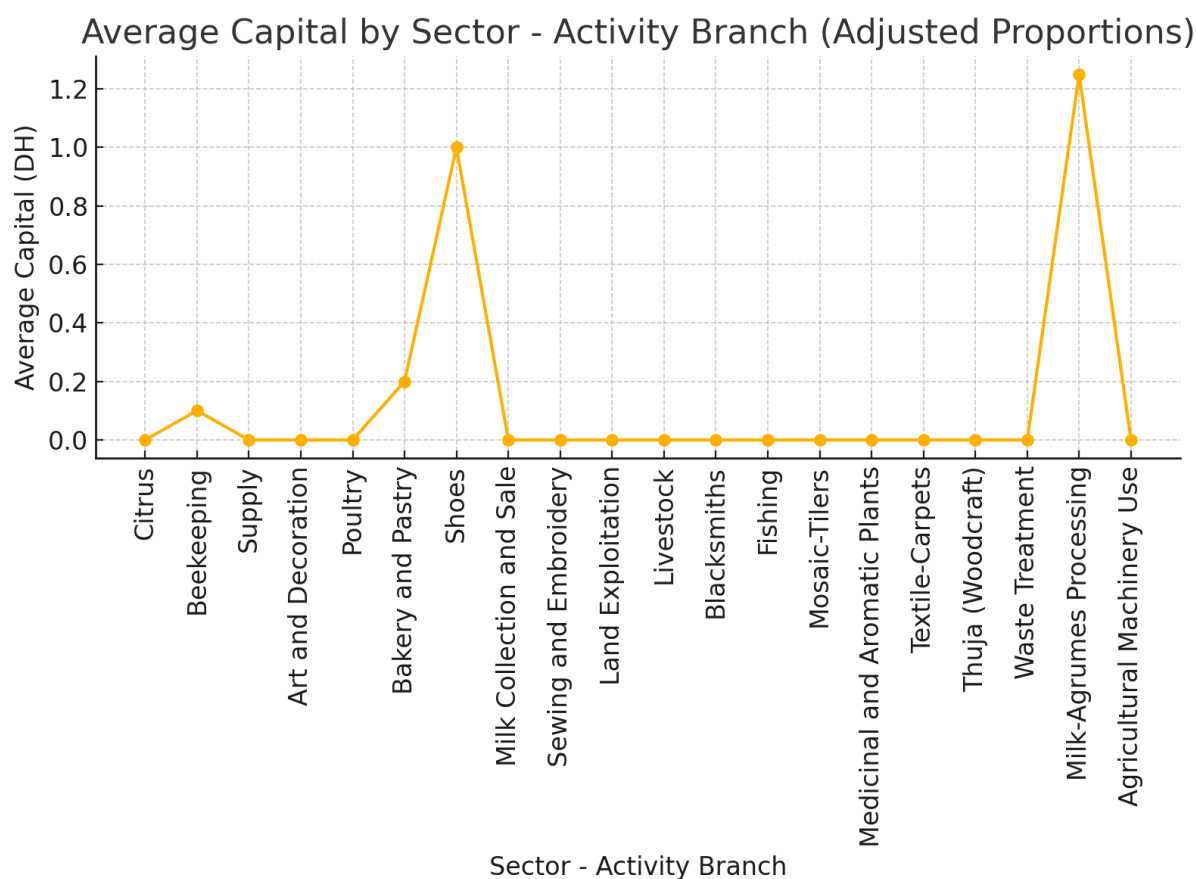
We observe through these graphs that the sector with the highest capital is CMA (cereals), followed by citrus fruits, as well as mainly milk collection and commercialization.

The second question asked: Which sectors/branches are conducive to the creation of women's cooperatives?

Observations

Table ends on the next page

Sector Branch of activity			
	Female	**Male**	**Total**
Citrus Fruits		5	5
Literacy		2	2
Apiary		2	2
Apiculture		3	3
Supply		4	4
Argan	5		5
Art and decoration		1	1
Culinary arts	1		1
Poultry		1	1
Wood Work Carpentry		1	1
Bakery and Pastry		1	1
Cereals		1	1
Shoes		1	1
CMA (cereals)		1	1

Milk collection and commercialization		1	1
Collection and commercialization of milk		18	18
SEWING - EMBROIDERY	1		1
RABBIT FARMING	1		1
Livestok		2	2
QUARRY EXPLOITATION		1	1
LAND EXPLOITATION		1	1
Forest		1	1
BLACKSMITHS AND IRONWORKERS		1	1
MARKET GARDENING		3	3
MAROQUINERIE		1	1
METAL-JEWELRY		1	1
MOSAIC-ZELLIGE		1	1
OLEICULTURE (OLIVE TREES)		2	2
FISHING		1	1
Artisanal fishing		1	1
MEDICINAL AND AROMATIC PLANTS		2	2
SUGAR PLANTS		1	1
TEXTILE-CARPETS	7		7
TEXTILE-CARPETS-SEWING	1		1
THUYA (ARAR TREE)		2	2
Weavers		1	1
Waste treatment		1	1
Milk Processing		1	1
Milk processing-Citrus		1	1
Transport Taxis		1	1
Shared use of agriculture equipment			1
Total	16	69	85

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	**85.000ª**	**40**	**.000**
Likelihood Ratio	**82.221**	**40**	**.000**
Linear-by-Linear Association	**1.247**	**1**	**.264**
Number of Valid Cases	**85**		

80 cells (97.6%) have an expected count less than 5. The minimum expected count is .19.

Workforce Distribution by Gender Across Sectors
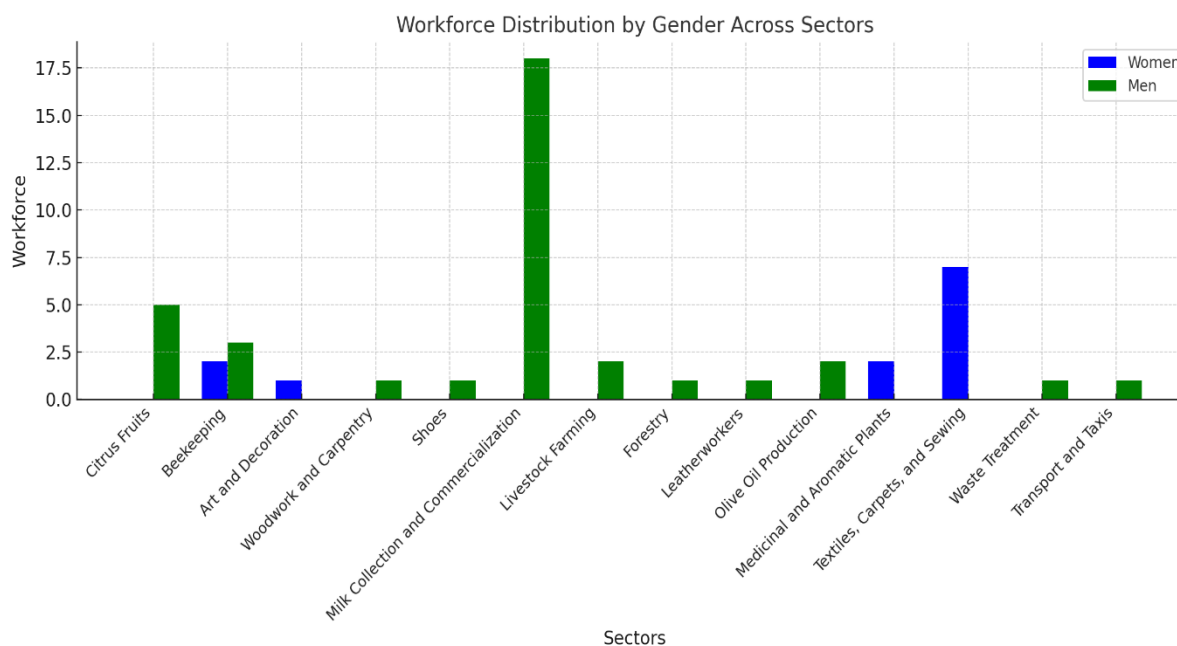
According to these various graphs, the sectors/branches conducive to the creation of women's cooperatives are mainly argan cooperatives, culinary arts, sewing-embroidery, rabbit farming, textile-carpets, and textile-carpets-sewing.

Third question is: Does the training received have a positive impact on the cooperative's financial situation (namely, surpluses and turnover)? To answer this, we tested their significance.

Formation Received (1)

	N	Mean	Std. Deviation	Std. Error Mean
Turnover (DH)				
NO	17	324,759.65	360,589.414	87,455.779
YES	59	49,906,410.47	289,556,330.049	37,697,023.277

Levene's Test for Equality of Variances t-test for Equality of Means
Variable: TURNOVER (DH)

	F	Sig	T
Equal Variance assumed	1.410	.239	-0.703
Turnover DH			
Equal variance not assumed			**-1.315**

Explanation:
- **Levene's Test for Equality of Variances:** This test checks if the variances of the two groups (those who received training and those who did not) are equal.
  - **F:** The F-statistic value from Levene's test (1.410).
  - **Sig.:** The significance value (p-value) of the Levene's test (.239). Since this value is greater than 0.05, we do not reject the null hypothesis of equal variances.
- **t-test for Equality of Means:** This test compares the means of two groups.
  - **Equal variances assumed:**
    - **t:** The t-statistic value when equal variances are assumed (-0.703).
  - **Equal variances not assumed:**
    - **t:** The t-statistic value when equal variances are not assumed (-1.315).

Note:
- **TURNOVER (DH):** Indicates that the variable being tested is the turnover in Moroccan Dirhams.
- The **t** values are provided under both assumptions (equal variances assumed and not assumed) due to the result of Levene's test.

Test for Equality of Means
Variable: TURNOVER (DH)

	Df	Sig. (2-tailed)	Mean Difference
Equal variances assumed	74	.484	-49,581,650.828
Equal variances not assumed	58.001	.194	-49,581,650.828

Explanation:
- **df (Degrees of Freedom):**
  - **Equal variances assumed:** 74
  - **Equal variances not assumed:** 58.001
- **Sig. (2-tailed):** The two-tailed p-value of the t-test.
  - **Equal variances assumed:** .484
  - **Equal variances not assumed:** .194
- **Mean Difference:** The difference between the mean turnover of cooperatives that did not receive training and those that did.
  - **Mean Difference:** -49,581,650.828 DH

Interpretation:
- The **negative mean difference** indicates that cooperatives **which received training** have a higher average turnover compared to those **which did not receive training** by **49,581,650.828 DH**.
- **Statistical Significance:**
  - Since the **p-values** (.484 and .194) are **greater than 0.05**, the difference in turnover between the two groups is **not statistically significant**.
  - We **fail to reject** the null hypothesis that there is no difference in mean turnover between cooperatives that received training and those that did not.

Note:
- The t-test was performed under two assumptions:
  - **Equal variances assumed:** Assumes that the variances of the two groups are equal.
  - **Equal variances not assumed:** Does not assume equal variances; adjusts degrees of freedom accordingly.

Independent Samples Test
t-Test for Equality of Means

95% Confidence Interval of the Difference

Upper	
Turnover (DH)	
Equal variances assumed	**91,021,623.133**
Equal variances not assumed	**25,877,325.540**

Dimension	1	2	Mean
Activity situation	0.425	0.497	0.569
Training received (1)	0.047	0.358	0.668
Participation in events (2)	0.153	0.397	0.642
Total Active	0.625	1.252	1.879

TRAINING RECEIVED (1)
Variable: SURPLUS (DH)

Training received	N	Mean	Standard Deviation	Standard Error of the Mean
NO	**17**	**15,532.53**	**40,463.150**	**9,813.755**
YES	**57**	**411,537.18**	**1,146,670.402**	**151,880.205**

Explanation:
- **TRAINING RECEIVED (1):** Indicates whether the cooperative received training.
  - **NO:** Cooperatives that did not receive training.
  - **YES:** Cooperatives that received training.
- **N:** The number of cooperatives in each group.
- **Mean:** The average surplus (in Moroccan Dirhams) for each group.
- **Standard Deviation:** Measures the dispersion of surplus values in each group.
- **Standard Error of the Mean:** Estimates the variability between sample means if multiple samples were taken from the same population.

The data suggests that cooperatives which received training have a higher average surplus compared to those that did not receive training.

Levene's Test for Equality of Variances
t-Test for Equality of Means

Variable: SURPLUS (DH)

	F	Sig.	t	df
Equal variances assumed	6.337	.014	-1.417	72
SURPLUS (DH)				
Equal variances not assumed			-2.602	56.465

t-Test for Equality of Means
Variable: SURPLUS (DH)

	Sig. (2-tailed)	Mean Difference	Standard Error Difference
Equal variances assumed	.161	-396,004.646	279,510.149
Equal variances not assumed	.012	-396,004.646	152,196.933

Explanation:
- **Sig. (2-tailed):** The two-tailed significance (p-value) of the t-test.
    - **Equal variances assumed:** .161
    - **Equal variances not assumed:** .012
- **Mean Difference:** The difference between the mean surplus of cooperatives that did not receive training and those that did.
    - **Mean Difference:** -396,004.646 DH
- **Standard Error Difference:** The standard error of the mean difference.
    - **Equal variances assumed:** 279,510.149
    - **Equal variances not assumed:** 152,196.933

Interpretation:
- The **negative mean difference** indicates that cooperatives **which received training** have a higher average surplus compared to those **which did not receive training** by **396,004.646 DH**.
- **Statistical Significance:**
    - Under the assumption of **equal variances**, the p-value is **.161**, which is greater than **0.05**, indicating that the difference is **not statistically significant** at the 5% level.
    - Under the assumption of **unequal variances**, the p-value is **.012**, which is less than **0.05**, indicating that the difference is **statistically significant** at the 5% level.
- This suggests that when variances are not assumed to be equal, the training received has a significant positive impact on the surplus of the cooperatives.

t-Test for Equality of Means
95% Confidence Interval of the Difference

	Lower bound	Upper bound
Equal variances assumed	-953,197.944	161,188.652
SURPLUS (DH)		
Equal variances not assumed	-700,836.326	-91,172.966

After performing the significance test, we observe that there does not seem to be a relationship between turnover and the training received. Concerning the significance test for turnover, it is 0.239, which is greater than 0.05, so there is no relationship between turnover and the training received. However, we note from the significant test for surpluses that there is a relationship between the training received and the cooperative's surpluses; we found 0.014, which is less than 0.05, so the training received has an impact on the cooperative's surpluses.

6. CONCLUSION

The purpose of this study is to clarify the functioning of Moroccan cooperatives, namely the 84 cooperatives, the COPAG cooperative, as well as the study conducted with the Association of Dr. Fatiha. The interviews conducted with the ODCO, the Association of Dr. Fatiha, and the COPAG cooperative have led to the drafting of reports. Compiling these reports allows us to synthesize our results and propose recommendations.

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BUSINESS COMMUNICATION BARRIERS GENERATION Y'S PERSPECTIVE

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ABSTRACT

The main objective of this study is to identify, analyze and describe how the "Y" generation perceives barriers to communication in a work environment in Portugal. This generation constitutes an increasing part of our active population, however there are no studies that try to understand main difficulties faced by this group or studies that try to help organizations adapt to these elements that have new needs. A quantitative research was developed, for which a questionnaire was developed and was applied to a sample of the population being analyzed via digital, the results were analyzed using Excel and google forms. It was possible to identify and describe the barriers to business communication perceived by this generation as the main ones, as well as the most used means of communication and how they vary depending on the situation. In this way, the aspects that a company should take into account to adapt to this generation and improve the flow of information are identified.

Keywords: Communication barriers; Business communication; Generation "Y"; Generations; Information flow

1. INTRODUCTION

Business communication, which used to be supported by memos, notice boards and notes in the corners of newspapers, has been enhanced and today has much more effective and comprehensive means. While a few years ago it was only possible to reach employees and customers in a slow and fragmented way, today, with a few clicks it is possible for people from all over the world to see your message in full quality and almost in real time (Tameirão, 2021). However, establishing good business communication is not always an easy task, as certain factors prevent information from flowing effectively. All obstacles to the flow of information are called communication barriers. Lunenburg (2010) states that it is essential to know and control the barriers to communication, as they impair the proper functioning of organizations. "It is important to know the main challenges that business communication can face and be prepared to deal with them." The concept of communication does not generate consensus, either because they disagree with the media, because of the types of communication or the barriers to communication. We present in this study a broad and current view of the concept of communication. We chose, in a first instance, to clarify the concept of communication and later to identify the barriers to business communication that are taken into account in this study. Most sociological approaches to the study of generations assume that generations are found in social life as groups or categories of people. To obtain a clear idea of the basic structure of the phenomenon of generations, Mannheim (1970) states that we must clarify the specific interrelationships of individuals that constitute a single generation unit.

For this study, we have taken into account several recent authors who present an updated view of the concept of generations. Fantini and Souza (2015) explain that, for these different age groups, the name "generation" was given, a concept that classifies the set of individuals who were born at the same time, influenced by the same historical context and collective social and cultural events, that causes groups to have different behaviors, values and motivations. This study was applied only to the "Y" generation because the weight of this generation in the active population of Portugal is large and growing, and it should represent 50% of the active population in the very near future (PORDATA, 2021). With this article, we intend to create a tool that allows current business managers to understand the main challenges identified by this group, so that they can adapt their organizations and achieve a better information flow.

2. LITERATURE REVIEW

Keyton (2011) states that the word communication derives from the Latin, "communis", which means common. Analyzing this meaning, it is possible to correlate it with the fact that communication only exists when there is transmission of information and knowledge from one individual to another and there is understanding of the transmitted information. This author also emphasizes that each communication involves at least one sender, one message and one receiver. People decode information selectively, individuals are more likely to perceive information favorably when it conforms to their own beliefs, values and needs (Keyton, 2010). When feedback does not occur, the communication process is referred to as one-way communication. Two-way communication occurs with feedback and is more desirable and efficient. There is disagreement between authors regarding types of communication. It is unanimous that types of communication should be divided between verbal communication and non-verbal communication. There are still two more groups, written communication and visual communication. Verbal communication includes face-to-face communication, telephone, radio or television, and other media that use orality to send the message. Non-verbal communication includes body language, gestures, clothing, behaviors. There are many subtle ways in which we communicate (perhaps even unintentionally) with others. For example, tone of voice can give clues to mood or emotional state, while hand signals or gestures can complement a spoken message. Written communication includes letters, emails, social media, books, magazines and other media. We can all write and publish our ideas online, which translates into a huge amount of information and communication. Visualizations such as graphics, maps, logos and other visualizations can all communicate messages and in an increasingly virtual world, this type of communication is increasingly used.

Table 1 – Business communication barriers

Lack of communication; Excessive communication; Bureaucratic communication; Lack of objectives clarity; Text out of context; Lack of rituals (Arantes, 1998)
Filtering; Selective perception; Defensive; Language (Robbins, 1999)
Inappropriate use of means; Semantic problems; No response; Physical distractions; Status effect; Stereotype; Halo effect; Selective perception; Projection (Schermerhorn, 1999)
Mechanical barriers; Psychosocial barriers; Personal barriers; Bureaucratic barriers; Hierarchical and departmental barriers; Geographical barriers (Marques, 2019)

Business communication is the entire communication process between the company and the public, whether internal or external. It can be used to transmit information, improve the organization's image, improve public's relationship with the company and achieve even better results (Tameirão, 2021).

The communication flow in organizations is influenced by the structure of the organization. This structure reveals the paths through which information flows in the organization and varies depending on who communicates with whom (Reis, 2020).

Table 2 - Description of the Barriers to Business Communication used in the study

Marques, J. (2019)
<u>Mechanical Barriers</u> - These are caused by appliances and machines not working properly. Faulty phones and computers can compromise business communication, as well as its entire operational part, since, nowadays, it has been practically impossible to work without the collaboration of various equipment on a daily basis.
<u>Psychosocial barriers</u> - This is where prejudices (homophobia, racism, machismo, among others) come in, as well as stereotypes that harm the interaction between people, due to the embarrassment they can promote.
<u>Personal barriers</u> - In the business environment we find an infinite range of personalities, there are people who are easier to communicate and others who are more introspective. These issues are perfectly normal and understandable, however, even if they are common, this type of communication barrier can prevent fluidity at work, directly harming the processes that are developed in the company.
<u>Bureaucratic barriers</u> - Companies often have management processes that make communication between departments difficult, compromising information sharing and decision-making by managers. In many organizations, information sharing involves procedures and rules that hinder or prevent the flow of information. This barrier is closely associated with upward communication, but it can be found in all directions.
<u>Hierarchical and departmental barriers</u> - Depending on how the departmental and hierarchical structure of the company is established, some barriers can be formed, preventing communication from flowing as it should flow within the organization. In other words, excessive departmentalization prevents an effective circulation of information among all employees.
<u>Geographical barriers</u> - The distance between the elements of a company can generate great challenges. A team may struggle to stay aligned in order to achieve goals. In fact, even without distance, there may be a lack of harmony between the elements of a company, the geographic distance only exacerbates the difficulties and enhances their emergence.
Andrade, R. (2019)
<u>Barrier of communication channels</u> - This barrier is related to the number and relevance of communication channels used by the company. More than relying on these platforms, it is necessary to know if employees know how to use them and if potential customers use them.
<u>Language barrier</u> - Language can become a barrier for many reasons, not just across different languages. Even if two people speak the same language, the tone of voice or the fact that one uses words and sentence constructions that the other does not know can lead to failures in the transmission of information.
<u>Empathy barrier</u> - Although it applies to all media, it predominantly arises through face-to-face and telephone contact. Regardless of the medium in question, empathy is the element that cannot be missing to succeed in managing the relationship. Empathy is understood as the ability to put oneself in the position of others in order to understand their positions, feelings and ways of thinking. In customer service, the lack of this good practice results in impacting losses for the business, mainly the increase in the number of complaints.
<u>Efficiency barrier</u> - This barrier is related to empathy barrier as it has to do with the quality and the way the service is performed. Today's world is highly technological and fast, people have followed these trends and have increasingly autonomous and impatient behaviors, the words speed and efficiency are synonymous when it comes to customer service.

According to Clemen (2005), organizational communication generates and manages the internal and external communication phenomenon in organizations, making possible the relationship between the system, the functioning and the communication process between the organization and its different audiences. Any factor that interrupts this phenomenon is called a barrier to business communication. The table 2 summarizes the barriers most highlighted by the authors of articles on business communication. The theory presented by Marques (2019) was selected because it best fits the context of this study and because it is the most current, even so, after carrying out the pilot study, we considered that it would be pertinent to complete it by adding 4 barriers indicated by Andrade (2019).

Since not all barriers present in Table 1 will be taken into account in the development of the study, we present in Table 2 a description of the 10 barriers used in the study.

3. THE DIFFERENT GENERATIONS IN THE WORK CONTEXT AND THEIR CHARACTERISTICS

The motivations and people career prospects who are part of organizations and companies are influenced by several factors such as profiles, age group, personal values, among others. In organizations we can have employees of different age groups working in the same space. These different age groups are seen as "generation", a concept that classifies the set of individuals who were born at the same time, influenced by historical context, collective social and cultural events and who have certain behaviors, values and motivations. "Generation" can be defined as a part of the historical process that individuals of the same age-class have in common/shared (Mannheim, 1993). According to Oliveira (2012) in the job market we have the following generations: the "baby boomers", the "X" generation, the "Y" generation and the "Z" generation. In our view and other authors, we still have another generation in the work context, the veterans or traditional ones. Each of these generations has its own set of characteristics, motivations and perspectives. According to the studies by Jacques et. al (2015), veterans are individuals born between 1922 and 1945. The elements of this generation were born and lived in periods of war, therefore, they are people who exercise leadership by the authoritarian method and who believe in teamwork. They tend to see everything based on the military model in which there is always someone who gives the last voice of command. In this way, a veteran leader in a company tends to concentrate power on himself, taking full responsibility for strategic decisions and their consequences. They were influenced by a war, the great depression and the Berlin wall. Their main characteristics are respect for hierarchy and authority, they are very dedicated, demonstrate a spirit of sacrifice and a patriarchal perspective (Loiola, 2009 & Soares, 2009). Andrade et. al (2012) add that this generation is characterized by being dedicated and faithful to work, by seeking job stability, by respecting the hierarchy and established rules without disputes. The "baby boomers" generation is composed by the parents of "X" generation and the grandparents of the "Y" Generation (Júnior et al, 2016). The "baby boomers" were born between 1946-1964, in terms of characteristics they are disciplined, structured, builders, they want to build a solid, stable, secure career and with loyalty to the same company (Conger, 1998). This generation is considered to have suffered a rigid upbringing, they are socially stable and persistent in everything they do (Alexandre, Pita & Freitas, 2018). According to Furucho et al (2015), this generation consists of individuals who lived in the post-war period, in a phase of economic growth. It was also in this generation that television appeared. According to Patela (2016), television allowed them to have access to news from around the world, and it influenced the education of "baby boomers" and the way they view the world. The Baby Boomer Generation is an optimistic generation, given that it lived in a time marked by strong developments, believes in both economic and social development and highly values job stability (Furucho et al, 2015). Duarte (2018) also adds that this is also a generation that is characterized by being little influenced, that values experience and that is mature and confident when making decisions. Generation "X" is composed of individuals born between 1965-1980, they are considered tolerant, individualistic, independent and workaholic. They seek to balance their professional, personal and quality of life needs. In addition, they prefer to work for many years at the same company and wait for a promotion. Due to the fact that it was at this time that new technologies appeared, television programs had a strong impact on the education of individuals, eventually changing their ways of life (Oliveira, 2012). It is considered that this was a generation that suffered a great cultural shock, which led to changes at behavioral level, since it emerged at a time when consumerism was at its peak, influencing the way of being of these individuals (Alexandre, Pita & Freitas, 2018).

According to Júnior et al (2016), the "X" generation is, in part, individualistic, but without losing group coexistence. Respect for the family is lower compared to other generations. Generation "Y" is made up of individuals born between 1981-2000, who were born with technology. They are unstructured, contesting, immediate, innovative individuals and do not like hierarchy (Macedo, 2009). Junior et al. (2016, 8) state that the "Y" generation had very different orientations from previous generations, it is a generation sensitive to injustice and multifaceted. Duarte (2018) says that this generation emerged at a time when several changes were felt worldwide due to the globalization process. It is a generation that was marked by facilitation in which the computer has an important prominence. The "Z" generation is made up of individuals born from the year 2000 onwards. This generation is quite identical to the previous generation because, in fact, both have a strong involvement with technologies (Alexandre, Pita & Freitas, 2018). According to Duarte (2018) this generation is defined by a "Z" thanks to the word "zapping", which translates as the act of successively changing channels. It is also known as the "Silent" generation because it is an egocentric generation, which exclusively meets their needs. Ciriaco (2009) also calls the "Z" generation the "Silent" generation because they always wear headphones.

4. METHODOLOGY

It was decided to develop a quantitative research divided into two phases, in a first phase an exploratory research was carried out and later, in a second phase, the application of a questionnaire. The aim of this investigation is to understand and analyze the "Y" generation in terms of business communication barriers. To this end, the following research objectives were defined: 1. Identification the barriers to communication that most affect the "Y" generation; 2. Identification the means of communication most used by the "Y" generation in a professional environment; 3. Identification the factors that make means of communication vary. Based on the knowledge and information acquired during the literature review and exploratory research, the final questionnaire was prepared in order to achieve objectives of this investigation. The tool selected for data collection was the questionnaire, applied online through the google forms platform (a platform that allows, among other things, the realization of online questionnaires, which can be shared and from which the answers are automatically received). This method was chosen because it is currently the one that allows the collection of information from a larger sample, in a fast, accessible and safe way. Five elements of the "Y" generation were selected to carry out the pilot study. This group was carefully selected to ensure that they had varied professional experiences, in order to verify that questions would respond to the proposed objectives and that they made sense for all sectors. In the present work, the population under study is Portuguese people who make up the "Y" generation, including all people who were born between 1981 and 2000 with Portuguese nationality. The study population consists of 2.3 million people (PORDATA, 2020). The requirements to be eligible to participate in this study were as follows: Being born between 1981 and 2000; Portuguese nationality; Have professional experience; Be willing to share your perspective on business communication barriers. The questionnaire was disseminated through means that facilitated randomly reaching elements of the intended generation. The questionnaire was distributed only through social networks and 63 valid responses were obtained.

5. RESULTS

Of the 63 participants in this study, 59% were female and 41% were male. Of all respondents, more than 50% say they work or have worked in a large company and more than 84% belong to the tertiary sector. The functions performed range from more operational positions such as waiter, to leadership and administration positions.

When asked what, for them, was the biggest barrier to business communication, there was no unanimity, however most of the answers focused on four of the ten barriers presented. Bureaucratic barriers were the most mentioned as the main barrier to communication. Hierarchical barriers were selected by 16% of the sample, followed by psychosocial barriers and personal barriers, which both obtained the same result, 12.7%. The most frequently used means of business communication, with face-to-face communication being the most frequent, followed by email, text message, video call and finally the telephone call. In addition to these five means of communication, there was only one other means selected, one of the respondents selected the hypothesis "other" and answered "group chat". Our questionnaire did not consider this hypothesis because a group chat is always based on another means of communication, be it whatsapp, where the main means of communication are text messages, or on zoom, where the main means of communication is video calling. For this reason, we will consider that this hypothesis is included in the five most chosen. When asked which business communication means they would use to inform a superior that they will not be able to go to work because they are sick, the most common means of communication was the telephone call, with more than 50% of respondents choosing this option. Regarding the means of business communication that they would use to deal with a customer complaint, it should be noted that face-to-face communication with 31.7% of responses, followed by email with 28.6% , telephone call with 22.2%.

According to the sample under study, the most efficient means of internal communication is face-to-face, with 57.1% of responses, followed by email with 30.2%. On the other hand, the means of external communication pointed out as the most efficient was email, with 28.6%, still with a relevant expression, face-to-face with 20.6%, video with 19% and the telephone call with 14.3% of respondents. We also asked our sample about their perception of the generation that had or will have more barriers in the business communication process. Once again there was no unanimity in the answers, it is possible to verify that, according to the sample under study, all generations had more barriers than generation "Y" (generation under study). Although the difference between the volume of responses is not significant, the generation that was identified as having or will have more barriers to communication was generation "Z". Regarding their perception of the evolution of barriers, the vast majority agree with the statement "New technologies have substantially reduced barriers to business communication". According to the point of view of almost 75% of the respondents, as technologies keep improving, there were fewer and fewer barriers to communication.

To finalize the questionnaire, we asked the respondents if they wanted to share any embarrassing moment in terms of communication in a work context. We present below the most interesting responses: "Technology has made it easier (in terms of speed of message diffusion and amount of content), but face-to-face communication is still preferable for sensitive matters; The more technological communication channels, for older generations, can be a barrier in the sense that they do not dominate the more recent communication channels (eg not knowing how to turn the microphone off and on); Also related to communication channels, it is considered by respondents as a barrier to technical failures (eg failure in the internet service); All the data presented above were analyzed with the purpose of drawing conclusions that allow us, whenever possible, to achieve the defined objectives". The selected sample is composed of people with different experiences, in different companies, with different functions and belonging to different sectors of activity, this makes the barriers to communication they feel are different, however it is possible to identify which are most felt. In the following table we present the business communication barriers in a descending order of relevance.

Table 3 - *Business Communication Barriers in Order of Relevance*

1. Bureaucratic barriers
2. Hierarchical and departmental barriers
3. Psychosocial barriers
4. Personal barriers
5. Communication channels barrier
6. Empathy barrier
7. Efficiency Barrier
8. Geographical barriers
9. Language barrier
10. Mechanical barriers

In this way, we can say that organizations should choose to reduce hierarchy, bring different employees together and facilitate communication, mainly in the upward direction, which is where there is more bureaucracy. It was possible to identify the communication means used most frequently by the "Y" generation in the professional environment. In Table 4 we present the most relevant corporate media from the point of view of the elements under study.

Table 4 - *Business Communication Means most used by the "Y" generation*

1. Face to face
2. Email
3. Message
4. Video call
5. Phone call

It is possible to manage communication in a work context more efficiently if the generation we are addressing is taken into account. Although communication is something that happens every day and all the time, it is certain that the communication practiced in the work context depends on numerous factors.

6. FINAL CONSIDERATIONS AND CONCLUSION

We attach extreme importance to all elements of an organization communicating according to the receiver of the message and the specificity of the situation, with a view to breaking down barriers to communication and thus promoting the information flow. Only in this way is it possible to achieve harmony and the proper functioning of companies, as well as the optimization of the organization's performance and maximization of results. Regarding the first objective, the identification of communication barriers that most affect the "Y" generation, organizations must find ways and processes that overcome the barriers caused by bureaucracy and hierarchical stratification, since these were the most identified. The hierarchical barriers identified appear in accordance with the line of thought of Macedo (2009), who characterizes the "Millennials" as individuals who do not like hierarchy, and thus see hierarchization as a barrier to labor communication of great weight. To mitigate or eliminate these barriers, all processes that delay the transmission of information must be eliminated, the information transmission procedures must be updated and supported by adequate means of communication and, finally, they must take advantage of new possibilities that have emerged with technology and allow and encourage any element to contact another element of the same organization in an easy and instantaneous way. Regarding the identification of the communication means most used by the "Y" generation in a professional environment, the most chosen means of communication was the "face-to-face", contrary to what could be expected since we live in an era increasingly dependent on technology and this is a generation characterized as extremely

technological by Patela (2016) and Macedo (2009). As such, it is important to point out that, although technologies help to eliminate some barriers, the elements that make up organizations are still not willing to give up personal contact, as they recognize that information is transmitted more effectively through this medium and that, there are elements such as body language that convey a lot of useful information, especially in a professional context. The fact that business communication means vary depending on the situation was confirmed as the respondents chose face-to-face communication as the most efficient means of internal communication, in turn, when asked about external communication, they chose email as the most efficient means of communication. However, when faced with specific situations, such as having to inform the superior that he is sick and unable to go to work or deal with a complaint, the communication means were not the same as they had been previously selected. It turns out that there is no right or wrong means of communication or one that is better than other, everything will depend on the situation and public to which we want to address.

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DIGITAL TRANSFORMATION OF ENTERPRISES IN EUROPEAN UNION COUNTRIES –CURRENT STATE AND FORECAST UNTIL 2030

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ABSTRACT

Digital transformation is one of the key challenges facing contemporary organizations, economies, and societies. The degree and scope of utilizing new technologies vary, and the processes of change do not proceed uniformly. Considering the above, the aim of the article is to present the diversity of the level of utilization of new technologies in enterprises between EU-27 countries in 2023 and in the perspective of 2030. Such aim required posing the following research questions:

- *What percentage of enterprises utilize artificial intelligence, Big Data, cloud computing?*
- *What are the disparities in these areas between EU-27 countries?*
- *How far are Polish enterprises from the goals set for EU-27 by 2030?*

In the analyses, data from the Eurostat database on the Digital Economy and Society Index (DESI) was used.

Keywords: digital transformation, artificial intelligence, Big Data, cloud computing, European Union

1. INTRODUCTION

Digital transformation is a comprehensive, holistic change in the functioning of the organizations – from their organizational culture and operational models to the products or services they offer to customers. In a broader sense, it signifies a shift in how markets, consumers, employees, entrepreneurs, states, and societies function, as a result of the implementation of digital technologies. Enterprises using new business models models (such as platforms, e-commerce, appstores, high speed trading) are increasingly competing in the market (Hannibal, Knight, 2018; OECD, 2019), leading to changes in the nature of work and employment relationships (Skórska, 2023). Undoubtedly, digital transformation is one of the most dynamic changes of recent decades, enabling the emergence of new opportunities for increased efficiency, flexibility, optimization of production processes in response to market needs and automation of processes in the supply chain (Alc´acer & Cruz-Machado, 2019). It is the main driver of innovation and change in individual enterprises, sectors of economy and public administration. Digitization, as a continuous process of convergence of the real and virtual world, becomes an integral element/factor of development, essential for maintaining competitive advantage (Rachinger et al., 2019), and also influencing the quality of life (Skórska, 2023). In addition to the many positive consequences of the observed changes, it is worth remembering the challenges faced by managers, employees, policymakers and entire societies. Growing uncertainty, risks and threats are related to, among others: with the social effects of automation and robotization of processes, including the replacement of employees by artificial intelligence (AI) and the increase in unemployment. These are also moral and ethical issues regarding responsibility for AI and the transparency of algorithms (Eurofound, 2023). One of the key challenges of digital transformation remains cybersecurity, adequate protection against cyberattacks, and data protection (Ameen, Tarhini, et al., 2021). There is also a risk of growing disparities between countries, societies, or socio-professional groups leading to digital exclusion.

Digital transformation negatively impacts the sense of community; people increasingly feel lonely, partly due to remote work and the shift of relationships and communication online, including through social media. The course of digital transformation primarily depends on the knowledge, awareness, and acceptance of the changes implemented within the organization. A high level of competence among employees and managers, as well as the appropriate problem-solving approach and an organizational culture conducive to cooperation and communication determine the success of implemented changes. This is important because delays in implementing new technologies, including artificial intelligence, Big Data, or cloud computing, can negatively impact the competitive advantage of businesses and economies. Due to the comprehensiveness and complexity of the observed processes and phenomena, it is impossible to present all aspects of digital transformation. Therefore, the article focuses solely on the digitization of enterprises in European Union countries. Taking this into account, the aim of the article is to present the diversity in the level of utilization of new technologies in enterprises among the EU-27 countries in 2023 and in the perspective of 2030. Achieving the goal required formulating the following research questions:

- What percentage of enterprises utilize modern technological solutions, including artificialintelligence, Big Data, and cloud computing?
- What are the disparities in these areas among the EU-27 countries?
- How significant is the gap between Polish enterprises and the goals set for the EU-27 by the year 2030?

In the conducted analyses, data from the Eurostat database on the Digital Economy and Society Index (DESI) were utilized. DESI was established in 2014 as a tool for monitoring the indicators of digital progress in EU countries. Since 2023, following the update of the applied methodology, 32 indicators have been considered, covering four fundamental areas: digital skills, digital infrastructure, digital transformation of enterprises, and digitalization of public services. Due to the complexity of the observed processes, further analyses were limited to the digital transformation of enterprises, taking into account three indicators: artificial intelligence, cloud computing, and Big Data. This is because, according to the assumptions of the "Digital Decade" policy program, by 2030, at least 75% of EU enterprises will utilize at least one of these three actions, in line with the profile of their economic activity (2022).

2. TECHNOLOGY DEVELOPMENT AS A KEY DETERMINANT OF DIGITAL TRANSFORMATION

Digital Transformation (DT) - its components, determinants and barriers have been the subject ofmany academic debates and empirical research for over two decades. It is also one of the policy areas of the European Commission, OECD and UN, as well as national policies. Due to the interdisciplinarity of this category and the possibility of analyzing it at various levels (individual, organizational or macro), there is no single definition of this concept, which implies many problems. Attempts to define DT have been made by individual researchers (Schallmo, Williams, Boardman 2020, Verhoef et al. 2021, Reis et al., 2018, Hausberg et al., 2019), international organizations, including the European Commission (2019), the Organization for Economic Co-operation and Development (2018), or the World Economic Forum (2016, 2018), as well as business representatives (Bloomberg, 2018, Deloitte, 2018). Each definition emphasizes that digital transformation is accompanied by dynamic technological development, including artificial intelligence (AI) and machine learning, automation and robotics, Big Data Analytics (BDA), applications and services based on cloud computing, the Internet of Things (IoT), virtual and augmented reality (VR, AR), 3D printing, and quantum computers.

2.1. Artificial Intelligence

The development of artificial intelligence (AI) is one of the most important and dynamically evolving solutions that impact various spheres of economic and social life. However, so far, a universally accepted definition of AI has not been developed (European Commission, 2018, Michałowski, 2018). Regardless of the discussions regarding the essence and definition of AI, there is no doubt that it affects all industries – from agriculture and manufacturing, through transportation and trade, to education and healthcare. It affects the development of decision-support systems, optimization of operations, assessment of financial risk, data storage and analysis, and automation of more advanced processes. Therefore, an increasing number of companies are utilizing these solutions, although their percentage remains small. In 2023, in the EU-27, this was just under 8%, with significant variation between individual member states. The highest percentage of companies using AI was in Denmark (almost 24%) and Finland (almost 16%), while in Romania, it was only 1.4%. Somewhat surprising may be the second place in the ranking of Portugal (over 17% of companies using AI). Poland belongs to the group of countries with a relatively low percentage of companies using AI solutions, which in 2023 did not exceed 3%, as shown in Figure 1.
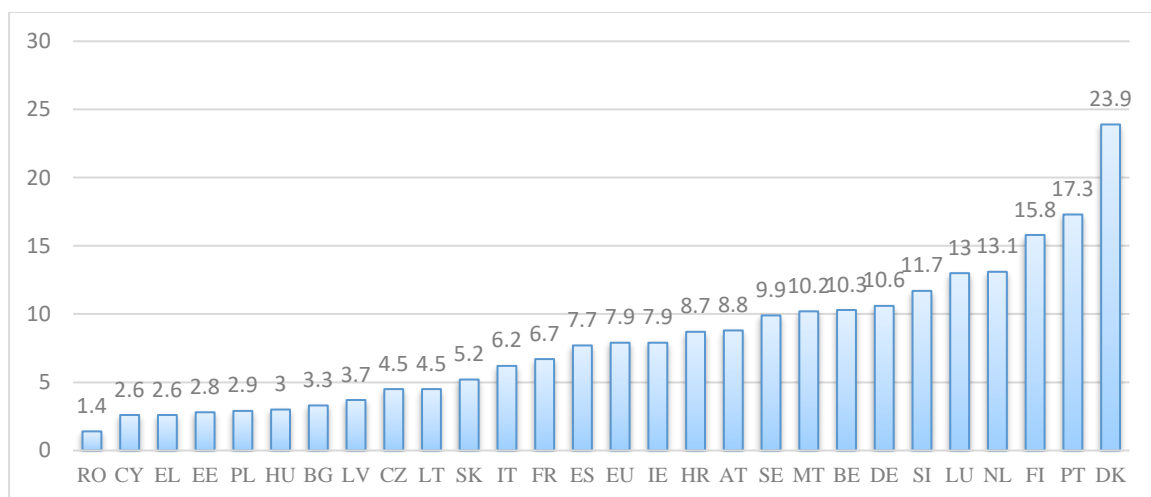
Figure 1: Percentage of enterprises using AI in the EU-27 in 2023 (%)
(Source: own based on data form Eurostat https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/ (data dostępu 5.05.2024)

According to the assumptions of the European Commission's policy program "Path to the Digital Decade" (2022), by 2030, the percentage of enterprises using AI should reach 75%. This means that for Poland, this difference exceeds 71 percentage points (Figure 1, 2). The achievement of this goal is expected to be supported by provisions presented in the strategic document "Policy for the Development of Artificial Intelligence in Poland from 2020" (2020). The smallest, although still significant, gap from the set goal is in Denmark (over 51 percentage points), while the largest gaps are in Romania (73.6 percentage points) and Greece (72.4 percentage points). This is primarily due to the economic structure of these countries and their level of socio-economic development.
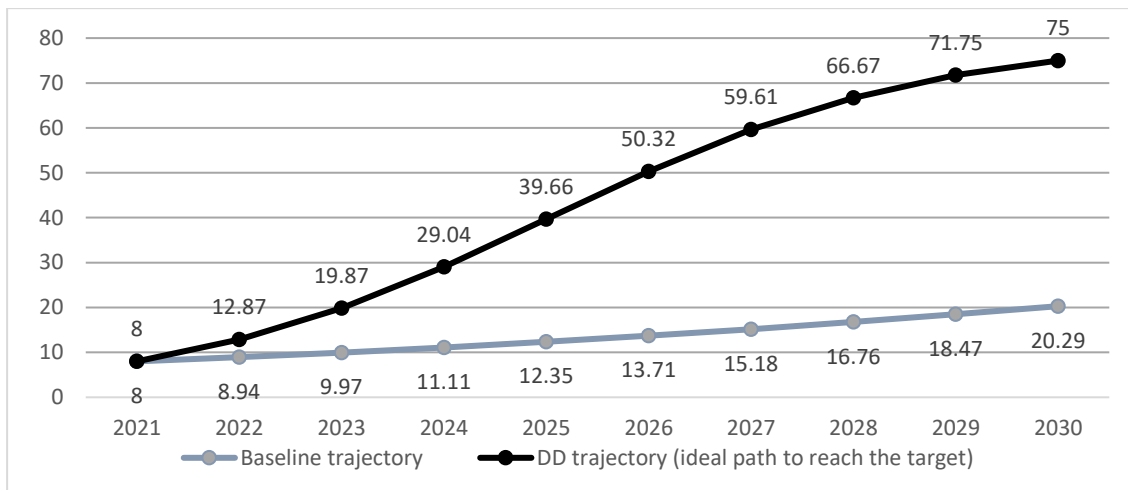
Figure 2: Percentage of enterprises using AI in the EU-27 – forecast for 2021-2030 (%)
(Source: own based on data from Eurostat: https://digital-decade-desi.digital-
strategy.ec.europa.eu/datasets/dd-trajectories/charts/dd-
trajectories?indicator=dd_ai&breakdownGroup=digital_decade&unit=pc_ent&country=EU
(5.12.2023)

Analyzing the potential impact of AI on enterprises, it is worth emphasizing its influence on automation of many processes, leading to increased productivity. In the short term, this may result in a decrease in employment (European Commission Report, 2019). In the longer term, it is estimated that for every 100 existing jobs, 130 new ones will be created (Gartner, 2017). Creation of new workplaces, including those related to data analysis, Big Data, etc., will require new competencies, including the ability to collaborate with artificial intelligence systems and the ability to use new technologies. Hence, the concerns that AI raises in societies are understandable. The development of AI poses also new ethical challenges for societies, governments, and businesses, especially concerning the responsible use of technology, privacy protection, and preventing discrimination. An example of such actions, with potentially serious consequences for public opinion, is image manipulation (so-called deepfakes). Risk of using someone's image for profit, creating false messages, evidence in criminal cases, or intimidation are among the concerns (Maras, Alexandrou, 2019).

2.2. Big Data

Big Data is directly related to AI, cloud computing, and the Internet of Things. The ability to collect, store, and analyze vast amounts of data helps companies make more precise decisions, building competitive advantage (Davenport, 2014, p. 8;). This influences the development of intelligent systems supporting human resource management, marketing, and strategic planning. It helps better understand customer preferences, moods, and behaviours, consequently optimizing supply chains, as well as detecting and preventing terrorist attacks or cybercrimes. One of the areas where Big Data offers immense possibilities is human capital management in organizations. Implemented solutions effectively help in detecting accidents and unfortunate events in the workplace, improving recruitment processes or , analyzing employee motivation and satisfaction,. However, challenges related to data collection, analysis, and employee privacy protection should be taken into account (Angrave et al., 2016; Gandomi, Haider, 2015).

Figure 6: Percentage of enterprises using Big Data in the EU-27 – in 2023 (%)
(Source: own based on data from Eurostat: https://digital-decade-desi.digital-
strategy.ec.europa.eu/datasets/desi/charts/ (data dostępu 9.12.2023)

Taking the above into account, in recent years, the scope of utilizing such solutions has been increasing, although with variations between European Union countries, as depicted in Fig. 3. In 2023, over 14% of companies in the EU-27 were using Big Data, with rates exceeding 27% in Denmark and the Netherlands, and reaching 30% in Malta. However, in Romania, it was only 5%, while in Bulgaria and Cyprus, it was just over 6%. The percentage of Polish enterprises using Big Data is nearly 6 percentage points below the EU average and 21.5 percentage points below that of Malta.
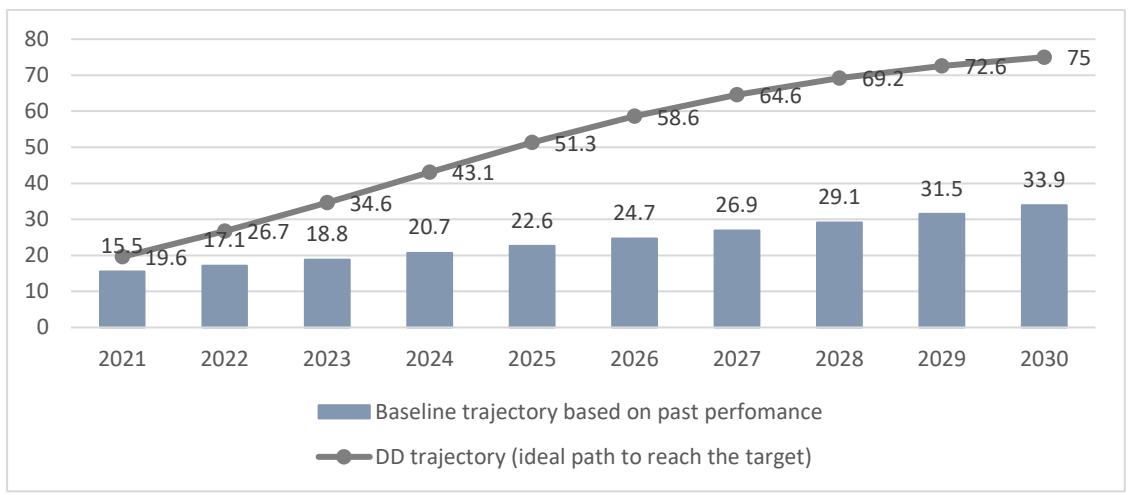
Figure 4: Percentage of enterprises using Big Data
in the EU-27 – forecast for 2021-2030 (%)
(Source: own based on data from Eurostat: https://digital-decade-desi.digital-
strategy.ec.europa.eu/datasets/dd-trajectories/charts/dd-
trajectories?indicator=dd_ai&breakdownGroup=digital_decade&unit=pc_ent&country=EU
(16.12.2023)

Considering similar goal (75% of companies using Big Data in the EU-27 by 2030), the disparities and the possibilities of its achievement seem a significant challenge for the entire European Union (Figure 4). In the case of Poland, the difference amounts to 66.5 percentage points, while for Slovakia and Romania, it is nearly 70 percentage points.

Malta, the Netherlands, and Denmark have the smallest distance to overcome, with just under 50 percentage points. Considering the wide spectrum of data utilization – from sports performance analysis, through medical and financial data, support for scientific research, law enforcement agencies, to the creation of smart factories and the improvement of city functions through smart cities – one can expect a growing dynamic of changes in the coming years.

2.3. Cloud computing

Cloud computing is another way of delivering computer services related to data storage, processing, analysis, or application usage over the internet, facilitating access to information from any location and device, as well as providing scalability and flexibility of IT infrastructure (Carlin, Curran 2012, Berman, Kesterson-Townes, Marshall, Srivathsa 2016). It influences the transformation of the IT infrastructure owned by organizations or being developed, serving as a platform for executing business processes.
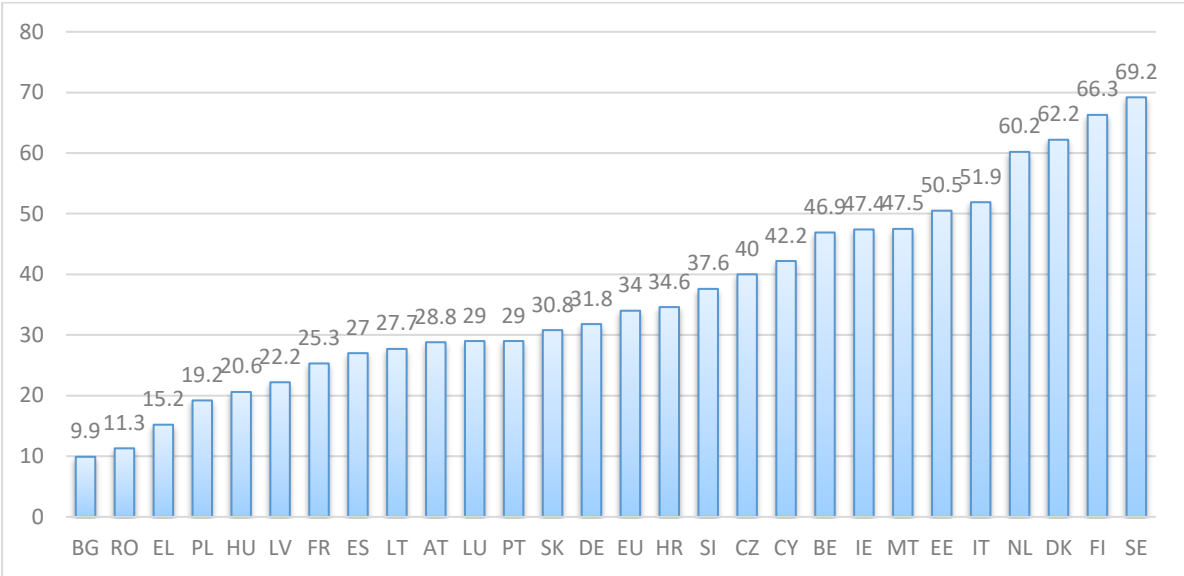
Figure 5: Percentage of enterprises using cloud computing in the EU-27 –in -2230 (%)
(Source: own based on data from Eurostat: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/dd-trajectories/charts/dd-trajectories?indicator=dd_ai&breakdownGroup=digital_decade&unit=pc_ent&country=EU (29.12.2023)

The popularity of this solution is steadily increasing, primarily due to the benefits that companies can achieve through it, including cost reduction, transferring responsibility for the operation and development of IT solutions, access to advanced IT solutions, and reducing the need for IT specialists. In 2023, 34% of enterprises in the EU-27 were using cloud computing, with significant variation observed between member states, similar to other technological innovations. The highest percentage of companies using cloud computing was in Sweden (almost 70%), Finland, Denmark, and the Netherlands (over 60%), while in Bulgaria, it did not exceed 10%. Poland belongs to the group of countries where the percentage of companies using this solution is lower than the average for the EU-27, as shown in Figure 5. The need to use it is evidenced by the forecast until 2030, according to which in the baseline scenario over 66.5% of companies in the EU-27 will be using it (Figure 6). It is worth noting that Sweden and Finland have already exceeded this point. In the case of Poland, the difference exceeds 55 percentage points, and for Bulgaria, it is over 65 percentage points.
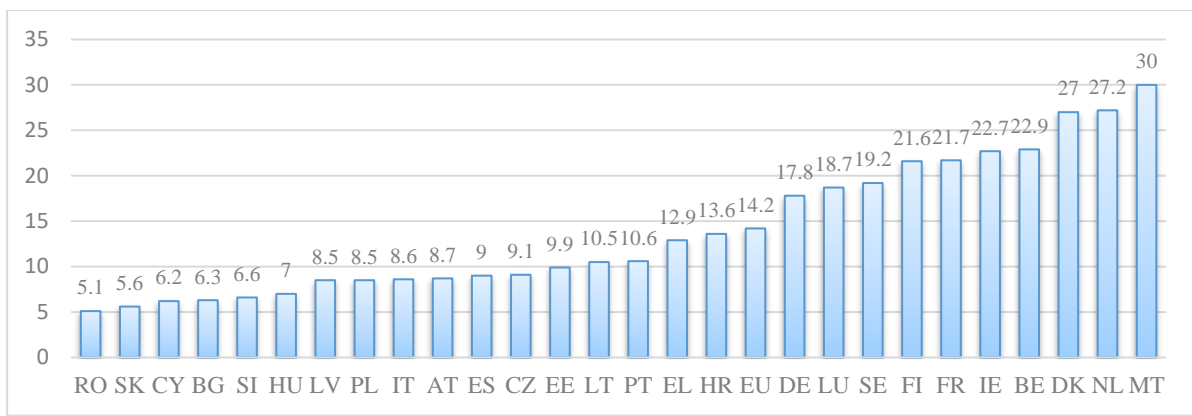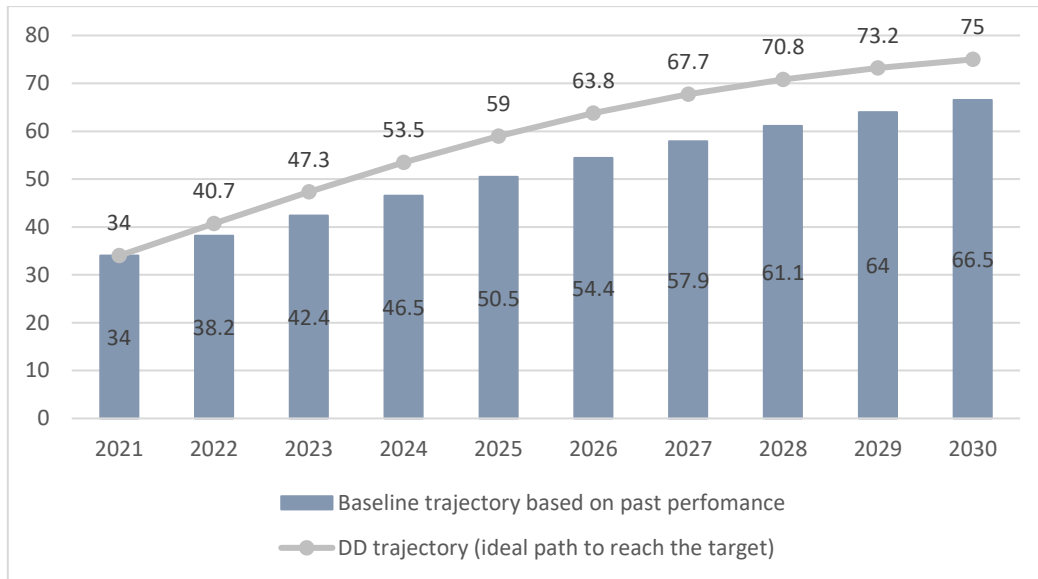
*Figure 6: Percentage of enterprises using cloud computing in the
EU-27 – forecast for 2021-2030 (%)
/Source: own bezsed on data from Eurostat: https://digital-decade-desi.digital-
strategy.ec.europa.eu/datasets/dd-trajectories/charts/dd-
trajectories?indicator=dd_ai&breakdownGroup=digital_decade&unit=pc_ent&country=EU*

When analyzing the benefits of using cloud computing, one must also consider the challenges associated with it, namely: data security, the risk of internet network failures, legal differences present in individual EU countries, and psychological barriers related to a lack of trust in providers of such solutions.

4. CONCLUSION

The process of digital transformation of businesses, economies, and societies offers new, immense opportunities while simultaneously presenting a significant developmental challenge of the 21st century. In recent years, data has become one of the key factors of production, analyzing, processing, and effectively utilizing it contributes to the competitive advantage of businesses and economies. In this process, solutions based on artificial intelligence are playing an increasingly important role, with their impact on all areas of life growing steadily. Data analysis indicates that a relatively small percentage of Polish businesses are using such solutions, and the gap between us and the goals set for 2030 for all European Union countries remains significant. This confirms that Poland is a country where there is still much space for improvement, as despite visible progress, most indicators remain below the EU average. To reduce this gap and fully leverage new solutions, it is necessary to quickly adapt to changing conditions, create new business models, modify and adapt legislation, and eliminate obstacles of a social, political, or economic nature. At the enterprise level, it is essential to continuously improve the digital skills of employees, increase the highly specialized workforce in the field of AI, exchange information, and attract specialists from abroad. Implementing these solutions in businesses can lead to cost reduction, increased efficiency, improved organizational agility, and support for human work. Such dynamic changes also require adjusting legal frameworks to the conditions of modern markets, particularly ensuring cybersecurity. The increase in cybercrime necessitates a growing demand for cybersecurity specialists. Companies from various sectors, as well as government institutions, hire experts capable of effectively securing systems against attacks, monitoring and analyzing incidents, and developing defense strategies against cyber threats using artificial intelligence.

Enterprises that are unable to react quickly enough may be displaced from the market, allowing technologically stronger entities to gain a competitive advantage. Every company must find answers to questions regarding the scope and pace of digital transformation, considering the associated risks. Digital transformation, along with the development of the metaverse - a "mirror" reflection of the real world in the virtual space, which is expected to become as important as physical reality in the future - also raises broader questions about equality, sustainable development, and social responsibility in the digital age.

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ORGANIZATIONAL INNOVATION AND THE ROLE OF MANAGERS WITHIN PORTUGUESE COMPANIES

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ABSTRACT

Today's corporate market is characterized by rapid and continuous change, demanding continuous improvement to ensure competitiveness. Within this context, the interaction between the psychosociology of organizations and organizational innovation becomes crucial. This research's main objective is to study the role of managers in promoting organizational innovation in four selected companies. The methodology adopted was a case study and the data collection instruments were interviews and questionnaires. Finally, it was possible to conclude from this study that in most companies, organizational change and innovation are extremely crucial factors for the proper functioning of a company and that managers are exceptional in their role. However, it is important to recognize that, through this study, we were also able to identify fewer positive behaviors of managers within the company.
Keywords*: Innovation; Management; Motivation; Organizations*

1. INTRODUCTION

The influence of managers on the organization's environment is profound and multilayered, shaping not only the company's day-to-day operations but also the culture, values, and overall performance of the company. A manager must know what to do in a competitive market and guide the team towards achieving the objectives. How managers behave and attire directly affects employee motivation, leading to greater or lesser productivity. Leaders who demonstrate empathy, integrity and trust create a positive working environment where employees feel valued and are encouraged to give their best. On the other hand, autocratic or distant managers can create dissatisfaction and disengagement, leading to low motivation and a decrease in employee turnover. In addition, a manager's leadership style affects the overall organizational culture. As a manager, all the actions and behaviours that are shared define the norms and values that guide employee conduct and translate into the type of organizational environment that a company may have.

Managers who promote transparency, communication, and teamwork create a culture of trust and collaboration, while managers who focus only on short-term results can encourage a culture of uncontrolled competition and individualism. Managers ability to make effective strategic decisions significantly impacts a company's performance and competitiveness. By analysing data, anticipating trends as well as assessing risks, managers can steer the organization in the right direction, identify growth opportunities and adapt quickly to market changes. It is through this process, the consecutive adaptation to market changes, that it is possible to distinguish companies in the market. It can therefore be seen that management's influence on organizational Innovation goes beyond simply implementing innovative ideas or technologies. It involves creating a cultural, strategic, and operational environment that fosters and sustains innovation over time, thus ensuring the organization's long-term relevance and therefore competitiveness. In this sense, understanding the underlying mechanisms by which managers influence innovation becomes fundamental to the success of organizations in today's dynamic and challenging business environment. The main purpose of this investigation is to study the role of managers in promoting organizational innovation, considering the interrelationship between organizational change and innovation. The aim is to understand how managers use their experience and the company's organizational culture to develop effective strategies that drive innovation and will ensure the success of organizational change processes.

Based on the literature review, the following hypotheses were formulated to guide this study:
H1: Companies that encourage a manager-employee culture of innovation tend to have higher levels of job satisfaction and employee engagement.
H2: Efficient leadership plays a crucial role in promoting organizational innovation, which positively influences employees receptiveness to change and the implementation of innovative ideas.
H3: Although a manager's leadership and management of a team are important, it is not always essential for organizational innovation.

2. LITERATURE REVIEW AND HISTORICAL FRAMEWORK

Organizational innovation and change are essential pillars for adaptation and success in a dynamic and competitive business environment. While change represents any modification, planned or unplanned, that takes place within an organisation, innovation encompasses the introduction of new ideas, processes, products or services that result in notable improvements in efficiency, competitiveness or value for the organisation's stakeholders. Learning processes play a central role in facilitating organisational change and innovation. This is because learning enables members of the organisation to acquire new knowledge, skills and perspectives essential for driving change and innovation effectively. This learning can take place at different levels, from the individual learning of team members to the collective learning that takes place throughout the organisation. To promote organisational learning, various processes are applied, such as experimentation, feedback, reflection, collaboration and seeking external knowledge through partnerships or networks. Leadership plays a crucial role in driving organisational change and innovation. Leaders have the responsibility of establishing a clear and inspiring vision for the future of the organization, communicating it effectively and mobilising team members to achieve it. In addition, leaders create an environment that stimulates experimentation, creativity and risk tolerance to encourage employees to seek new ideas and innovative solutions. They also deal with resistance to change, helping members within the organisation to overcome the emotional and cognitive barriers that can prevent the adoption of new practices or behaviors. In conclusion, organisational change and innovation are driven by learning processes and effective leadership.

By fostering a culture of continuous learning and creating the right conditions for innovation, organisations are able to adapt more quickly and thus thrive in a business environment. Implementing change and promoting innovation within an organisation can bring a number of significant advantages, ranging from operational improvements to competitive advantages in the market. One of the main advantages lies in the ability to remain relevant and adaptable in a constantly evolving business environment. When a company can adapt quickly to changes in the market and customer requests, it is better placed to stand out from the competition and achieve long-term success. One of the most tangible benefits of implementing organisational change and innovation is improved operational efficiency. By analysing and adjusting internal processes, an organisation can identify areas of waste and inefficiency, boosting its operations and reducing costs. This increases profit and makes resources available that can be directed towards more strategic activities, such as research and development of new products or services. What's more, innovation can lead to the development of revolutionary products or services that better meet customer needs and expectations. This not only increases customer satisfaction but can also result in greater trust with the brand and thus, by receiving positive recommendations, it is possible to boost the company's growth and success in the long term. Another important benefit of implementing organisational change and innovation is employee participation. When employees are encouraged to contribute innovative ideas and solutions, they feel valued and motivated to work towards the company's success. This creates a more positive and productive working environment, where everyone is committed to the organisation's common goals.

However, despite the many benefits, implementing organisational change and innovation can also present significant challenges. One of the biggest challenges is resistance to change on the part of employees, who may feel threatened by the unknown or worried about possible impacts on their jobs or daily routines. This requires clear and effective communication from leadership. In addition, implementing organisational change and innovation often requires significant investments in terms of time, money and human resources. This can pose a challenge for some organisations, especially those with limited budgets or operating in highly competitive sectors. Another challenge is effective change management, ensuring that change initiatives are planned and executed in a structured, coordinated way and with as little margin for error as possible, thus requiring the appointment of dedicated change leaders and the implementation of formal change management processes to ensure that all stakeholders are involved and informed throughout the process.

3. METHODOLOGY
This study was carried out in four companies from different sectors of activity in order to gain an insight into the different realities and challenges faced by these organisations. The companies used were: MOBIPIUM, Hospital Veterinário HIDROVET, Confeções Albertina Pinto Pereira & Filha Lda. and Ponto Singular. MOBIPIUM is the world's first nomad start-up. It operates in the Digital Marketing sector and was created over 10 years ago. It has developed its internal technology to create a Programmatic Network that connects advertisers and publishers around the world. HIDROVET Veterinary Hospital has been a company in the equine veterinary field for 8 years, in partnership with the Lusófona University of Humanities and Technologies (Lisbon - Portugal). It offers equine physiotherapy and rehabilitation services, with the aim of preventing injuries, restoring and improving the horse's athletic performance, as well as buying and selling equipment for them. Confeções Albertina Pinto Pereira & Filha Lda., based in Ermesinde, Portugal, was founded in 2002 with the aim of making outerwear in series. Ponto Singular is an electronic security systems company founded in 2007. Its aim is to develop and implement security solutions according to the client's needs.

With reduced costs and adapted to each situation, the systems are powerful tools for managing assets and human resources, allowing permanent, local or remote control of the system. The methodology adopted was qualitative, with individual interviews with directors on a variety of aspects related to change and innovation within the organisation, the perception of the organisational culture in relation to innovation and the perceived barriers to implementing new ideas. We also used quantitative methods by applying the questionnaire to company employees from different departments and hierarchical levels to ensure a diverse representation of organisational experiences. The sample consisted of 17 participants, including 3 Directors, 1 Manager, 7 collaborators and 4 employees, representing different hierarchical levels and departments within the organisations.

4. ANALYSIS AND PRESENTATION OF RESULTS

1.   What is your gender?

- Female
- Male
- Prefer not to say
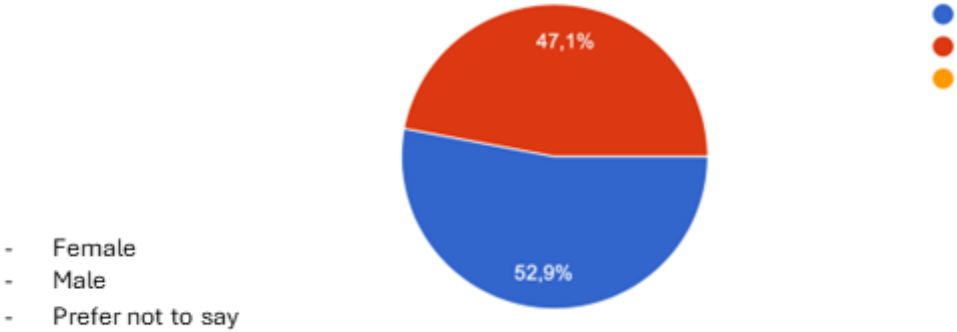
 In this analysis we can see how 52.9% of the sample is female and 47.1% male.

2.   Please indicate your educational qualifications.

- 1 cycle
- 2 cycle
- 3 cycle
- Secondary School
- Degree Course
- Post Graduate
- Master Degree
- Doctoral Degree
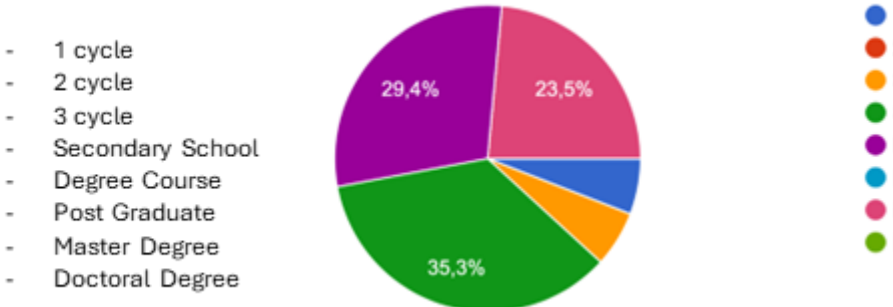
This chart shows that 35.3% of the sample have completed secondary school, 29.4% have a degree course, 23.5% have a master's degree, 5.9% have completed the 3rd cycle and 5.9% have completed the 1st cycle.

3.	What is your position in the company?

- - Members of the board
- - Managers
- - Employees
- - Staff
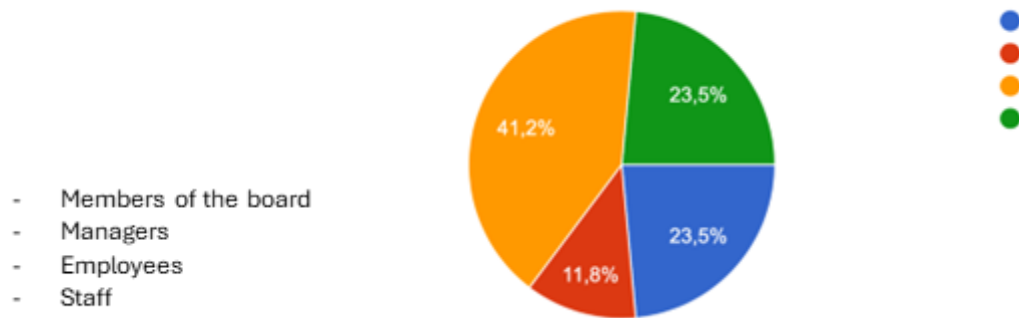
In this analysis we can see how 41.2% of the sample are employees, 23.5% are members of the Board of Directors, 23.5% are staff and 11.8% are managers.

4.	How long have you worked for the company?

- - Less than a years
- - Between 1 and 3 years
- - Between 3 and 5 years
- - More than 5 years
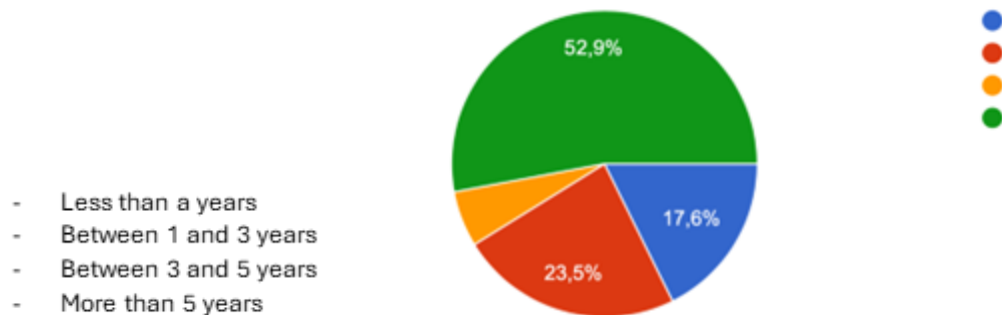
This chart shows that 52.9% of the sample has worked for the company for more than 5 years, 23.5% has worked for the company for between 1 and 3 years, 17.6% has worked for the company for less than 1 year and 5.9% has worked for the company for between 3 and 5 years.

Interview Conducted and answers obtained

Directors:
The questionnaire administered directly to the directors was as follows:
Question 1: Do you think your company faces any challenges when it comes to organizational innovation? If so, which ones?
Question 2: What have been the most successful organizational innovation initiatives carried out by your company in recent years?
Question 3: In the context of the challenges that managers face when trying to promote innovation in the company, what strategies would you like to see in your company?
Question 4: If you don't have one, do you think recruiting a manager would change the way the company works and/or its environment? if your answer is yes, please indicate why.

MOBIPIUM: Ricardo - Founder and CEO
Question 1:
"Yes, especially with AI in constant development, it is difficult to keep up with the pace of innovation in this field."

Question 2:
"Commitment to tailor-made training, recognizing the importance of keeping the team up to date with the latest skills and knowledge."

Question 3:
"Strategies to promote protocol innovation. This would include implementing clear and structured processes for identifying, developing and implementing new ideas and solutions."

Question 4:
"No, because I believe that innovation should be present in all areas of the company, and not just under the responsibility of a specific manager."

MOBIPIUM: Rita Mendes - Human Resources Manager
Question 1:
"No, we are always in the process of evaluating our process and, consequently, ways to improve and adapt our practices."

Question 2:
"Changing the onboarding and performance model has been one of the most successful organizational innovation initiatives."

Question 3:
"Further developing the well-being program would be a valuable strategy to meet the challenges of promoting innovation in the company, where a healthier and more stimulating work environment can be created."

Question 4:
"No, I believe that because our company is frequently undergoing evaluation processes, we are always improving performance areas together."

HIDROVET: Carolina Nascimento - Director and Manager
Question nº1:
"Improving management and communication within the team can be an important priority to overcome this challenge and promote organizational innovation in the company."

Question nº2:
"Implementing effective communication so that the team functions as a cohesive unit have been one of the most successful organizational innovation initiatives carried out by our company in recent years."

Question nº3:
"An area in which managers could improve to further boost innovation in the company is research and partnerships. This involves dedicating more resources to internal research, constantly encouraging new opportunities to develop innovative products, services or processes.

Question nº4:
"I would like to see strategies implemented that emphasize research as a way of promoting innovation in our company in order to dedicate resources for research and development of new technologies, products or services."

Confeções Albertina Pinto Pereira & Filha Lda.: Bárbara Pinto Pires - Executive Director
Question nº1:
"No, our company has come up with innovative ideas right from the start, so that has never been a problem within the company."

Question nº2:
"In addition to monthly feedback meetings, we also implemented a more transparent and collaborative communication system. This included the adoption of internal communication tools, such as instant messaging platforms."

Question nº3:
"In addition to the various strategies that are used, I would like to see the company try to collaborate with partners, suppliers and even customers in such a way that we can obtain a solid network of employees."

Question nº4:
We did not get an answer.

Ponto Singular: João Carrão – CEO
Question nº1:
"Organizational innovation always entails some challenges, in particular the resistance of the employees themselves, because they are too comfortable with their daily routine, implementation costs or even some lack of technical knowledge that the company has in its staff. These have been our company's biggest challenges."

Question nº2:
"Undoubtedly have been a change in culture, based on accountability and valuing creativity. We now have mandatory meetings to discuss obstacles and strategies, where the obstacle or constraint is presented in advance so that there can be a period of reflection which make our tasks and actions much more productive."

Question nº3:
"What we have been doing and will continue to work hard on, because it's a task that never ens, is precisely working on the culture, targeting the values, the mission and the vision, so that all employees always keep it in mind, we use an increasingly creative but responsible process in which everyone has to give feedback to others, sharing information is an essential factor for us."

Question nº4:
        We did not get an answer.

Employees:

As for the questionnaire applied to employees, the data is as follows:

1. What sector do you work in at the company?
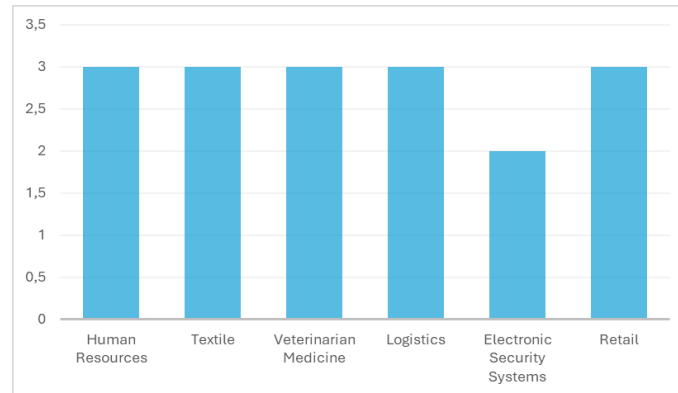
In this analysis we can see how, of the 17 responses in the sample, 3 are from Human Resources, 3 from Textiles, 3 from Veterinary Medicine, 3 from Logistics, 3 from Commerce and 2 from Electronic Security Systems.

2. How would you describe the level of innovation within your company?

- None
- Not very sufficient
- Not Sufficient
- Sufficient
- Good
- Very good
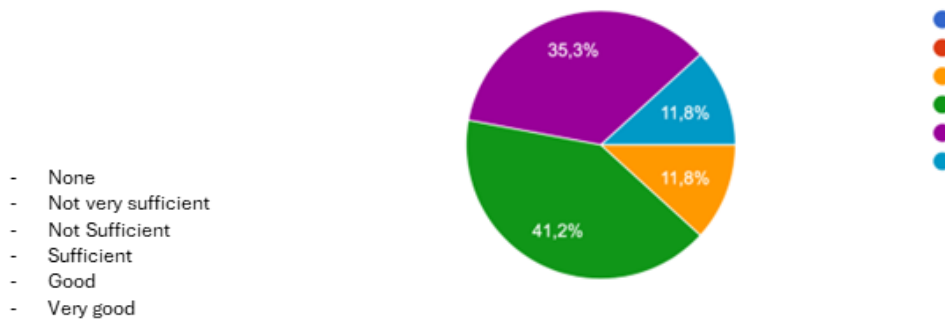
This chart shows that 41.2% of the sample described the company's level of innovation as sufficient, 35.3% as good, 11.8% as not very sufficient and 11.8% as very good.

3. Do you believe that organizational innovation is important for a company's success?

- Yes
- No

In this analysis we can see how 100% of the sample believes that innovation is important for a company's success.

4. Does your company's organizational culture value and encourage innovation?
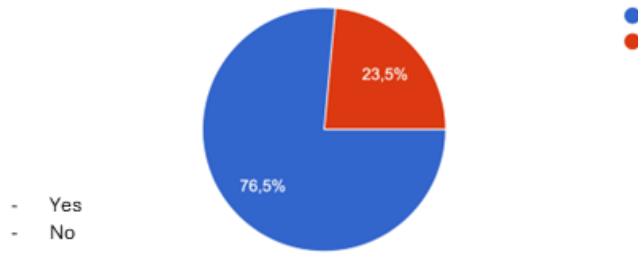
This chart shows that 76.5% of the sample believe that their company's organizational culture values and encourages innovation, while 23.5% believe that it does not.

5. Is your company's management committed to making innovation a priority at all levels?
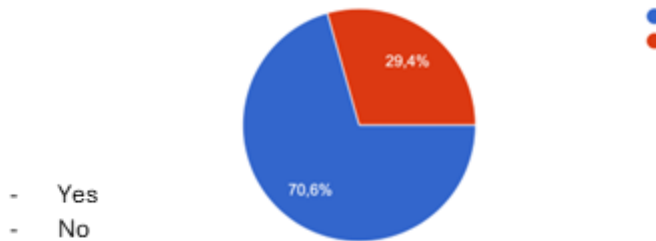
In this analysis, we can see how 70.6% of the sample believes that their company's management is committed to making innovation a priority at all levels.

6. Do you think that collaboration and teamwork actively encourage innovation?

This chart shows that 100% of the sample believes that collaboration and teamwork actively encourage innovation.

7. In your opinion, how important is collaboration between managers and team members in promoting organizational innovation?
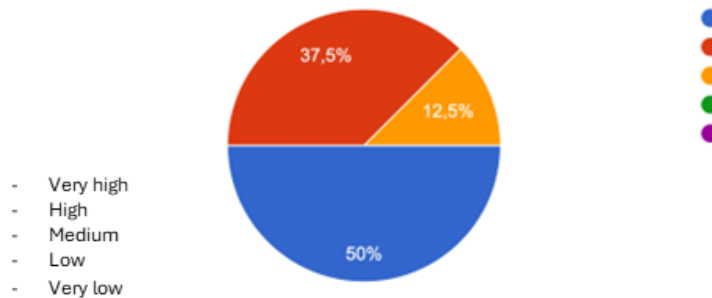
In this analysis we can see how 50% of the sample believe the importance of collaboration between managers and team members in promoting organizational innovation is very high, 37.5% believe it is high and 12.5% believe it is medium.

8. Does the manager of your department have a character that you see as innovative?

- Yes
- No
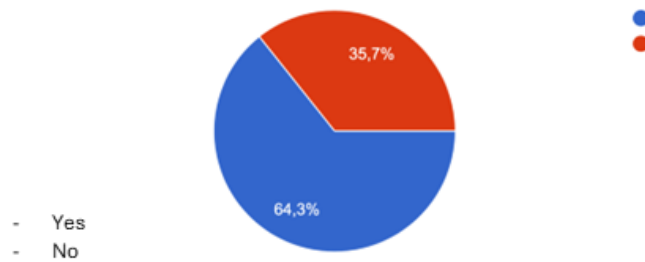
In this chart we see that 64.3% see their department manager as innovative while 35.7% believe the opposite.

9. What impact does organizational innovation have on the professional development and motivation of employees?

- Very big
- Large
- Medium
- Small
- Very small
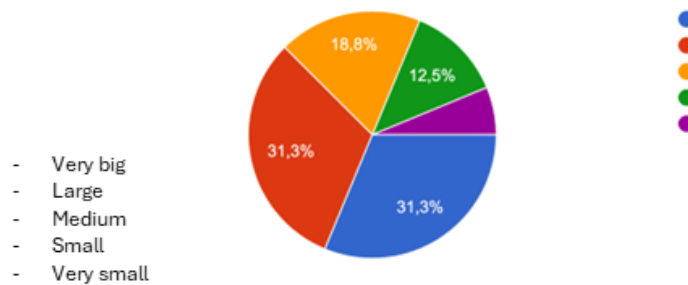
In this analysis we can see how 31.3% of the sample believe the impact of organizational innovation on the professional development and motivation of employees is very big, 31.3% believe it is large, 18.8% believe it is medium, 12.5% believe it is small and 6.3% believe it is very small.

10. In your opinion, what would be an area of improvement for managers to further boost innovation in the company?
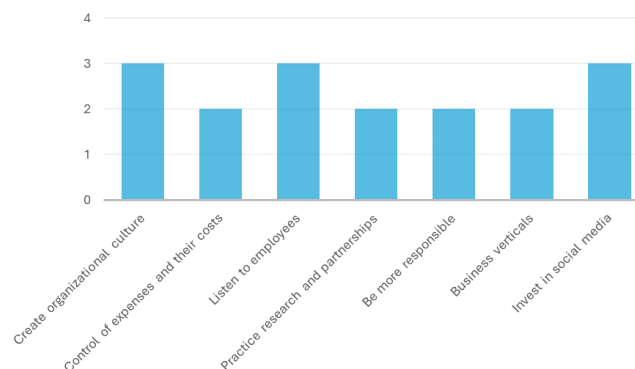
This chart shows a pattern where the participants prefer a change in organizational management within the company.

11. In your opinion, do managers show flexibility and willingness to experiment with new approaches or innovative solutions?

- Yes
- No
- Rarely
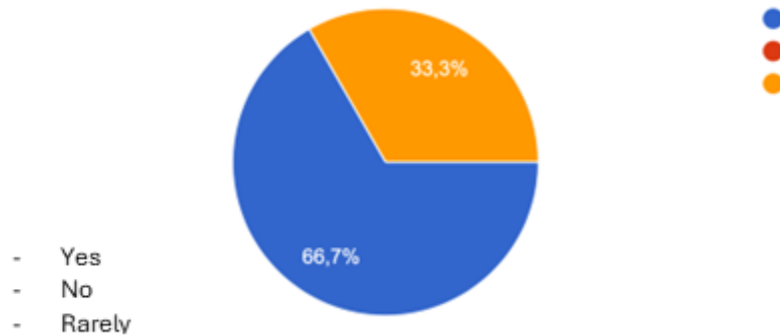
In this analysis we can see how 66.7% of the sample believe that managers show flexibility and openness to new approaches, while 33.3% believe that this is rare.

12. Are managers willing to receive feedback from employees on their work?

- Yes
- No
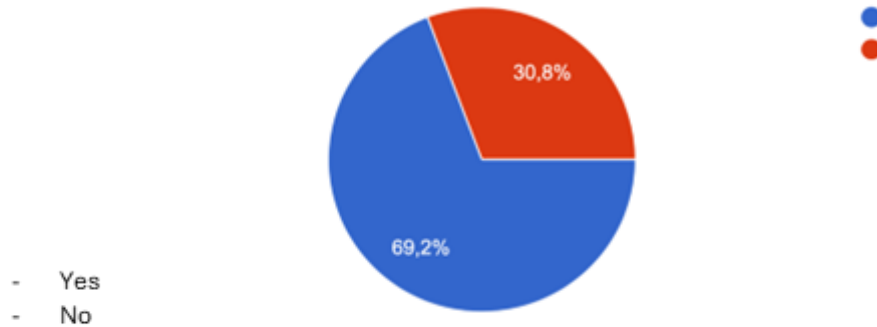
This chart shows that 69.2% of the sample believe that managers are open towards receiving feedback from employees on their work, while 30.8% believe that they are not.

13. Do you think your company has an innovative organizational character?

- Yes
- No
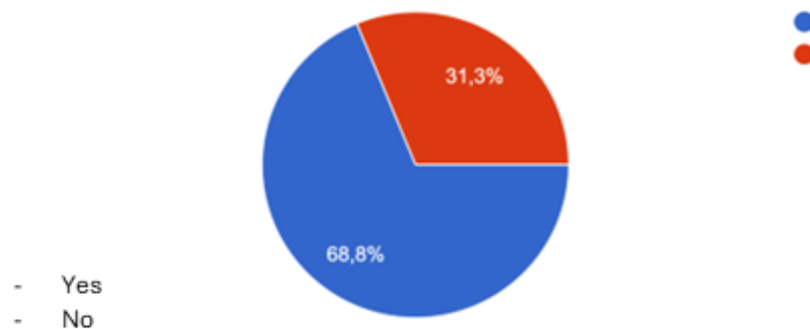
In this analysis, we can see how 68.8% of the sample believe they have an innovative organizational character, while 31.3% do not.

Hypothesis analysis:

Hypothesis 1: One of the companies studied, Confeções Albertina Pinto Pereira & Filha Lda, mentions in its answers that it has no obstacles to organizational innovation, even without a manager. The company's director, Bárbara Pinto Pires, manages to carry out this role, without having to recruit a specific person for the job of manager. in other words, this company has high levels of job satisfaction and employee participation, and it is a relationship between the director and her employees.

Hypothesis 2: We were able to verify this hypothesis through the company MOBIPIUM, which provided us with key information regarding leadership. The company constantly evaluates the company's weekly results, so we can conclude that leadership is effective in the company and that employees are always positively influenced so that the company meets its objectives.

Hypothesis 3: We found this hypothesis to be true at Ponto Singular, just as at Confeções Albertina Pinto Pereira & Filha Lda., where the recruitment of a manager is not important for the companies, managing to keep their staff motivated and interested. The difference is that if they had a manager, certain tasks would be assigned to the managers, and the director wouldn't have to take on all the tasks.

5. FINAL CONSIDERATIONS: CONCLUSION

From what we can observe from the results obtained in successful organizations, the role of managers is fundamental in innovation and adapting to change, as they are responsible for leading and guiding teams to achieve the company's objectives. Managers need to create an environment conducive to innovation, where employees feel motivated and encouraged to think creatively and contribute with innovative ideas. This involves providing adequate resources, support and promoting a culture of error tolerance and continuous learning where failures are seen as growth opportunities. It is necessary for companies to be responsive to market trends, customers' needs, and modern technologies, always looking for new ways to improve internal services and develop new products or services. From the data analysis, innovation has several profound impacts on organizations; it is not only a source of competitive advantage and business growth, but it can also contribute to social well-being, environmental sustainability, and the creation of long-term value for all the stakeholders involved. This is precisely why it is so crucial that organizations nurture a culture of innovation and invest in innovation processes in a continuous and strategic manner. Innovation is regarded as a crucial source of competitive advantage, as those companies that manage to innovate in a consistent and effective way can create unique and higher quality products or services, differentiating themselves from their competitors in the market. Furthermore, by offering products or services that are of a higher quality, more efficient, or more aligned with the customer's needs, a company can improve the customer's overall experience and increase their loyalty to the company. This not only enhances the existing customer base but may also attract new customers through positive recommendations and "word from mouth to mouth". It can also yield significant improvements in the efficiency of organizations. When we introduce new types of technology, we enable companies to optimize their operations, reducing costs, increasing productivity, and improving their profitability. Comprehending and exploring the influence of managers on organizational innovation is crucial if organizations are to succeed and survive in the highly competitive, globalized marketplace of today. By fostering a culture of innovation, promoting collaboration, and investing in resources and strategies that encourage creativity and continuous learning, managers can lead their organizations toward a future of success and sustainable growth.

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HUMAN CAPITAL DEVELOPMENT, CAPABILITIES AND ECONOMIC GROWTH IN NIGERIA

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ABSTRACT
Human capital development has been identified by various authors as part of the economic growth determinant. It is impossible to achieve sustainable growth without matching the relationship between human capital and economic growth with appropriate capabilities. This study sought to examine the relationship among human capital development, capabilities, and economic growth in Nigeria using time series data spanning from 1984 to 2021. Autoregressive Distributed Lag (ARDL) cointegration estimation technique was employed to analyse the relationship among human capital development, capabilities, and economic growth as confirmed by pre-test results [Phillip Peron (PP) and Augmented Dickey-Fuller (ADF)] to test for stationarity. The finding reveals that total factor productivity (proxy for innovation capability), Gross capital formation and financial deepening (financial capability) were the capability variables that significantly influenced economic growth. Therefore, the study concludes that human capital development without adequate capabilities, Nigeria will not be able to sustainably grow. Consequently, the government should focus its efforts on devising policies that will revolutionize Nigeria's education system in a manner that will stimulate the economy.
Keywords*: Human Capital Development, Total Factor Productivity, Trade Openness, Life Expectancy and Financial Deepening*

1. INTRODUCTION

The development of a nation is not solely determined by the allocation of natural resources or the amount of physical capital stock, but rather by the quality and quantity of its human resources. Human resources are active entities that interact with other resources to create output. Human resources development is important to the growth and productivity of any organization. Any country that is struggling or found it difficult to improve the skills and knowledge base of its citizen and effectively utilize them for the development of the nation, will not be able to achieve anything (Aurora and Natércia, 2004). This confirms the essential role of human resources development in the process of development. It also attests to the fact that human capital plays an important key role in the economic development of any nation (Ogujiuba, 2013). Human capital is the total stock of a country's labour force that has the capacity such as skills, knowledge and managerial ability needed to transform the land, capital and other required inputs to produce commodities as output that will satisfy human desire. Human capital development yields a high level of productivity if properly harnessed. All growth theories, from the classical growth theory to the endogenous growth theory, have identified investment as a fundamental component of economic growth; however, the new growth theory emphasizes the accumulation of knowledge (human capital formation) as a successful investment that will effectively enhance economic growth. Barro & Sala-i-Martin (2004) suggested that human capital generates economic development, especially in the long run if it can be combined with mechanisms such as innovation that can generate returns to capital and positively contribute to long-term growth. The importance of capabilities in the adoption and diffusion of technologies was emphasized by Abramovitz (1986). He opined that the contribution of human capital to the growth of the economy depends on the country's capabilities.

Capabilities according to Abramovitz (1986) include all factors that allow full utilization of economic agents' potential. No doubt, that it is adequate human capital development that can significantly influence economic growth in any country. Yilmazer & Cinar (2015) noted that the development of human capital is a key factor in achieving economic growth and development. Nigeria's planning was centered on ensuring physical capital accumulation for swift growth and development in the past, while the role of human capital in the development process was not adequately recognized. Since Nigeria independent, her economic objective has been to achieve stability, output expansion, social progress, and self-sufficiency among others. But, internal problems have been inhibiting this. The problems are lack of adequate human development programme, crude agricultural practices, inadequate infrastructure facilities, an underdeveloped manufacturing sector, poorly planned policy, and mismanagement of limited resources. According to Yilmazer & Cinar (2015), developing countries witness faster per capita income than developed countries but unfortunately, it is an arduous task for them to reach their development level. They agreed that the major reason for developed countries' high per capita income is the ability of their skilled workforce to produce technological advancements that positively influence their output. Hence, need for improvement in human capital and closing the gap of human capital development among countries to attain economic growth sustainability. In the literature, endogenous growth postulates that knowledge is important for a country's economic growth and that human capital refers to the knowledge embodied in humans (Ali, Egbetokun and Memon, 2016). Ali et al acknowledge that knowledge acquired through education and productivity capabilities is recognized as important key drivers of economic growth. They asserted that the development of capabilities is essential for the development of human capital and the growth of the economy. Sen, (1999) opined that enhancing people's capabilities can lead to a broader range of options and better skill development, ultimately contributing more effectively to the economic development process as functional variables. The argument is that simply enhancing or increasing human capital is inadequate if the capabilities to generate output is not concurrently increased (Ranis, Stewart, and Ramirez 2000). On this basis, all other economic fundamentals that can improve the economic productivity of the economy are very important. Abramowitz (1986) emphasizes the significance of being able to learn and utilize new technology, attracting financial investments, and engaging in international trade in the process of catching up with more advanced economies. The idea of capabilities extends beyond just human knowledge and skills, and encompasses factors related to economic opportunities within the context of the determinants of the catching-up process. Sen (1999) viewed development as the expansion of capabilities, and are essential for the nation's economic development. From the views of both Abramovitz and Sen, It is evident that analyzing economic growth requires more than just considering the inputs of labor (human capital) and capital (physical capital) in the production function. As a result, the optimal contribution of human capital to economic growth is dependent on its combination with the necessary capabilities. The attempt to connect economic growth with human capital with capabilities will help to resolve the controversy that arose when early researchers looked at the relationship between human capital with economic growth. Ramirez and Stewart (1998) concluded that, human capital and economic growth are inextricably linked, but there is little agreement on the factors that bind them together. Many research works have been conducted by researchers in Nigeria with the majority focused on the relationship between human capital and economic growth without considering the effect of capability variables in the relationship. It is therefore relevant to explore the relationship between human capital development and economic growth by incorporating capability variables. There are different types of capabilities have been delineated in literature, including human capabilities, financial capabilities, social capabilities and economic capabilities.

Yilmazer & Cinar (2003) discovered that the impact of human capital development on economic growth was indirect through innovation. Their work demonstrates the significance of possessing a relatively substantial amount of human capital in order for a nation to fully realize the advantages of its domestic innovation endeavours. While other researchers include different capabilities variables in their studies. Human capital and economic growth have been widely discussed in the literature, most especially that of endogenous growth theory, ranging from Arrow's learning-by-doing to Romer's Endogenous Technical Change, which suggests that innovation can enhance human capabilities. The findings of these studies are not yet definitive. Ali et al (2016) indicates that the regression outcomes of both the human capital and economic growth analyses are influenced by other variables, and that other variables associated with human capital should be incorporated into the analysis. This is why the focus of this study is on the impact of capability variables on the link between human capital development and economic development in Nigeria.

2. MODEL SPECIFICATION

For the purpose of this study, the model used is the Endogenous Growth Model, with particular reference to Ali et al (2016), modified to include capability variables, and specified as follows:

$$GDP_t = f(TFP_t, GCF_t, HCD_t, LEXP_t, TOP_t, FD_t)$$

The model is explicitly defined thus:

$$GDP_t = \alpha + \beta_1 TFP_t + \beta_2 GCF_t + \beta_3 HCD_t + \beta_4 LEXP_t + \beta_5 TOP_t + \beta_6 FD_t + \varepsilon_t$$

Definition of Variables

GDP_t = Gross Domestic Product

TFP_t = Total Factor Productivity capturing innovation capability

GCF_t = Gross Capital Formation capturing financial capability

HCD_t = Human Capital Development measured by the addition of primary and secondary enrolment

$LEXP_t$ = Life Expectancy capturing health capability

TOP_t = Trade Openness capturing economic capability

FD_t = Financial Deepening also capturing financial capability

Apriori Expectation

In Nigeria, it is anticipated that there will be a positive relationship between economic growth and other selected variables.

Symbolically, the expected relationship can be expressed as follows:

$\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \beta_5 > 0, \beta_6 > 0.$

Estimation Technique

The method used in this study is the Autoregressive Distributed Lag (ARDL) approach to co-Integration to evaluate the relationship between variables of interest.

Sources of Data

Secondary data was used in this study. Therefore, GDP, Gross Capital formation, School enrolment, life expectancy and financial deepening were obtained from statistical Bulletin of the Central Bank of Nigeria (CBN), National bureau of statistics (NBS) and World Bank data base. Total factor productivity and Trade openness were computed.

3. RESULTS

Testing the Normality in the Distribution of the Data Set in the Stud

Table 1: Descriptive Statistics

	GDP	TFP	HCD	LEXP	GCF	TOP	FD
Mean	33725.22	1.44E-06	127.1663	48.09308	3.33E+10	0.159303	14.20263
Median	23068.85	1.14E-06	130.4250	46.19550	1.93E+10	0.104135	12.69500
Maximum	69810.02	6.72E-06	150.3300	54.63800	7.42E+10	0.468774	21.31000
Minimum	13779.26	-5.06E-06	100.3500	45.63500	9.57E+09	0.000978	9.150000
Std. Dev.	19578.10	2.15E-06	11.56620	2.860100	2.21E+10	0.156067	3.932046
Skewness	0.734406	0.131083	-0.385775	0.951401	0.735770	0.530492	0.598722
Kurtosis	1.996529	4.794092	2.328980	2.405596	1.876739	1.839933	1.829066
Jarque-Bera	5.010239	5.205205	1.655465	6.292120	5.426315	3.913114	4.441184
Probability	0.081666	0.074081	0.437039	0.043021	0.066327	0.141344	0.108545
Sum	1281558.	5.49E-05	4832.320	1827.537	1.26E+12	6.053521	539.7000
Sum Sq. Dev.	1.42E+10	1.71E-10	4949.748	302.6664	1.80E+22	0.901209	572.0563
Observations	38	38	38	38	38	38	38

Source: Author computation (2024)

Table 1 shows that TFP and TOP are symmetrical while GDP, HCD, LEXP, GCF and FD are asymmetrical in their distribution. TFP is normally skewed, while GDP, LEXP, GCF, TOP and FD are positively skewed and HCD is negatively skewed. Result of kurtosis shows that GDP, HCD, LEXP, GCF, TOP and FD are platykurtic, while TFP is leptokurtic. Jarque-Bera statistic revealed that GDP, TFP, HCD, GCF, TOP and FD are normally distributed while LEXP is not.

Testing the Correlation among the Series using Correlation Matrix

It is pertinent to be sure whether there is interaction among the variables before proceeding to other estimations. This study used a correlation matrix to examine that.

Table 2: Correlation Matrix of Selected Series

	GDP	TFP	HCD	LEXP	GCF	TOP	FD
GDP	1.000000	0.873514	0.084224	-0.058165	-0.054758	0.261874	0.147215
TFP	0.873514	1.000000	-0.166377	-0.400015	-0.321351	-0.052791	-0.101613
HCD	0.084224	-0.166377	1.000000	0.647284	0.561066	0.610132	0.611409
LEXP	-0.058165	-0.400015	0.647284	1.000000	0.850956	0.663952	0.603102
GCF	-0.054758	-0.321351	0.561066	0.850956	1.000000	0.775156	0.810418
TOP	0.261874	-0.052791	0.610132	0.663952	0.775156	1.000000	0.854627
FD	0.147215	-0.101613	0.611409	0.603102	0.810418	0.854627	1.000000

Source: Author computation (2024).=

Table 2 shows that LEXP and GCF are negatively correlated with GDP while TFP, HCD, TOP and FD are positively correlated with GDP.

Time Series Properties of the Variable

Table 3. Unit root test

| Variables | Level | | | First Difference | | | Order of Integration |
	P.P Statistics	ADF Statistics	5% critical Value	P.P Statistics	ADF Statistics	5% critical Value	
GDP	-3.1610	-3.2595	-2.9434	----------	----------	---------	I(0)
TFP	-3.9666	-4.0885	-2.9434	----------	----------	---------	I(0)
HCD	-1.6624	-1.9434	-2.9434	-5.3914	-5.3946	-2.9458	I(1)
GCF	-0.8595	-0.4614	-2.9434	-4.4284	-4.1431	-2.9458	I(1)
FD	-1.1093	-1.07071	-2.9434	-5.8189	-5.6378	-2.9458	I(1)
LEXP	-1.8767	-2.1157	-2.9434	-4.1150	-4.1150	-2.9458	I(1)
TOP	0.1584	0.1407	-2.9434	-4.6391	-4.7110	-2.9458	I(1)

Source: Author computation (2024)

The unit root test results of both Augmented Dickey-Fuller (ADF) and Phillip Peron (PP) confirmed that GDP and TFP are stationary at their levels while HCD, GCF, FD, LEXP and TOP are made stationary at their first difference. The fact that all the variables are not similar in their order of integration means that Johansen cointegration criteria cannot be met. Therefore, this study employed Autoregressive Distributed Lag (ARDL) cointegration procedure.

Testing the Long-run relationship Among the Series

Table 4: Co-integration Bound Test for GDP

F- Statistic 10.1703		
Level of Significance	I(0) Bound	I(1) Bound
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.9 9

Source: Author's Computation, (2024)

Table 4 revealed that the result established that long-run relationship. Given that the estimated F-statistic value of 10.1703 exceeds the upper bound's critical values even at a 1% significant level. It affirms the existence of long-run relationship among the variables. Therefore, both short run and long run dynamism shall be estimated through ARDL.

Table following on the next page

Table 5: Long Run Analysis Result - Source: Author's Computation, (2024)

Dependent Variable: GDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.666409	6.552829	-0.101698	0.9197
GDP(-1)	0.637088	0.338919	1.879766	0.0702
TFP(-1)	0.077743	0.034266	2.268808	0.0264
HCD(-1)	0.039365	0.059774	0.658560	0.5154
LEXP(-1)	0.053334	0.046357	1.150512	0.2593
GCF(-1)	2.91E-10	6.47E-11	4.497983	0.0001
TOP(-1)	4.688879	7.171298	0.653840	0.5184
FD(-1)	1.065720	0.294295	3.621267	0.0011
R-squared	0.682477	Mean dependent var		4.286193
Adjusted R-squared	0.605834	S.D. dependent var		4.395696
S.E. of regression	2.759735	Akaike info criterion		5.056957
Sum squared resid	220.8680	Schwarz criterion		5.405264
Log likelihood	-85.55371	Hannan-Quinn criter.		5.179751
F-statistic	8.904572	Durbin-Watson stat		2.225776
Prob(F-statistic)	0.000008			

The result in Table 5 showed that gross capital formation, total factor productivity and financial deepening have significant effect on Nigeria's economic growth in the long run. This indicates that gross capital formation and financial deepening have a positive influence on Nigeria's economic growth. Human capital development, life expectancy and trade openness have insignificantly impacted on Nigeria's economic growth in the long run. R^2 value of 0.68 affirms that approximately 68% of the variation in the dependent variable was explained by the selected capabilities. Since gross capital formation and financial deepening are measures of financial capacity, and total factor productivity captured innovation capacity. Therefore, financial and innovation capabilities significantly influence Nigeria's economic growth in the long run.

The Short-run Dynamic Relationship among the Series

Table 6: Error Correction Model (ECM) result - Source: Author's Computation, (2024)

Dependent Variable: D(GDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.062331	0.438963	-0.141996	0.8881
D(GDP(-1))	0.845688	0.349507	2.419662	0.0225
D(TFP(-1))	0.177438	0.134266	1.323813	0.2309
D(HCD(-1))	0.105887	0.063581	1.665387	0.1074
D(LEXP(-1))	0.009142	0.048796	0.187343	0.8528
D(GCF(-1))	2.48E-10	7.58E-11	3.272939	0.0029
D(TOP(-1))	3.095446	11.57124	0.267512	0.7911
D(FD(-1))	1.028285	0.299343	3.435141	0.0019
ECM(-1)	-1.340055	0.225128	-5.952412	0.0000
R-squared	0.740209	Mean dependent var		0.103183
Adjusted R-squared	0.663234	S.D. dependent var		4.257323
S.E. of regression	2.470591	Akaike info criterion		4.859109
Sum squared resid	164.8031	Schwarz criterion		5.254989
Log likelihood	-78.46397	Hannan-Quinn criter.		4.997282
F-statistic	9.616213	Durbin-Watson stat		2.019960
Prob(F-statistic)	0.000003			

The results of Table 6 revealed that only gross capital formation and financial deepening have significant impact on Nigeria's economic growth in the short run. Total factor productivity, human capital development, life expectancy, and trade openness does not significantly impact Nigeria's economic growth in the short run. The ECM coefficient is significant and negative as shown in Table 6. The significance of the ECM affirmed that long-run equilibrium exit relationship between capabilities and Nigeria's economic growth. The value of R^2 (0.74) confirms that the selected capabilities explained about 74% differential of the dependent variable. Since, gross capital formation and financial deepening captured financial capability. Hence, only financial capability significantly influences economic growth in Nigeria at short run.

Testing for Structural Stability
This study employed cumulative sum of the recursive residuals (CUSUM) and the cumulative sum of squares were used to test for the stability of the model. The plots are shown in figures 1 and 2 below:

Figure 1: CUSUM Test for Structural Stability of the Parameters
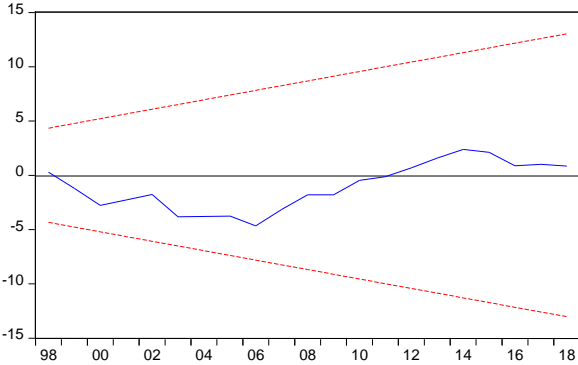
Figure 2: CUSUM of Squares Test for Structural Stability of the Parameters
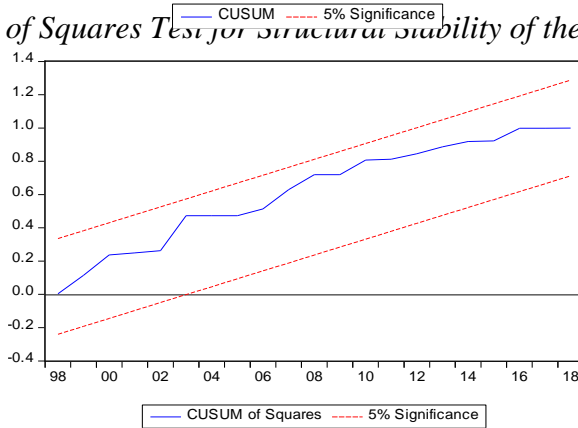
The results in fig 1 and fig.2 are suggestive of coefficient stability since the plots did are within the 5% critical bound. The existence of coefficient stability for the estimated parameters were confirmed for both the short run dynamics and the long run of function economic growth over the periods under review. Also, the results affirm tendency of further coefficients stability.

5. DISCUSSION
The study shows that total factor productivity has significant positive impact on economic growth in Nigeria but only at long run. The implication of positive impact is that an increase in total factor productivity will result to an increase in Nigerian economic growth. This is in accordant with the existing theory. Theoretically, technology has the potential to speed up manufacturing processes, improve labour efficiency (productivity), and enhance production quality and quantity.

The outcome is in line with the view taken by Banerjee and Roy (2014), Widarni and Bawona (2021), that technology is the most significant and influential factor contributing to economic growth. But Widarni and Bawono (2021) affirmed that technology is effective driver of economic growth not only in the long run and also, in the short. Human capital development has positive but insignificant impact on Nigerian economic growth. It is essential to invest in human capital in order to enhance labour productivity in the long run. The lack of impact may be due to a lack of investment in the necessary skills. This is in line with Alfada (2019), which confirmed the positive correlation between human capital and economic development. This finding is contrary to that of Widarni and Bawono (2021) that discovered that human capital is negatively insignificant only in the short run. Life expectancy has an insignificant positive impact (both at short run and long run) on Nigeria economic growth. Based on the predictions of endogenous growth theory, high life expectancy supposed to translate into increase in education investment in long-term and accumulation of more personal knowledge. (Barro and Sala-i-Martin, 1992; Acemoglu and Johnson, 2007). The result is in agreement with Savedoff and Schultz (2000), Schultz (2002), showing that health is positively influencing economic growth by increasing productivity of labour.

While Ngangue and Manfred (2015) found that life expectancy has a significant positive impact on economic growth. But, Barro and Lee (2010) shows an inverse relationship between life expectancy and economic growth. Gross capital formation has direct significant effect on Nigerian economic growth. This implied that an increase in the gross capital formation acts as an economic stimulus, invariably cause an increase in economic growth. This result is tandem with the works of Orji and Peter (2010) and Bakare (2011) found that capital formation has direct significant influence on Nigeria economic growth.

This study negate the findings of Anyanwu (2014) and Ajose and Oyedokun (2018) who discovered inverse non-significant relationship between economic growth and capital formation in Nigeria. Trade openness has positive but does not have significant impact on economic growth which contradicted the trade-led growth hypothesis. Finding of this study is in accords with Vlastou (2010), Polat, Shahbaz, Rehman and Satti (2015), Were (2015), Ulaşan (2015), and Lawal, Nwanji, Asaleye and Ahmed. (2016) who found that trade openness has a negligible impact on economic growth. Contrary to Asfaw (2014), Zarra-Nezhad, Hosseinpour and Arman,(2014), Brueckner and Lederman (2015) and Yaya (2017), all of these studies showed that openness contributes to economic growth.

Financial deepening is directly and significantly related to economic growth in Nigeria. Financial deepening is the capacity of financial institutions to efficiently allocate funds for investment within the economy. An efficient financial system typically facilitates and sustains economic development. The finding is in agreement with Nzotta and Okereke (2009), Sulaiman, Oke and Azzez (2012) Mesagam, Ohukwa and Yusuf (2018) who affirmed that there is significant relationship between financial deepening and Nigerian economic growth. Finally, the study also found that a strong long-term equilibrium relationship exists between economic growth and capability variables employed in the study. This clearly shows that whenever there is an imbalance from the short-term equilibrium level, there will be convergence to the long-term equilibrium. However, the study finds that total factor productivity (proxy for innovation capability), Gross capital formation and financial deepening (financial capability) are the variables that significantly influenced economic growth during the under review.

6. CONCLUSION

This research explored the influence of capability variables on the relationship between human capital and Nigerian economic growth. The findings of the study indicated that Nigeria's economic growth during the study period was largely driven by innovation and financial capabilities.. Therefore, the study concludes that human capital development without adequate capabilities cannot achieve sustainable growth in Nigeria. Hence, the government should make every effort to formulating appropriate policy to transform Nigeria education system in such a way that will be effective in stimulating economy. the government should make every effort to formulate appropriate policies to transform the education system in Nigeria.

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TOURISM AND AIRLINES ACTIVITIES IN THE SOCIOECONOMIC DEVELOPMENT STRATEGIES OF CAPE VERDE ISLANDS: AN EMPIRICAL STUDY USING PLS-R

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ABSTRACT

The purpose of this paper is to analyze the impact of the relationship of the airlines and tourism activities in the socioeconomic development of Cape Verde using the Partial Least Square Regression. The results demonstrated that the PLS-R model provides the determination of the statistical and explanatory variables, in this case, the relationship between air transport activity and the socioeconomic development of Cape Verde. In terms of optimization and arbitration, it's deductible that a high coefficient of tourist income is necessary to influence the economic growth of the region, with special attention to tourist destinations (dest_I) and their influence on balance and socio- economic impact. In addition, there is a correlative trend between the three explanatory variables, gross domestic product, tourism, and passengers and their characteristics, which in turn elucidate the readers of the determinants to be amplified and the components to be optimized for obtaining a greatest possible advantage.
Keywords: Air Transport Activity; Tourism; Socio-economic Development; Partial Least Squares; Cape Verde Islands; Decision-Making

1. INTRODUCTION

The changes in the world economy caused by globalization have further increased interest in the activity of air transport and demand changes in the way of thinking and relating it to the environment. Air transport and the tourism sector are inextricably linked (Njoya et al., 2020). Although some segments of tourism may not involve air transport for reasons related to short distances (domestic tourism), tourism preferences (bus, train and boat trips including cruises) or even a negative attitude mainly due to environmental concerns. The emergence and growth of mass leisure tourism and business travel began in the 1960s, and has been associated with strong development and technological progress, both in terms of aircraft and the evolution and behavior of markets to the detriment of the process of deregulation and liberalization in air transport, in different regions of the world (Vicente and Reis, 2021). According to ATAG (2020), 58% of international tourists traveled by air in 2018 (in the pre-COVID- 19 era) compared to 35% in 1980. Furthermore, air transport had a direct employment effect on tourism estimated at 19.6 million jobs in sectors such as hotels, restaurants and tourist attractions; when the various multiplier effects are also considered, the total impact was 44.8 million jobs and US$ 1 trillion in world GDP (ATAG, 2020). The demand for air transport is largely derived in nature, i.e., very few passengers fly for the sake of flying; most people fly to go somewhere and do something. In other words, air transport demand is heavily dependent on spatially fixed activities mainly related to leisure tourism, business, visiting friends and relatives and other purposes. In addition, air cargo plays an important role in supply chain and logistics, especially in thriving and remote tourism regions. Both air transport and tourism are strongly cyclical and highly sensitive to changes in the economic, social and political environment.

But, as with many other relationships between socioeconomic phenomena, this one is complex, also characterized by non-linearity and bidirectional causality (Brugnoli et al., 2018; Poulaki et al., 2020). Overall, investment in improving accessibility, particularly in airports and their respective mobility accesses, boosts the growth of the tourism sector in a given destination, due to the reduction in transport costs and also associated with the improvement of airport infrastructure, a better offer of air connections with reduced travel times (Vicente et al., 2021). At the same time, if inbound tourism flows in a peripheral area exceed a certain threshold, investors may be persuaded to channel resources into air transport to help the destination in question realize its full growth potential (Butler, 1980). The air transport sector is fundamental to leveraging the economic growth of a given region and/or country, presenting itself as a strategic sector for socioeconomic development and strongly contributing to the dynamism and competitiveness of the economy, either through facilitating the mobility of people, goods, capital, and cultures (Vicente and Reis, 2021). The most developed countries have been investing in air transport for a long time and continue to do so, because it has become obvious that economic and even social development must go through more and better transport infrastructures. This alert has had an impact on strategic policies in Africa and, specifically, in Cape Verde, which initiated a series of investments focused on the air transport activity sector, both at a technical and regulatory level, with the objective of making a difference in terms of Africa and the World.

2. LITERATURE REVIEW

At the beginning of aviation, travel was restricted to commerce, that is, the demand for goods for subsistence and the need to improve living conditions. Air travel / transportation was seen and felt as a necessity, that is, used only for business purposes (Ripoll-Zarraga and Raya, 2020). Currently, we live in a globalized, high-tech society, full of motivations to travel, where access to various means of transport has become, more than a possibility, a requirement. Thus, the society of the 21st century incorporates, in the solution of displacement, contemporary requirements of access, time, comfort and reach (Valente and Cury, 2004). According to Forsyth et al., (2014), transport is a fundamental component of tourism, providing the vital link between areas that generate tourists and destinations. Therefore, there are very close ties between the transport and tourism industries, that is, good accessibility on the one hand, which is determined by the transport services provided is essential for the development of any tourist destination. Aviation and its technological advances have made it possible to approach borders and provoke the expansion of tourism, bringing interesting options such as, for example, the appearance of charter flights and Low-Cost Carriers (LCC's) that boosted mass tourism (Forsyth et al., 2014). In recent times, the sharp growth of tourism is one of the agents responsible for the significant increase in demand for the different means of transport, hence the concern, "relationship between the activity of air transport versus tourism". This relationship has been contemplated in a special way in recent years, just as the increase in tourism has been favored, in large part, by the development of the activity of air transport, the reverse is also true, because the growing tourist demand has led to the development of air transport services that needed to adapt to an increasingly demanding and sophisticated demand, which seeks good prices and quality in travel (Valente and Cury, 2004). Based on the foregoing discussion of the demand-derived nature of air transport and its close relationship to tourism, one might be tempted to regard all academic air transport literature as relevant to tourism. Indeed, interesting reviews are provided by Ginieis et al. (2012); Kaps and Phillips (2004). However, such a hypothesis would not only render any attempt to review the literature useless (due to the very broad scope), but it could also prove to be methodologically problematic.

Smith (1998) discusses extensively the concept of "tourism ratio" defined as the percentage of a sector's turnover that can be attributed to tourism. When this ratio exceeds 15%, the sector is normally considered part of the tourism business ecosystem. According to Stabler et al. (2010), discussions on the tourism index have played an important role in the development of Tourism Satellite Accounts (TSAs), which have been in place since the early 2000s. Interestingly, the Aviation Organization International Civil Aviation Agency (ICAO) has recently undertaken a similar effort to develop an Aviation Satellite Account (ASA), to help analysts properly measure the economic size and impact of air transport (ICAO, 2019). Therefore, it can be said that the development of the tourism system and air transport activity are closely linked and follow a parallel and mutually influential process, constituting two interdependent segments (Forsyth et al., 2014). As technology advances, profitability and efficiency in aviation have also improved considerably, facilitating the possibility for tour operators to further lower flight prices and contributing to the opening of new markets, even the most remote ones. Thus, many tourist centers have developed in different regions of the world, thanks to the establishment of adequate air services (Forsyth et al., 2014). The history of tourism merges with that of air transport, with one having a cause-and-effect relationship over the other. The close relationship between the activity of air transport and tourism was even more evident with the tragic advent of the attacks on the United States on September 11, 2001. Certainly, much more than a most regrettable event in history, it also served to expose how delicate it is. the system of interrelation between tourism companies and companies in the air transport activity. There was a worldwide retraction in tourism, affecting the entire production chain of this activity. Starting with the air transport companies themselves, with the interruption and cancellation of hundreds of flights. Hotels had their reservations canceled at rates never seen before, tour operators did not resist and travel agencies from all over the planet passed, and still face great difficulties (Valente and Cury, 2004). We note that the activity of tourism and air transport has evolved very close to each other. Nowadays, it has been demonstrated that tourism activity, where tourist destinations, tourist carriers and tourist emitting centers are integrated in a "network", where there is a sum of common values and objectives (Valente and Cury, 2004). According to ICAO (2019) most commercial air transport services are closely related to the tourism sector, as different types of tourists (i.e., business, leisure and other categories) act as direct customers of airlines and airports. Air and airport freight services may also have some limited relevance for tourists. Pleasure flying is part of general aviation and can be considered a case of special interest in sports tourism.

Based on the academic literature relevant to air travel, tourism can be reduced to contributions that predominantly involve:
- the analysis of different airline business models (such as: legacy, low-cost-carriers, charters, private and executive aviation); strategic alliances (Star Alliance versus One World, for example); different types of airports (small, medium and large, such as hub or regional), and their respective impacts on passenger behavior (demand) in relation to consumption; as well as, analysis of the dimension of connectivity and operations in the airport network, enhancing the development of regions and contributing to the improvement of tourism (Vicente et al., 2021; Antwi et al., 2020; Ripoll-Zarraga and Raya, 2020)
- the relationship between aero-politics and tourism; the implications of regulation/deregulation/liberalization of airlines, airports and air traffic control for sustainability tourism development. Examples of literature include Arblaster and Zhang, 2020, Efthymiou and Papatheodorou (2020), Forsyth et al. (2014), Koo et al. (2016), and Poulaki et al. (2020)

- the systemic airline-airport relationship with a focus, among others, on issues of supply chain conflict; the airline-airport-air navigation relationship; and the relationship between air-airport-destination authorities. Examples from literature include Efthymiou et al. (2016), and Halpern and Graham (2015).

About the relationship between general aviation and tourism remains poorly researched, with can consider on the study by Poulaki et al. (2020).

3. THE SOCIOECONOMIC IMPACT OF AIR TRANSPORT ACTIVITY

Air transport is one of the most important industries in the world. Its technical development and service have been one of the biggest contributors to the success of modern society's progress. The demand for air services increases the influence of air transport activity in the global economy, enabling the rapid movement of millions of people, and billions of dollars' worth of goods through markets around the world (ATAG, 2014). Air transport activity is a major contributor to global economic prosperity. It provides the only fast worldwide transport network, essential for global trade and tourism, which is a major economic component (Vicente et al., 2021). The economic impact of this industry in the world is US $ 2.4 trillion, equivalent to 3.4% of the world gross product (ATAG, 2014). The approaches to the economic impacts of air transport activity in the world have sought to associate it with the consequent multiple generation of jobs, revenues and investments resulting from this activity. Air transport has a substantial economic and social impact both on its own activities and on assuming a facilitating role for other industries. Second (Vasigh et al., 2013) we can classify these contributions as: - Direct Socioeconomic Impact; - Indirect Socioeconomic Impact; - Induced Socioeconomic Impact; - Catalytic Socioeconomic Impact. This set of economic and social impacts assumes a facilitating role on the main economic indicators, such as Gross Domestic Product, Employment, Income and Government Revenues.

4. INTERDEPENDENCE BETWEEN THE ACTIVITY OF AIR TRANSPORT AND TOURISM IN CAPE VERDE

Air transport activity is increasingly important for tourist markets, and has significantly contributed to the growth of tourism in many parts of the world (Baltaci et al., 2015; Page, 2015; Belobaba et al., 2016; Graham and Dobruszkes, 2019), as is the case in Cape Verde. Table 1 presents the data referring to the entry of tourists (by air) in Cape Verde, in order to exemplify the increasing importance of the activity of air transport for international travel.

Table following on the next page

*Table 1 - Entry of Tourists to Cape Verde by Country of
Habitual Residence Through Air Modal (2000-2014)*

Year	South Africa	Germany	Spain	France	Italy	Portugal	Other countries
2000	4.469	17.631	4.704	10.223	28.514	32.182	17.292
2001	3.392	17.617	4.223	11.642	44.661	36.417	16.217
2002	10.003	13.796	4.722	11.813	35.080	34.292	16.146
2003	5.225	18.095	7.679	12.847	54.278	28.548	23.376
2004	10.034	14.433	10.281	11.160	55.200	38.129	17.815
2005	9.432	21.121	7.626	14.284	69.728	50.240	25.413
2006	4.659	30.485	7.800	25.145	65.109	59.881	48.663
2007	307	31.329	8.711	23.646	46.324	59.420	99.060
2008	193	32.705	9.880	21.057	48.956	57.854	118.670
2009	175	40.138	5.646	22.675	42.628	50.617	129.121
2010	218	48.920	7.514	43.496	40.717	60.277	141.572
2011	2.819	60.495	13.787	66.641	56.378	65.693	162.460
2012	278	67.306	12.714	69.593	30.345	67.790	74.151
2013	1.321	74.238	9.741	74.239	30.769	58.070	102.908
2014	351	68.834	8.165	61.992	28.029	60.161	107.516

Source: National Statistics Institute of Cape Verde (2015)

In general, the number of international tourist arrivals to the islands of Cape Verde has shown a strong growth trend. At the international level, in 2014, there were 1,133 billion entries, and it's estimated that in 2030 tourism is responsible for the travel of 1.8 billion tourists, with projections of an annual growth of 3.3% (WTTC, 2016)). The interrelation between air transport activity and the economy is evident because this sector of activity contributes to job creation, growth / income distribution and is vital for the growth and expansion of tourism (Vasig et al., 2013; Wensween, 2015). Figure 1 shows the evolution of international tourist arrivals and movements at Cape Verde airports in the period 2000-2014.

*Figure 1 - Evolution of Tourist Arrivals and Movements at
Cape Verde Airports, 2000-2014.*
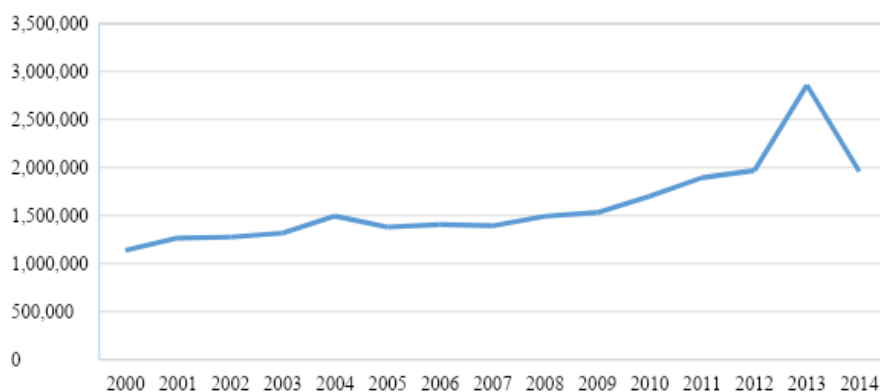
Source: National Statistics Institute of Cape Verde (2015)

International tourist arrivals and movements at Cape Verde airports, as presented by the National Statistics Institute of Cape Verde, have been growing over the years, from the 1,138,772 million corresponding to arrivals and movements in 2000 and reaching 1,959,250 million in 2014 with a slight drop compared to the previous year. This reduction is partly explained by the volcanic eruption that occurred on the island of Fogo and the irregularity of domestic flights to this island. The economic extent of tourism is very high and its global market is continuously expanding. Tourism activity and its magnitude have great potential to spread the positive impacts of globalization widely, reaching beneficially different types of economies. However, to this end, tourism depends heavily on-air transport (Vicente et al., 2021). According to data from the World Tourism Organization (2016), international tourism revenues reached US $ 1.197 billion in 2013 and US $ 1.245 billion in 2014, which corresponds to a 3.7% increase in real terms (taking into account the exchange rate fluctuations and inflation). According to the same source, for small island states and various tourist destinations, this activity has become predominant, diversifying an economy that would otherwise be dependent on primary goods, natural resource extraction and subsistence agriculture. Cape Verde has strongly invested in tourism as an engine of economic growth and development. Bank of Cape Verde data confirm a sustained growth in the share of tourism in the national Gross Domestic Product. This fact can be verified through Table 2.

Table 2 - Gross Revenue from Cape Verde Tourism, 2000-2014
(million Cape Verde escudos)

Year	Gross tourism revenue	Gross tourism revenue as% of GDP	Service Share by %
2000	4.686,4	7,3%	37,3%
2001	6.539,1	9,5%	41,1%
2002	7.509,4	8,9%	42,2%
2003	8.306,1	9,6%	42,1%
2004	8.808,00	9,4%	40,5%
2005	10.351,00	11%	42,6%
2006	17.495,00	16,1%	53,9%
2007	26.861,00	19,3%	60,0%
2008	25.415,00	18,8%	56,7%
2009	21.002,00	15,4%	55,3%
2010	22.268,00	15,9%	51,7%
2011	29.523,00	19,9%	60,9%
2012	33.799,00	19,6%	65,8%
2013	36.716,00	21,6%	N/D
2014	33.255,00	19,7%	N/D

Source: Bank of Cape Verde (2015)

In the 2000-2014 period, tourism revenues multiplied approximately eight times, and the contribution of this sector to the formation of the Gross Domestic Product reached 21.6% in 2013. Tourism represents a possibility of economic improvement in the population's standard of living. With the increase in demand, there is a need to increase the supply, and therefore, the increase in the labor force, thus creating new job opportunities.Figure 2 shows the evolution of the number of personnel employed in hotel establishments over the period under analysis.

*Figure 2 - Evolution of the Number of Personnel Served in
Hotel Establishments in Cape Verde, (2000-2014)*
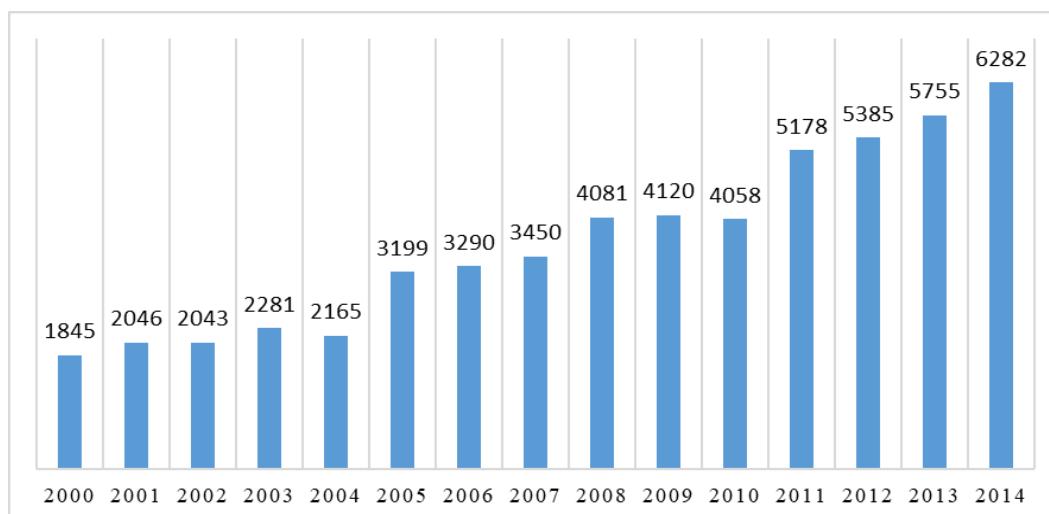
Source: National Statistics Institute of Cape Verde (2015)

Over the years, tourist inflows to Cape Verde have grown, with a notable impact on the increase in employment generated by the sector and, consequently, the increase in revenues. Tourism has impacts on various segments of the economy, employing sectors of more qualified, high-tech labor (such as transport and communication), and is one of the most important sectors for the balance of payments due to the positive impact of promoting entry of foreign currency into the Cape Verdean economy. And as an export sector it helps to improve the balance of payments as shown in Table 3.

*Table 3 - Contribution of Air Transport and Tourism Travel to
the Balance of Payments of Cape Verde, 2000-2014 (million escudos Cape Verde)*

Year	Balance of Payments	
	Tourism Travel	**Air Transport**
2000	4.820,7	5.008,5
2001	6.663,5	5.844,9
2002	7.096,3	8.468,5
2003	8.357,9	7.917
2004	8.578,4	8.462,3
2005	10.770,9	8.799,3
2006	19.247,4	10.550,6
2007	23.495,5	9.693,5
2008	25.334,38	12.869.01
2009	21.321,3	10.842,4
2010	22.677,8	14.444,0
2011	26.449,1	11.250,4
2012	33.798,8	10.207,6
2013	28.597	7.926
2014	29.429	6.064

Source: Bank of Cape Verde (2015)

The impacts of tourism on a given destination can be positive or negative. That is why authors such as Goeldner et al. (2002, p. 36) summarize by stating that "tourism is neither a blessing nor a plague, neither poison nor panacea". That is, it offers great benefits, but it can also bring problems. Poorly planned tourism can harm the destination and communities. "One must strike a balance in terms of cost-benefits in order to produce the best result". (Goeldner et al, 2002, p. 36). The positive impacts of tourism can be summarized in three areas: economic on GDP and employment, environmental on natural resources and socio-cultural on the community. On the other hand, authors such as McKercher (1993) clearly state that negative impacts are inevitable. The economic importance of tourism depends on the level of activity in the sector and the specificity of the country. In the insular regions, tourism is an important source of income, exports, generator of jobs and a relevant factor for poverty reduction, and may be the main economic activity (Vicente et al., 2021). Small Island Developing States (SIDS) are regions with disparate levels of economic development, vulnerable due to insularity, with ecological weaknesses, reduced institutional capacity, weak capacity for economic diversification, dependent on limited resources for export and susceptible to importing almost everything, such as food, fuel and construction material. Logistics costs are high given the low volume of trade compared to mainland countries. The development of tourism in small islands is affected by globalization, that is, by the exploitation of factors of production and volume in order to attract the largest possible number of tourists and, at the same time, more immigrants to fill the jobs generated. This globalization and the volume tend to standardize tourist offers, which can affect the uniqueness of the islands (Croes et al., 2013). The islands are increasingly popular attracting amounts of tourism. that exceed those of the population and the direct and indirect contributions of tourism are contributing to the improvement of the quality of life and the reduction of poverty levels. Poverty reduction is a highly relevant objective, as in the past the survival of the SIDS population depended mainly on agriculture and fisheries (Hall, 2010). Many authors such as Sharpley (2012) argue that the development of tourism that is planned and managed in a sustainable way generates enormous benefits for the islands. Therefore, at international conferences and meetings, as well as in various publications, decisions and recommendations are issued to support SIDS in the development and monitoring of actions and initiatives aimed at the economic and social development of the islands through tourism. For Manning (2016), in the study "The Challenge of Sustainable Tourism in Small Island Developing States", these countries face several challenges, such as the small size that puts pressure and competition on available resources such as land, natural resources, human resources, among others; the isolation that affects access to markets, increasing logistical costs and access to services as well as the maritime and insular situation that affects environmental quality and biodiversity, climate change that causes exposure to various risks.

5. CAPE VERDE AS A TOURIST DESTINATION
The Cape Verde tourist destination - which is at the "stage of development" due to natural attractions such as a tropical climate, sun and sea - runs the risk of "stagnation", if public authorities do not follow the evolution of tourist activities with the most adequate public policies in terms of planning and management of the destination, investments in key factors such as infrastructure, health, safety and guarantee of environmental/social sustainability. The diversification of tourism impacts, which have been limited only to fiscal multipliers (taxes for the State) and the generation of semi-skilled jobs, is a condition to enhance the participation of the national private sector in the tourism value chain and more economic and social benefits for communities on all islands.

Cape Verde, as with the Small Island States - finds in tourism one of the main alternatives to boost its economic and social development due to a set of natural attractions, such as the climate, extensive beaches, exotic landscapes, among others. According to Wilkinson (1989), in the 1980s, he already highlighted that tourism was the inevitable path for islands looking for alternative forms of economic development and export to obtain foreign exchange. Tourism is undoubtedly one of the most important sectors of economic activity, contributing to the generation of wealth and improving the standard of living and well-being of populations through the promotion of investments, stimulus to the development of infrastructure, creation of jobs and revenue generation. That is why these small countries also recognize the importance and advantages of tourism and are investing heavily in the development of this segment of activities in order to obtain economic advantages. At the same time, great importance is being given to the evaluation of the effects of tourism in order to minimize negative impacts and enhance positive ones through efficient planning (Goeldner et al., 2002). Tourism and air transport play an important role in economic and social development within the framework of an increasingly intense competition between countries, regions and cities (Goffi and Cucculelli, 2019). Since tourism presents itself as an important instrument for economic development for both developing and developing countries (Cárdenas et al., 2019), the assessment of competitiveness is very useful for planning and prioritizing policies. According to Vicente et al., (2021), it is important to understand the relationship between air transport activity and tourism for the economic and social development of the regions.

6. PARTIAL LEAST SQUARES-REGRESSION (PLS-R)

The PLS (Partial Least Squares) is a technique to estimate the coefficients of the system of structural equations, through the method of least squares. At PLS, the focus will be on how PLS-R, or PLS regression, emerged to solve the problem of multicollinearity in a regression model. When the coefficients of a regression model are to be evaluated and there is a relatively large number of explanatory variables X, with an extreme dependency relationship between them, there is multicollinearity (Hair et al., 2016). The multicollinearity problem means that regression coefficients can be insignificant for the explained variable and this can cause difficulties in interpreting the regression equation due to the signs of the erratic coefficients. When this problem appears, the most direct solution is to reduce the dimensionality of X, the set of explanatory variables. The immediate question then is how to achieve this reduction. The answer usually involves finding a set of new variables that are created as a linear combination of the originals, in such a way that the problem of multicollinearity is eliminated (Vicente et al., 2021). There are several software packages that contain the PLS methodology to avoid doing this excessively long job, one of which is the PLS regression method (Ning, 2014). Partial least squares (PLS) are a method for building predictive models when the factors are many and highly collinear. Note that the emphasis is on predicting responses and not necessarily trying to understand the underlying relationship between variables. Briefly, the PLS regression model presents itself as a multivariate data analysis technique used to relate one or more response variables Y with several independent variables X, based on the use of factors. In addition to allowing the identification of factors (linear combinations of the X variables) that better model the Y dependent variables, it effectively admits working with data sets where there are highly correlated variables and which present considerable random noise (Vicente, 2015). Swedish professor Herman Wold was the founder of basic structural equations and Partial Least Squares (PLS). Subsequently, Partial Least Squares-Regression (PLS-R) emerged as a multivariate technique due to the reduction of dimensions, in order to eliminate collinearities in the set of explanatory variables (X).

With the decrease of that set, the resulting subset of the descriptive variables is optimized in order to predict the dependent variable (Y) (Vicente and Reis, 2021). With the development

of PLS, many other methods were developed in parallel, such as PLS-PM (trajectory modeling), as an alternative PLS (Partial Least Squares) is used to flexibly estimate the systems coefficients of structural equations (Wang and Tian, 2013). The regression by the method of partial least squares consists of a group of multivariate statistical techniques that allow the simultaneous examination of a set of theoretical relationships between one or more independent variables, with continuous or discrete variables, and one or more dependent variables, also continuous or discrete. For a more detailed analysis of this algorithm, consult Wold et al. (2001), Tenenhaus (1998), and Vicente (2015). «Cross-validation is a practical and reliable solution to verify this power predictive, being the standard test in PLS regression analysis» (Wold et al., 2001, p.116), and being available in most software dealing with PLSR, such as: R©, SAS©, Matlab©, SIMCA-P© and XLSTAT©.

7. METHODOLOGY

The present investigation had the specific objective of verifying the extent to which tourism and air transport activities contribute to Cape Verde's socioeconomic development, in the period from 2000 to 2014. Data collection was carried out by consulting numerous statistical bulletins provided by the National Statistics Institute of Cape Verde, reports from Airports and Air Safety and Bank of de Cape Verde. The database compilation process contains the presentation of the methodology used to carry out the econometric study, namely, the analysis of the panel data (using Microsoft Office Excel). The discretionary study was done through panel data analysis, using regression modeling based on the method of partial least squares (PLS-R) obtained through the econometric software, XLSTAT©. Thus, the various variables and the definition of the equation for modeling through multiple linear regression were created, using the method of partial least squares and the XLSTAT©. The proposed model that was used is the following equation:

Econometric Model of the Relationship Between Socio-Economic Development and Air Transport and Tourism Activities

$$PVTair\ i\ t = \beta_0 + \beta_1 Gross\ Internal\ Product\ i\ t + \beta_2 PAX\ it + \beta_3 Tourism\ i\ t + \beta_4 tourist\ destination\ i\ t + \beta_5 existence\ of\ international\ airport\ i\ t$$

$$+\beta_6 existence\ of\ conection\ between\ islands\ i\ t \cdots + \beta_k X_{ki} + e\ it$$

$$t = period\ of\ time\ in\ analysis: 2000, \ldots, 2014.$$

$$i = 15\ observations\ were\ made\ for\ each\ ID's: 1, \ldots, 9.$$

The multiple linear regression model allows to obtain a set of regressions that will be used in the prediction of a Y data set for a confidence interval of 1-α%, normally 95%, with which future scenarios can be constructed. Based on the Equation, it is intended to study the results obtained using regression modeling by the method of partial least squares (PLS-R) using XLSTAT©. Therefore, in the present investigation, we used a conceptual tool composed of a dependent variable (quantitative) - Air Navigation Income (PVTair) and three independent variables (quantitative) - Gross Domestic Product (GDP or "PIB"), Tourism (TUR) and Passenger Flow (PAX) and three independent variables (qualitative) - Tourist Destination (dest_I), Existence of Air Connection (lig_A) and Existence of International Airport (lig_AI).
The variables contain 135 observations regarding the nine selected IDs as shown in Table 5.:
- Minimum - Represents the lowest value observed in each of the variables

- Maximum - Represents the highest value observed in each of the variables
- Average - Represents the observation that contains the highest concentration of data collected in each of the variables
- Standard Deviation - Represents the variation in the data collected compared to the previously stated average.

We selected the variables and statistical data that have a greater degree of connection with the theme of this investigation, as described in the following table (table 4).

Table 4 - Presentation and Definition of Data Used

Variable	Definition of the Variable	Variable Source
GDP or "PIB" of Cape Verde	Current GDP (Market Prices) in Dollars $	*World Bank*
Tourism	Total tourist overnight stays	National Statistics Institute of Cape Verde
Passenger Flow at Cape Verde Airports	Passenger Flow at Cape Verde Airports.	Airport and Air Safety Management and Accounts Report
Revenue from Air Navigation	Total income from Cape Verdean air navigation.	Airport and Air Safety Management and Accounts Report
Tourist destination	Dummy variable: if the island is considered tourist (1), otherwise (0).	Authors' elaboration based on data collected by the National Statistics Institute of Cape Verde
Existence of Air Connection	Dummy variable: if there is an air connection on this island (1), otherwise (0).	Authors' elaboration based on ASA's accounts and management reports.
Existence of International Airport	Dummy variable: if there is an international airport (1), otherwise (0).	Authors' elaboration based on ASA's accounts and management reports.

Source: Author

After defining the variables, we will start the process of identification (ID) of the Cape Verde islands taking into account the airport infrastructure existing in them. The dummy variables were elaborated in-house from data/information available in statistical bulletins of Tourism Institute, ASA's and National Statistics Institute of Cape Verde.

Table 5 - Cape Verde Islands and Airport Infrastructure Identification

	Cape Verde	Airport Infrastructures
ID 1	Island of Sal	International Amílcar Cabral Airport
ID 2	Island of Boa Vista	International Aristides Pereira Airport
ID 3	Island of Santiago	International Nelson Mandela Airport
ID 4	Island of São Vicente	International Cesária Évora Airport
ID 5	Island of Maio	Aeródrome of Maio
ID 6	Island of Fogo	Aeródrome of São Felipe
ID 7	Island of São Nicolau	Aeródrome of Preguiça
ID 8	Island of Brava	X
ID 9	Island of Santo Antão	X

Source: Author (2018) according AAC (2014)

8. DISCUSSION OF RESULTS

The statistical data for each of the variables defined for the present study are found in the table below:

Table 6 - Descriptive Statistics of the Variables of the Estimated Model

Quantitative Variables	Obs.	Minimum	Maximum	Average	Standard deviation
PVT air	135	19995,887	51207,975	35351,019	10865,947
PIB ("GDP")	135	582390,395	1410444,570	1024594,702	303690,095
TUR	135	84,000	1579412,000	200314,515	406657,427
PAX	135	0,000	1007561,000	168079,993	238835,939
Qualitative Variables					
dest_I	135	0	1		
lig_A	135	0	1		
lig_AI	135	0	1		

Source: Author (Output Data Analysis and Statistical Software XLSTAT©).

In order to highlight the quality of the model obtained, the cross-validation system is used, elucidating the significance of the variables. In the present study model, an aggregated two-component model was determined. The results achieved are summarized in the following figure and table (Figure 3) and in (Table 7).

Figure 3 - Model quality by number of components
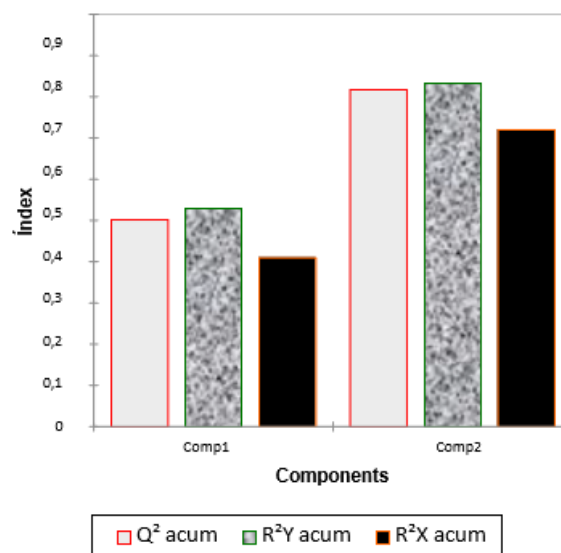
Source: Author (Output Data Analysis and Statistical Software XLSTAT©)

The table below illustrates in a concise numerical way the value corresponding to each statistical component.

Table 7 Summary of model components

Estatistics	Comp1	Comp2
Q² acum	0,502	0,817
R²X acum	0,409	0,719
R²Y acum	0,530	0,832
Limit	0,05	0,05

Source: Author (Data Analysis and Statistical Software XLSTAT©)

The efficiency and reliability of the PLS model are evaluated by the percentage of variance explained (R2Y) and also by the ability to predict (Q2). The PLS model is, in addition. Furthermore, evaluated in relation to the goodness of fit (R2). According to the rule of cross-validation 1 (R1), which sets a significance threshold of 0.05 for the models PLS with less than 150 observations, we observe from the results obtained, two statistically significant components (Vicente et al., 2021; Wold et al., 2001). According Vicente (2015) and (Wold et al., 2001), the Q2 values obtained through the "leave one out" cross-validation technique (leave-one-out) allowed the predictive estimation of the model. The model with a number of factors that result in the highest Q2 was considered the best among the built models. To simplify this model, the VIP method (importance of the variable in the projection) was used to identify the least relevant (Chong and Jun, 2005). All variables that have a score (score) VIP > 0.8 are considered significant for the model (Wold, 1994). In short, the PLSR method consists of forming components that capture the greatest amount of information arranged in the independent variables to predict the variable dependent. Analyzing table 7, it appears that all indicators have reliability values, that is, Q² = 0.817, which is higher than the minimum acceptable limit (0.05). The Data Analysis and Statistical Software (XLSTAT©) adopts by default the analysis for the first two statistically significant components (Vicente, 2015), in this case, guaranteeing an overall quality of the model of 81.7%. The components R²X and R²Y represent a coefficient of variation of 71.9% and 83.2%, respectively. As the objective of this article is to evaluate the relationship between the activity of air transport and the socioeconomic development of Cape Verde, it can be concluded that there are reliable indicators, with Q²> 0.05. Bearing in mind that the efficiency and reliability of the model are assessed by the percentage of the explained variance (R²Y) and also by the predictive capacity (Q²) it can be said that the component is statistically considerable and an impact of 81 is estimated, 7% in income from Cape Verdean air navigation. The Linear Regression model produced in the essay can be written as:

PVT air = 7829,63504789273+2,90686005545523E-

02*GDP+1,64661939089948E-03*TUR-3,72912324063609E-03*PAX

+989,542552033005*dest_I-0-989,542552033006*dest_I-1+2597,86587181703

*lig_A-0-2597,86587181703*lig_A-1-2453,42332479368*lig_AI-0

Source: Author (Output Data Analysis and Statistical Software XLSTAT©).

We can benefit from the PLS model to express a linear function that highlights the relationship between air transport activity and the economic and social development of a region. It is noted that it is a model with a linear function whose dependent variable PVT air (Air Navigation Income) which is defined by the line from the sum of the product of the coefficients obtained by the associated explanatory variable.

Through the description of the model, it's possible to interpret and evaluate in a simple and concise way the relationship / influence of each explanatory variable with the dependent variable (PVT air) due to the reading of the achieved coefficient. Figure 4, emphasizes the relationship between standardized coefficients and the dependent variable addressed. The Jack-Knifing method was used, inspiring a 95% confidence interval.

Figure 4 - Standardized Coefficients as a Function of PVT air
PVT air / Standardized Coefficients (Int. de conf. 95%)
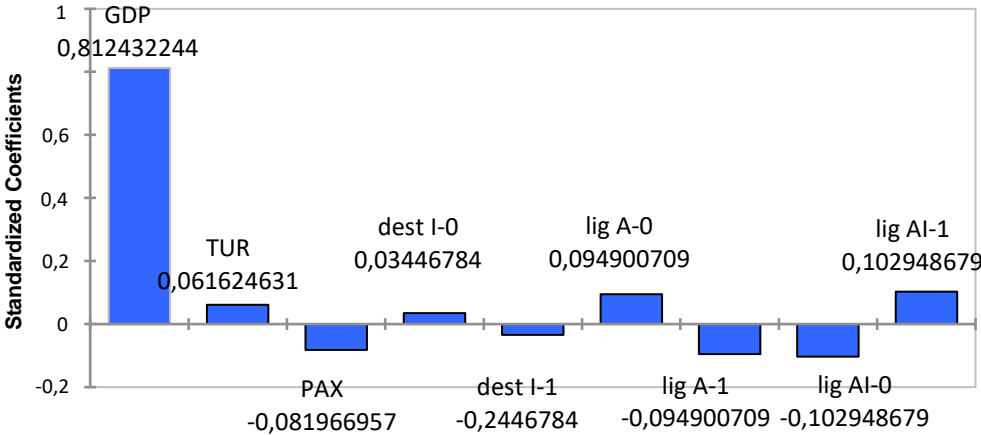
Source: Author (Output Data Analysis and Statistical Software XLSTAT©)

According to the graphic equalization, the consistency of the first variable is notorious. There is a clear positive relationship between the profit from the air transport activity and the respective explanatory variables, namely, the Gross Domestic Product (GDP), and Tourism (TUR). Due to PLS's ability to eliminate multicollinearity problems from the model, it is possible to verify that it is the variable (GDP) that has the greatest positive correlation with the benefit of air transport activity, presenting tourism with a positive correlation, but with less related weight of that gross domestic product. The result obtained shows that the benefit of the air transport activity is strongly determined by socio-economic stability (GDP) and tourism (factors that attract destinations). As a result, passenger flows (PAX), the tourist destination (dest_I), the lack of air links between the islands (lig_A) and the lack of international airports in most of the islands (lig_AI) negatively influence the benefit of air navigation. In Cape Verde the air transport activity is a little explored and differentiated sector in its varied market niches, however, there is an inefficiency in the airport infrastructure and consequently its regional and international connections. Graphs 1 and 2 show the quantitative contribution of each variable to the benefit of air transport activity, keeping the 95% confidence interval visible for the two components of the model. It is noted that one of the possible criteria for choosing and characterizing the best component obtained in the PLS-R model is the evaluation of the correlation coefficient (R^2) between X and Y, for each wavelength of the data set, choosing the VIP values of component 2 because it has a higher R^2 value. Therefore, variables with amplitude values greater than 0.8 are of particular importance.

Graph 1 - VIP values for the first component VIPs (1 Comp / Int. de conf. 95%)
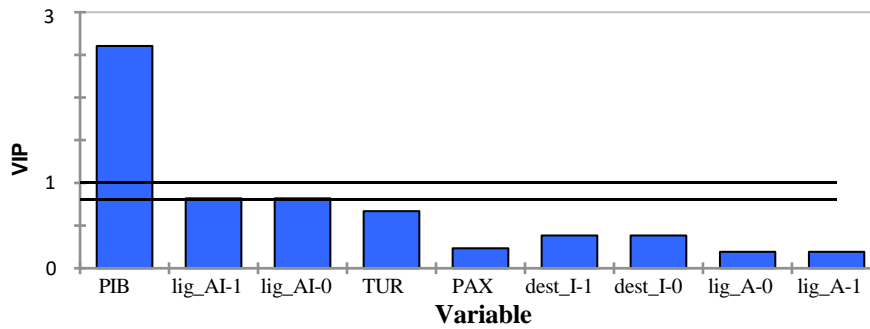
Source: Author (Output XLSTAT©)

Graph 2 - VIP values for the second component

VIPs (2 Comp / Int. de conf. 95%)
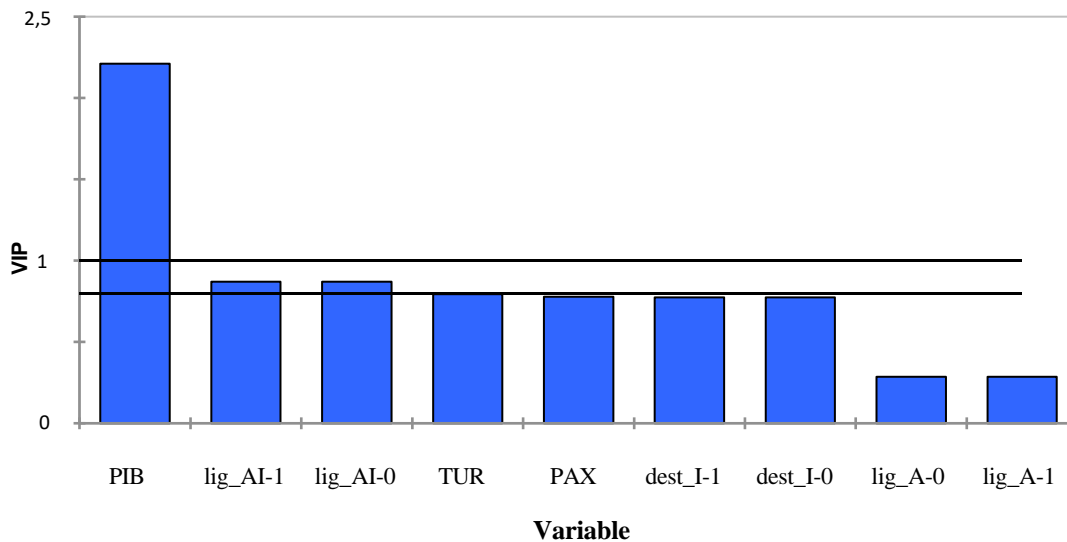
Source: Author (Output XLSTAT©)

Gross domestic product (GDP) makes a contribution of 2.211 to the benefit of air navigation, a value very close to the upper limit, with greater quantitative influence in relation to the other explanatory variables. In sequence we have the explanatory variables, the international air connection (lig_AI), tourism (TUR) with an impact of 0.87, 0.80 respectively.

All other contributors in PVT air, have VIP values below 0.8 and are considered as variables of low influence in the dependent variable. The results show that the benefit of Cape Verde's air transport activity is more affected by socioeconomic factors, namely, the lack of air links between the islands, the lack of international airports and lastly the attraction of tourist destinations in the archipelago.

In the following Figure 5, we can observe the behavior of the explanatory variables in the benefit of the air transport activity, it shows the relationship between the observed RT and the RT predicted by the model.

Figure 5 - Behavior of Variables in PVT air, 2000 to 2014
Source: Author (Output XLSTAT©)
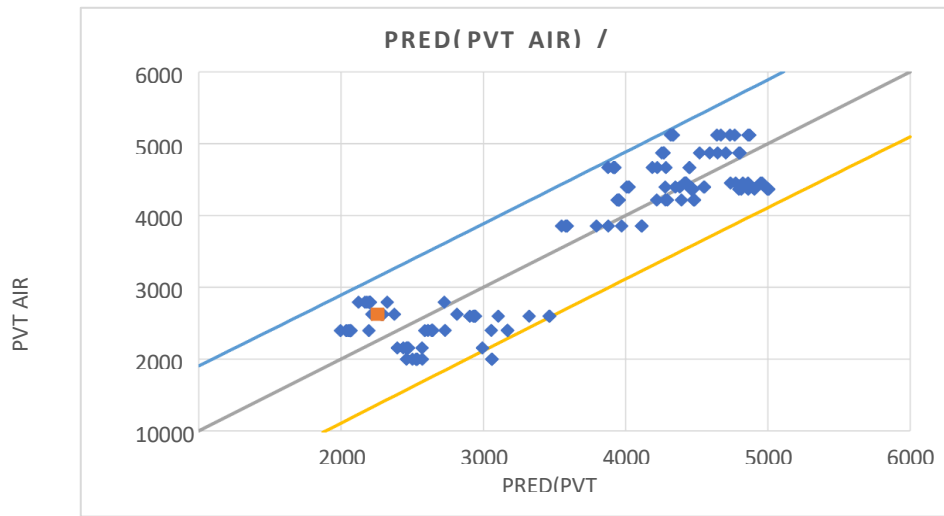
Analyzing Figure 5, an approximately linear behavior is verified, confirming the robustness of the model obtained, presenting a concentration of values along a line and also verifying that a satisfactory global model was obtained to estimate the relationship between the activity of the air transport and Cape Verde's socio-economic development. The observed values (vertical axis) versus the values predicted in the contribution of Cape Verde's PVT air indicate a good predictive behavior, giving us a perception of the model as a forecast / evolution option. The PLS regression analysis gives rise to assessments for other extensions, namely the PLS weights, which helps us to understand the relationship between the independent variables, namely (PIB, TUR, PAX, dest_I, lig_A, lig_AI) and the dependent variable (PVT air). This relationship is shown for the components w * c1 vs w * c2 (for X and Y respectively) as shown in Figure 6.

*Figure 6 - Weights w * c1 vs w * c2 in PLS regression*

Variables on the axes w*/c1 e w*/c2
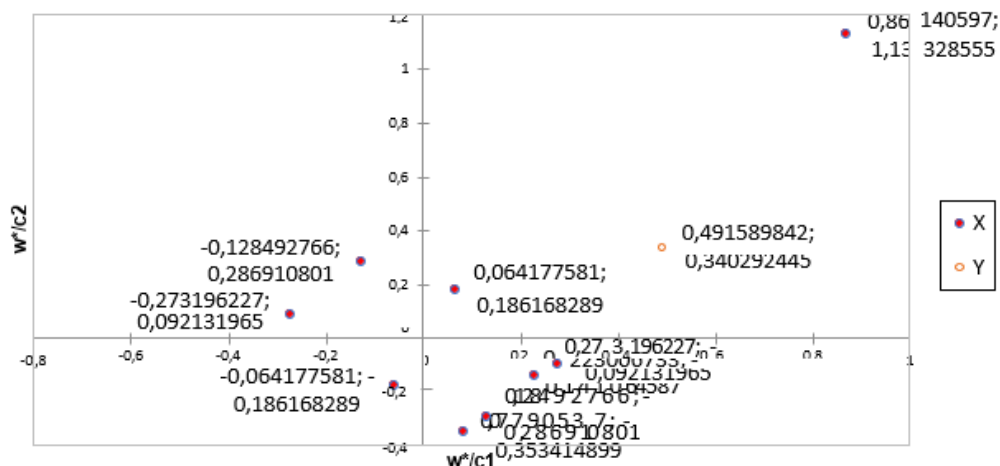
Source: Author (Output XLSTAT©) – Contact Author for all the Values

152

From the observation of figure 6, there is a considerable distance from the origin, which implies a high correlation of the X variables with the benefit of the air transport activity. The correlation is relatively high between PVT air and gross domestic product (GDP). This correlation is reflected in the country's economic stability. It is expected that there is a positive correlation between air revenue (PVT air), tourism (TUR) and passenger flows (Pax), thus the lack of tourist destinations (dest_I), the lack of air connection between the islands and the inexistence international airport (lig_AI) transposes an inverse relationship in the benefit of air transport in Cape Verde.

9. FINAL CONSIDERATIONS AND CONCLUSION

In order to properly understand certain variables and their importance in the socio- economic development of Cape Verde, the equation that lists all these explanatory variables (independent) was analyzed in detail in order to understand their real contribution to the benefit of air navigation. The aid of XLSTAT© software through the Jack-Kniffing method is understandable in understanding the behavior of statistical data and its effectiveness with regard to the reason for the response to the factors that negatively influence the benefit of air navigation. This investigation aimed to partially answer some of the questions raised in relation to the contribution made by air transport activity in Cape Verde's socio-economic development. To this end, the main purpose for carrying out this research work and methodological application of PLS (Partial Least Squares) with the XLSTAT© software by the Jack-Kniffing method, consisted of analyzing the behavior of the profit from Cape Verdean air navigation, taking into account the development that has occurred in the sectors of air transport and tourism. This descriptive study, through the analysis of panel data, between 2000 and 2014, used modeling with PLS-R regression (partial least squares regression) obtained through the XLSTAT©. Through the diagnosis of the responses generated, with the aid of the econometric software XLSTAT©, two members stand out with special statistical significance, that is, they successfully passed the cross-validation test R1 with the restriction of $Q^2 > 0.05$, thus allowing a total quality 81.7% of the model in practice ($Q^2 = 0.817$). It is notorious that the model has a high capacity in predicting and explaining the variation in the contribution provided by gross domestic product (GDP) to Cape Verde's air transport activity (Wensveen, 2015; Graham and Dobruszkes, 2019).

The positive relationship between tourism (TUR) and the aerial advantage of Cape Verde (PVT air) is also conclusive, due to the model's ability to suppress multicollinearity problems, the explanatory variables are arranged according to their magnitude, that is, according to the correlation with PVT air. Likewise, the negative correlation between the absence of an air connection between the islands (lig_I), the absence of international airports (lig_AI), and the benefit from air navigation that translates into a negative impact on regional socio-economic development is also notorious. In terms of optimization and arbitration, it is deductible that a high coefficient of tourist income is necessary to influence the economic growth of the region, with special attention to tourist destinations (dest_I) and their influence on balance and socio-economic impact. By the model's outcome, the existence of a correlative trend between explanatory variables is identified, such as: gross domestic product, tourism, and passengers and their characteristics, which in turn elucidate the readers of the determinants to amplify and the components to be optimized to obtain the greatest possible profit. It should also be noted that all variables with values of approximately 0.8 or higher, contribute significantly to the economic and social development of the Cape Verdean archipelago. It is also exposed, in a perceptible way, the negative relationship existing in the explanatory variables with values below 0.8 in order to be studied and articulated for a propitious enhancement.

In short, the PLS-R model provides the determination of statistical and explanatory variables, in this case, the relationship between air transport activity and the socioeconomic development of Cape Verde. Through its methodological use, it is possible to help those who want to contribute to the interiorization of sustainable growth, as it exposes the causes that disturb socio-economic growth, illustrates the evolutionary path, optimizes and pre-establishes the estimate of income or income. behavior of air transport activity in Cape Verde's social and economic development.

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FACTORS BEHAVIORAL ANALYSIS RELATED TO THE MANAGEMENT OF TOTAL REVENUEMANAGEMENT IN A LEGACY AIRLINE USING PLS-R

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ABSTRACT

The operational strategy now operates in a highly regulated industry with a competitive environment as a result of the liberalization of aviation. The current article is to identify the variables that affect overall income and advance the behavior variable's research. Thegoal was to investigate the sustainable factors and overall revenue behavior of TAP Air Portugal, a legacy carrier operating on three different kinds of routes, using PLS-R. We conclude that by observing the behavior of total revenue throughout the time that rates for a particular trip are available, it is possible to keep an eye on how the Revenue Management system is acting.
Keywords: *Airline; Revenue Management; Decision-Making Process; Management; Partial Least Squares; TAP Air Portugal*

1. INTRODUCTION

The air transport industry started in the second decade of the last century, presenting apolitical function as a vector of relationship between States and internally as a mobility vector. And the economic potential remains the development potential of various activities, whether directly in transport as a service, or indirectly in the construction of infra-structures or technological development, or even inducing an increase in economicactivity due to the impact on the transport vector of people and goods. Babashamsi et al. (2022) assert that airports are essential for the movement of people and products as well as for fostering the expansion of the global economy. The expansionof runways, taxiways, and aprons, as well as routine maintenance and rehabilitation of the current pavements, all require significant annual financial outlays from airports. Additionally, understanding costs and revenue management is essential to making betterdecisions that will ultimately benefit the business. It is this dynamic and political-economic importance that serves as the engine for the development of aviation regulatory structures, consolidated in a post-war environment, in the Chicago Convention, which is under the aegis of a greater project of globalizationand the unification of peoples, as they are. the United Nations. As for the regulation of fares that previously belonged to the States, since 1978, it has been transferred to the private sector, that is, to aviation companies. In this way, regulation ceases to contribute to a cost structure aiming at the economic impact now aiming, above all, at maximizing revenue. At the same time, technological and scientific development provides the appearance ofa multidisciplinary technique that seeks exactly the maximization of revenue, Revenue Management (RM). Thus, it is expected that the development of this technique is dependent on the adequacyof the explanatory variables, (and these on the type of services provided by the carriers) evolving towards the integration of RM models with cost functions aiming at maximizingrevenue. According to Dogani (2002), quality discrimination has not shown to be a successful strategy for preventing the movement of high-fare customers to low-fair availability. According to the Revenue Management Society (2013), revenue management is amanagement technique that aims to maximize the revenue of a perishable asset.

Some authors have referred to this as the "industrialization" of the demand-management processas a whole (Tallury & Ryzin, 2005). Both legacy carriers and low-cost carriers employ intertemporal segmentation and implicit segmentation as strategies to capitalize oncustomer variability (Alderighi, 2010). One defining feature of low-cost carriers has beenidentified as the equilibrium between dynamic pricing, load factors, and low operating costs (Redondi et al., 2012). Established hubs face competition from low-cost carriers on the feeder routes (Redondiet al., 2012). Legacy carriers have responded by segmenting their products into more intricate categories (Hazldine, 2011). In 2009, IATA proposed a gravity model that takesinto account the distance between origin and destination as a crucial determinant to explain premium demand (Vicente et al., 2021). Revenue management, which takes its cues from Tallury and Ryzin's 2005 book "The Theory and Practice of Revenue Management," aims to assist the decision-maker on three levels:
- Price decisions, defining the product reference price
- Structural decisions, defining the product
- Determining quantity and assigning products to anticipated demand.

We recognize that the majority of the work involved in developing revenue management is focused on modeling the decisions related to quantity and price. First- level algorithms for demand and allocation problems under analyst supervision are provided by this method. These algorithms get more intricate and resource-intensive computationally. Our strategy aims to investigate less complex analytical techniques to assist strategic level judgments in revenue management.

2. LITERATURE REVIEW

The growth of data, information, and systems has led to a significant increase in interestin the field of revenue management in recent years. The airline business remains the primary focus of study, despite the fact that revenue management has seen many new applications over the years (Park & Piersma, 2002). Numerous solution approaches have been offered since Littlewood (2005) originally suggested one for the airline revenue management challenge. Businesses that provide perishable goods or services frequently struggle to sell a product with a set capacity over a limited time. This is according to Park & Piersma (2002). Through the use of product differentiation, it is frequently possible to target distinct client categories in markets where consumers are prepared to pay varying pricesfor the product (Vicente, 2022). Thus, this tactic offers the chance to give the product to various consumer segments atvarious price points, such as charging various rates at various times or charging a greaterprice for a higher degree of service. Revenue management is the field that deals with making decisions such as pricing to charge and how much items to reserve for each consumer segment in order to accomplish this strategy (Opoku et al., 2022). According to Dogani (2002), revenue management is the art of selling each product tothe right customer at the right time for the right price, with the goal of maximizing profitfrom a limited capacity of a product over a finite horizon. This definition includes practices like price discrimination and turning away customers in favor of other, more lucrative ones. Since the airline sector deregulated tickets in the 1970s, revenue management has its roots there (Vicente & Reis, 2021). The issue of airline revenue management has drawn a lot of attention over the years andis still relevant today. Among other industries, revenue management is also used in the hotel, car-rental, railroad, and cruise-line sectors. However, there are other businesses besides tourism where revenue management might find use (Park & Piersma, 2002). The implementation and evolution of revenue management is demonstrated in the study by Friesen & Mingardo (2020) in the parking management industry in Europe.

Although they are widely used in many industries, such as hotels and airlines, revenue management (RM) and dynamic pricing (DP) are still not well known in the parking industry. Private parking operators and local governments seldom ever use DP in Europe,other from airport parking and a few pilot projects. Numerous studies on revenue management and its significance for decision-making areincluded in the literature review (Vicente et al., 2021). In order to comprehend that the majority of the work put into developing revenue management focuses on modeling the pricing and quantity decisions, we may locate studies in this sector that use mathematical and econometric modeling (Cleophas, Frank & Kliewer, 2009). Cleophas, Frank, and Kliewer (2009) state that this method offers first-level algorithms for handling demand and allocation issues under analyst supervision. These algorithms get more intricate and resource-intensive computationally. In order to support strategic level decisions in revenue management, the methodology aims to investigate less complex analytical techniques. Cavaco (2016) states that the goal of airline revenue management is to maximize revenue, which is the total of the fares collected from customer bookings. The advent oflow-cost carriers and the internet have presented new issues for airline revenue management forecasting, since customers are now able to make more educated decisions.Furthermore, developments in dynamic pricing allow for a more advanced approach to pricing but also necessitate gathering more data on consumer responses. The best price to sell a seat at any given moment is found using revenue management tools. Making this decision requires knowledge based on several criteria, not all of whichhave historically been accessible. Due to increased competition and various economic challenges, revenue management is crucial in the current environment. All airlines, full service and low-cost, must optimizerevenue in order to thrive and expand (Cavaco, 2016).

Due to increased competition and various economic challenges, revenue management is crucial in the current environment. All airlines, full service and low-cost, must optimizerevenue in order to thrive and expand (Opoku et al., 2022; Vicente et al., 2021). Revenue management offers a variety of tactics to help airlines enhance and optimize revenue as they modify their business procedures and models to address the present issues affecting the sector (Muthusamy & Kalpana, 2018). Because of the difficult nature of the aviation industry, airlines must constantly make investments in new or updated technologies in order to increase income. A specific area of emphasis that is becoming more and more crucial to an airline's performance is the Revenue Management (RM) system. The best price to sell a seat at any given moment is found using revenue management tools. Making this decision requires knowledge based on several criteria, not all of whichhave historically been accessible. In order to help an airline carrier optimize its revenues and affect profitability, the revenue management paradigm change necessitates a comprehensive, 360-degree strategy to fore-casting, assessing, and optimizing all revenuesources (Muthusamy & Kalpana, 2018). To better deepen the theoretical and application knowledge about revenue management strategy, we can also consult the following studies: Babashamsi et al., 2022; Cleophas, Frank & Kliewer, 2009; Friesen & Reinecke, 2007; Kimes, 2000, 1989; Muthusamy & Kalpana, 2018; Talluri & Van Ryzin,2005, 2004); Vicente, 2015; Vicente & Reis, 2021;Vicente et al., 2021.

3. METHODOLOGY
A – Data
Countless researchers and experts recognize the need and importance of applying methodological approaches to the analysis of the impact of total revenue management onan airline to improve economic and financial results.

However, many of the conclusionspresented in the existing literature are based mainly on theoretical research, with few empirical and exploratory studies capable of extrapolating the results obtained. The primary goal of this study is to close some of this gap with relation to the Portuguese context, enhancing national scientific advancement and improving decision-making. The goal of this paper is to assess the overall revenue management practices of a legacy airline that will remain anonymous for ethical and privacy reasons. This project aims to identify and analyze the determinants responsible for the behavior of Total Revenues, in the model presented.

Once the problem is identified, it is important to state the starting questions that willserve as the basis for its analysis. So we propose:
- What factors influence the way that a legacy airline's total revenues behave?
- Understand the behavior of the main determinants that influence the behavior of Total Revenues in a legacy airline;
- Explore the relationships between explanatory variables and Total Revenues, in the proposed model.
- This work aims to:
- Find out which determinants explain the behavior of total revenues in a legacy air- line;
- Using PLSR (Partial Least Squares Regression), analyze the behavior of total revenues in a legacy airline, through the analysis of the relationships between theexplanatory variables and the Total Revenues;
- Calculate how explanatory factors affect a legacy airline's total revenue management procedure.

In order to achieve these goals, we used the PLS (Partial Least Squares) approach, which was first used in an applied study on aviation and tourist management by Vicenteet al. (2021) and developed by Wold (1979) and Tenenhaus et al. (2005). A legacy type carrier provided the database, which had 348.975 observations and eightcarefully chosen variables, each of which was connected to the observed individual soldtariffs in three different routes. The observations were taken from June 24, 2020, to December 31, 2021. The initial stage involved narrowing down the sample's dimensions.To support strategic choices and product modeling, the study of aggregated demand rather than individual demand was conducted by analyzing the total revenue earned by each flight, as opposed to examining the behavior of each tariff sold. A legacy type carrier provided the database, which had 348.975 observations and eightcarefully chosen variables, each of which was connected to the observed individual soldtariffs in three different routes. The observations were taken from June 24, 2020, to December 31, 2021.

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Quantitative variables:
DV   Flight Date
ID   Flight Identification associated with one and one only combination of date of flight, origin and destination and the departure the flight
RT   Total revenueDt
       Total distance
PT   Total passengers per Flight
Ct   Amount of sells in a given day before the flight
Fr   Frequency given by the number of flights on the same route in a given dayPD
       Total amount of sold tariffs in D type Class, economy
PB   Total amount of sold tariffs in B type Class, economy PC
       Total amount of sold tariffs in C type Class, economy PP
       Total amount of sold tariffs in P type Class, executivePE
       Total amount of sold tariffs in E type Class, executive

Qualitative variables:
DS   Total sells in a flight in a determined weekdayCd
       Weekend or Week flight
TR   Route type concerning existent competition, Legacy type, Low-cost carrier or mixed
Hv   Schedule before or after 12:00 LCL time

B - PLS-R modelling

Wold (1979) created the PLS-R technique, which is employed in the Path Model (Tenenhaus et al., 2005). Hoskuldsson (1988) and Geladi & Kowalski (1986) investigatedand improved PLS-R. PLS-R, or partial least square regression, was chosen in order to achieve the goal of utilizing a less demanding analytical technique because of its lower demands on scale, sample dimension, and residual distribution (Vicente, 2015). Even when there is significant multicollinearity, PLS performs adequately when there are a lot of independent variables (Morellato, 2010). Using latent variables, this techniquecreates an X and Y matrix, where X is the matrix of independent factors and Y is a matrixof dependent variables (Tenenhaus et al., 2007).

PLS determines which variables to omitfrom the final model by using the correlation between the components to create scores ofthe components, which are linear combinations of the original X matrix variables. With this approach, a model's ability to predict and explain events is enhanced in the first place (Vicente, 2015). The variances among the various variables are correlated (Wooldridge, 2005; Vicente, 2015; Cavaco, 2016). Vicente et al. (2021) state that dimension reduction is a step in the Partial Least SquaresRegression model approach, which comes before the least squares model adjustment. Theoriginal variables are transformed via the dimension reduction strategy, typically by combining them in a linear fashion. In order to eliminate multicollinearity in the set of explanatory variables X, referred to as the independent variable, the model performs a multivariate analysis of the data by decreasing the dimension. As a result, the sub-set of the described variables is improved in a way that makes it possible to predict the dependent variable Y. Thus, it is possible to carry out a simultaneous analysis of multiple dependency and in- dependence relationships between latent variables, through observed variables. This model was developed by Herman Wold, in the 60s, having been initially developed for application in econometrics and later having been adapted in chemometrics(Tenenhaus, 1998).

The term "partial" refers to the process of iteratively estimating the parameters in blocks (by latent variable) at the expense of the entire model, simultaneously, and it is named Partial Least Squares (Partial Least Squares) because theparameters are estimated using a series of least squares regressions (Vicente & Reis, 2021). Preferably, the partial least squares regression model is considered as a techniqueand prediction, and not an interpretation, although some studies may interpret theextracted factors (Morellato, 2010).

Because this model has this predictive character, its application is interesting inmonitoring the behavior of total revenues in a legacy airline. The applicability of this typeof model is accepted by several sectors of activity, such as: chemistry, agrarian sciences,environment, genetics, energy, security, medicine, among others (Vicente et al., 2021). Its author, Herman Wold, addressed several studies and improved his approaches based on his conclusions and the conclusions of other colleagues in his field, the economy. He was therefore chosen to become a member of the Swedish Academy of Sciences, the American Statistical Association, and the Institute of Statistics and Mathematics. Additionally, he held honorary memberships in the American Academy of Arts and Sciences, the American Economic Association, and the Royal Statistical Association (Vicente & Reis, 2021).

A regression model's multicollinearity issue is resolved by the PLSR. There is multicollinearity because there are many explanatory variables (X) and a strong dependency relationship between them that requires evaluating the regression model's coefficients. Because of the unpredictable coefficients' signs, multicollinearity may make it more difficult to understand the regression equation. When the topic of how to minimize the dimensionality of X comes up, the problem of multicollinearity is typically resolved by identifying a collection of new variables that are produced as a linear combination of the originals (Morellato, 2010; Vicente et al., 2021). The major component method has become a standard methodology for dimensionalityreduction in recent times. PLS establishes itself as a potent analysis tool because of its minimal criteria with regard to its measurement scales, sample size, and residual distribution (Vicente, 2015). Furthermore, the data do not have to follow known or normal distributions (Falk & Miller, 1992). When the factors are too many and highly collinear, partial least squares are considered to be a method of building predictive models. Bearing in mind that the focus will not necessarily be on understanding the underlying relationship between variables, but on predicting responses. According to Vicente & Reis (2021), the PLS can be a useful tool when there is no practical need to limit the number of facts measured, as it is not suitable for screening fac-tors that have a negligible effect on the response. According to Vicente (2015), the PLS regression model allows not only the identification of factors (linear combinations of variables X) that better model the dependent variables Y, but also works with the efficiency of data sets where highly variable variables exist. correlated and with considerable random noise. PLS relates one or more response Y variables as a multivariate data analysis technique, with several independent X variables, based on the use of factors (Vicente et al., 2021). PLS is a method that uses latent variables to combine two sets of data, X and Y, whereX is a set of indicators and Y is a set of answers (Tenenhaus et al., 2007). Vicente et al. (2021) state that the PLS components denoted by t,..., t must be orthogonal and connected to X. PLS components with the names u,..., u are orthogonally unrestricted and are associated with Y. The centralized blocks of X and Y are X and Y. Geladi and Kowalski (1986) state that creating a model that represents a relationship between Y and X in a regression estimate is a more straightforward approach to the PLS methodology. (such as $Y = XB + E$). PLS generates component scores by combining the original X variables in a linear fashion. This allows the variables to be eliminated from the final model by using the correlation between the components to identify which ones to use.

First, we must extractthe factors to get T = XW + F (where E and F are terms of error) in order to derive Y = XB + E. The scoring matrix T is determined by maximizing the covariance between the factor scores and the replies, and it corresponds to an appropriate weight W matrix component. The variables X are summarized in the matrix of scores T. The loads for Y are then found by estimating the linear regression model of Y in U to get C = YC + G (where G is an error component). This regression model can be used as a predictive regression modelonce the loads are determined C. It is similar to Y = XB + E, with B = WC (Morellato, 2010). This model was made simpler by applying the VIP approach (variable importance in the projection), which found the most significant predictors (Wooldridge, 2005). Thus, all variables result from a VIP score> 0.8 (Wold, 1994). Briefly, through the PLSmethodology it is possible to determine the behavior of a given model, over a determinedperiod of time, from a set of independent and explanatory variables and where the variations that occur over the various variables are directly related to a variation (Wooldridge, 2005; Vicente, 2015). In this way, it can be said that this methodology, through a set of pre-selected and indicated variables, is the target of repeated observation,during a determined period of time, allows a statistical analysis of data (Wooldridge, 2005; Vicente, 2015; Vicente et al., 2021). According Vicente & Reis (2021), the PLS regression model can have a wide applicability to various sectors of activity. From the area of chemistry, economics and even tour-ism or even wine production. According to authors Kelly & Pruitt (2015), Fuentes et al. (2012), McWilliams & Montana (2010) and Jia et al. (2009) may be applicable in time series. In turn, according to authors Kelly & Pruitt (2015) andKubberØd et al. (2002), can also be applied in cross-section. In addition, this methodology is, according to the authors Malec (2014), Wang et al. (2012), Krishnamurthy et al. (2007) and Yin et al. (2006), applicable to panel data. The PLS regression method has several advantages, the most notable of which are the following (Morellato, 2010): ▪ Modeling regressions with multiple variables; ▪ Accept; ▪High predictive power due to the factors produced, in response to high covariance with the variables. When the sample size is not high, where the observations made in the study are small,the PLS regression technique proves to be advantageous for providing a solution createdby the multicollinearity problem in regression models (Wold, 1979; Barclay et al., 1995).Because it is more ideal for predictive purposes, it is also suitable in very complicated circumstances when theoretical understanding is inadequate (Chin et al., 2003).

4. RESULTS

A – Modelling test
The second component model, which is the X matrix variations explained in 35,4% andthe Y variation by 90,4%, demonstrated a strong prediction capability of the dependent variable matrix Y. The model was verified using the cross-validation method (R1) whiletaking into consideration the restriction $Q^2 > 0.05$, resulting in a global model quality of 67,4%. (see Table 1).

Table following on the next page

Table 1: MODEL TEST RESUME

Model	R²X	R²Y		Q²	Test
Component	Cumulative	Cumulative	Limit …	Cumulative	
1	0,210	0,855	0,050 …	0,537	R1
2	**0,354**	**0,904**	**0,050**	**0,674**	**R1**

Source: Developed by author

B - Standardized Coefficients

With a 95% statistical relevance, the relationship between the dependent variable (RT)and the coefficients produced by the linear model is quantified by the study of the derivedstandardized coefficients. (see to Figure 1).

Figure 1. Standardized Coefficients
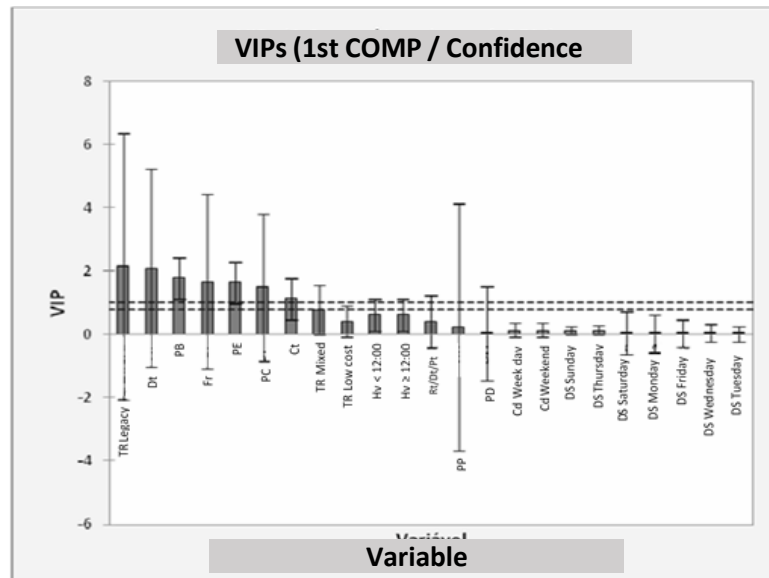
Source: Developed by author

C - VIP values1st and 2nd components

The variable influence values on the projection in relation to the first component are shown in the accompanying figure, where the confidence intervals are presented using the statistical technique known as Jack-Knifing. According to Welt (1994), factors with values greater than 0.08 are deemed more significant (see to Figure 2).

Figure 2. VIPs of 1st Component with Confidence Interval of 95%
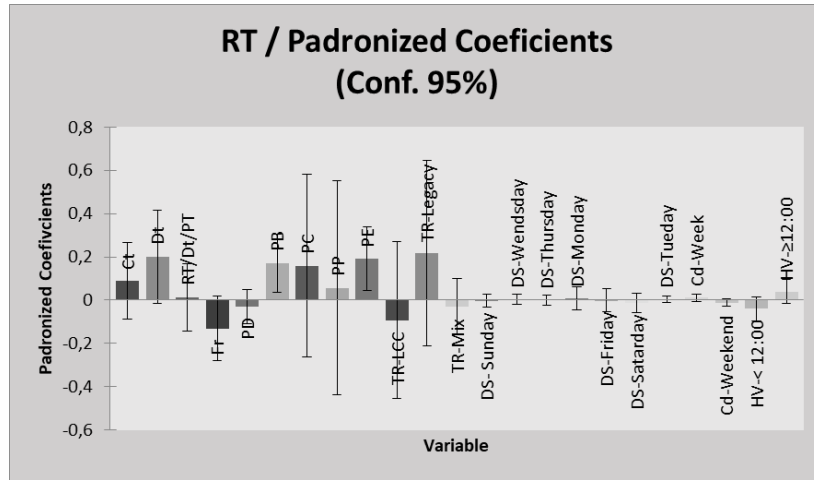
Source: Developed by author

D - Components Analysis Modeling
The variance link between two components can be observed in a plan thanks to the t components, also known as scores. We verify that models gravitate toward a linear distribution in our analysis (see to Figure 3).

Figure 3. The t components or scores of the model with linear distribution evidence
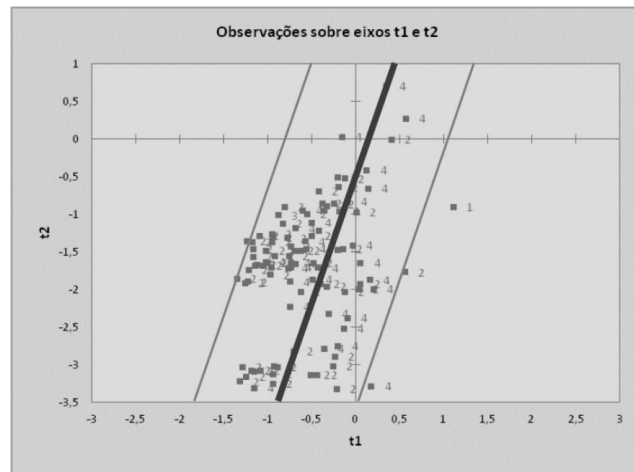
Source: Developed by author

E - Comparison of the Observed and Predicted Total Revenue
Even though the model tends to be linear, there are two observable clusters when comparing the relationship between the computed model forecast Total Revenue and theObserved Total Revenue using the cross-validation process. When computing flights witha total income below the 30.000 euros threshold, the model performs more accurately. This threshold, which is the higher values associated with long-haul flights in our database, is related to routes where low-cost carriers compete (see to Figure 4).

Figure 4. Predicted Total Revenue
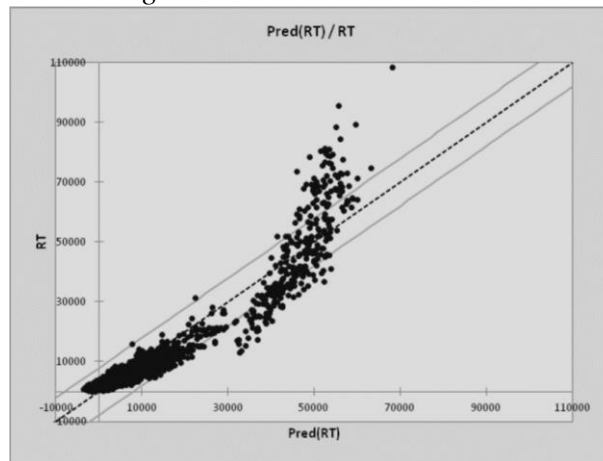
Source: Developed by author

5. DISCUSSION

The operation on a route with legacy type only competition (TR-Legacy) has the highest positive association with the total revenue (RT), according to our analysis of the standardized coefficients. Tariffs of types B, C, and E have the strongest positive association. Tariff types P and D exhibit a lower positive correlation and a negative correlation, respectively, with RT. The strongest negative association with RT was seen in the competition between low-cost carriers and frequencies. The regression model generated with the PLS-R provides support for this analysis. In addition to demonstrating that operating in a legacy type route has a major impact on overall revenue, the VIP analysis also reveals that products of the B, C, and E types account for the majority of total revenue. Each route's frequency count has an impact, justlike the route where LCCs compete. According to published research, there ought to be a positive relationship between the quantity of frequencies and demand (Doganis, 2002; Wensveen, 2007). The only variable exhibiting an unexpected response is the frequency variable. Accordingto our analysis, this pattern indicates that a saturation point has been reached in the examined routes—that is, the point at which adding more frequencies would provide customers more options and generate more demand has been passed, resulting in an observed dilution of demand for the given product. As anticipated, the model finds a strong positive link between total revenue and total flight distance as well as routes with no competition. The ability to remove collinearity makes it feasible to comprehend the goods that have astronger association with overall income; in the model under study, this includes the tariffsB, C, and E, which show stronger positive correlations. Utilized as a discount tool, the Dtariff exhibits a negative association with overall revenue. Additionally, it demonstrates anegative relationship between overall revenue and frequency per route and low-cost competition. The conceptual recommendations made by Doganis (2002), Talluri & Van Ryzin (2005, 2004), and Babashamisi et al. (2022) are consistent with the results. Because long-haul and medium-haul flight predictions behave differently, the variance ofthe dependent variables under study varies for these two types of routes. According to Doganis (2002), the long-haul flights in this aggregated model had an optimistic prediction behavior of the overall income. This demonstrates why various product modelsare required for various kinds of flights. We draw the conclusion that airlines are frequently cited as the model for best practices in pricing and revenue management, and that the sector has made significant investmentsin creating complex systems for managing inventory availability, forecasting demand, andtracking and reacting to rivals' prices in the market (Muthusamy & Kalpana, 2018).

Thishelps businesses much in their pursuit of a competitive edge and higher yields; but, no matter how advanced the technology, it is merely a tool for a more comprehensive plan. It is an extension of the abilities held by pricing teams, commercial executives, and flightanalysts who are required to provide revenue outcomes, claim Vicente et al. (2021). In order for the stakeholders to consider their better commercial strategies and how these translate into the strategies, architecture, and operations of the pricing and revenue management functions with the goal of creating and aggregating value for the business, it is imperative that investments in computer science systems and specifically in trainingin this field be continued. This is because the aviation industry is dynamic and complex.

6. CONCLUSION

Using the XLSTAT © program, the results were analyzed and two statistically significant components were found. These components passed the cross-validation test (R1) with the $Q^2 >$ 0.05 constraint, indicating that the model's global quality was 67.4% (Q2 = 0.674). We found that the model obtained has a high explanatory capacity for the variation in Total Revenue and has a robust ability to predict it, with room for optimization of the explanatory model, and it is likely that, since the mischaracterization of explanatory variables for reasons of confidentiality, it is not possible to use econometric explanatoryvariables extensively tested in the industry in gravitational models, thus reducing the explanatory power of X. On the other hand, the advantage of this methodology is clear, presenting itself as an important prediction technique, and not of interpretation. We can also conclude, in a first assessment, that there seems to be a clear positive relationship between the total revenue obtained per flight and the operation on routes without competition from other company models (TR Legacy), also verifying that the total distance (Dt) has a direct relationship to total revenue. Due to the ability of PLS to eliminate the multicollinearity problems of the model, it is possible to verify that it is theBasic, Classic and Executive tariffs that have the highest positive correlation with total revenue, with the Plus tariff also having a positive correlation, but with less associated weight than the previous ones. The Discount rate has a slight, negative correlation with total revenue. The number of frequencies per route and the presence of competition fromLCC operators on the route are the two factors that have the biggest negative impact on total revenue. In the context of decision-making support, we can infer a high dependence on premiumtraffic for generating revenue in the revenue management model used by the company studied and, showing some weakness in the ability to generate revenue in the LCC marketsegments. It is also possible to infer some saturation effect on the routes studied due to avolume of flight frequencies above the optimum. From the results obtained, it appears that there is a significant influence of the total distance and the type of Legacy route in the Total Revenue per flight and sales in Basic, Classic and Executive fares. In this way, it is verified which operation model for which the company is optimized in terms of total revenue and which market segments have thebest response. We also verified a significant impact of the number of frequencies on the routes, with the influence of the LCC competition being lower in relation to this last variable, however presenting itself as still relevant with a value close to 0.8. Through the analysis of the relationship between the observed RT and the RT predictedby the model, we found that for RT <30,000 there is a cluster with a behavior highly correlated with the results obtained by modelling. We also see a positive correlation in both components of Legacy routes, total distance,and the Executive, Plus, Classic and Basic segments with total revenue. Through the results obtained, we confirmed a negative correlation in both components of the routes with LCC competition. We concluded in the present study that the use of the PLS technique makes it possibleto determine the explanatory variables, the behavior of the Total Revenue.

By applying this methodology, analysts can be assisted in the revenue management process, helping to enhance knowledge of the variables influencing overall revenue behavior and, consequently, optimize decisions to sustain an optimum curve. income for the duration that fares for a certain flight are available. We draw the conclusion that the PLS technique makes it possible to examine how independent variables affect the overall revenue behavior being studied. Analysts can use this technique to help comprehend how different factors affect overall income, which will enable them to optimize product design and create warning signs for unfavorable, unanticipated effects on revenue, such as the variable frequency in our study. Large volumes of data can be interpreted in an understandable manner through the graphic presentation, making it suitable for executive briefings. The findings are consistent with the findings of a study conducted by Muthusamy & Kalpana (2018) for "Aerolineas Argentinas," which describes how the airline based in South America used Sabre Air Vision Marketing & Planning solutions to transform its revenue management and revenue integrity processes and saw double digit growth. Additionally, the methodology put forward by Friesen & Mingardo (2020) is consistent with the conceptual foundation of revenue management as it applies to aviation in this instance. According to the literature review, the outcomes are vital to enhance the decision- making process globally and fundamental to choosing better, sustainable strategies. Lastly, we offer some recommendations for additional study. It is necessary to investigate and examine the limited number of recent and current instances of pricing and revenue management techniques in the aviation industry. In order to better understand passenger behavior and customer demand patterns, academics could focus on analyzing revenue and pricing management schemes that some private operators (low-cost operators) have recently introduced. On the one hand, we invite both public and private airline operators to share their data with the academic community. Customers' views of (un)fairness might be tested by experimental research, which would also assist airline managers in enhancing and more accurately assessing their revenue management systems.

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NAVIGATING SOCIAL MEDIA: A COMPARATIVE ANALYSIS OF USERS' BRAND AND SHOPPING-RELATED ACTIVITIES ACROSS DIFFERENT PLATFORMS

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ABSTRACT

This study categorizes user activities on major social media platforms into brand-related and shopping-related activities, using secondary data from 66307 respondents across 20 countries collected by Euromonitor. The results point that Facebook and YouTube are primarily used for finding brand and products information. Instagram is notable for brand and product search, receiving offers after referrals, and buying goods. TikTok stands out for purchases after influencers' reviews. WeChat engages users in brand interactions and purchases stimulated by influencers. The platforms form four clusters: Facebook and Instagram; WeChat and TikTok; Pinterest and WhatsApp; and YouTube in an isolated cluster. The study also discusses academic and managerial implications, limitations, and future research directions.
Keywords: Brand-related activities, E-commerce, Shopping-related activities, Social Media, Social media platforms

1. INTRODUCTION

In recent years, social media's role in marketing has soared. With over 4.9 billion users globally (Baluch & Main, 2024), social media platforms have become vital for businesses to connect with audiences. This growth, accelerated by the COVID-19 pandemic, shifted focus from traditional to digital marketing (Dencheva, 2023). Social media marketing is now essential for brand awareness, customer engagement, and sales (Gartner, 2024). Marketers must choose the right platforms to maximize efforts, considering user demographics and engagement patterns. By understanding these, they can craft strategies that enhance brand visibility and sales. Key factors include identifying target audiences, analyzing platform features, and evaluating engagement metrics. Assessing competitor activity, defining content types, and determining budgets in each social media platform are crucial steps. Brands should also use key performance indicators (KPIs) to test and adjust strategies, ensuring efficient and impactful marketing. Understanding user activities on each platform provides insights into brand interactions and purchasing decisions, helping tailor strategies to each platform's user base (Jha & Verma, 2024). Social media influences the customer journey from discovery to post-purchase advocacy, driving engagement, trust, and loyalty through targeted content and interactions (Eval, 2024).

Companies can optimize marketing by comparing user engagement and shopping behaviors across social media platforms, enhancing brand visibility and sales. Understanding user behavior nuances allows for personalized interactions (Trunfio & Rossi, 2021). This study provides platform-specific insights, helping businesses allocate resources efficiently (Toraman et al., 2022).

2. LITERATURE REVIEW
2.1. Social media platforms
Social media platforms have transformed communication, enabling the creation and exchange of user-generated content. Rooted in Web 2.0 principles, they allow users to share thoughts and ideas, fostering rich online interactions (Kaplan, 2018). For businesses, social media is crucial for engaging customers and enhancing brand presence. These platforms provide direct consumer feedback and foster community around products (Dwivedi et al., 2023). Companies use social media for strategic marketing, boosting sales, brand awareness, and customer engagement (Barreda et al., 2015; Chatterjee & Kar, 2020). By leveraging social media, businesses stay competitive and responsive to customer needs. As of April 2024, Facebook leads with 3.065 billion monthly active users, followed by YouTube with 2,504 billion, and Instagram and WhatsApp with 2 billion each (Statista, 2024a). These staggering numbers underscore the immense reach and influence of social media platforms in users' lives.

2.1.1. Facebook
Facebook, launched on February 4, 2004, by Harvard students including Mark Zuckerberg, quickly expanded from Ivy League schools to a global audience by 2006. Features like the News Feed and the Wall fueled its rise (Greiner et al., 2019). Now a social media giant, Facebook influences communication, business, and culture. For businesses, Facebook is vital for marketing and customer engagement. Its targeting tools and analytics optimize ads and strategies. The platform supports various content formats and e-commerce integration, enhancing digital presence (Appel et al., 2020). Users benefit from connecting with friends, sharing updates, and real-time communication via Messenger and live streaming, fostering community through groups and events, with personalized content feeds (Akgül & Uymaz, 2022).

2.1.2. Instagram
Instagram, launched on October 6, 2010, quickly gained popularity, reaching one million users in two months. Its unique features, like photo filters and a square aspect ratio, set it apart. Facebook acquired Instagram in April 2012 for about $1 billion. Over time, Instagram added Stories, IGTV, and Reels, boosting user engagement. For businesses, Instagram enhances brand visibility and customer engagement through visually-driven content like Stories, Reels, and IGTV. Advertising options, such as sponsored posts and shoppable tags, help reach a broader audience and drive sales. Analytics tools provide insights into user behavior and campaign performance, refining strategies (Salunke & Jain, 2022; Dwivedi et al., 2023). For users, Instagram offers diverse content creation and consumption with posts, Stories, Reels, and IGTV. Interactive features like likes, comments, and messaging enhance social interaction. The algorithm personalizes content feeds by analyzing user preferences, boosting content discovery and engagement (Thomas et al., 2020; Laestadius & Witt, 2022).

2.1.3. Pinterest
Pinterest, founded in 2009 evolved from an app called Tote. Tote's mobile payment issues led to Pinterest, which launched as a closed beta in March 2010, gaining 10,000 users in nine months.

The iPhone app launch in March 2011, followed by an iPad app and mobile website, accelerated growth. By December 2011, Pinterest was among the top 10 social networks (Joyce, 2017). For businesses, Pinterest boosts brand visibility and drives traffic through visual content. Its visual search engine helps reach new audiences. Advanced analytics provide insights into consumer behavior, refining marketing strategies. Features like promoted Pins and targeted ads increase conversions (West, 2020). For users, Pinterest is a vibrant platform for discovering, organizing, and sharing visual content. Users create and curate "pins" on "boards." The visual discovery engine tailors content to user interests. The Smart Feed algorithm personalizes the experience by showing relevant pins based on interactions. Social features include following users and commenting on pins (Emasah, 2024).

2.1.4. TikTok

TikTok, launched as Douyin in China in September 2016 by ByteDance, quickly captivated audiences with short-form videos. By September 2017, ByteDance introduced TikTok internationally. Its rise accelerated with the Musical.ly merger in August 2018, adding a large user base and content (Feldkamp, 2021). TikTok's interface and algorithm, which tailors content based on user interactions, fueled its global expansion. During the COVID-19 pandemic, TikTok saw a surge in downloads and engagement as people sought entertainment and social connection (Johnson, 2020). For businesses, TikTok enhances brand engagement and awareness. Its short-video format allows brands to create both informational and emotional content, boosting social media engagement through likes, shares, and comments (Wahid et al, 2023). For small and medium enterprises (SMEs), TikTok effectively increases brand awareness among Generation Z, leveraging content marketing, influencers, and psychological factors (Murwani et al, 2023). For users, TikTok is a platform for creativity, social interaction, and information sharing. Its algorithm curates personalized content, increasing screen time and user involvement (Treiblmaier et al, 2024).

2.1.5. WeChat

WeChat, developed by Tencent, debuted in 2011 as Weixin and quickly gained 100 million users by 2012 before rebranding. It evolved from messaging to a multifaceted ecosystem with features like WeChat Moments, WeChat Pay, and Mini Programs (WeChat, 2024). Tencent's focus on mobility, media convergence, gaming culture, and Sinicization has driven WeChat's success (Negro et al, 2020), making it essential for over a billion users and revolutionizing communication in China (Yang, 2022).

For businesses, WeChat enhances customer engagement, marketing, and sales through Official Accounts, Mini Programs, and WeChat Pay (Wang et al, 2023). Companies use Official Accounts for interaction and service, while Mini Programs support e-commerce and loyalty programs (Birkinshaw et al, 2019). WeChat Pay facilitates seamless transactions. For users, WeChat integrates messaging, social networking, and mobile payments, allowing easy communication, content sharing, and purchasing. Mini Programs offer access to third-party services like transportation booking and bill payments (Montag et al, 2018).

2.1.6. WhatsApp

WhatsApp, founded in 2009, was developed as an short-message-service (SMS) alternative using internet connectivity for messaging. Acquired by Facebook in 2014 for $19 billion, WhatsApp introduced end-to-end encryption in 2016, enhancing user privacy (Kohne et al., 2023). For businesses, WhatsApp Business API helps companies automate customer interactions, providing efficient service and support. It allows sending notifications, updates, and promotional messages, enhancing engagement. End-to-end encryption ensures secure communication, crucial for customer trust.

Integration with business tools and customer relationship management (CRM) systems enhances CRM, making WhatsApp essential for improving interaction and efficiency (Urien et al., 2019). For users, WhatsApp supports multimedia messaging, enabling users to send text, images, videos, and voice messages seamlessly. Additionally, WhatsApp enables group chats for social purposes (Lee et al, 2023). Its cross-platform functionality keeps users connected across devices (Hassan et al, 2021).

2.1.7. YouTube

YouTube, founded in February 2005, was acquired by Google in November 2006 for $1.65 billion. It evolved into a platform offering diverse content, including educational videos, music, and live streams, and introduced monetization options for creators, impacting the digital economy. Today, YouTube is crucial for internet culture and a primary source of entertainment and information. For businesses, YouTube enhances digital marketing strategies with targeted advertising and content marketing, building brand awareness and loyalty. Analytics tools provide insights into viewer behavior, refining content strategies (Budzinski et al, 2021). Integration with Google services enhances campaigns, making YouTube a powerful tool for global engagement. For users, YouTube offers versatile content from music videos to educational tutorials. Its recommendation algorithm enhances user experience by suggesting videos based on preferences (Greeves & Oz, 2024). Interactive features like comments and shares foster community, while live streaming enables real-time engagement (Sherer & Shea, 2011).

2.2. Brand-related activities in social media platforms

Brand-related activities on social media platforms play a crucial role in the customer journey, particularly in the stages of information discovery and engagement. Consumers frequently turn to social media to find information about brands, companies, and their products or services. This process is facilitated by the vast amount of user-generated content, reviews, and brand posts available on social media platforms (Joshi et al, 2023). Engaging with a company or brand about a product or service is another critical activity, where customers interact through comments, direct messages, and live chats. These interactions not only provide immediate feedback and support but also foster a sense of community and loyalty among consumers (Liu, 2021). The integration of social media into the customer journey enhances brand visibility and credibility, as consumers often rely on peer recommendations and social proof when making purchasing decisions (Santini et al, 2020). Consequently, brands that effectively utilize social media for both information dissemination and customer engagement can significantly influence consumer behavior and drive brand loyalty. Different social media platforms offer unique environments and tools for brand-related activities, influencing how brands interact with their audience and manage their online presence. Each platform's unique features and user base shape the way brands conduct their activities, from content creation and customer engagement to advertising, ultimately influencing the overall customer journey (Trunfio & Rossi, 2021; Li et al, 2021).

2.3. Shopping-related activities in social media platforms

Shopping-related activities on social media platforms have become increasingly prevalent, driven by various influential factors. Consumers often buy goods or services after seeing advertisements from companies or brands, leveraging the targeted nature of social media ads to reach specific audiences effectively (Farivar et al, 2018). Additionally, influencer reviews or posts significantly impact purchasing decisions, as followers tend to trust the opinions and recommendations of influencers they admire (Long et al, 2024).

Social media platforms themselves have evolved into direct shopping channels, allowing users to purchase products seamlessly without leaving the app (Jothi & Gaffoor, 2017). Furthermore, referral programs incentivize users to refer friends or family, often resulting in special offers or discounts from companies or brands, thus enhancing customer acquisition and retention (Hajli, 2015). These activities collectively illustrate the dynamic and multifaceted nature of social commerce. Different social media platforms offer unique shopping-related activities that cater to their user base and functionalities. Each platform leverages its unique features to facilitate shopping, making social media a versatile and powerful tool for e-commerce.

According to Statista (2024b), the social media platforms through which online shoppers worldwide are most likely to make purchases in 2023, were Facebook (with 27%), followed by Instagram (with 20%), TikTok (with 8%), YouTube (with 8%) and WhatsApp (with 7%).

3. RESEARCH QUESTIONS AND METHODOLOGY
3.1 Research questions
Different social media platforms have different characteristics and reach, and can perform various functions for companies and users. Thus, the primary research questions that this work intends to answer are the following:

- Do brand-related activities and shopping-related activities vary by social media platform?
- Which social media platforms are most similar to each other in terms of brand-related and shopping-related activities?

3.2. Methodology
This research used a positivist approach with secondary data analysis from the 'Voice of the Consumer: Digital Survey' by Passport - Euromonitor International, covering 20 countries in 2023. Each country had an independent sample, totaling 66,307 participants. The sample sizes for each social media platform were based on users' population per country.

Participants answered questions about their brand interactions and shopping activities on social media platforms: a) Find out information about a brand, company, or products and services; b) Engage with a company or brand, about a product or service; c) Buy goods or services after seeing a company or brand advertisement; d) Buy goods or services on social media platform; e) Buy goods or services after seeing an influencer review or post about it, and f) Receive an offer from a company or brand after referring someone.

The Kruskal-Wallis test identified significant differences in brand and shopping activities across social media platforms. This non-parametric test compares the medians of three or more independent groups. Average values of each activity were analyzed using index numbers, and a cluster analysis grouped similar social media platforms.

4. RESULTS AND FINAL DISCUSSION
4.1. Brand and Shopping-related activities of social media platforms
In the Kruskal-Wallis test, all the P-Values were lower than 0,05, indicating that there are statistical significant differences between the social media platforms in all the brand and shopping-related activities. The P-Value (significance levels) of the Kruskal-Wallis test of the variables Engage with a company or brand, about a product or service, and Receive an offer from a company or brand after referring someone had values of 0,001. All the other variables had a P-Value of 0. When it comes to brand-related activities, users frequently seek information about brands, companies, and their products or services. Engaging with companies about their products or services is also a common activity. On the shopping activities, the most frequent behavior is purchasing goods or services after seeing an influencer's review or post. Buying items after viewing a company or brand advertisement is also prevalent.

Users often receive offers from brands after referring someone, and many consumers buy goods or services directly through social media platforms. The key highlights for brand-related activities are:

- Discovering Brand Information: Facebook stands out prominently, followed by YouTube and Instagram. Other social media platforms fall below the average.
- Engaging with Brands: WeChat, Instagram, and Facebook lead the way, surpassing the average engagement levels. Other platforms lag behind.

The key highlights for shopping-related activities are:

- Purchasing After Seeing Ads: WeChat, Instagram, Facebook, and TikTok excel, with values above the average. Other platforms don't perform as well.
- Buying Directly on Social Media: Consumers prefer WeChat, Instagram, Facebook, and TikTok for direct purchases, with these platforms showing higher-than-average values. Others are less favored.
- Influencer-Driven Purchases: WeChat, Instagram, TikTok, and Facebook again lead, with above-average values. Other platforms trail behind.
- Referral-Based Offers: Instagram, WeChat, and Facebook are the top platforms where users receive offers after referring someone.
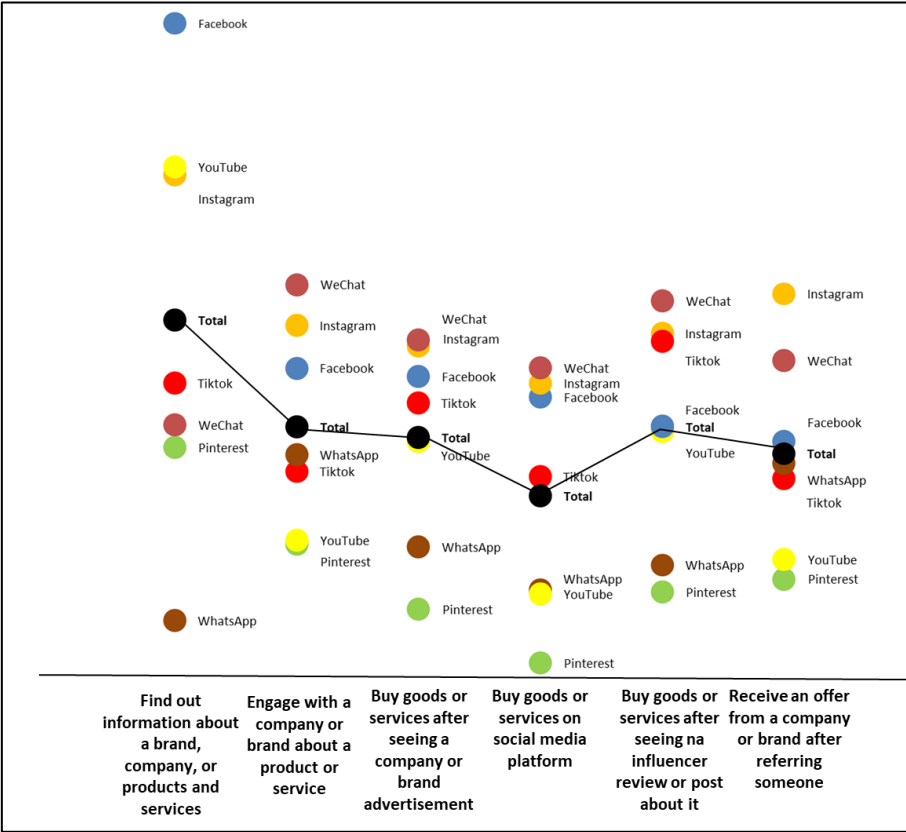
Figure 1: Percentages of users that perform brand and shopping-related activities in each social media platform.

4.2. Similarity between social media platforms

The analysis of brand similarities was conducted using hierarchical Cluster Analysis, employing average linkage between groups and the Euclidean quadratic distance methodology. The resulting dendrogram is shown in Figure 2. The selected social media platforms served as the cases, while the variables were brand and shopping-related activities.

176

The agglomeration schedule revealed that the coefficients for the first four aggregations were 121, 132, 146, and 284, respectively. This data led to the decision to highlight four clusters, due to the significant difference observed in the fourth aggregation. In this analysis, Facebook is clustered with Instagram, Pinterest is grouped with WhatsApp, TikTok is paired with WeChat, and YouTube forms a separate cluster. This clustering is based on the activities performed by users on each social media platform. Facebook and Instagram exhibit higher-than-average values across all activities, with a notable similarity in the high percentage of users finding information about brands, companies, products, or services. Conversely, Pinterest and WhatsApp generally show below-average values in all activities. TikTok and WeChat stand out for their high percentage of users purchasing goods or services after seeing influencer reviews or posts, while they have lower values for finding information about brands, companies, products, or services. YouTube tends to have below-average values in most activities, except for finding information about brands, companies, or products, where it scores significantly above average. Additionally, YouTube has average values for purchasing goods or services after seeing advertisements or influencer reviews.
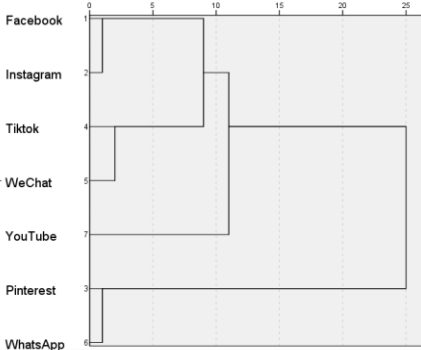
Figure 2: Dendogram with similarity between social media platforms.

4.3. Discussion and future research opportunities

These results can be integrated into the customer journey framework, highlighting the most suitable social media platforms for each stage. Brands can optimize their marketing efforts by selecting the right platforms. The findings reinforce that social media marketing is a crucial tool for building brand awareness, fostering customer engagement, and driving sales (Barreda et al., 2015; Chatterjee & Kar, 2020; Gartner, 2024). Platforms such as WeChat, Instagram, Facebook, and TikTok dominate both brand-related and shopping-related activities, offering superior engagement, e-commerce features, and advertising effectiveness compared to other platforms. Furthermore, cluster analysis emphasizes the distinct roles that different social media platforms play in these activities (Jha & Verma, 2024). Facebook and Instagram exhibit above-average performance across all activities, particularly in brand discovery and engagement, where they are popular for helping users find information about brands, products, and services. This is consistent with previous research identifying Facebook and Instagram as leading platforms for discovering and engaging with brand information (Akgül & Uymaz, 2022; Laestadius & Witt, 2022; Thomas et al., 2020). In contrast, TikTok and WeChat excel in influencer-driven shopping, highlighting their growing impact on social commerce through influencer marketing (Birkinshaw et al., 2019; Murwani et al., 2023; Negro et al., 2020; Wang et al., 2023). YouTube, on the other hand, excels in brand discovery, aligning with its primary role as a content consumption platform rather than a direct commerce tool (Greeves & Oz, 2024). For tech companies, this insight can guide the development of features that users don't currently find positively differentiated.

From a managerial perspective, this work can significantly influence the strategies of both brands and social media platform managers. Looking ahead, future research could analyze the evolution of brand and shopping-related activities on each social media platform over time. This study is based on a global sample, but it would be interesting to explore behavioral differences based on users' nationalities. Given that many platforms are based in the United States while others are in China, factors like political restrictions, cultural affinities, and users' countries of origin could lead to varied behaviors on social media platforms. Additionally, examining the impact of user age could be insightful, as platforms like TikTok tend to attract younger audiences compared to others. It would also be valuable to investigate how the characteristics and features of each social media platform influence user activities, as well as how users' habits affect their platform usage.

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ANALYZING THE IMPACT OF QUERY COMPLEXITY AND INDEXING ON SQL PERFORMANCE: A METHODOLOGICAL AND RESOURCE UTILIZATION STUDY

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ABSTRACT

Efficient data retrieval is essential for modern applications, especially when dealing with large and complex datasets. This paper explores the optimization of SQL query performance through strategic indexing and the use of various query structures. Central to this research is the Datawrap web application, designed to simplify query generation and provide detailed insights into execution times. The study evaluates the performance impact of clustered and non-clustered indexes, comparing query execution times on both indexed and non-indexed data. Additionally, it analyzes different JOIN operations, focusing on how query complexity and data volume influence execution speed. The findings highlight the benefits of efficient indexing and query optimization, with significant improvements in performance metrics, as well as an in-depth examination of resource utilization and system efficiency under various scenarios.
Keywords: SQL Queries, performance analysis, datawrap application, index optimization, user experience

1. INTRPDUCTION

Databases are essential tools for efficiently storing, organizing, and analyzing data to extract valuable insights. However, as data complexity and volume increase, the execution of complex queries can become sluggish, impacting system performance and user experience. The sheer time required to retrieve specific datasets can lead to significant delays and inefficiencies, posing a serious challenge for businesses and applications that rely on real-time data processing. Indexing emerges as a powerful and indispensable technique to optimize query performance, drastically reducing the time needed for data retrieval. By organizing data in a way that allows for faster access, indexing helps improve system efficiency and ensures that information is delivered swiftly. This paper addresses these challenges by exploring SQL queries, their classification, and providing practical examples to illustrate key concepts. The discussion also emphasizes the importance of understanding query performance and the strategies that can be used to enhance it. Central to this research is the introduction of the Datawrap web application. Datawrap is designed to simplify the creation of complex SQL queries through a user-friendly interface, enabling users to apply various filters seamlessly. It provides detailed insights into query execution times, offering a foundation for analyzing performance and identifying potential areas for optimization. The study extends to a comparison of different indexing strategies and highlights existing research that offers concrete performance data and analysis. Additionally, the paper provides a comprehensive overview of the technologies and architecture used in developing Datawrap, ensuring a complete understanding of the system's design and functionality.

2. PERFORMANCE OPTIMIZATION THROUGH INDEXING IN DATABASES

Processing large volumes of data demands efficient methods for the rapid execution of queries. The speed at which these queries are performed is crucial for the optimal functioning of databases, especially when dealing with substantial datasets.

Indexing is commonly used to accelerate queries and enable faster data access without the need to scan the entire database. This section analyzes relevant chapters from manuals and textbooks by professors and lecturers at the Zagreb University of Applied Sciences. These works explore the differences in query execution times on indexed and non-indexed data. The manual Modeliranje, implementacija i administracija baza podataka by Željko Kovačević examines the distinction between clustered and non-clustered indexes, comparing the execution times of queries with and without indexing. Meanwhile, the textbook Baze podataka by Kramberger T., Duk S., and Kovačević R. compares the performance of queries using indexes versus those without, though it does not differentiate between clustered and non-clustered indexes as the former work does. Searching for specific data within a large set of records often requires checking each record sequentially until the desired information is found. Kovačević describes this as "scanning," which is typically the slowest execution method, consuming significant processor resources. This inefficiency highlights the necessity of indexes, which enhance the speed of data retrieval in large datasets.

Clustered indexes, the first type examined, define the physical arrangement of records in a table, with only one such index allowed per table. Because clustered indexes are sorted, they significantly improve query performance. For example, Kovačević executed a query that retrieved records from a table containing 10,000 rows and compared the performance before and after indexing. Initially, on non-indexed data, the SQL Server's Query Optimizer—a tool designed to find the optimal execution plan—resorted to scanning all records.
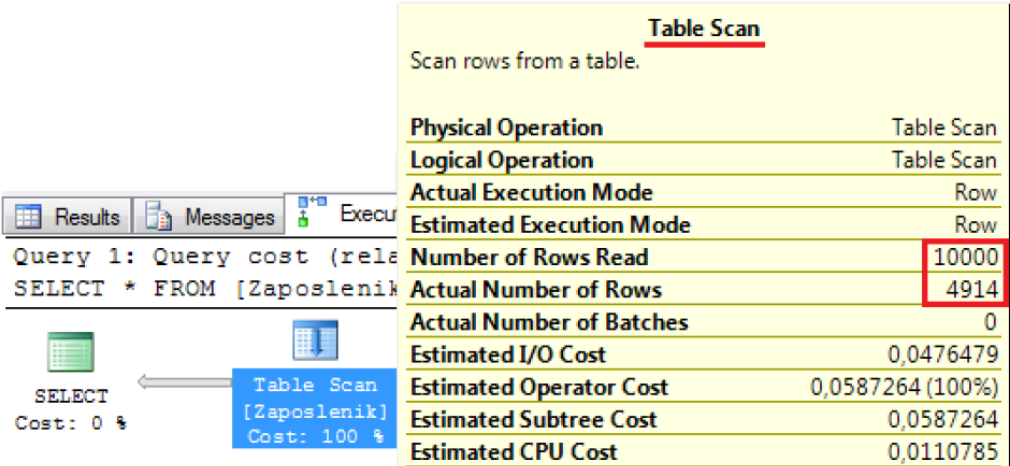
*Figure 1 - shows that all 10,000 records were read,
even though only 4,914 met the specified condition*

This detailed analysis underlines the substantial performance gains achieved through the strategic use of indexing, highlighting the importance of understanding and implementing efficient database optimization techniques.

Upon introducing a clustered index and executing the query again, the Query Optimizer identifies a faster and more efficient method for retrieving the desired records. This improvement is demonstrated in Figure 2 where only the exact number of rows that satisfy the condition—4,914 rows—are read, rather than scanning the entire dataset.
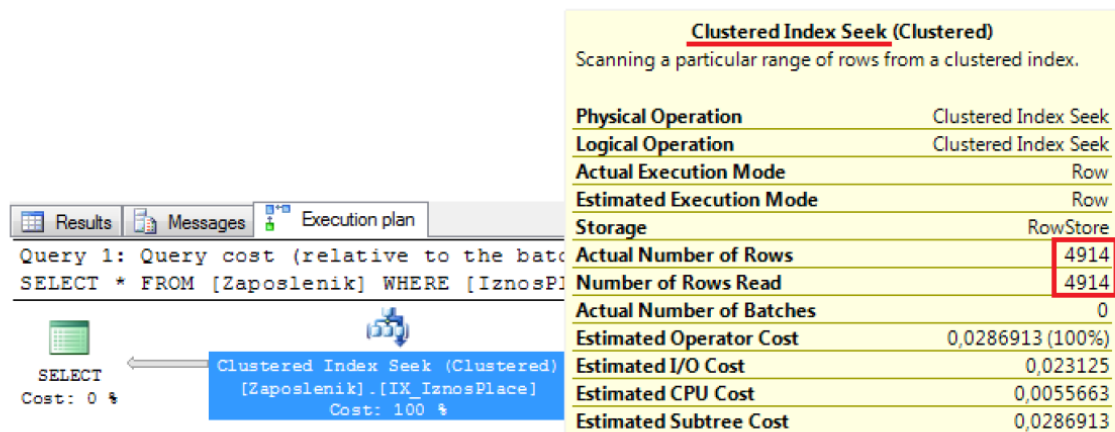
Figure 2 - Execution Plan - Clustered Indexes

In contrast, non-clustered indexes are unsorted and contain "pointers to the data rather than the actual data" [5]. Although these indexes also facilitate faster searches and improve performance, the author does not provide specific figures for comparison. Nonetheless, non-clustered indexes still play a critical role in optimizing database operations by reducing query execution times and enhancing overall system efficiency.

Subsection *Performanse upita s indeksom i bez indeksa* [6], authors Kramberger T., Duk S. i Kovačević R provides a brief analysis of query performance on a simple table containing 10 million rows. Similar to the earlier example, the authors executed a simple query to retrieve all records that met a specific condition. On non-indexed data, the query required a full scan of all rows, taking 8,588 milliseconds to complete, as shown in Figure 3

Figure 3 - SQL Server execution statistics without indexes

After adding an index to the column used for the search, the performance improved significantly. The query execution time was reduced to just 86 milliseconds, demonstrating the dramatic efficiency gain achieved through indexing, as illustrated in Figure 4.

Figure 4 - SQL Server execution statistics with indexes

3. FOCUS OF THE RESEARCH AND METHODOLOGY

The research focuses on analyzing query performance across varying levels of complexity, utilizing collected time measurements. The objective is to validate or refute hypotheses suggesting that as query complexity increases, so does the time required for execution, and that the use of indexes significantly accelerates query performance. By examining these factors, the study aims to provide a comprehensive understanding of how indexing and query structure impact overall database efficiency. The first step in the methodology involves precisely defining the time components to be analyzed. Four key components were identified:

- **Database time:** This represents the time required to execute a query within the database itself. It was measured using a custom procedure detailed in the Database chapter.
- **Real time:** This is the total time taken from the moment the Apply filters button is clicked until the results are loaded in the user interface. It includes sending the query to the database, executing it, and receiving the results. This time is calculated as the difference between the end and start time in milliseconds, using the performance.now() method.
- **Request time:** This is the difference between Real time and Database time, representing the time taken to send and receive data between the application and the database. It does not include the time taken to execute the query on the database.
- **Execution time:** This is the time taken for direct execution in the database, measured using the same commands utilized in the custom procedure.

Once the time components were defined, specific queries were selected for performance analysis. The complexity and structure of these queries are explained in more detail in subsequent subsections. Additionally, two scenarios were considered:

- Retrieving all data (no limit)
- Retrieving only 10 records, utilizing a limit feature implemented as lazy loading in the application interface

For each selected query, the average execution time (excluding request time) was calculated based on five repetitions to ensure more reliable and realistic measurements for comparison. After obtaining the average values, the data was sorted and visualized using graphs to facilitate the interpretation of results.

External factors that could influence execution speed were also taken into account. To minimize their impact, measurements were conducted during the same time period, with minimal load on the laptop.

Performance analysis based on query complexity

This subsection focuses on analyzing query performance in relation to their complexity, considering the following types of queries:

- 0: Retrieving all records from the database
- 1: A simple query with one parameter in the WHERE clause
- 2: A query with two parameters in the WHERE clause
- 3: A complex query with three parameters in the WHERE clause

Each query represents a different level of complexity, and the analysis examines how this complexity impacts execution time. Chart 1 provides a graphical representation of the query execution times organized by their complexity, emphasizing the WHERE clause's impact on performance. The focus is on retrieving only the first 10 records that meet the specified conditions, showcasing the dynamic nature of query performance.

By observing the lines representing Real time (actual execution time) and Request time (time for sending and receiving data), a clear pattern and variation in execution times emerge. As the complexity of the WHERE clause increases, there is a gradual rise in the time needed to generate, execute, and display the queries in the interface. This trend can be attributed to the greater number of iterations required by the query generation function and the longer execution times within the database, resulting from the more complex query demands. Additionally, when examining the times recorded directly from the database (Execution time) and those measured using the custom procedure (Database time), a slight increase is also observed as query complexity rises. This analysis highlights the direct correlation between query complexity and performance, providing valuable insights into the impact of structured data retrieval on system efficiency.

Execution time per query complexity level with a limit

	0	1	2	3
Database time	0.0042420	0.0053820	0.0061830	0.0078494
Real time	0.04762198	0.0359744	0.086057	0.1554932
Request time	0.0433800	0.0305924	0.0798740	0.1476438
Execution time	0.0042330	0.0062000	0.0072000	0.0083000
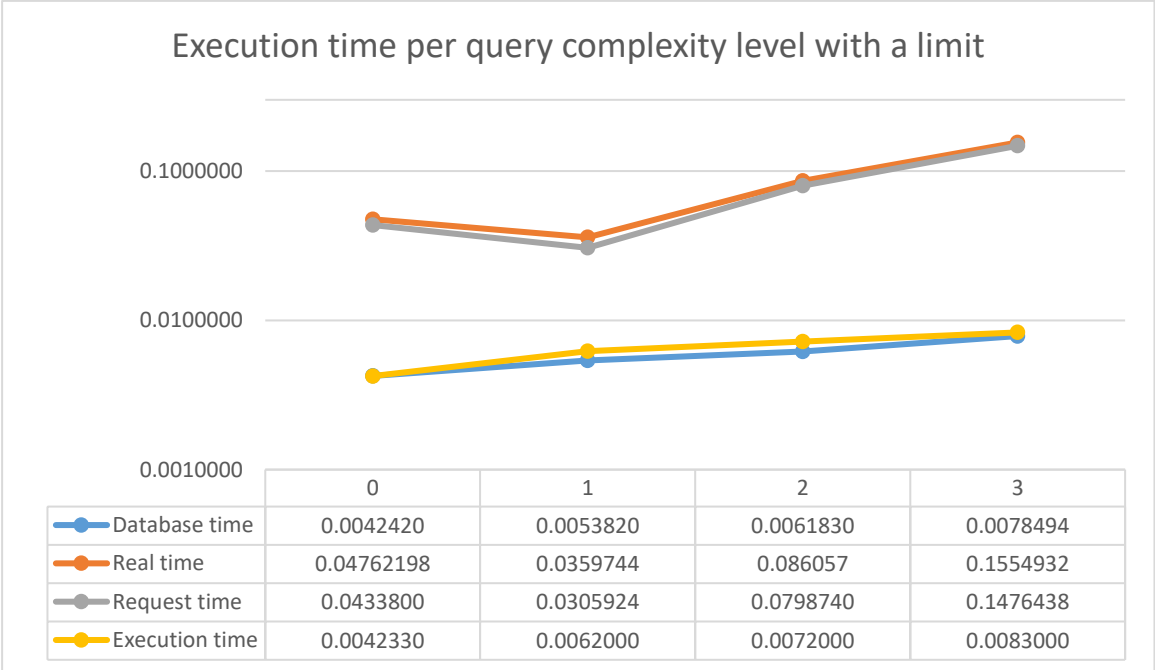
Chart 1 - Execution time by query complexity with limit

The next graph, shown in Chart 2, presents the time measurements for queries with identical WHERE clauses as in the previous example. However, unlike the limited queries, these queries retrieve the entire available data structure that meets the specified conditions, without any restrictions or limits applied. The graph reveals a linear increase in execution time as the complexity of the queries rises. Notably, there is a significant spike in the Real time for Query 0, which retrieves all available records. This outcome is expected, as fetching and subsequently displaying all data requires the longest processing time. The graph highlights how unrestricted queries demand substantial resources, emphasizing the impact of query structure and data volume on overall performance.

Chart following on the next page

	0	1	2	3
Database time	0.0226068	0.0184262	0.0815244	0.3635084
Real time	0.1895666	0.0444478	0.1752210	0.6660420
Request time	0.1669598	0.0260216	0.0936966	0.3025336
Execution time	0.1521	0.022	0.0822	0.3938
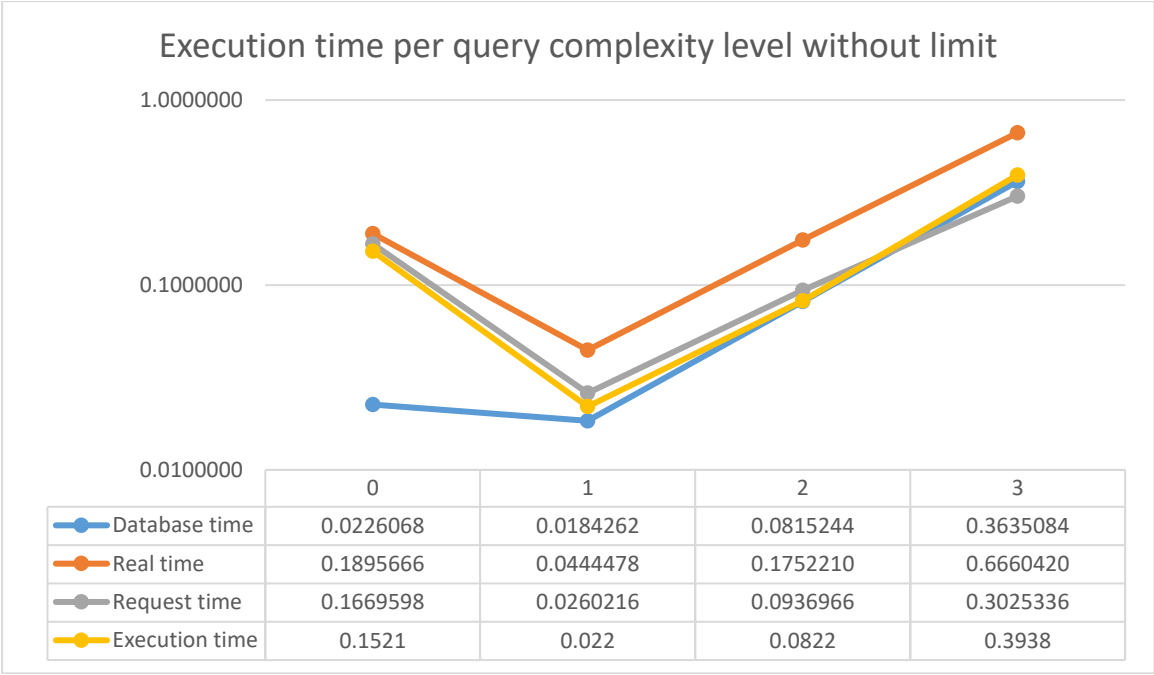
Chart 2 - Execution time per query complexity level without limit

In both scenarios, executing queries directly in the database took slightly longer than running them through the application using the custom procedure. Query profiling showed that a significant amount of time is spent on data transfer, which accounts for the observed differences in execution times. While using the application and applying filters with the previously discussed queries, memory usage and CPU load were monitored through Task Manager for processes associated with Visual Studio Code and XAMPP, the tools used for local deployment of the application. Depending on query complexity, there was a slight increase in CPU load, ranging from 0.9% to 2.4% when lazy loading was implemented. Without using a limit, the load increased further, reaching between 2.7% and 6%. To evaluate system performance under higher loads, multiple queries were executed simultaneously in different browser tabs. This resulted in a noticeable spike in CPU usage, especially when retrieving data without limits, where the load reached up to 20%. Memory usage, on the other hand, remained relatively stable during each run, fluctuating between 4% and 5.5% without significant variation.

Performance analysis of queries by JOIN type and indexing
The second segment of the research focuses on analyzing query performance based on variations in different JOIN operations, data indexing within the database, and the scope of retrieved data—whether all records meeting the conditions are fetched or a limit is applied to retrieve only the first 10 records. A consistent query structure was used throughout the analysis, with parameters adjusted to account for different JOIN types, whether the table was indexed or not, and the specified data limit. Chart 3 provides a visual representation of the number of results for each type of JOIN, confirming the theoretical concepts discussed. As expected, there is a significant increase in the number of results with the CROSS JOIN operation, which generates the Cartesian product of the tables. The number of results for other JOIN types also aligns with expectations. For instance, a LEFT JOIN returns all records from the first table, which consists of 5,000 entries in the database. In contrast, RIGHT JOIN and INNER JOIN only return records that meet the specified conditions. This analysis highlights the importance of correctly linking tables to ensure that the results align with the intended query requirements. Understanding the behavior of different JOIN operations is crucial for efficient and accurate data retrieval in complex queries.
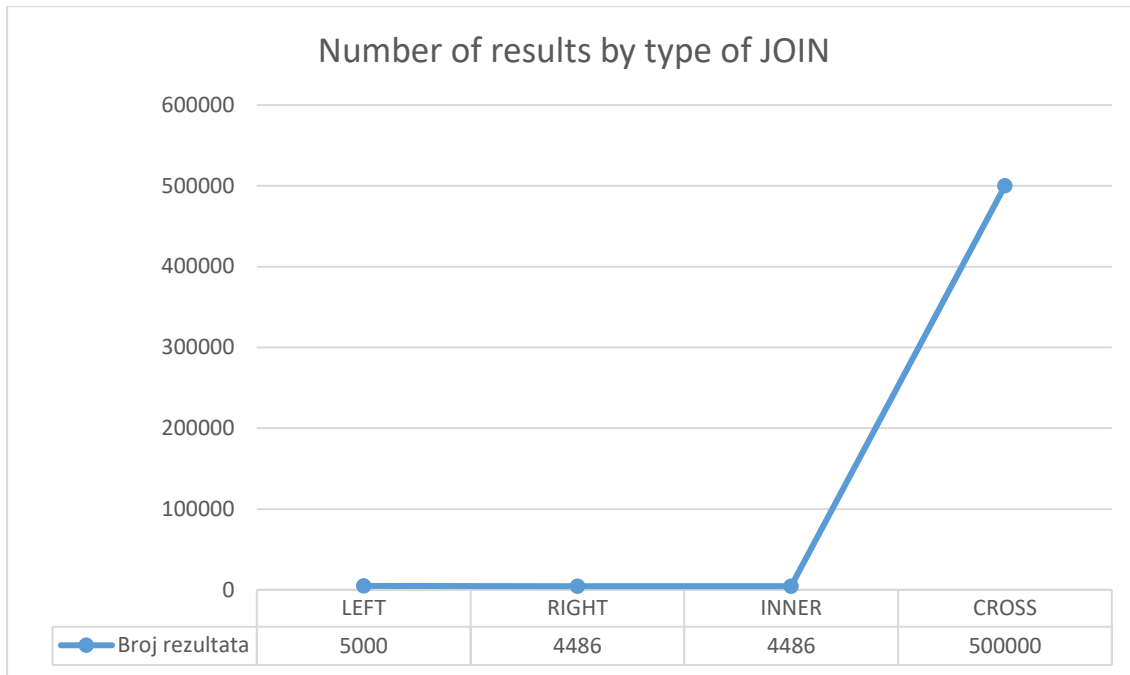
Chart 3 - Number of results by type of JOIN

Chart 4 presents the execution times for queries in the database, both executed directly (Execution time) and through the custom function (Database time), with a limit applied to retrieve only the first 10 records. The results clearly show that queries on indexed data execute faster, consistent with findings from the existing literature discussed in the Overview of the Research Area chapter. The most significant deviation is observed for non-indexed data with the LEFT JOIN operation, likely due to the requirement to fetch data for all records in the first table and then check each condition. Additionally, the CROSS JOIN operation displays relatively low execution times. This can be explained by the Cartesian product nature of CROSS JOIN, which pairs each row from the first table with each row from the second table. Given the limit imposed, the number of comparisons required is reduced compared to other JOIN operations, making CROSS JOIN faster and more efficient in this scenario. Another noteworthy observation is the comparison between direct execution in the database and execution via the custom procedure. Both approaches exhibit a similar trend in the graph, yet direct database execution consistently lags slightly in speed. This reinforces the importance of efficient query optimization and highlights the benefits of using well-structured procedures for performance gains.

Chart following on the next page
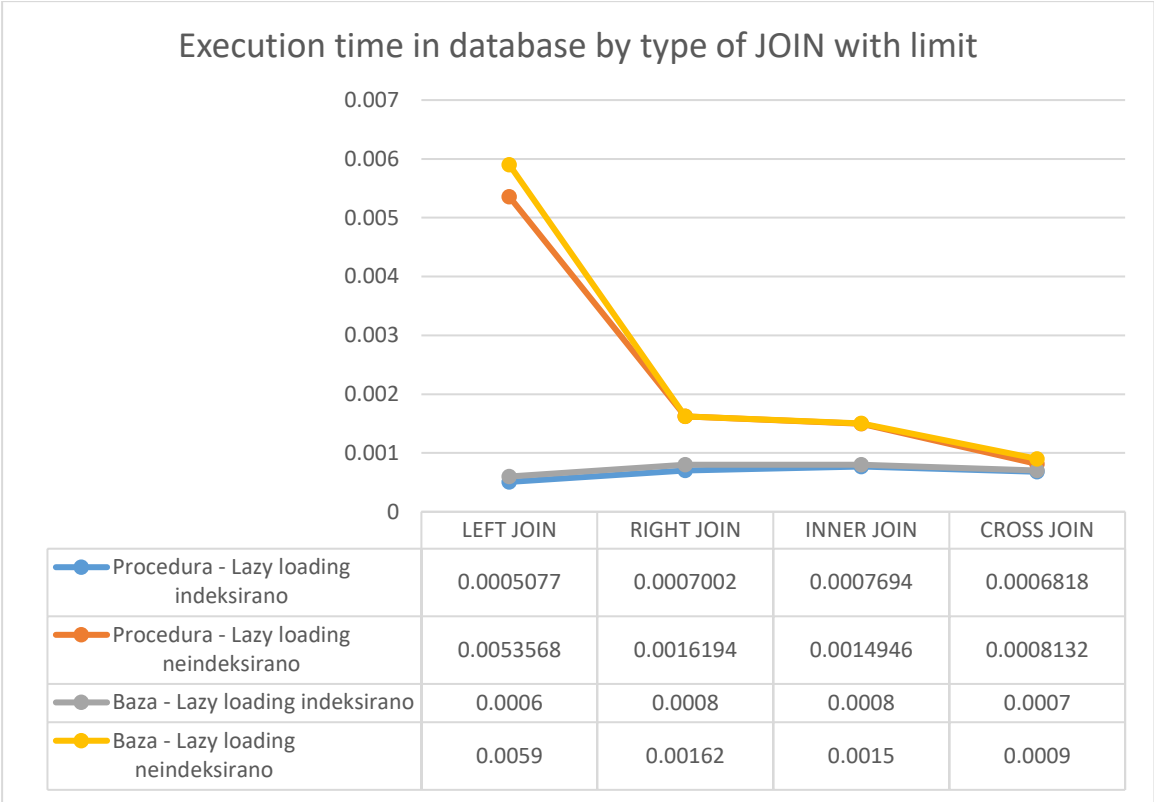
Chart 4 - Execution time in database by type of JOIN with limit

	LEFT JOIN	RIGHT JOIN	INNER JOIN	CROSS JOIN
Procedura - Lazy loading indeksirano	0.0005077	0.0007002	0.0007694	0.0006818
Procedura - Lazy loading neindeksirano	0.0053568	0.0016194	0.0014946	0.0008132
Baza - Lazy loading indeksirano	0.0006	0.0008	0.0008	0.0007
Baza - Lazy loading neindeksirano	0.0059	0.00162	0.0015	0.0009

When analyzing the same queries without any data limitations, the graphical representation in Chart 5 appears almost identical to the previous scenario. However, a crucial difference is observed with the CROSS JOIN operation, which experiences a substantial increase in execution time. This is due to the creation of a Cartesian product, resulting in 500,000 records, which significantly extends the execution duration compared to other JOIN types. Notably, in the unlimited data scenario, direct execution in the database was unsuccessful for the CROSS JOIN operation. The attempt to execute it resulted in a timeout, preventing the retrieval of an execution time value for this query. This highlights the challenges and inefficiencies associated with handling large datasets using complex JOIN operations without data restrictions. The findings underscore the importance of applying appropriate query constraints and optimizing execution strategies for complex data relationships.

Chart following on the next page
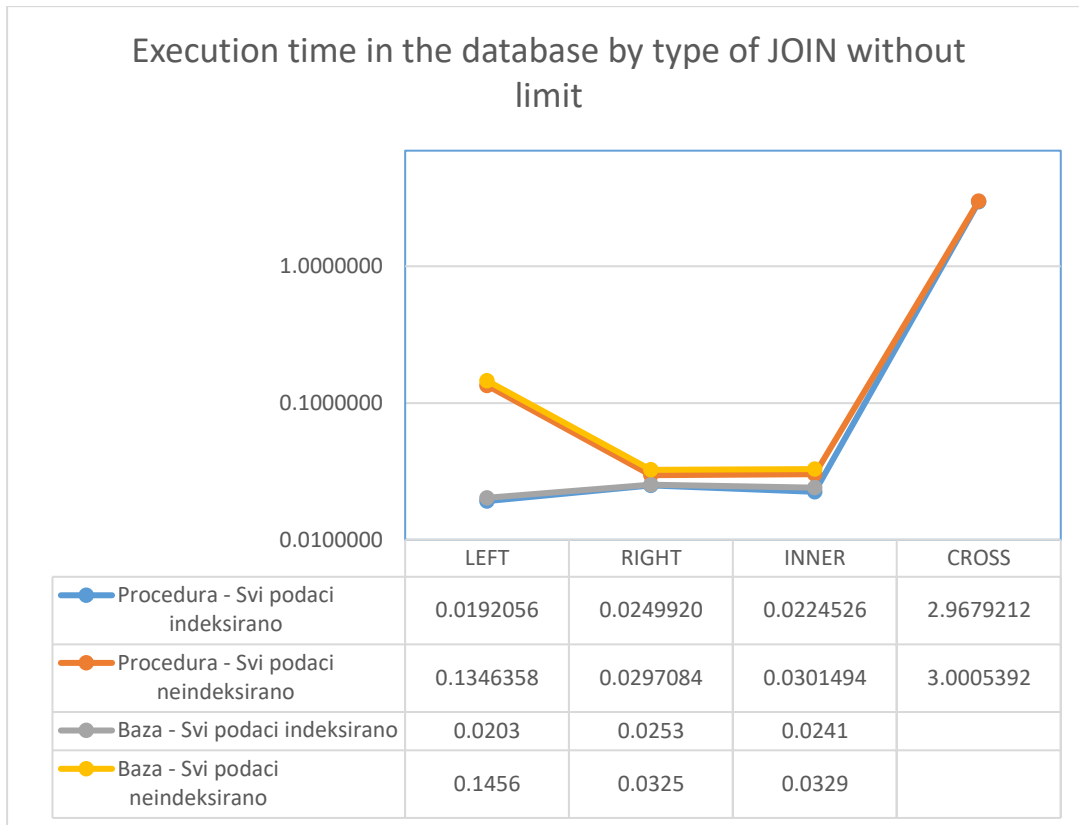
Chart 5 - Execution time in the database by type of JOIN without limit

The next segment of the analysis focuses on Real time execution, which measures the total duration from clicking the Apply filters button to query creation, sending the query to the database, execution, and finally retrieving and displaying the data in the user interface. Chart 6 clearly illustrates that queries on indexed data execute faster, reinforcing the advantages of indexing. A significant spike is once again observed for the LEFT JOIN operation, reflecting a similar pattern to that seen in Chart 4, which focused on in-database execution times. This consistency emphasizes the impact of query structure on performance and the critical role of efficient data indexing in improving overall query execution speed.
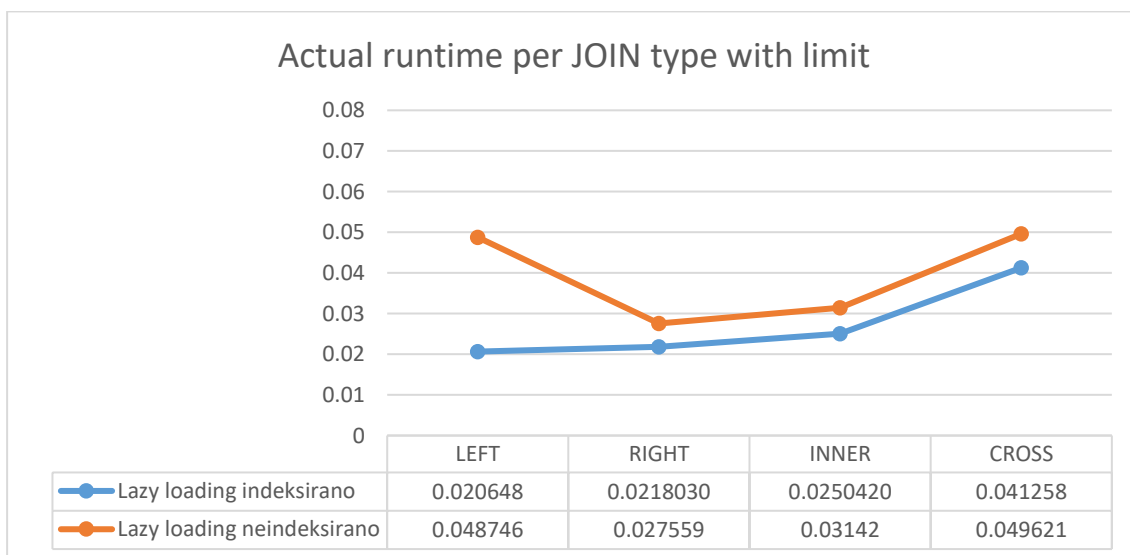
Chart 6 - Actual runtime per JOIN type with limit

When comparing Real time execution of queries without applied limitations, Chart 7 once again confirms that the use of indexes leads to faster execution times. The most pronounced increase in execution time is observed for the CROSS JOIN operation, which generates 500,000 records. This results in a query execution time exceeding 8 seconds, underscoring the significant challenges and limitations associated with CROSS JOIN operations. The findings highlight the inefficiencies that can arise when working with large datasets without applying constraints, emphasizing the need for careful query optimization and strategic data handling.

Actual execution time per type of JOIN without limit

	LEFT	RIGHT	INNER	CROSS
Svi podaci indeksirano	0.164821	0.1085470	0.1058720	8.3519480
Svi podaci neindeksirano	0.2522930	0.1155370	0.121141	8.5048790
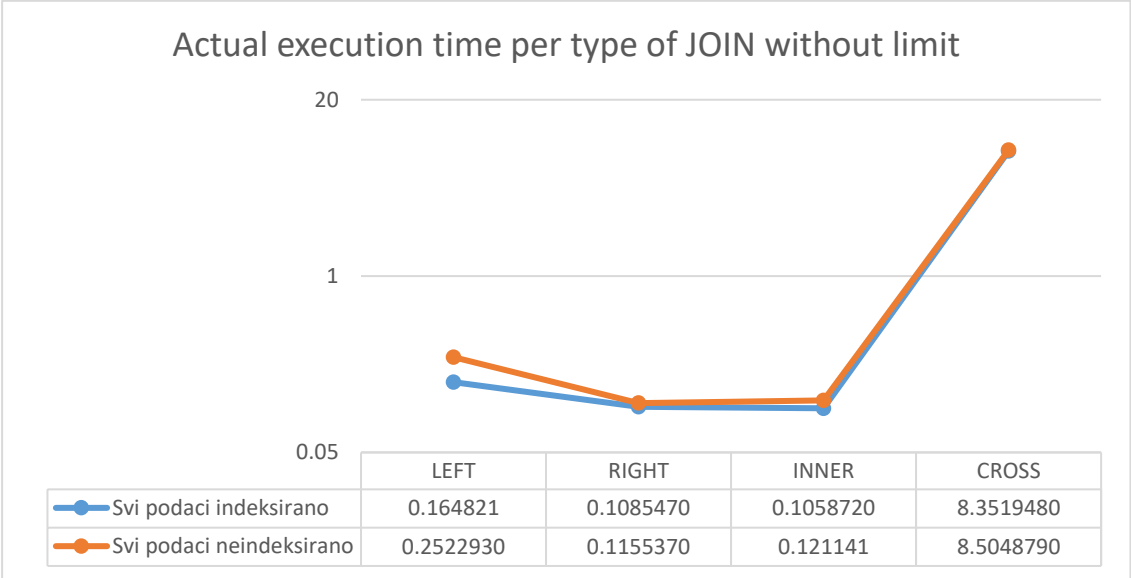
Chart 7 - Actual execution time per type of JOIN without limit

Chart 8 illustrates the Request time, which represents the duration for sending and receiving data requests, categorized by JOIN type when retrieving only 10 records. When compared with the graph in Figure 7.6, it is evident that both share the same trend direction. This consistency is expected, as both metrics reflect the impact of query complexity and data handling on performance. The similarity in trends reinforces the understanding that efficient data transfer is closely tied to the underlying query execution and indexing strategies.

The time of sending and receiving requests by type of JOIN with a limit

	LEFT	RIGHT	INNER	CROSS
Lazy loading indeksirano	0.02005018	0.0211028	0.0242726	0.0405762
Lazy loading neindeksirano	0.0436692	0.0259396	0.03299294	0.0488078
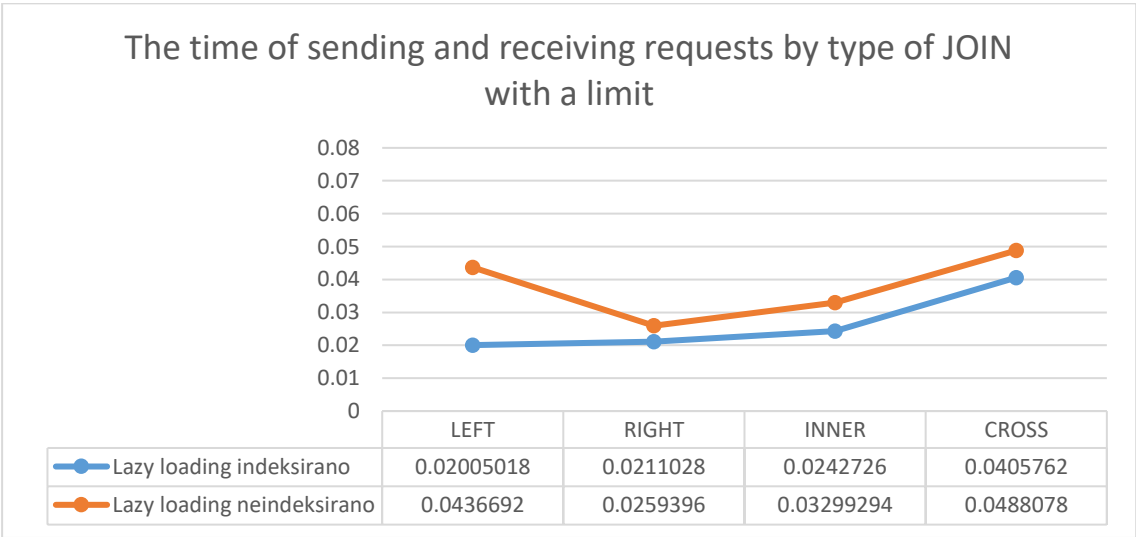
Chart 8 - The time of sending and receiving requests by type of JOIN with a limit

Chart 9 shows the Request time for different JOIN types when all data is retrieved without any limits. This graph shares the same trend direction as Chart 7, which depicted Real time execution without data restrictions. The consistency in these trends indicates that the overall performance dynamics remain influenced by query complexity and data volume, further emphasizing the impact of efficient indexing and data transfer mechanisms on optimizing execution times.

	LEFT	RIGHT	INNER	CROSS
Svi podaci indeksirano	0.1456154	0.0835550	0.0834194	5.3840268
Svi podaci neindeksirano	0.1176572	0.0858286	0.0909916	5.5043398
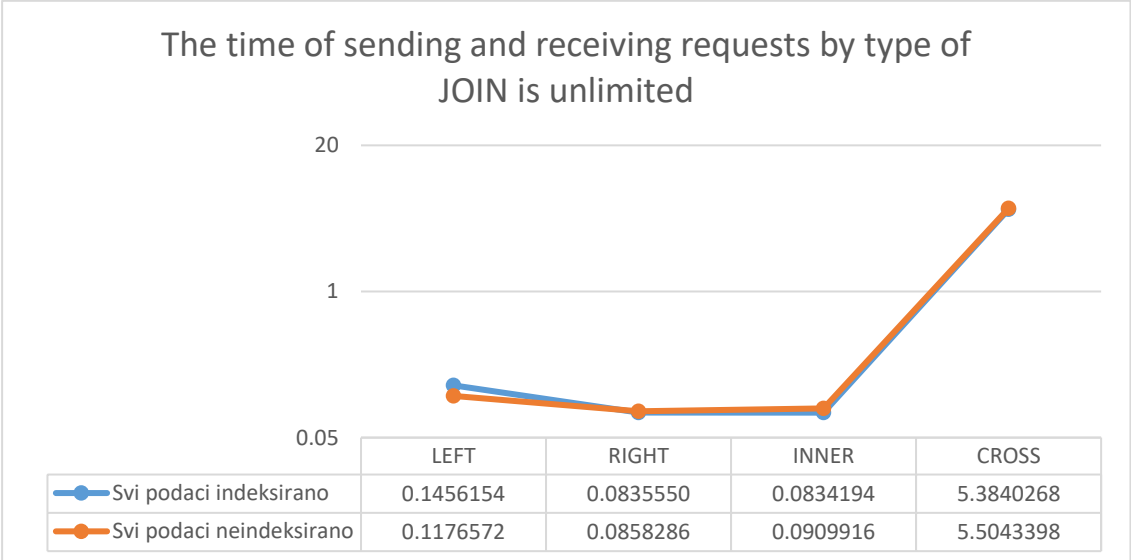
Chart 9 - The time of sending and receiving requests by type of JOIN is unlimited

The impact of the aforementioned queries on CPU and memory usage was also analyzed. When a limit was applied, there were no significant variations in either CPU or memory utilization, regardless of the JOIN type or whether the data was indexed. CPU usage remained stable, ranging between 1.5% and 3%. Notable differences emerged when all data was retrieved using the CROSS JOIN operation. In this scenario, CPU usage spiked dramatically to 30%. Additionally, when multiple tabs in the browser were used to perform filtering with CROSS JOIN operations, CPU load increased further, reaching up to 50%. In contrast, executing other JOIN types across multiple tabs resulted in considerably lower CPU usage, typically ranging from 15% to 20%. This highlights the substantial resource demands of CROSS JOIN operations, especially when handling large datasets without constraints, and the importance of query optimization in managing system performance.

4. CONCLUSION

This study concludes that databases play a pivotal role in modern society. Through effective storage, analysis, and organization of data, essential information can be extracted, facilitating decision-making and improving everyday workflows. Understanding the context of data and accurately interpreting it is crucial to derive meaningful insights. Performance analysis based on query complexity and the use of various JOIN options and indexing revealed that indexing indeed speeds up query execution. The analysis considered four intervals: execution time in the database, time elapsed from clicking the filter button to displaying results, the difference between these times, and direct database measurement. The results demonstrated the importance of precise query formulation, as more complex WHERE clauses increased execution time. CPU load analysis indicated that the application heavily utilizes processor resources under pressure. For example, CROSS JOIN operations consumed up to 30% of CPU resources, suggesting that eliminating or optimizing such resource-intensive options could be beneficial.

The study underscored the necessity of selecting the appropriate JOIN operation and optimizing queries to achieve the desired data selection while minimizing execution time. Despite current limitations, such as working with only one data set, Datawrap has largely fulfilled its purpose, successfully enabling performance analysis. The analyses validated the hypotheses, aligning with existing research in the field.

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CURRENT STATUS ON SUSTAINABLE DEVELOPMENT IN CROATIA

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ABSTRACT
The concept of sustainable development is defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs. This paper examines the implementation of sustainable development in the Republic of Croatia using a descriptive analysis based on three key indicator groups: economic and social, knowledge economy, and environmental protection indicators. Data were collected from Eurostat and the World Bank for 2022 and 2023. The economic and social indicators show that Croatia's economy is growing faster than the EU average, reflecting its status as a developing country. However, challenges such as lower employment rates and high levels of poverty remain. Croatia invests more in education compared to the EU average, but research and development expenditures lag significantly. This lack of investment in innovation and technology commercialization limits Croatia's potential for economic competitiveness. In terms of environmental protection, Croatia performs well in renewable energy use and reducing greenhouse gas emissions. However, it faces challenges due to its high dependence on energy imports, a significant issue amidst global political uncertainties like the Russia-Ukraine conflict. Based on the Sustainable Development Goals (SDG) Index, Croatia ranks 8th globally, achieving 82.19% of the goals, with notable progress in poverty reduction and quality education. However, it lags in responsible consumption and climate action, particularly regarding nitrogen emissions and greenhouse gas emissions embodied in imports. This analysis highlights Croatia's positive trajectory in sustainable development but emphasizes the need for further investment in innovation and energy independence. The findings serve as a foundation for future research on the macroeconomic and social impacts of sustainable development measures.
Keywords: Croatia, Economic indicators, Environmental protection, Knowledge economy, Sustainable development

1. INTRODUCTION
Sustainable development has increasingly become a key objective for economies around the world, underscoring the urgent need to balance economic growth, environmental preservation, and social well-being. Since the initial recognition of sustainable resource use in the 1970s, definitions and frameworks have evolved to address the complex connections between present resource demands and the rights of future generations. As a member of the European Union (EU) and a relatively recent adopter of the euro, Croatia occupies a unique position in aligning with global standards and aspirations for sustainability. Integrating sustainable development into Croatia's policies and practices not only brings it in line with the United Nations Sustainable Development Goals (SDGs) but also aligns with the EU's ambitious green

initiatives, exemplified by the European Green Deal and related policy frameworks. While Croatia has made significant strides, it continues to face a range of sustainability challenges, from economic reliance on tourism to high energy import dependency and comparatively low investment in research and development. However, Croatia's strong rankings in education investment and SDG performance underscore its commitment to adopting a more sustainable path. This paper examines the current state of sustainable development in Croatia, analyzing key indicators across economic, social, and environmental domains. By identifying both areas of progress and ongoing challenges, this study aims to provide a basis for targeted policy recommendations that can further bolster Croatia's sustainable development efforts and enhance its resilience amid global economic shifts and environmental challenges. The paper begins with an introduction that defines the basic elements of the research and briefly outlines the paper's structure. Following the introductory section, the research continues with a brief overview of sustainable development, after which the research methodology and data are explained. The core of the paper presents an analysis of recent sustainable development indicators in the Republic of Croatia. The paper concludes with a synthesis of the key research findings.

2. CRASH COURSE ON SUSTAINABLE DEVELOPMENT (SD)

The importance of sustainable use of natural resources was first recognized in 1977. According to Hartwick (1977), the importance of sustainable resource use is linked to capital and technological investments that are sufficient to meet both present and future needs. Furthermore, sustainable development is defined as "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (UN World Commission on Environment and Development, 1987). Pavić-Rogošić (2010) expands this definition, emphasizing a process of change in which resource use, investments, and institutional changes are aligned with the needs of both current and future generations. Kandžija and Cvečić (2008) highlight three main goals of sustainable development: economic competitiveness, employment and social equity, and environmental protection. Črnjar and Črnjar (2009) view sustainable development through three key concepts: development, needs, and future generations. Development primarily pertains to economic aspects, while the concept of needs underscores a balance between developed and less developed countries, which often harm the environment to meet basic needs. The concept of future generations is based on advanced technologies and sustainability. Historically, it is widely acknowledged that developed economies accumulated wealth through unsustainable production, while subsequently imposing the concept of sustainability on less developed economies. Črnjar and Črnjar (2009) therefore identify nine principles of sustainable development: 1) respect and care for the environment, 2) improvement of life quality, 3) protection of Earth's vitality and biodiversity, 4) minimizing the depletion of non-renewable resources, 5) respecting Earth's carrying capacity, 6) changes in personal attitudes and behaviour, 7) enabling communities to care for their own environment, 8) establishing a national framework for development and protection integration, and 9) forming a global alliance for long-term development. The European Union incorporated sustainable development into its policies, beginning with the Lisbon Strategy in the 2000s, which aimed at economic growth, social development, and environmental protection. Despite ambitious goals, implementation faced challenges due to insufficient coordination among member states and political obstacles (Boromisa and Samardžija, 2009). A later review highlighted the importance of the "knowledge triangle" and the open method of coordination (Petak, 2012). Following the Lisbon Strategy, the Europe 2020 Strategy aimed to position the EU as the most competitive economy by 2020. Its primary goals were smart, sustainable, and inclusive economic growth.

However, progress fell short of expected economic growth and productivity (Tomljanović, 2020). The EU continued to strengthen its focus on human potential and sustainability as keys to economic recovery. In 2019, the EU launched the Europe 2030 strategy, with targets to reduce greenhouse gas emissions by 40%, increase renewable energy consumption to 27%, and achieve energy savings through green industries (European Commission, 2019). Sustainable development within the EU aligns closely with the United Nations' 2015 Sustainable Development Agenda, which includes 17 key goals. Environmental protection in the EU has evolved since 1972, with standards tightening through the Maastricht, Amsterdam, and Lisbon treaties. Črnjar and Črnjar (2009) emphasize the principles of EU environmental policy: the "polluter pays" principle, the precautionary principle, and the principle of correction. The combination of economic and environmental goals is essential for achieving sustainable development. Each country faces unique challenges on this path and must establish its own sustainable foundations (Haller et al., 2020).

3. RESEARCH METHODOLOGY AND DATA

This paper conducts a descriptive analysis of the implementation of sustainable development in the Republic of Croatia. The analysis is based on three groups of indicators: economic and social indicators, knowledge economy indicators, and environmental protection indicators. For economic and social indicators, the following data were analyzed: GDP growth rate (%), GDP per capita (in euros), employment rate (% of population aged 15-65), unemployment rate (% of population aged 15-74), people at risk of poverty or social exclusion (% of the population), minimum wage (euros per month), and government gross debt (% of GDP). The analysis of knowledge economy indicators covered government expenditure on education (% of GDP), early school leavers (% of population aged 18-24), population aged 30-34 with tertiary education (%), research and development expenditure (% of GDP), and high-technology exports (% of manufactured exports). Environmental protection indicators show Croatia's performance in national expenditure on environmental protection by institutional sector (% of GDP), electricity prices (euros per MWh, including taxes), energy import dependency (% of gross available energy), renewable energy share (% in gross final energy consumption), recycling rate of municipal waste (% of total municipal waste), and greenhouse gas emissions (tonnes per capita). Data were collected from Eurostat and the World Bank databases, depending on availability, for the years 2023 or 2022. Additionally, Croatia's position on implementing sustainable development goals (SDGs) is presented based on the SDG Index, which covers 166 world economies where the *"overall score measures the total progress towards achieving all 17 SDGs. The score can be interpreted as a percentage of SDG achievement, with a score of 100 indicating that all SDGs have been achieved."*

4. ANALYSIS OF RECENT SD INDICATORS IN CROATIA

Economic and social indicators suggest that Croatia's economy is expected to grow at a faster pace than the European average, a common characteristic of developing countries, which sets a strong foundation for further structural changes. Furthermore, following recent reductions, Croatia now has an unemployment rate on par with the EU average, although its employment rate still trails below both the EU average and the targets set by European development strategies. With an average monthly salary of €840, Croatia ranks in the lower half within the EU, and nearly 20% of its population remains at risk of poverty and social exclusion. Regarding public debt, Croatia adheres to the stability levels outlined by the Maastricht convergence criteria, reflecting its ongoing adaptation as a new Eurozone member and its implementation of reforms necessary to fully realize the benefits of the shared currency. Modern economic trends are increasingly shaped by the need to incorporate advanced sources of economic growth and their outputs into national economies.

Consequently, the state of the economy, including progress in sustainable development, must be evaluated in the context of investment in research and development, education, and other knowledge economy indicators. In these areas, Croatia invests a higher share of public funds in education than the EU average, has a youth dropout rate almost five times lower than the EU average, and demonstrates a rising percentage of its population aged 30-34 with tertiary education. However, investments in research and development, significantly below the EU average, and their commercialization - namely the development of innovative products and services for national economic gain, especially through exports - remain critical challenges. Table 1 provides a summary of Croatia's and the EU's standings across key groups of sustainable development indicators.

Indicator	EU	Republic of Croatia
Economic and social indicators		
GDP growth rate (%)	0,4	3,1
GDP per capita (in euro)	29280	14750
Employment rate (%, population 15-65)	70,4	65,8
Unemployment rate (as percentage of the labour force aged 15 - 74 years)	6,1	6,1
People at risk of poverty or social exclusion (% of the population)	21,6	19,9
Minimum wage (euro per month)	-	840
Government gross debt (% of GDP)	81,7	63
Knowledge economy indicators		
Government expenditure on education, total (% of GDP)	4,9	5,2
Early school leavers (% of population 18 - 24)	9,5	2
Population of 30-34 years with completed tertiary education (%)	44,7	38,5
Research and development expenditure (% of GDP)	2,3	1,24
High-technology exports (% of manufactured exports)	16	12
Environmental protection indicators		
National expenditure on environmental protection by institutional sector (% of GDP)	2,2	2
Electricity prices (Euro per MWh, incl. taxes)	285	154,3
Energy imports dependency (% of gross available energy)	62,5	60,3
Renewable energy (% in gross final energy consumption)	23	29,4
Recycling rate of municipal waste (% of total municipal waste)	48,7	34,2
Greenhouse gas emissions (Tonnes per capita)	7,8	6,7

Table 1: Sustainable development indicators in the Republic of Croatia and the EU (Source: developed by authors based on Eurostat (1-5), 2024, World Bank (1-2), 2024)

Environmental protection indicators reveal that Croatia's public investment in environmental activities aligns closely with the EU average, amounting to approximately 2% of GDP. Additionally, Croatian citizens pay notably lower electricity prices than the EU average, while significant progress has been made in renewable energy use and reducing harmful emissions. In these areas, Croatia holds a stronger position compared to the EU average, signaling a positive outlook for future sustainability efforts. However, a major challenge for both the EU and Croatia remains the high dependency on imported energy, which constitutes over 60% of available energy. This vulnerability has become particularly apparent amid the ongoing Russian-Ukrainian conflict and recent tensions in the Middle East. Moreover, the data underscore the need for greater efforts in waste recycling. According to the SDG Index, Croatia ranks 8th out of 166 countries, which certainly represents an impressive achievement. With a score of 82.19, Croatia meets 82.19% of the globally prescribed sustainable development goals. Notable progress has been made in the areas of No Poverty, Quality Education, and Reduced Inequalities. Conversely, areas with declines, which pose future challenges, include Responsible Consumption and Production, as well as Climate Action. Within Responsible Consumption and Production, the most problematic issues identified are nitrogen emissions from production and plastic waste exports. In Climate Action, the GHG emissions embodied in imports stand out as a critical future challenge. Croatia's overall progress toward the SDGs is illustrated on Image 1.

Image 1: Trends of SDG goals in the Republic of Croatia in 2024
(Source: Sustainable Development Report (1), 2024)

Analyzing all EU member states according to the global SDG Index, Finland, Sweden, Denmark, and Germany occupy the top positions, while the Republic of Croatia ranks 7th. Notably, 8 EU member states are among the top 10 countries globally in the SDG Index. The remaining two spots are held by Norway (7th place) and the United Kingdom (9th place), both of which are closely connected to the EU economy, directly and indirectly.

Figure following on the next page
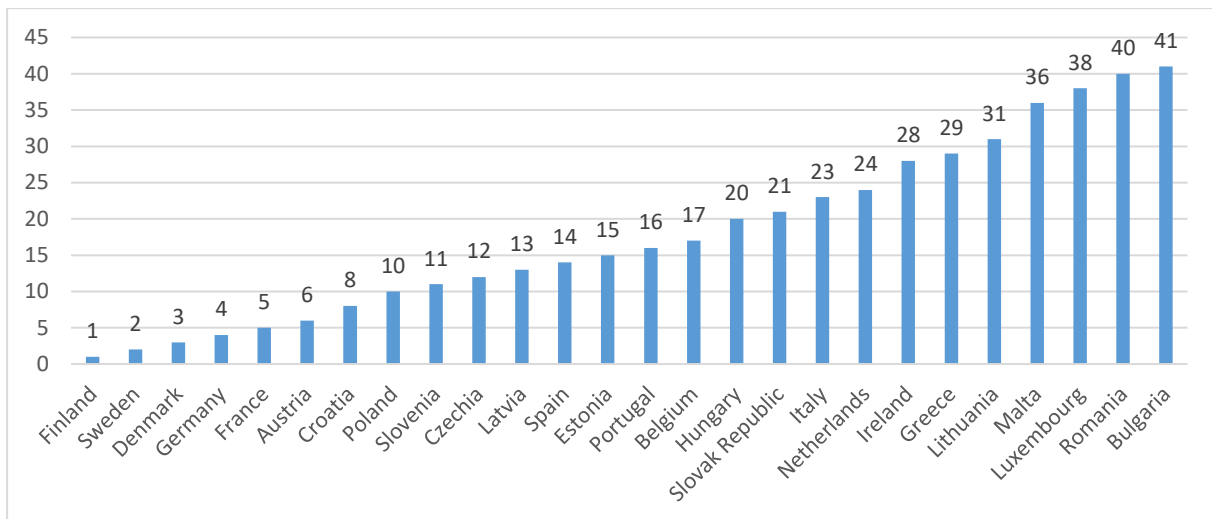
Figure 1: EU Member States According to the SDG Indeks in 2024
(Source: developed by authors based on Sustainable Development Report (2), 2024)

This demonstrates that the EU has established itself as a global leader in promoting and achieving sustainable development goals, which strongly contributes to its competitiveness and the attainment of positive economic and social trends. Within this context, the Republic of Croatia is highly ranked, reflecting its capability and readiness to adopt contemporary global and European development pathways. However, challenges and open questions remain, requiring careful mitigation and reinforcement through available financial and other implementation tools.

5. CONCLUSION

Generally, in terms of Croatia's outlook and in the context (of the economic dimension) of sustainability, Mačkić, Matutinović, and Recher (2020) argue that the COVID-19 pandemic exposed all the vulnerabilities of Croatia's deindustrialized economy, which has largely relied on tourism and other service sectors since gaining independence. Neglecting the industrial sector not only risks the loss of technical and technological competencies but also makes the entire economy dependent on international trade to meet even the population's primary needs. In times of crisis, such as a prolonged pandemic or international trade or military conflicts, this dependency can evolve into a national security issue. A vision for Croatia should first address its economic identity: should it be an attractive, high-income destination or one that prioritizes employment growth? The social democratic answer to this dilemma is clear and consistent— employment. Today, this objective also includes prioritizing environmentally sustainable job growth. This decade is crucial for securing biodiversity, halting climate change, and laying the groundwork for more sustainable production, consumption, exchange, and distribution of scarce resources. If Croatia envisions itself as a modern, innovative, open, inclusive, healthy, green, secure, and sustainable economy, it must commit to specific steps in that process. The first step is setting clear goals for environmental, social, and economic transformation. The EU Council has issued recommendations for Croatia, including enhancing capacities for regulation implementation, strengthening anti-corruption measures, and establishing an efficient, stable, and predictable regulatory and legal system that enables effective dispute resolution mechanisms. Implementing these recommendations is essential for advancing the Green Plan in Croatia, supporting the transition to a fair, prosperous society with a competitive, resource-efficient, and modern economy. Incorporating European Green Plan strategies in Croatia's recovery program could ultimately stimulate economic growth and innovation (European Commission, 2020).

Specifically, the results of the analysis conducted in this paper indicate that, despite some remaining lags, the Republic of Croatia is experiencing positive economic trends. This progress occurs amid existing structural limitations and labor market challenges. In the field of implementing a knowledge economy, Croatia is making advancements in education; however, challenges remain in terms of investment in research and development, as well as in the commercialization of these outputs to achieve economic growth and competitiveness. Regarding environmental goals, the Croatian economy, like that of the entire EU, is marked by a high level of energy dependency, which complicates the green transition and the achievement of climate and energy efficiency targets set out in European development strategies, particularly the European Green Deal. Nevertheless, Croatia's strong global position in the SDG Index clearly reflects the country's orientation and commitment toward sustainable development goals (e.g., significant progress in the use of renewable energy sources and reduction of harmful emissions). In these areas, Croatia ranks better than the EU average, which is certainly a positive indicator for the future. Ranking eighth globally, Croatia has outperformed many more developed countries, which serves as a solid foundation for long-term stable economic growth. The research conducted here builds upon existing studies on this topic and provides a foundation for future research, which should focus on quantifying the effects of implementing sustainable development measures on the macroeconomic and social characteristics of Croatia's economy.

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SUSTAINABLE AVIATION FUELS: A PATWHWAY TO DECARBONIZATION IN AVIATION – THE CASE STUDY OF SWISS INTERNATIONAL AIRLINES

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ABSTRACT

Despite contributing only 2.5% of global anthropogenic CO2 emissions, aviation faces intense scrutiny due to its significant challenges in decarbonization. The industry's dependence on energy-dense fossil fuels and the current technological constraints of alternative energy sources make it particularly difficult to reduce its carbon footprint. As part of global efforts to meet international climate goals, such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), aviation has become the center of attention in the climate change mitigation effort. Industry stakeholders are under increasing pressure to adopt sustainable practices that can reduce environmental impact. Among these solutions, Sustainable Aviation Fuels (SAF) have emerged as one of the most promising, offering the potential for substantial emission reductions without requiring major technological modifications to aircraft. This paper examines SWISS International Airline's initiatives to implement Sustainable Aviation Fuel (SAF) as a component of its comprehensive sustainability strategy. With this case study, this research analyzes the integration of SAF into the airline's operations and assesses the challenges and opportunities encountered during the process. The methodology employs qualitative research techniques, combining primary data obtained from interviews with corporate responsibility executives with secondary data from corporate sustainability reports to provide an in-depth understanding of the adoption of SAF. Being a contemporary and under-researched phenomenon, qualitative and exploratory research was employed to facilitate a comprehensive analysis of the complexities inherent in the adoption of SAF. While focusing primarily on SWISS, the research examines the broader implications of SAF implementation within the aviation sector. It investigates the tecno- economic, environmental, and regulatory factors that influence the viability and scalability of SAF, as well as the role of market-based mechanisms, such as emissions trading systems. The findings of this innovative study provide insights how SAF can contribute to mitigating the aviation industry's carbon footprint and enhance its sustainability, thus establishing a foundation for the future of sustainable aviation.

Keywords: Aviation, Decarbonization, Reduced emissions, Sustainable Aviation Fuels (SAF), Case study

1. INTRODUCTION

As one of the fastest-growing sectors worldwide, the aviation industry plays a vital role in global trade and the economy, supporting 87.7 million jobs and contributing 4.1% to the global GDP.[1] However, the sector's rapid growth also brings significant environmental costs, with aviation accounting for a substantial share of global greenhouse gas emissions.

With projections indicating a doubling in aviation fuel consumption by 2050, the need for sustainable alternatives is clear. Among the available options, Sustainable Aviation Fuels (SAFs) have emerged as one of the most viable near-term solutions capable of reducing life-cycle emissions by up to 80%. In response to the environmental challenges posed by aviation, organizations, such as the International Civil Aviation Organization (ICAO), have aligned their carbon reduction goals with those of the Paris Agreement, aiming for carbon-neutral growth from 2020 and net-zero emissions by 2050. ICAO's strategy outlines four main pillars for decarbonization: advancing aircraft technology, optimizing operations, expanding the use of SAF, and implementing market-based measures such as CORSIA.[2] As a renewable energy source compatible with current airplanes and aviation infrastructure, SAFs are essential for enabling immediate reductions in aviation emissions. This study examines the adoption of SAFs by SWISS International Airlines through a case study approach. It aims to understand how SWISS navigates the multifaceted challenges of SAF adoption, focusing on the economic, regulatory, environmental, and technological barriers as well as the risks involved. By exploring these interconnected factors, this study sheds light on the potential and limitations of SAF as a decarbonization strategy within the aviation sector while identifying the critical areas necessary for its broader adoption.
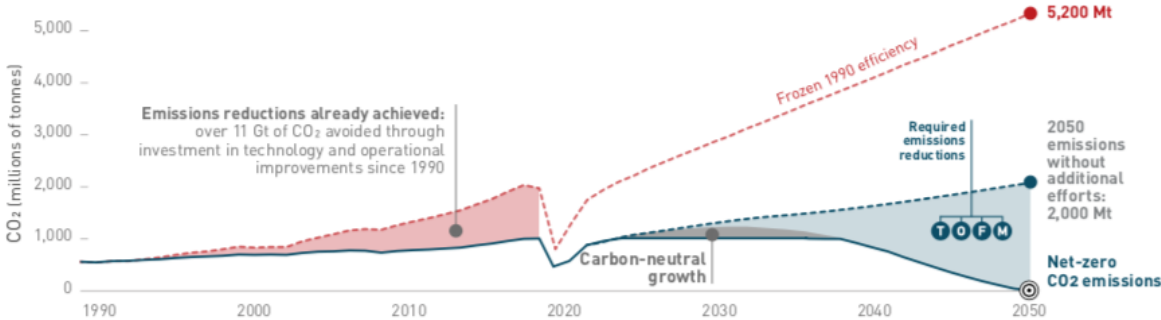
Figure 5: Prediction of CO2 emissions until 2050. (Source: Waypoint2050)

2. TECHNOLOGY

Despite contributing only approximately 2.5% of global carbon emissions[3], aviation faces significant challenges in decarbonization due to technological and economic constraints. Long-distance flights require high-energy-density fuels for large aircraft, for which viable alternatives are unavailable. Economic factors also exert influence, as airlines operate with minimal profit margins, and aircraft, which represent valuable long-term assets, typically remain in service for over 25 years. The competitive nature of the industry has always driven technological innovation, with each new aircraft generation achieving reductions in CO_2 emissions of up to 25%. The Air Transport Action Group (ATAG) forecasts that investments and gains in new technologies can contribute from 12 to 34% to reduce CO2 emissions depending on the level of investment in new evolutionary and revolutionary technologies.[4]

2.1 Evolutionary Technologies

Evolutionary aircraft design will continue to help reduce fuel use and emissions in the next generation of traditional aircraft. This involves the incorporation of technology that is being developed to be integrated into existing types as they come off the production line over the coming years or to be retrofitted into in-service aircrafts. Evolutionary technologies are progressively enhancing the sustainability of aviation.

Recent advancements in evolutionary technologies, such as improvements in engine efficiency, lightweight materials, additive manufacturing and aerodynamic designs, offer incremental yet significant gains in fuel efficiency, cumulatively reducing emissions by approximately 25% per generation of new aircraft.[5]

2.2 Revolutionary Technologies
In the long run, revolutionary aircraft and engine technologies are expected to contribute significantly to sustainable aviation and reduce fuel consumption and emissions. On the aircraft side, it is expected that innovative design concepts such as canards, truss-braced wings, box-wing, or even blended wing-body will be explored in the future. On the propulsion side, emerging technologies such as electric, hybrid-electric, hydrogen-powered engines, and open rotors represent promising options for the future. However, challenges, such as weight constraints and energy density, currently limit these systems to short-haul operations. While these alternative systems may evolve over time, liquid fuels are likely to remain the aviation's primary energy source due to their superior energy density and the slow turnover of existing fleets.

3. OPERATIONS AND INFRASTRUCTURES
Operational and infrastructure advancements can significantly improve fuel efficiency and reduce emissions, aiding aviation's goal of net-zero carbon emissions by 2050. The ICAO indicates that targeted investments in these areas can account for at least 3% of this objective. However, airspace congestion, which affects the efficiency of air traffic management (ATM) efficiency, can negate these benefits. Measures such as engine washing, electronic flight bags, single-engine taxiing, last-minute fuel adjustments, and wake energy retrieval (biomimetic techniques) can reduce emissions by optimizing fuel use. Infrastructure enhancements, such as optimized ATM through SESAR in the EU and NextGen in the U.S., are also essential. Techniques such as reducing Auxiliary Power Unit (APU) usage, Continuous Descent Operations, and 4D Trajectory-based Operations further contribute to fuel and emission reductions.[4]

4. SUSTAINABLE AVIATION FUELS (SAF's)
Sustainable Aviation Fuels (SAF) are renewable, non-fossil-based jet fuel alternatives produced from sources such as waste oils, agricultural residues, municipal waste, or a combination of hydrogen and CO_2 from sustainable sources. SAF meets strict quality standards, enabling seamless integration with existing aircraft, engines, and infrastructure without modifications. Its primary benefits include a potential 70–80% reduction in greenhouse gas emissions and enhanced energy security while also driving innovation and job creation in the clean energy sector. However, their high production costs, limited capacity, and regulatory hurdles have restricted their widespread adoption.[6]

4.1 Production Pathway of Sustainable Aviation Fuels
Currently, SAF is more expensive than conventional jet fuel, with various production pathways such as Hydrotreated Esters and Fatty Acids (HEFA) and Fischer-Tropsch processes that differ in costs and emissions reductions. Regulatory frameworks such as the EU's Renewable Energy Directives and ICAO's CORSIA drive SAF development by setting blending mandates and offering incentives. SAF can be broadly divided into two categories: biofuel and synthetic fuel.

4.1.1 Biofuels

SAFs sourced from biomass, such as waste oils, fats, and municipal solid waste (MSW), avoid food crop competition and offer circular economic benefits. Feedstocks such as cellulosic waste, cover crops, jatropha, halophytes, and algae are promising for SAF because of their sustainability advantages, from reduced greenhouse gas emissions to economic viability. In actuality, only HEFA is produced in scale; nevertheless, biofuels will not be scalable to the aviation needs.[7] Thus, other possibilities need to be explored, such as synthetic fuels.
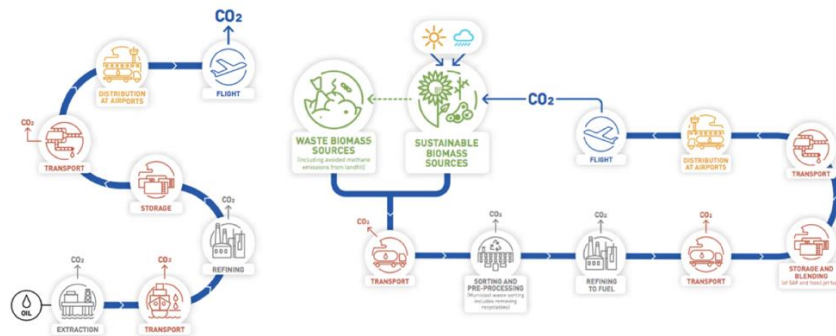
Figure 6: Diagram of carbon life cycle for fossil fuel (left) Vs sustainable biofuel (right) (Source: ATAG)

4.1.2 Synthetic fuels

Also called e-fuels, synthetic fuels are not dependent on biomass, which helps avoid sustainability issues such as land use conflicts and the food versus fuel debate. Although e-fuel research is less mature than bio-SAF, e-fuels offer substantial potential for short- and medium-term decarbonization. The production of e-fuels involves the production of syngas by combining green hydrogen produced through water electrolysis using renewable electricity with CO_2 from concentrated sources or direct air capture. The power-to-liquid (PtL) method remains the most developed for e-fuel production, whereas the newer sun-to-liquid (StL) pathway, or solar fuels, provides a promising low-carbon energy solution by directly converting solar energy, water, and CO_2 into hydrocarbon fuels. These carbon-neutral fuels match the energy density of fossil fuels, emitting only as much CO_2 as that used in the production process. However, the sun-to-liquid technology is currently in the early stages of development.[8]
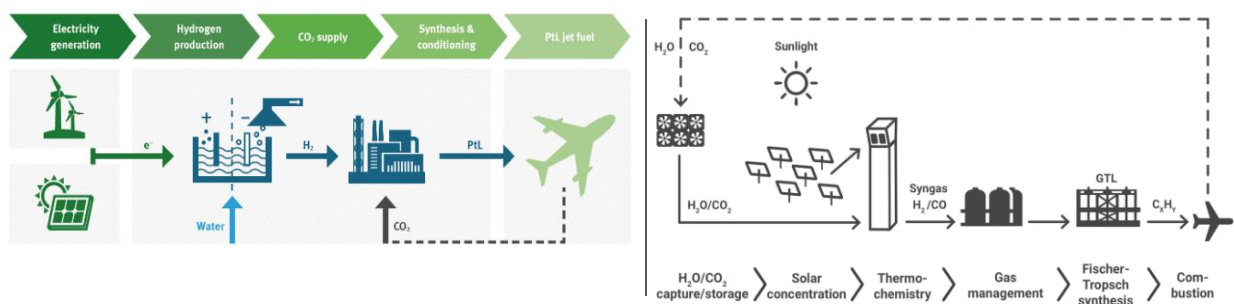
Figure 7: The fuel production chain process of Power-to-Liquid fuel (left) and Sun-to-Liquid fuel (right). (Sources: ICAO/IEA)

4.2 Techno-economic Analysis of Sustainable Aviation Fuels

Sustainable Aviation Fuel (SAF) is generally more expensive than conventional jet fuels, with prices typically ranging from two to five times higher.[9] Factors contributing to the high costs of SAF include limited production scale, complex production processes, and feedstock availability.

As technology advances and economies of scale improve, SAF costs are expected to decrease, potentially supported by government incentives, carbon pricing, and airline commitments to sustainability. The HEFA pathway currently offers the most cost-effective SAF production, but is limited by feedstock availability. Fischer-Tropsch (FT) and Alcohol-to-Jet (AtJ) pathways show promise, especially when utilizing cost-effective feedstocks like municipal solid waste (MSW), although they remain more expensive than conventional fuel. Power-to-Liquid (PtL) SAF has high production costs due to energy-intensive green hydrogen and CO_2 capture processes, but it offers long-term scalability when supported by renewable energy sources. Future SAF viability depends on further technological improvements, feedstock diversity, and favorable regulatory frameworks, alongside careful environmental impact considerations to ensure alignment with sustainability objectives. The following graph shows the levelized cost of production of the different pathways and feedstocks.
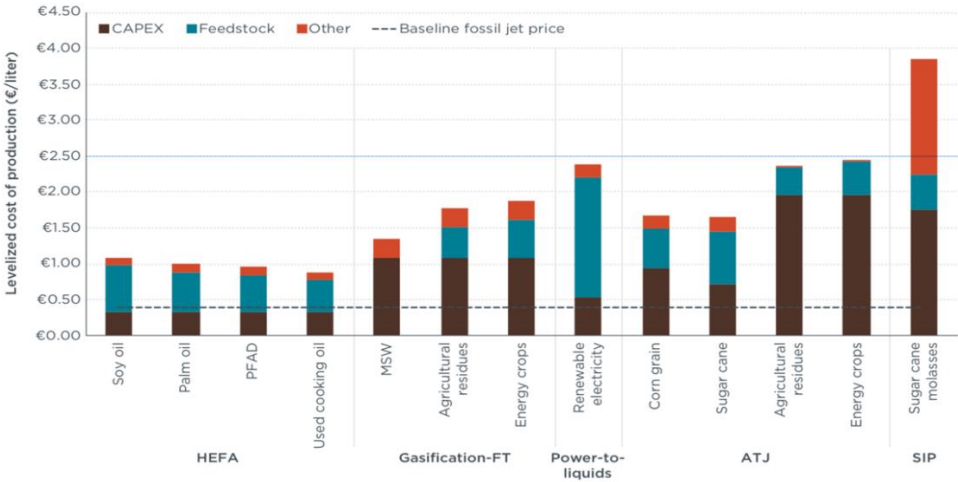
Figure 8: Levelized cost of production of different SAF pathways.(Source: ICCT)

4.3 Environmental and Socioeconomic Impacts of Sustainable Aviation Fuels

The techno-economic analysis reveals that Sustainable Aviation Fuel (SAF) is not yet cost-competitive with fossil jet fuels, although its environmental benefits are clear. Assessing the greenhouse gas (GHG) emissions of SAF requires Life Cycle Analysis (LCA), typically measured in CO_2 equivalents per megajoule (gCO2eq/MJ). Conventional fossil jet fuel has a carbon intensity of approximately 85–95 gCO2eq/MJ, whereas SAF pathways are generally much lower. The HEFA pathway, especially when using waste fats and oils, achieves GHG savings of 25–85% compared to conventional fuel, although emissions vary depending on hydrogen sources and feedstock. Fischer-Tropsch (FT) SAF, particularly from waste-based feedstocks, has some of the lowest GHG emissions, achieving 85–95% reductions, while Alcohol-to-Jet (AtJ) has variable savings due to its energy-intensive processes. E-fuels present the highest emission reduction potential, cutting GHG emissions by over 95% when produced with renewable energy, but their performance relies heavily on the availability of green electricity.[10]

Sustainability encompasses environmental, social, and economic dimensions. From a socioeconomic perspective, the adoption of SAFs can lead to long-term economic and health benefits. SAFs will also stimulate the economy by creating employment opportunities in renewable energy and related sectors, fostering innovation and regional development through the production of valuable feedstocks for SAF production in the most underdeveloped regions of the world. Policies incentivizing SAF adoption, such as carbon pricing or subsidies, aim to reduce emissions and often have socioeconomic benefits, including the promotion of cleaner energy industries and support for communities involved in SAF feedstock production.

Future SAF production must expand significantly to meet emission targets, requiring substantial investment and a global regulatory alignment. The "book and claim" system presents an economic solution to escalate SAF by enabling airlines to claim carbon benefits without requiring direct fuel utilization, thereby simplifying logistics and facilitating broader adoption.

5. MARKET-BASED MECHANISMS FOR CARBON REDUCTION IN AVIATION

Economists view emissions as a problem of negative externalities, in which the costs of pollution and environmental damage are not reflected in the market prices of goods and services.[11] Economic incentives such as emission taxes, tradable allowances, and regulatory policies are essential for internalizing environmental costs. These mechanisms encourage cleaner production methods by aligning private incentives with social welfare.[12] Carbon pricing, including the EU Emissions Trading System (EU-ETS) and the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), is a key tool for emission reduction. CORSIA, a global initiative, mandates that airlines offset emissions exceeding a predetermined baseline through the utilization of carbon credits from verified projects. The baseline was established at 2019 emission levels and, commencing in 2024, is reduced to 85% of 2019 emissions.[13]

The EU-ETS operates on a cap-and-trade system within the European Union, enforcing sector-wide emission limits. Under the EU-ETS, emission allowances are initially allocated free of charge based on emissions, and these allowances are subsequently auctioned. Free allocation to aircraft operators will be reduced by 25% in 2024 and by 50% in 2025, transitioning to full auctioning for the sector by 2026. A linking agreement with Switzerland ensures the alignment of the EU and Swiss trading systems. Effective January 2024, EUR 1.6 billion from ETS allowances have been allocated to address, partially or fully, the price differential between conventional fossil fuels and eligible alternative aviation fuels.[14]

Voluntary offset markets also contribute to carbon reduction, allowing companies to offset emissions beyond regulatory requirements, although they lack the rigor of compliance markets, raising concerns about greenwashing.

6. RESEARCH METHODOLOGY

The adoption of a case study approach enables an in-depth examination of SAF adoption within its real-world context, which is essential for exploring the underresearched aspects of this topic. This methodology links empirical data to the study's initial research questions, facilitating the derivation of meaningful conclusions.[15] The investigation employed a qualitative, exploratory approach with data collection conducted in two phases: interviews with key SWISS personnel and analysis of secondary data from SWISS and Lufthansa Group reports and SAF educational sessions. Semi-structured interviews with SWISS's Head of Corporate Responsibility provided primary data on SAF's strategic and operational integration, elucidating insights into the challenges and opportunities in SAF adoption. Data analysis involved the identification of key themes and trends from the collected data to interpret organizational processes and decision making. However, the single-case study design limits the generalizability of the findings and the evolving SAF landscape presents uncertainties. Future research could expand on multicase and longitudinal designs. Ethical considerations encompassed data triangulation, objective analysis, and peer reviews to ensure unbiased results, supported by the researcher's professional background in SWISS. These measures contribute to a balanced and comprehensive evaluation of the SWISS SAF strategies.

7. FINDINGS

SWISS International Airlines, a subsidiary of the Lufthansa Group, is a member of the Star Alliance, which constitutes the largest global airline network. As a Lufthansa subsidiary, SWISS leverages the group's extensive resources, collaborative strategies, and sustainability policies, which are oriented towards mitigating environmental impact and promoting long-term industry innovation. This affiliation is particularly pertinent in the context of Sustainable Aviation Fuel (SAF) adoption, as both SWISS and Lufthansa are actively pursuing SAF as a crucial component of their decarbonization strategies. The alignment with Lufthansa enables SWISS to integrate into a broader framework that facilitates shared sustainability objectives and investments, utilizing Lufthansa's scale and influence in domains such as research, partnerships, and regulatory engagement. Consequently, the SAF initiatives implemented by SWISS are not isolated endeavors, but components of a coordinated, group-wide approach to promoting sustainability across operations.

7.1 Environmental Benefits

SWISS has established ambitious objectives for reducing CO2, aiming to halve 2019 net CO2 emissions by 2030 and achieve carbon neutrality by 2050. The airliner bases its effort on the four pillars identified by ICAO and IATA: fleet renewal, operational measures, Sustainable Aviation Fuels (SAF) and investments in climate protection projects. Investments in fleet modernization, with the introduction of new-generation aircraft. These advanced aircraft demonstrate up to 30% reduction in fuel consumption and carbon emissions compared to their immediate predecessor models. With this contemporary fleet, SWISS demonstrates the lowest specific fuel consumption within the entire Lufthansa Group, at 3.27 l/100pkm. Operational measures constitute another factor contributing to the achievement of the objective, with the organization engaging in continuous optimization of flight procedures and routes, weight reduction strategies, and fleet maintenance, specifically through engine washing. Cleaner engines operate at lower temperatures, consume less fuel (approximately 1% less), and consequently emit reduced levels of CO2.

Sustainable Aviation Fuels are key elements in achieving CO2 targets for aviation. The Lufthansa Group joined the First Movers Coalition of the World Economic Forum. This initiative aims to use at least 5 % SAF in 2030.[16] The currently available SAF reduces CO2 emissions by up to 80% but are only available in small quantities and at a higher price (3-5 times more expensive than conventional kerosene). In 2023, SWISS achieved a reduction of approximately 5,400 tons of CO2 through the use of Sustainable Aviation Fuel (SAF), while the Lufthansa Group collectively reduced over 43,600 tons. Unlike offsetting, SAF directly lowers emissions by substituting fossil fuels, offering a more immediate impact on CO2 reduction. SWISS and the Lufthansa Group invest in climate protection initiatives and innovative technologies to mitigate unavoidable CO2 emissions, supporting the Paris Agreement's objective of minimizing greenhouse gases. In collaboration with customers, they contribute to global projects aimed at avoiding emissions or permanently sequestering CO2.

7.2 Economic Factors

The most significant economic factor is the high cost of Sustainable Aviation Fuels (SAF). SAF is 3 to 5 times more expensive than conventional fossil fuel. Fuel represents the largest variable cost for airlines, accounting for approximately 25% of total costs.[17] This has a substantial impact on airline profitability as airlines operate with narrow profit margins. To address these increased costs, SWISS, alongside the Lufthansa Group, pioneered the involvement of clients in a voluntary market by introducing Green Fares in 2023.

These fares aim to reduce 20% of individual flight-related CO2 emissions by utilizing sustainable aviation fuels (SAFs) and offset the remaining 80% of CO2 emissions to an equivalent extent by contributing to climate protection projects. In 2023, approximately 5% of the SWISS passengers opted for the Green Fare. To address part of the increased compliance costs associated with Sustainable Aviation Fuel (SAF) mandates and carbon pricing mechanisms, such as CORSIA and EU/CH-ETS, the organization has implemented an Environmental Cost Surcharge. This surcharge is applicable to departures from the 27 EU member states, UK, Norway and Switzerland. The surcharge ranges from 1 to 72 Euros, depending on the class of travel and flight distance, and will be effective for departures from January 2025.[18]

7.3 Collaborations and Partnerships
Aware of the limited availability of SAF and biofuels, SWISS is collaborating closely with the Lufthansa Group (LHG) on partnerships aimed at ensuring a sustainable long-term supply of SAF. LHG has secured four offtake agreements, guaranteeing the procurement of 3.399 million liters of SAF. Additionally, SWISS established a strategic partnership with Synhelion, a Swiss company pioneer in sun-to-liquid fuel technology[8], to accelerate and scale up this innovation, positioning SWISS as the first airline in the world to utilize solar fuels. To address unavoidable CO_2 emissions, SWISS and LHG have also partnered with Climeworks[19] for carbon removal via direct air capture (DAC), enabling captured carbon to be either permanently stored or used as a feedstock for next-generation synthetic fuels.

7.4 Regulatory and Policy Factors
SWISS anticipates a rise in compliance-related costs in the coming years, driven by SAF mandates and the EU/CH Emissions Trading Systems (ETS). As part of the Fit for 55 package, the ReFuelEU Aviation[20] initiative aims to reduce emissions by 55% by 2030, setting a European SAF blending mandate that begins at 2% in 2025, increases to 6% by 2030, and continues to increase thereafter. Additionally, the European ETS, which places a cost on carbon emissions, is expected to further increase costs due to the planned reduction of free allowances and a full transition to auction-based pricing by 2026. SWISS supports the establishment of global regulatory instruments and would welcome a global SAF blending mandate, as this would help prevent competition distortion and mitigate carbon leakage. However, the company emphasizes that scaling SAF adoption will require robust support programs to make SAF economically viable on a larger scale.

7.5 Risks
Decarbonizing aviation presents several risks. Europe's progressive environmental policies, including SAF mandates and carbon pricing (ETS), may disadvantage European companies, risking competitive distortion. Carbon leakage is another risk, as emissions reductions in regulated regions could drive emissions increases in areas with relaxed environmental standards. Higher SAF-related costs may prompt airlines to shift operations to such regions, effectively transferring emissions. Additionally, feedstock competition might divert resources from other renewables, while lower fossil fuel demand in regulated areas could lead suppliers to target less-regulated regions, potentially increasing emissions. If SAF production relocates to areas without robust environmental standards, reliance on non-renewable energy could offset its climate benefits. Another risk is oil price volatility; as sectors such as automotive move towards electrification, potential oil price drops could further challenge the competitiveness and economic viability of SAF. Finally, greenwashing remains a risk, particularly with offsets, if projects lack transparency, verification, or genuine environmental impact.

8. DISCUSSION

Sustainable Aviation Fuel (SAF) plays a pivotal role in SWISS's decarbonization strategy, directly aligning with global aviation goals, such as those set by the ICAO and Paris Agreement. Unlike carbon offsetting, SAF reduces emissions at the source by substituting fossil fuels and reinforcing SWISS's commitment to sustainable operations. As the airline industry faces mounting pressure to reduce emissions, SAF has emerged as a practical and immediate solution, particularly for reducing life-cycle emissions by up to 80%. While SAF holds promise for SWISS's ambitious environmental targets, such as halving 2019 CO2 levels by 2030, challenges such as limited availability and high production costs restrict its widespread adoption. Despite the potential environmental benefits, the current scale of SAF production remains insufficient to meet the demand, limiting its role in significant carbon reduction for aviation. This underscores the need for continued advancements in production technology and policy support to expand SAF availability. The high cost of SAF, typically three to five times that of conventional fuel, poses financial challenges for airlines with narrow margins. SWISS's adoption of Green Fares and Environmental Cost Surcharges reflects a strategic effort to compensate for these costs and involve consumers in the sustainability effort. Such measures highlight the delicate balance airlines must achieve between sustainability commitments and financial viability, which is crucial as SAF mandates drive up operational costs. Partnerships are integral to SWISS's SAF strategy, enabling access to vital resources and innovations. Collaborations with the Lufthansa Group, Synhelion, and Climeworks expand SWISS's capacity to adopt cutting-edge technologies such as sun-to-liquid and direct air capture (DAC). These alliances demonstrate that successful SAF integration in aviation often depends on shared expertise and investment, positioning SWISS as a pioneer of SAF adoption. SAF mandates, carbon pricing, and EU/CH ETS regulations are essential for SAF scaling, and SWISS supports these initiatives while advocating global standardization to prevent market distortion. However, regional regulatory disparities could lead to competitive challenges, underscoring the need for harmonized global policies. SWISS's alignment with regulatory frameworks reflects an industry-wide call for consistent policies to support long-term SAF adoption. Decarbonizing aviation poses several risks, including carbon leakage, feedstock competition, oil price volatility, and greenwashing. Carbon leakage, where emissions reductions in one area may cause increases in another, is a pressing concern, as regulatory costs could push airlines to less-regulated regions. The potential for feedstock diversion and volatile oil prices could further challenge SAF's competitiveness. Addressing greenwashing concerns with transparent offsets and rigorous standards is essential for maintaining consumer trust in environmental claims. SWISS's SAF initiatives, if scaled and aligned with favorable policies, could become a model for the broader aviation sector. SAF adoption has transformative potential; however, its success depends on the alignment of scale, economic viability, and supportive regulations. By leading in SAF integration, SWISS exemplifies how airlines can contribute to decarbonization, shaping a more sustainable aviation future if SAF production, costs, and global standards continue to advance.

9. CONCLUSION

Sustainable Aviation Fuel (SAF) is central to SWISS's decarbonization strategy, offering immediate emissions reductions while aligning with international goals, such as those set by the ICAO and the Paris Agreement. SWISS's experience underscores both the promise of SAF, with potential life-cycle emissions reductions of up to 80%, and the ongoing challenges, such as limited availability and high costs, that hinder large-scale adoption. Partnerships with the Lufthansa Group, Synhelion, and Climeworks exemplify how collaborative innovation can address these obstacles, while strategic initiatives like Green Fares and Environmental Cost Surcharge reflect SWISS's proactive approach to managing SAF-related costs.

Scaling SAF will require cohesive international regulatory support, investments in production, and competitive pricing. Challenges, including risks such as carbon leakage, oil price volatility, and greenwashing, underscore the importance of transparent and rigorous standards in building public trust. By aligning global standards, scaling up production, and ensuring financial support, SWISS's pioneering role in SAF adoption can serve as a model for other airlines, helping the industry heading toward a more sustainable aviation future.

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TOP MANAGEMENT AND INTRAPRENEURIAL DYNAMIC: A MULTI-SECTOR ANALYSIS

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ABSTRACT

In management literature, it is well known that there is a wide range of mechanisms available to facilitate the development of an intrapreneurial climate within companies. Many academics have examined the levers of intrapreneurial dynamics. The models presented by the various researchers highlight a panoply of levers likely to influence the intrapreneurial behavior of employees. For example, Basso and Legrain identify five determining factors, including the strategic vision and leadership of managers. For their part, Ireland, Kuratko and Morris have highlighted the impact of intrapreneurial strategy on performance, drawing on levers such as human resources management, culture and structure. The present work is part of a growing body of research on the intrapreneurial process. The main objective is to assess the impact of managerial support on the adoption of intrapreneurial behavior by employees working in different business sectors, especially Morocco's global businesses (MMM). The research enabled us to highlight certain levers that have a direct impact on the development of intrapreneurial behavior, notably the project-based approach adopted by top management.
Keywords: Intrapreneurship, Top management support, Morocco's global businesses.

1. INTRODUCTION

Morocco's strategic development choices have put it on the path to openness and progress. This process has been intensified by the implementation of targeted sectoral strategies. As a result, the Moroccan industrial sector has embarked on a growth dynamic that has been strongly consolidated since the implementation of the Emergence Plan and the conclusion, in 2009, of the National Pact for Industrial Emergence. Tangible achievements to date include a 22% increase in exports in the sector, a marked improvement in infrastructure and the arrival of world-class industrial leaders, boosting foreign direct investment to an average annual rate of 23% since 2009. These achievements have put Morocco firmly on the world's radar as a credible and competitive industrial destination. The challenge now is to consolidate the foundations of the existing industrial edifice, in order to make the most of the country's industrial potential, which lies at the crossroads of Europe, Africa, the Middle East and America. However, the new context characterized by violent environmental turbulence requires us to reinvent ourselves in order to create value and meaning. That said, it is imperative to accompany industrial strategy with intelligent human resources management.

Indeed, the development of creativity and intrapreneurial behavior within Moroccan companies is essential to stimulate innovation, promote adaptability and strengthen competitiveness in globalized markets. Intrapreneurship represents a serious avenue for firms wishing to develop a competitive edge and extend their market leadership. The aim of this article, which is part of the body of research on the intrapreneurial process, is to assess the impact of managerial support on intrapreneurial development in Morocco's main industrial sectors. The study aims to answer two questions: Can we speak of managerial support from top management for intrapreneurial initiatives? If so, what forms does this support take? Using data from a survey of some 40 mainly manufacturing firms, this study seeks to contribute to the literature by highlighting the importance of developing an intrapreneurial dynamic within Moroccan companies.

2. CONTEXT

A report published by the McKinsey Center for Government on the challenges facing the world's governments suggests solutions for governments in these times of international crisis. The report recommends that governments equip themselves with talented, efficient and effective people to lead reform programs. If this is the case for public bodies, what about private companies operating in a highly turbulent environment? Moroccan companies, especially those operating in Morocco's Global Trades, which are considered to be the country's engines of economic growth, are called upon to reinvent their strategies by giving greater importance to innovation, the one and only way in which they can assert themselves in the face of competitors' competitive products. In this sense, intrapreneurship, far from being a risk, represents an opportunity for the managers of these firms. Indeed, this approach is based on a « win-win » partnership, which can only be beneficial if and only if a flexible management framework is created within the organization, including clear standards and simple rules. Although Morocco, like many other developing countries, faces challenges in harmonizing a new generation of high-school-educated, entrepreneurial-minded employees with managers who find it difficult to nurture this talent, efforts to improve this dynamic must be acknowledged. It's true that, more than ever, companies need leadership that liberates energies and inspires. If Moroccan managers are not surrounded by staff with an intrapreneurial streak, they may find it difficult to maximize performance. It is therefore essential to cultivate the intrapreneurial spirit and, where necessary, recruit employees with intrapreneurial potential. By adopting this approach, managers can capitalize on the initiatives and skills of their employees, who are called upon to propose solutions to problems and seize new opportunities as they arise. Instilling an intrapreneurial dynamic is a sine qua non for stimulating creativity and innovation within Moroccan industrial companies.

3. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT
Intrapreneurship

Intrapreneurship, which can be defined as « the adoption of entrepreneurial attitudes and practices within established organizations » (Bouchard, 2009), is attracting a great deal of interest from both business and academic circles. Yet the concept is an old one, as management specialists have been interested in it since the late 1960s, when the first entities dedicated to corporate venturing were taking shape in large American companies. The « intrapreneur » profile proves to be an essential ingredient in every successful innovation process, when managers provide them with a clear vision of the future. The need for innovation is then more apparent, and employees know where to direct their efforts. Initial studies into the intrapreneurial process were carried out in 1976. The results showed that intrapreneurs and entrepreneurs had similar personal characteristics.

In 1985, consultant Gifford Pinchot introduced the neologism « Intrapreneurship », which was to enjoy unprecedented success (Pinchot, 1985). This work enabled intrapreneurship to spread

rapidly to companies around the world. For over two decades, a number of researchers have been developing theories and models to enrich the literature on intrapreneurship. The main aim is to clarify the phenomenon, and explain its contribution to firm survival and performance in hostile, competitive environments. Within this framework, Guth and Ginsberg (1990) described the determinants and possible effects of intrapreneurship through corporate projects and strategic renewal. drazin and Dess (1996) outline the antecedents and consequences of entrepreneurial orientation. Schinde and Schoonhoven proposed a multi-level model representing the effects of context on innovation. Barrett, Balloun and Weinstein (2000) showed a natural progression of business activity from the establishment of mission strategy, intrapreneurial behavior, business practices and competitive tactics, to marketing and sales performance. In the same year, Schinde, Morris and Kuratko proposed an illustrative model of the dynamic nature of the processes triggering intrapreneurship. Antoncic and Hisrich (2001) put forward two factors essential to intrapreneurship, namely the environment and the organization. For their part, Manimala, Jose and Thomas (2005) presented a model of organizational design capable of fostering high-impact innovation. Today, classic organizational designs inspired by Taylorism seem to be outdated (Allali, 2005). It is in this context that intrapreneurship is seen as an alternative and a means of stimulating innovation in products and services, as well as in processes and techniques, while enabling companies to retain the best of their staff.

Managerial support and intrapreneurial development
Support via the Strategic Vision (SV)
Several authors have argued that the degree of impact of an innovation depends on the level of commitment and direct involvement of management in the innovation process. Nunes and Fay cite the levers that top management can use to promote encounters, stimulate initiative-taking, develop relationships and give a voice to employees (Nunes and Fay, 2007). For both authors, it is essential to move away from a structure-based management style, to develop a coherent strategic vision over time, to overcome barriers to initiative-taking, to create a climate conducive to innovation and to develop sponsorship. The profile and coaching style of managers and the executive team certainly have an impact on creativity. Guth and Ginsberg recall the role of leadership, pointing out that: « Many would argue that entrepreneurial behavior in organizations is critically dependent on the characteristics, values/beliefs, and visions of their strategic leaders » (Guth & Ginsberg 1990). Kuratko, Montagno and Hornsby (1990) conducted an empirical study to develop « The Intrapreneurial Assessment Instrument » (IAI), an instrument for identifying the most important environmental factors influencing managers' entrepreneurial behavior. These include managerial support, organizational structure and resource availability (Kuratko & al., 1990). Basso and Legrain clearly set themselves apart when they presented a model that makes managerial support a lever for triggering intrapreneurial dynamics. For the two authors, a strategic vision for intrapreneurship must provide answers to the following questions: What are the major changes desired in terms of target customer profiles, the company's offering and industry competition? What does the company want to become in the next five years? They insist that this type of vision is « (...) inseparable from the exercise of prospective thinking, which is distinct from strategic thinking and unfortunately still little practised by major groups in rethinking their possible main lines of development » (Basso & Legrain, 2004). According to Basso and Legrain, a management team needs to be heavily involved in driving change. Formulating a strategy will have no effect if the management style is not in line with the strategic call. Both researchers prescribe that top management must embody risk-taking, innovation and the entrepreneurial spirit, as it is inconceivable that the management team should demand entrepreneurial or innovative behavior when they themselves fail to lead by example.

Support via the project-based approach (PBA)
A number of studies on intrapreneurship have highlighted the fact that creativity depends on training to enhance the employee's role as a contributor (Jaoui, 2003). Human resources strategy must support the company's innovation strategy by implementing a coherent policy built around training, now a major component of every intrapreneurship scheme. In most companies that decide to create an intrapreneurial dynamic, intrapreneurs benefit from training in business model construction, public speaking and, above all, project management. By way of example, Société Générale's top management trained the 240 intrapreneurs selected by the company in innovative working methods and methodologies: test and learn, agile method, design thinking, customer-centric approach, ability to pivot, to call on networks etc.

For Bouchard, the presence of « organizational slack » is essential. Intrapreneurs often need initial support, in the form of coaching (access to a network in particular) and training (Bouchard, 2009). Senior management support in organizations with high innovative potential mainly takes the form of creating interdisciplinary teams, while encouraging them to take courageous decisions. This support gives employees greater freedom, as they are allowed to use part of their time to explore new ideas and avenues without having to ask permission in advance. The example of the simple 15% rule developed by 3M is an interesting one, and represents a line for other companies to follow.

The aim of the present work is therefore to test the general hypothesis that support from top management, (1) VS and (2) PBA, contributes to the development of intrapreneurial behavior.

This general hypothesis gives rise to two adjacent hypotheses:

H1: Top management supports the development of intrapreneurship
H2: Top management support involves (1) establishing a strategic vision
H3: Top management support involves (2) adopting a project-based approach
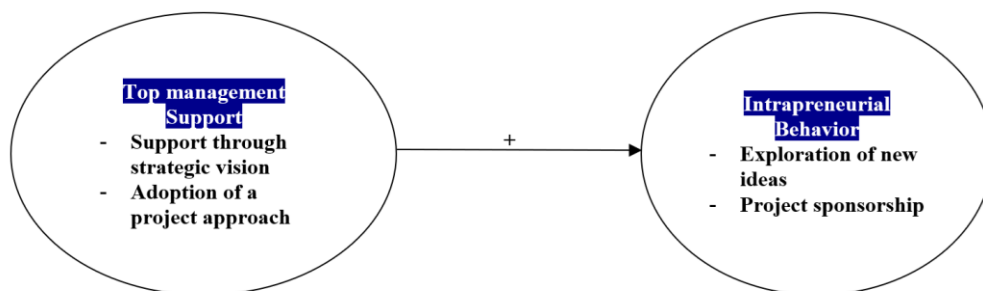
Figure 1: Theoretical model (Source: Own illustration)

4. METHODOLOGY
Data collection
In this study, whose main objective is to assess the impact of top management support on intrapreneurial development, we opted for a hypothetico-deductive approach. The survey was carried out at fifty companies in six different sectors. Of the fifty questionnaires sent out, forty were returned, giving a response rate of 80%.

	Numbers	Percentage
Size		
Less than 50 persons	4	10,0
Between 50 and 250	11	27,5
Between 250 and 500	8	20,0
Between 500 and 1000	10	25,0
More than 1000	7	17,5
Sector		
Automotive	6	15,0
Aeronautics	5	12,5
Agri-food	10	25,0
Electronics	4	10,0
Textile	7	17,5
Finance	5	12,5
Telecoms	3	7,5
Status		
Executives	21	52,5
Middle managers	13	32,5
Frontline Managers	6	15,0

Figure 2: Profile of respondents

Data processing

Data processing with SPSS software, using data cross-tabulation, correlation matrices and factorial correspondence analysis.

5. RESULTS AND DISCUSSION

Main results

In terms of top management support in terms of vision, strategy and communication, half of those surveyed were certain that their management teams had a clear vision and strategy. A good portion of the sample remains undecided (Figures 1 and 2).
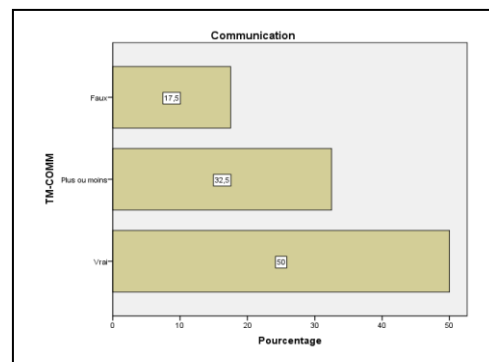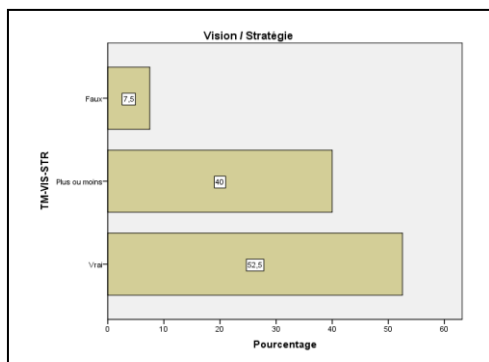
Figure 1: Perception about vision presence (Source: SPSS)   *Figure 2: Perception about communication*

Figure 3 shows that SMEs are the least equipped in terms of clear vision and strategy.
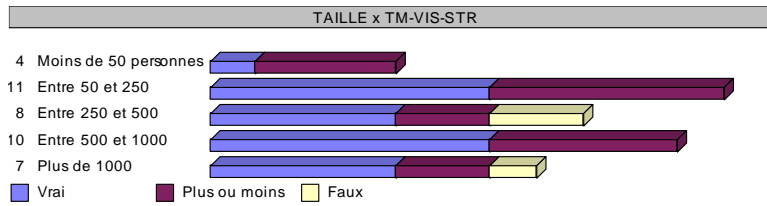
Figure 3: Vision & strategy by company size
(Source: Sphinx)

Among Morocco's global businesses, skepticism remains the main characteristic. Indeed, with the exception of the Electronics and Aeronautics sectors, there is a certain amount of doubt about the existence of visionary leadership. For example, almost 30% of respondents in the Textile sector claim that their companies lack strategic vision (Figure 4).
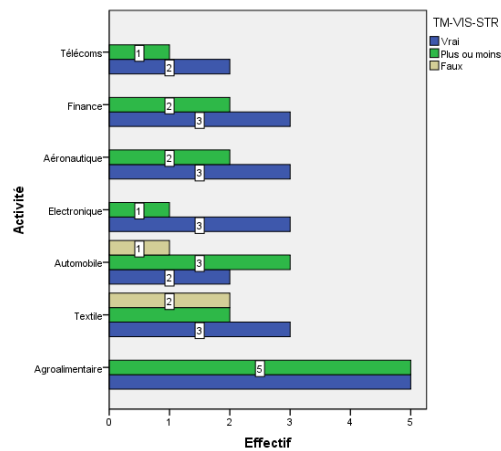
Figure 4: visionary leadership by sector

There was a negative correlation between top management's vision and strategy and the percentage of time spent by executives and managers supporting other employees' ideas (p-value equals 0.009). It is also important to note that the correlation analysis showed that the inspiration of staff by top management's vision is dependent on the latter's communication skills (p-value equals 0.005).

Table following on the next page

			TM-VIS-STR	PARAIN1	EXPLORE	PARAIN2	TM-VIS	TM-COMM
Rho de Spearman	TM-VIS-STR	Coefficient de corrélation	1,000	-,206	-,123	-,412**	,530**	,653**
		Sig. (bilatérale)	.	,208	,457	,009	,001	,000
		N	40	39	39	39	39	40
	PARAIN1	Coefficient de corrélation	-,206	1,000	-,047	,231	-,311	-,303
		Sig. (bilatérale)	,208	.	,775	,156	,054	,061
		N	39	39	39	39	39	39
	EXPLORE	Coefficient de corrélation	-,123	-,047	1,000	,316	-,112	-,242
		Sig. (bilatérale)	,457	,775	.	,050	,496	,138
		N	39	39	39	39	39	39
	PARAIN2	Coefficient de corrélation	-,412**	,231	,316	1,000	-,174	-,276
		Sig. (bilatérale)	,009	,156	,050	.	,289	,089
		N	39	39	39	39	39	39
	TM-VIS	Coefficient de corrélation	,530**	-,311	-,112	-,174	1,000	,438**
		Sig. (bilatérale)	,001	,054	,496	,289	.	,005
		N	39	39	39	39	39	39
	TM-COMM	Coefficient de corrélation	,653**	-,303	-,242	-,276	,438**	1,000
		Sig. (bilatérale)	,000	,061	,138	,089	,005	.
		N	40	39	39	39	39	40

**. The correlation is significant at the 0.01 level (two-tailed).

Table 1: Correlation table

As far as top management support for project teams is concerned, the results show that management teams encourage the formation of project teams. Indeed, 85% of responses confirm this. In this respect, MMMs show significant percentages, even reaching 100% in some sectors, such as Aeronautics and Electronics. With regard to support for ideas put forward by employees, 55% of the sample consider that top management encourages promising ideas, compared with only 15% who do not. A more detailed analysis by sector of activity reveals that the environment of firms in the Electronics sector is more conducive to the development of ideas (Figure 5).

TM-IDEE SEC-ACT	Vrai	Plus ou moins	Faux	TOTAL
Aéronautique	60,0% (3)	40,0% (2)	0,0% (0)	100% (5)
Automobile	33,3% (2)	50,0% (3)	16,7% (1)	100% (6)
Eléctronique	75,0% (3)	25,0% (1)	0,0% (0)	100% (4)
Textile	57,1% (4)	14,3% (1)	28,6% (2)	100% (7)
Agroalimentaire	60,0% (6)	30,0% (3)	10,0% (1)	100% (10)
Financier	60,0% (3)	40,0% (2)	0,0% (0)	100% (5)
Télécoms	33,3% (1)	0,0% (0)	66,7% (2)	100% (3)
TOTAL	55,0% (22)	30,0% (12)	15,0% (6)	100% (40)

Figure 5: Support for promising ideas

There's no doubt that top management's encouragement of project team building is an essential element in the development of intrapreneurial behavior within organizations. The p-value calculated in the correlation table, equal to 0.040 (here less than 5%), shows that there is indeed a positive correlation between top management support for project team building and the percentage of time spent by employees exploring new ideas (see correlation table n°2).

			PARAIN1	EXPLORE	PARAIN2	TM-EQP	TM-PJT-RISQ
Rho de Spearman	PARAIN1	Coefficient de corrélation	1,000	-,081	,296	-,437*	-,394*
		Sig. (bilatérale)	.	,666	,106	,014	,028
		N	31	31	31	31	31
	EXPLORE	Coefficient de corrélation	-,081	1,000	,141	,371*	-,065
		Sig. (bilatérale)	,666	.	,451	,040	,730
		N	31	31	31	31	31
	PARAIN2	Coefficient de corrélation	,296	,141	1,000	-,332	-,536**
		Sig. (bilatérale)	,106	,451	.	,068	,002
		N	31	31	31	31	31
	TM-EQP	Coefficient de corrélation	-,437*	,371*	-,332	1,000	,248
		Sig. (bilatérale)	,014	,040	,068	.	,178
		N	31	31	31	31	31
	TM-PJT-RISQ	Coefficient de corrélation	-,394*	-,065	-,536**	,248	1,000
		Sig. (bilatérale)	,028	,730	,002	,178	.
		N	31	31	31	31	32

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

Table 2: Correlation table

Senior management support for risky projects is not on the agenda of MMM companies. In fact, only 17% of MMM companies feel that senior management remains tolerant of risky projects. Furthermore, it is worth highlighting the negative correlation between top management's support for risky projects and the percentage of managers capable of playing the role of sponsors (p-value equal to 0.028) and the amount of time spent by respondents in supporting ideas expressed by other employees (p-value equal to 0.002). We can deduce from this that, in addition to top management, who remain sceptical about the risks that certain projects may entail, managers and executives take off their sponsor's hat when it comes to risky projects. One of the most frequently cited characteristics of project teams is the provision of autonomy in the choice of team members. In addition, project teams have control over processes, and their requests are generally met by management. However, it should be pointed out that top management does not allow teams a great deal of autonomy when it comes to decision-making (Figure 6).
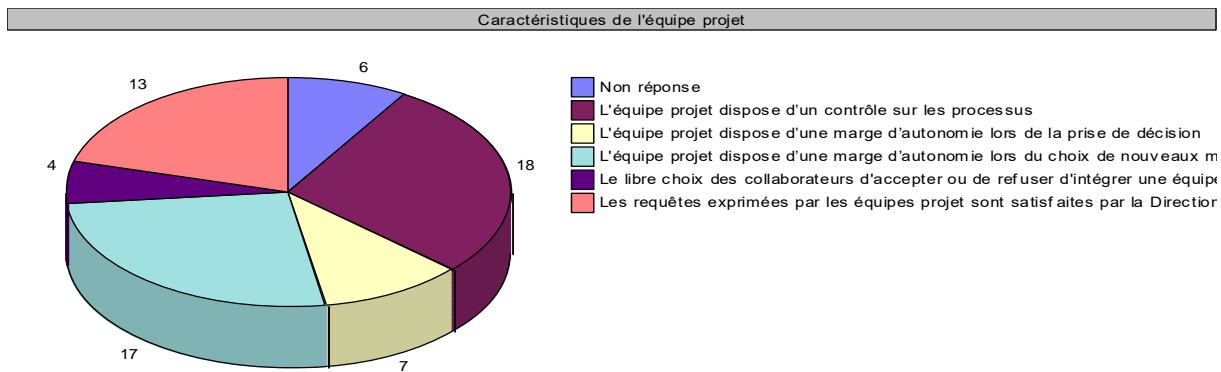
Figure 6: Project team's power over the process

Discussion

When it comes to top management support in terms of vision and strategy, the Textile sector stands out for its lack of visionary leadership within the industry. Similarly, the Aerospace and Electronics sectors are the most communicative in terms of vision and strategy. When it comes to supporting new ideas, more than half of the sample felt that top management encouraged promising new ideas. Further analysis by MMM reveals that none of the firms in the Aerospace and Electronics sectors disapprove of top management's support for ideas. Top management support for risky projects is not on the agenda of MMM companies, since only 13% of them feel that management takes a convincing interest in risky projects. Top management's encouragement of the formation of project teams is an essential element in the development of intrapreneurial behavior within organizations. It is worth noting that 90% of those surveyed believe that their management encourages the formation of project teams. In this respect, no MMM sector is an exception. Projects are often a response to a request from management. What's more, for more than half the respondents, the projects carried out by MMM companies enable them to anticipate changes in market demand. When it comes to the prerogatives of project teams, almost half of those surveyed stressed that teams have a margin of autonomy when choosing members, 40% felt that they have control over processes, and 38% felt that requests expressed by project teams are met by management.

6. CONCLUSION

Companies, especially those operating in highly competitive environments, need to adopt an open and positive attitude in order to seize new opportunities, dare to change the rules and move away from mimicry by plauying the creativity card. The study highlighted the crucial importance of top management support for intrapreneurial initiatives, particularly when they are structured around a project-based approach. The analysis revealed that the success of these initiatives relies heavily on top management's ability to provide ongoing strategic and operational support throughout the project development phases. Top management's strategic vision is a central element, guiding and inspiring intrapreneurial projects. It ensures that initiatives taken at project team level are part of a trajectory consistent with the company's long-term objectives. However, the results indicate a negative correlation between this mapped-out vision and the amount of time managers devote to supporting their staff. This observation underscores a paradox: although the overall strategy is essential, it can sometimes distract managers' attention from innovative grass-roots efforts. This highlights the need for top management to balance strategic demands with active, day-to-day support for project teams. What's more, the project-based approach requires sustained top management involvement in building and monitoring teams. It's not just a question of providing resources, but also of creating flexible organizational structures that allow projects to flourish.

Supervision of project teams, supported by effective communication, is essential to transform innovative ideas into concrete results. Indeed, our analyses show that inspiring staff with top management's vision is highly dependent on the latter's communication skills. A top management capable of communicating its vision effectively is more likely to mobilize and motivate its teams, thus strengthening the cohesion and effectiveness of intrapreneurial projects. In this way, the support of top management goes beyond the simple definition of a strategy, and is best expressed through a project-based approach. This involves constant attention to team dynamics, judicious allocation of resources, and clear, inspiring communication. This multi-dimensional support is what enables intrapreneurial initiatives to develop to their full potential, aligning internal innovation with the company's strategic ambitions, while ensuring that they are firmly anchored in operational reality.

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COMPARATIVE ANALISYS OF HEALTHCARE EXPENDITURE IN CROATIA IN RELATION TO EU COUNTIES AS A PRECONDITION FOR A NATION'S WELFARE

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ABSTRACT

Healthcare spending is deeply connected to the concept of welfare economics through the prism of financial investment in healthcare in order to improve the availability and quality of healthcare and the health of the population in general. Healthcare spending in the EU countries varies significantly, with an average share of healthcare spending of around 10.3% of GDP according to Eurostat. The largest share of public spending on health is recorded in countries such as the Netherlands, Denmark and Sweden, where public helath spending exceeds 10% of GDP. These countries are characterized by highly developed health systems that combine public and private funding sources. On the other hand, EU members such as Poland, Hungary and Romania invest a smaller share of GDP in health, and health services in these countries may be less accessible. According to Eurostat, Croatia allocated around 7.2% of GDP for healthcare, which is below the European average. Healthcare financing in Croatia is mostly public, while private consumption accounts for about 15% of total healthcare expenditures. Although Croatia provides basic health care at a solid level, it faces challenges such as long waiting lists, inequality in the availability of services between urban and rural areas, and an aging population, which increases pressure on the system. The analysis shows that, although Croatia has invested significant resources in the health sector, it still lags behind the more developed EU countries in terms of the amount of spending per GDP and the quality of services. To improve the efficiency and equality of health care, additional investment in infrastructure, human resources and the reduction of regional disparities in the availability of health services are needed. The aging of the population and the rising costs of long-term care represent additional challenges that require structural changes in the financing of the Croatian health system.

Keywords: Availability, Healthcare financing, Population, Welfare economics

1. INTRODUCTION

In recent times, health economists have increasingly emphasized the importance and impact of health on the economy. Specifically, the relationship between health and the economy is characterized by a causal link in both directions. While the health of a population influences economic growth or decline and economic flows, the economy, in turn, can positively or negatively affect the health of the population. Greater financial investment in healthcare can lead to improved health service delivery, strengthening human capital and boosting productivity, thus contributing to economic outcomes in terms of growth and progress. Therefore, it is crucial to evaluate the phenomenon of healthcare spending within a country and beyond. Healthcare spending has a negative relationship with multifactor productivity but shows a positive correlation with labor productivity, personal consumption, and GDP. The influence of healthcare expenditure on economic performance is a significant factor within economic analysis. Nevertheless, the debate continues regarding the types and levels of optimal healthcare spending that are beneficial for economic development (Raghupathi et al., 2020). In other words, no nation has identified the ideal model for healthcare financing that maximizes population health outcomes.

Public healthcare spending constitutes social investment aimed at improving people's lives and well-being, while also acting as an investment in the country's health capital (Hu and Wang, 2024), with the goal of improving access to healthcare services. A characteristic of healthcare systems around the world, in general, is the unequal financial allocation for healthcare, which stems from a country's level of development and its ability to fund and invest in the healthcare system. The method of healthcare financing affects the overall concept of access to healthcare, which must ensure a sufficient workforce, adequate healthcare infrastructure, sufficient supplies of medicines, and adequate medical equipment. If any of these resources are lacking, it can lead to disruptions in the accessibility and sustainability of healthcare services and hinder the achievement of the World Health Organization's core policy of "health for all."

Sustainable healthcare systems and services are traditionally understood as those equipped with adequate resources to meet the health-related challenges faced by the population. In this context, issues such as limited funding or an aging population exemplify key obstacles to achieving sustainability in healthcare (Berg et al., 2022). From an economic perspective, healthcare financing is linked not only to the accessibility of healthcare services but also to treatment outcomes. For example, studies have shown a negative correlation between per capita healthcare expenditure and maternal and infant mortality, as well as a positive correlation between per capita healthcare expenditure and life expectancy for both men and women (Karaman et al., 2020). The quality of public healthcare spending is evident in the health outcomes of various countries, with the correlation and causal relationships between public health outcomes and healthcare investment being influenced by government efforts to improve citizens' quality of life through a strong healthcare system. This suggests that during periods of heightened vulnerability, there is a greater need for solid revenue and spending strategies (World Bank, 2019). Despite extensive research, there is still no consensus on the effects of healthcare financing and financial investments on health outcomes. Additionally, it has been noted that many studies focus solely on one or two health outcome indicators – particularly infant mortality or life expectancy (Karaman et al., 2020). States, or national health funds, are key actors whose healthcare policies and strategic directions can lead to improvements in the health of the population. They contribute to increasing life expectancy and enhancing the quality of life for the population, while also allowing better control over mortality rates from various diseases (Martinez et al., 2022). The relationship between healthcare expenditure and health outcomes is of interest to policymakers given the continuous rise in healthcare spending in most developed countries (Nixon and Ulmann, 2006). A pertinent example of this is the World Health Organization's analysis of global healthcare expenditure, which shows an upward trend in spending worldwide. According to WHO data from 2021, global healthcare expenditure amounted to $8.5 trillion (€7.93 trillion) in 2019, double the figure from 2000 when it was $4.2 trillion (€3.92 trillion). Approximately 60% of healthcare spending comes from public sources, 40% from private funding, and only 0.21% from other external assistance. During the same period, the global GDP increased by 74%, from $50 trillion (€46.6 trillion) to $86 trillion (€80 trillion). Correspondingly, healthcare spending as a share of GDP rose from 8.5% to 9.8% (WHO, 2021). Financial disruptions are a key determinant of risk within the healthcare system, and understanding financial indicator trends is essential for the proper formulation and creation of public healthcare policies (Onofrei et al., 2021). Therefore, it is necessary to view healthcare through a cyclical lens composed of key elements and indicators of both the healthcare system and the economy.
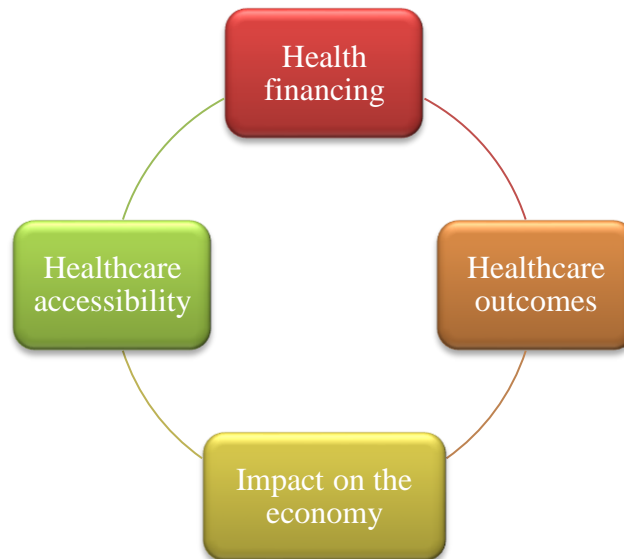
Figure 1. Model of Healthcare Functioning and Financing Dependency
(Source: Author)

Figure 1 illustrates a model of healthcare functioning supported by adequate financial resources. It represents an inseparable framework by which healthcare systems should operate and be guided to maximize resource utilization and efficiency. Croatia, as one of the newer European Union member states, according to the European Commission report (European Commission, 2021), has sufficient access to healthcare services despite long waiting lists, which in practice often negates the accessibility of healthcare, even though healthcare facilities are available across most of the country. Croatia allocates significantly less financial resources for healthcare compared to the EU average, which is reflected in some treatment outcomes, as well as in life expectancy and healthy life years. Characteristics of the Croatian healthcare system, in addition to long waiting lists, include substantial debts generated year after year with no resolution in sight, which are also a consequence of insufficient healthcare funding and the absence of clear strategic directions and in-depth system analysis.

2. METHODOLOGY

he research methodology is based on the analysis and comparison of the latest Eurostat data regarding healthcare expenditure in millions of euros, as a percentage of gross domestic product, and per capita spending for all European Union member states. The aim is to compare Croatia to other member states and the EU average. The study also presents changes in healthcare expenditure over the years, expressed both in millions of euros and as a percentage change. Finally, data on survival rates and healthy life years at the EU member state level are provided as potential indicators of healthcare system effectiveness and investment in healthcare.

3. RESULTS AND DISCUSSION

Within the EU member states general situation with health financing is that the capacity of governments to allocate resources to healthcare and other social security measures is influenced by the size of the public sector, which is significantly larger in countries like Sweden and France compared to Estonia and Lithuania. Generally, government spending as a percentage of GDP tends to be lower in newer EU Member States than in older ones.

Within the European Union, there is a mix of wealthier and less affluent Member States with similarly sized public sectors (such as Cyprus, Poland, the United Kingdom, and Germany), as well as notable outliers on either end of the spectrum (such as Ireland and Hungary) (Thompson et al., 2009). Some countries have a higher GDP than others and, relative to GDP, allocate a smaller percentage to healthcare, which does not necessarily mean they spend less in absolute terms per capita. For this reason, we present healthcare expenditure in three categories – absolute amounts in millions of euros, as a percentage of GDP, and per capita:

	Million eur	% of GDP	Per capita
EU 27	1.648.486,53	10,36	3.684,55
Belgium	59.625,83	10,76	5.104,86
Bulgaria	6.575,40	7,66	989,78
Czechia	24.308,74	8,80	2.277,78
Denmark	36.066,82	9,48	6.109,87
Germany	488.677,00	12,61	5.831,61
Estonia	2.528,00	7,02	1.874,20
Ireland	30.983,40	6,12	5.997,91
Greece	17.562,40	8,50	1.682,72
Spain	131.114,07	9,74	2.745,32
France	313.574,39	11,88	4.606,98
Croatia	4.933,18	7,22	1.279,15
Italy	175.719,00	8,95	2.977,60
Cyprus	2.463,99	8,87	2.699,66
Latvia	2.925,67	7,62	1.556,72
Lithuania	4.881,95	7,24	1.724,07
Luxembourg	4.304,06	5,55	6.590,17
Hungary	11.296,76	6,70	1.171,33
Malta	1.660,94	9,52	3.124,93
Netherlands	96.820,00	10,10	5.469,75
Austria	49.897,38	11,16	5.518,49
Poland	41.869,59	6,38	1.137,09
Portugal	25.370,25	10,47	2.437,17
Romania	16.337,18	5,75	857,66
Slovenia	5.478,52	9,61	2.593,90
Slovakia	8.476,28	7,72	1.560,50
Finland	25.925,61	9,69	4.666,15
Sweden	59.110,13	10,71	5.636,55

Table 1. Healthcare Expenditure in 2022
Source: Eurostat (data codes: hlth_sha11_hf)

The data in Table 1 display healthcare expenditure expressed in millions of euros, as a percentage of GDP, and per capita spending. The average healthcare expenditure for the European Union is 10.36% of GDP, with Belgium, Germany, France, the Netherlands, Austria, Portugal, and Sweden being member states that allocate more than the EU average. Croatia ranks at the bottom with healthcare spending at 7.22% of GDP. Only Ireland, Luxembourg, Hungary, Poland, and Romania allocate less. However, an even more telling indicator of healthcare allocation is per capita spending in absolute terms.

This data accurately reflects the actual amount of money allocated, whereas a country's GDP may be higher or lower, meaning a smaller GDP percentage allocation does not necessarily imply insufficient spending, as previously mentioned. Luxembourg serves as an example. The EU average is €3,684.55 per capita. Belgium, Denmark, Germany, Ireland, France, Luxembourg, the Netherlands, Austria, Finland, and Sweden allocate more than the EU average per capita. Croatia, according to this measure, is also near the bottom with €1,279.15 per capita. Only Bulgaria, Hungary, and Poland allocate less.
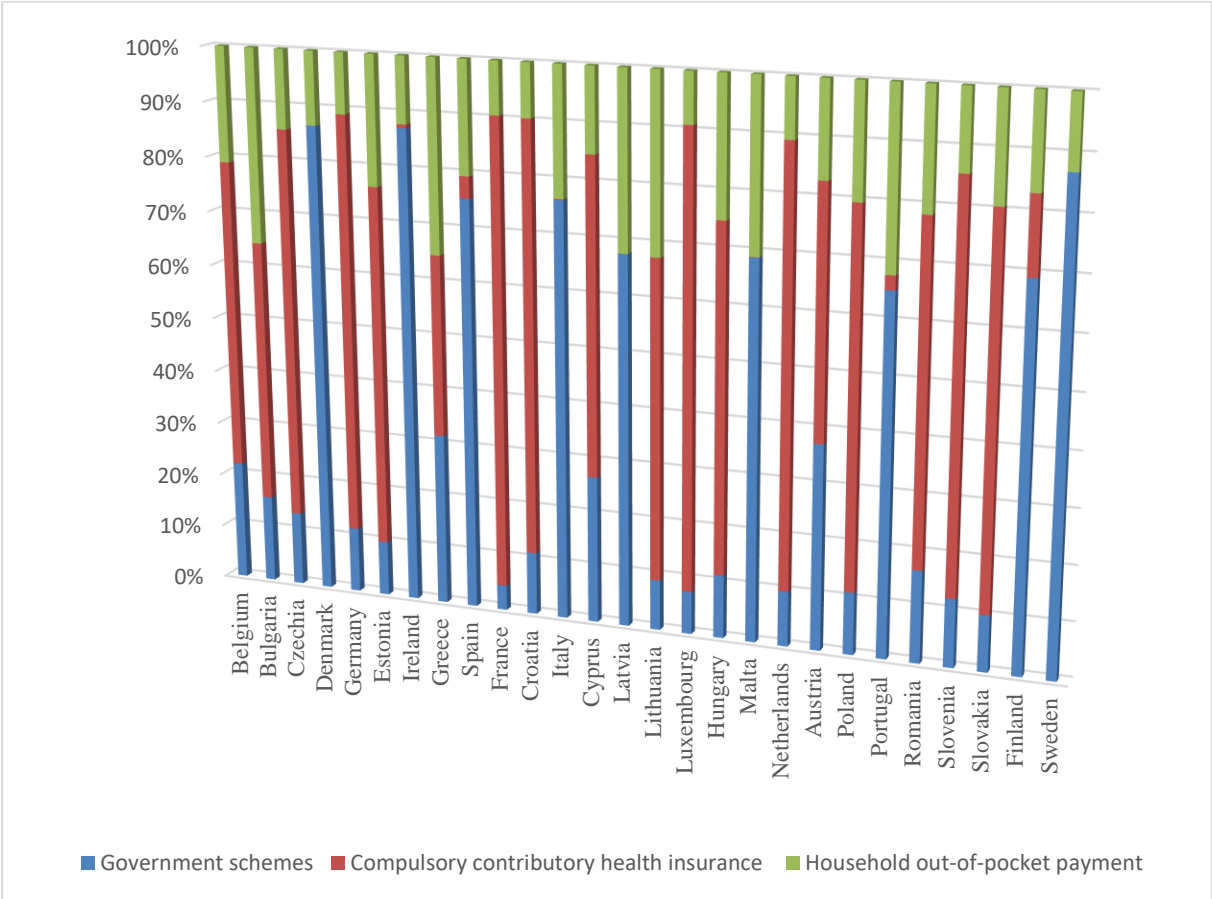
Figure 2. Healthcare Expenditure by the State, Mandatory Health Insurance, and Out-of-Pocket Payments
Source: Eurostat (data codes: hlth_sha11_hf)

Figure 2 presents data on healthcare funding sources in millions of euros across European Union member states, comparing state contributions, mandatory health insurance, and out-of-pocket financing. Germany stands out as the country that finances healthcare the most through mandatory health insurance in absolute terms. However, the focus here should not be on absolute amounts, but rather on the proportions, as depicted in Figure 2. In Croatia, for example, 79% of healthcare financing comes from mandatory health insurance, highlighting the extent to which the healthcare system relies on citizens rather than state contributions. Countries with a similar funding model include Germany, Belgium, Bulgaria, the Czech Republic, France, Lithuania, Luxembourg, Hungary, the Netherlands, Austria, Poland, Romania, Slovenia, and Slovakia. On the other hand, countries such as Denmark, Ireland, Spain, Italy, Portugal, Finland, and Sweden primarily fund their healthcare through government contributions.

TIME	2014	2015	2016	2017	2018	2019	2020	2021	2022	2014-2022 in %
EU 27	1.178.280	1.215.960	1.249.704	1.293.955	1.337.368	1.393.016	1.463.302	1.591.674	1.648.487	39,91
Belgium	42.752	44.990	46.420	48.071	49.967	51.504	51.902	56.112	59.626	39,47
Bulgaria	3.306	3.386	3.637	3.936	4.121	4.364	5.226	6.125	6.575	98,92
Czechia	11.987	12.437	13.118	14.248	15.739	17.177	19.762	22.520	24.309	102,80
Denmark	27.397	28.241	29.023	29.770	30.528	31.424	33.373	36.859	36.067	31,64
Germany	322.775	338.638	352.397	370.023	386.123	407.025	431.941	466.713	488.677	51,40
Estonia	1.275	1.370	1.458	1.572	1.735	1.893	2.082	2.352	2.528	98,20
Ireland	18.559	19.292	20.181	21.216	22.460	23.931	26.505	28.632	30.983	66,94
Greece	13.986	14.498	14.743	14.391	14.581	15.031	15.716	16.670	17.562	25,57
Spain	93.831	98.363	99.729	104.003	108.330	113.776	120.093	126.001	131.114	39,73
France	247.767	251.497	256.712	261.211	264.935	270.562	279.815	307.568	313.574	26,56
Croatia	2.908	3.028	3.184	3.328	3.561	3.785	3.897	4.720	4.933	69,65
Italy	144.317	146.613	147.963	150.697	153.790	155.524	159.892	170.278	175.719	21,76
Cyprus	1.212	1.219	1.265	1.345	1.480	1.638	1.935	2.362	2.464	103,33
Latvia	1.291	1.389	1.556	1.610	1.804	2.029	2.194	3.038	2.926	126,66
Lithuania	2.266	2.424	2.581	2.733	2.972	3.420	3.728	4.383	4.882	115,48
Luxembourg	2.709	2.751	2.850	2.987	3.174	3.412	3.720	4.096	4.304	58,89
Hungary	7.488	7.731	8.124	8.566	8.952	9.206	10.058	11.368	11.297	50,86
Malta	795	889	945	1.042	1.110	1.298	1.416	1.589	1.661	108,91
Netherlands	70.964	71.236	72.918	74.614	77.553	82.447	89.399	96.852	96.820	36,44
Austria	34.541	35.692	37.021	38.355	39.871	41.651	43.103	49.246	49.897	44,46
Poland	25.681	27.280	27.756	30.664	31.502	34.400	34.183	37.111	41.870	63,04
Portugal	16.168	16.743	17.520	18.235	19.313	20.395	21.150	24.033	25.370	56,91
Romania	7.568	7.923	8.509	9.672	11.371	12.810	13.728	15.632	16.337	115,87
Slovenia	3.200	3.309	3.429	3.520	3.797	4.125	4.435	4.956	5.479	71,22
Slovakia	5.256	5.418	5.666	5.721	5.991	6.534	6.659	7.776	8.476	61,26
Finland	20.237	20.389	20.399	20.654	21.111	21.998	22.929	24.652	25.926	28,11
Sweden	48.043	49.212	50.601	51.771	51.497	51.656	54.461	60.031	59.110	23,04

Table 2. Changes in Healthcare Expenditure from 2014 to 2022 in
Millions of Euros and Percentage
Source: Eurostat (data codes: hlth_sha11_hf)

Table 2 presents changes in healthcare financing among EU member states in millions of euros and as a percentage from 2014 to 2022. The European Union average increase is 39.91%. Croatia is above the EU average for this indicator, as are many countries, including Bulgaria, the Czech Republic, Germany, Estonia, Ireland, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, Austria, Poland, Portugal, Romania, Slovenia, and Slovakia. Latvia recorded the highest percentage increase in healthcare financing over the years, at 126.66%. Interestingly, wealthier or older EU member states, those that allocate more per capita to healthcare, have shown lower percentage increases, among them Belgium, Denmark, Greece, Spain, France, Italy, the Netherlands, Finland, and Sweden.

	Life expectancy	Healthy life years
	2022	**2022**
EU 27	77,9	62,6
Belgium	79,7	63,7
Bulgaria	70,6	66,7
Czechia	76,1	61,8
Denmark	79,5	55,9
Germany	78,3	61,1
Estonia	73,6	59,3
Ireland	80,9	66,0
Greece	78,3	67,0
Spain	80,5	61,2
France	79,3	64,4
Croatia	74,6	60,3
Italy	80,7	67,4
Cyprus	79,7	66,0
Latvia	69,4	54,2
Lithuania	71,4	60,3
Luxembourg	80,8	60,2
Hungary	72,6	62,6
Malta	80,4	70,2
Netherlands	80,2	58,5
Austria	79,1	60,9
Poland	73,4	62,4
Portugal	78,9	59,1
Romania	71,3	59,0
Slovenia	78,6	66,7
Slovakia	73,6	57,3
Finland	78,7	57,9
Sweden	81,4	66,5

Tablica 3. Life expectancy and healthy life years in 2022
Source: Eurostat (data codes: hlth_hlye)

Finally, Table 3 displays life expectancy and healthy life years, which in this analysis are equated with treatment outcomes. Life expectancy and healthy life years depend on the availability of healthcare services, which is influenced by healthcare financing, as well as on preventive healthcare models shaped by the direction of health system policies at the national level. The average life expectancy in the European Union is 77.9 years, while in Croatia, it stands at 74.6 years. Healthy life years in the EU average 62.6 years, compared to 60.3 years in Croatia. The table shows that, in general, countries that spend more per capita on healthcare tend to achieve better results in at least one of these indicators. These countries include Belgium, Denmark, Germany, Ireland, Spain, France, Italy, Luxembourg, the Netherlands, Austria, Portugal, Finland, and Sweden. Existing research on the Croatian healthcare system similarly highlights key issues, particularly emphasizing life expectancy, preventable causes of mortality, and the high proportion of funding through mandatory health insurance. Džakula et al. conducted a study that revealed life expectancy in 2020 was 77.8 years, with per capita healthcare spending at €1,305 (Džakula et al., 2021). In other words, the situation has worsened over the years.

According to a European Commission study, while healthcare in Croatia is relatively accessible, issues persist with waiting lists and healthcare access in more remote areas. This study, like previous ones, underscores the financially unregulated system, the heavy reliance on mandatory health insurance funding, and significant debts that are subsequently covered by the state (European Commission, 2021). Finally, Mihaljek in his work points out that while the rise in healthcare expenditure cannot be halted, the financing of healthcare can and must be made more efficient (Mihaljek, 2015). The main limitation in previous researches lies in the insufficient number of studies that directly link and illustrate the relationship between financing, accessibility, and treatment outcomes. Regarding the Croatian healthcare system, there is a general lack of studies that would provide policymakers with a realistic and causal depiction of these elements, enabling effective reforms and policies to be implemented. This would help ensure rational financial spending, redirect resources from inefficient to effective activities, and ultimately maintain and improve access to healthcare services.

4. CONCLUSION

From an economic perspective, particularly from the point of view of health economists, the functioning of healthcare in Croatia is often not aligned with economic principles and the tenets of economic operations. Healthcare is difficult to economize due to the inherent challenge of reconciling supply and demand principles. This is primarily because the demand for health is unpredictable, while the supply is inelastic, meaning it cannot easily adjust to fluctuations in demand. Therefore, greater efforts are required in planning, prevention, and long-term increases in financial allocations. Croatia is characterized by a notably low level of healthcare funding. As mentioned earlier, the Croatian healthcare system is marked by long waiting lists and substantial debt, which stem from insufficient financing and inadequate planning, as clearly evidenced by EU-level indicators. Financial resources are insufficient to achieve desired health outcomes for both the population's well-being and the economy's growth and flows. Policies must be enacted to stabilize the healthcare system in terms of financial allocations, with the aim of improving and expanding human and health resources, thereby increasing accessibility (primarily by reducing waiting lists), improving efficiency through debt reduction (a specific issue in Croatia's healthcare system), and enhancing the quality and outcomes of care. A prerequisite for policy development is a thorough analysis of financial (in)efficiency and the establishment of benchmarks to achieve healthcare efficiency and accessibility, ultimately benefiting both the population and the economy. In this way, health economics can truly serve the nation's welfare.

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PUBLIC INTEREST AND THE ENERGY TRANSITION: INSIGHTS FROM KEYWORD TRENDS IN V4 COUNTRIES

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ABSTRACT

Nowadays public opinion plays a crucial role in shaping the political support for the renewable energy transition, including investments in green energy, and reforms in energy consumption and generation patterns. However, this transition reveals a paradox: shifting to renewable energy requires significant investments, which can lead to significant costs for consumers. That is why the issue of public readiness to participate in the energy transition process is critical for the development of policies and investment strategies. In this study, we analyze the volume of searched keywords related to renewable energy for households across V4 countries, focusing on time series trends for the top 10 keywords from December 2016 to September 2024. Identification of key change points is an essential step to exploring potential factors that triggered changes in public interest during this period. Tools such as Google Trends and Semrush can be used not only to track search volumes but also to uncover relevant topics that may have influenced public interest. Our findings offer insights into the dynamics of public engagement with renewable energy, providing a starting point for a detailed analysis of global and local events as impact factors.

Keywords: Energy transition, Keyword analysis, Public opinion, Renewable energy, V4 countries

1. INTRODUCTION

Since 2022, the issue of energy transformation has expanded beyond climate action and resource conservation to address energy security, largely due to disruptions following the Russian invasion of Ukraine in 2022 (IEA, 2022). These issues underscore the strategic necessity of a diversified, renewable energy infrastructure that reduces reliance on external fossil fuel sources (Zakeri et al., 2022). As countries worldwide work toward long-term energy security, the Visegrad Four (V4) nations—Czech Republic, Hungary, Poland, and Slovakia—face unique pressures to balance environmental goals with their high dependency on non-renewable energy, adding urgency to their transitions within the broader EU framework (Żuk et al., 2023). However, the renewable energy shift requires substantial investment and reconfiguration of existing energy infrastructure, impacting both households and businesses (McWilliams et al., 2023). Public opinion has thus become crucial for shaping effective energy policies, as public support or opposition significantly influences policy viability (Haber et al., 2021). In addition, research shows that the "human factors" of the energy transition, such as social acceptance of renewable energy technologies and willingness to participate, are key to the success of energy policies. While support for renewable energy is widespread, economic and security concerns can complicate this stance, with consumers often prioritizing immediate financial stability over long-term goals (Komendantova, 2021). In V4 countries, the post-communist transition and economic restructuring have shaped both public attitudes and energy policies (Jonek-Kowalska & Rupacz, 2024). Though V4 nations align with EU climate goals, studies point to discrepancies between policy adoption and practical implementation, driven partly by persistent energy dependence and lower environmental awareness (Surwillo & Popovic, 2021). As the energy crisis intensifies, examining public opinion in these countries offers valuable insights into regional readiness for renewable energy adoption and potential obstacles.

Traditional methods of gauging public opinion, such as surveys and focus groups, are costly and time-intensive, while emerging alternatives—such as analyzing search engine data—offer efficient, real-time insights. Search engines like Google Trends provide dynamic data on public interest in environmental topics, reflecting shifts in awareness and sentiment related to energy issues (Álvarez-García et al., 2023). Recent studies have validated this approach, with indices like the Environmental Awareness Index (EAI) demonstrating that online search activity can serve as a reliable proxy for environmental behavior and engagement (Dabbous et al., 2023). This study aims to analyze data on search volumes for keywords related to photovoltaics as a widely recognized technology in the Visegrad countries, focusing on trends for the 10 most popular keywords for the period from December 2016 to September 2024. This analysis uses Semrush as tool to capture changes in public engagement, contributing to a broader understanding of how public interest is shifting in response to local and global factors. Recent literature often discusses general public support or sentiment toward renewable energy or climate change, but does not examine specific moments or events that trigger noticeable changes in public interest over a longer period of time. The gap in change-point analysis limits the depth of insight into the factors that actively influence public readiness. This study combines the advantages offered by online search data, such as extended time periods and trend-sensitive insights, with the ability to locally explore regions that are not in the global research focus.

2. LITERATURE REVIEW
2.1 Geopolitical Shifts and Public Opinion in Renewable Energy Policy
The urgency of a global transition to renewable energy has traditionally been linked to climate change mitigation, natural resource conservation, and carbon emissions reduction. However, as confirmed by reports from international energy organizations, recent geopolitical events, including the Russian invasion of Ukraine in 2022, have pushed energy security and independence to the top of the agenda (IEA, 2024; WEC, 2024; BP p.l.c., 2023). Zakeri et al (2022) highlights that this shift in perspective underscores the strategic need for diversified, resilient energy systems that reduce reliance on external fossil fuels. Consequently, public opinion now plays a more significant role in shaping energy policy (Kastrati et al., 2023), as Governments often attempt to reflect people's perspectives when drafting new policies, such as those on renewable energy (Dasgupta & De Cian, 2018). Moreover, social acceptance is also important in terms of the approval of specific technologies, which affects their successful adoption (Haber et al., 2021). Studies like those Dasgupta & De Cian (2018) and Jeong et al. (2023) emphasize that strong public backing is essential for establishing long-term energy policy measures, suggesting that public sentiment can act as both a driver and a barrier in the renewable energy transition.

2.2 Public Perception and Policy Challenges in V4 Energy Transition
The energy transition in the Visegrad Four (V4) countries faces skepticism both regarding their EU-aligned policies and public opinion on renewable energy and environmental issues (Riepl & Zavarská, 2023). This skepticism largely stems from ongoing resistance to the EU's primary climate goals, with the V4 countries showing a relatively slower adoption of renewable sources while maintaining strong support for traditional energy sources, such as coal and nuclear power (Kovacs et al., 2024). Despite regional similarities in economic development and similar trends in electricity consumption, the authors note that the energy strategy of the countries is different (Jonek-Kowalska & Rupacz, 2024; Żuk et al. 2023).

Recent public opinion studies suggest that the main obstacle to increased public participation in energy transformation across the V4 is not a lack of environmental awareness but rather low

social mobilization (Surwillo & Popovic, 2021). Authors further observe that consumers in the V4 countries often prefer cost-saving energy solutions, such as home insulation, over more expensive alternatives like installing solar panels or opting for renewable energy sources. The literature underscores the importance of examining public opinion and engagement in energy policy development, given the social diversity within the V4, where varying perspectives across social groups can influence shifts in political approaches (Surwillo & Popovic, 2021; Riepl & Zavarská, 2023; CBOS, 2023). According to Eurostat, solar photovoltaics (PV) currently holds the highest net maximum electrical capacity among renewables in the Czech Republic, Poland, and Hungary, and ranks second after hydropower in Slovakia (Eurostat). The share of solar PV is expected to keep expanding due to its numerous advantages over both fossil and other renewable energy sources. The IEA highlights solar PV's modular nature, which enables applications ranging from small residential setups to large-scale solar farms, making it a highly adaptable and accessible option for consumers. Additionally, solar PV is one of the least expensive and most widely supported renewable technologies. Despite this, there remains a gap in research on public perceptions of solar PV, a gap potentially rooted in the generally favorable public opinion of this technology (Haber et al., 2021; Heras-Saizarbitoria et al., 2011). However, studies suggest that public perception of renewables is not fixed and can shift over time due to evolving social and economic factors.

2.3 Evolving Methods for Public Opinion Analysis

Traditional methods for assessing public opinion on energy transition, including surveys, interviews, and focus groups, offer valuable insights into public attitudes and perceptions on specific issues. For example, the Institute of Sociology at the Czech Academy of Sciences, Istvan Ervin Haber in Hungary, and the Public Opinion Research Center in Poland have conducted surveys of attitudes towards renewable energy sources and specific technologies with samples of 1,026, 716, and 1,079 respondents, respectively. While these surveys provide important findings, there are limitations in terms of scale and comparability across the V4 countries over time. Expanding sample sizes would be costly, and differing study parameters make it challenging to assess regional trends within a consistent time frame. In contrast, using data from social media and search engines offers advantages, providing insights over extended periods and covering countries lacking traditional survey data (Mellon, 2013). With the rise of big data, social media has become an increasingly popular resource for studying public opinion. Murtfeldt et al. (2024) found that from 2006 to 2023, over 27,000 studies used Twitter data across various fields. In recent years, semantic analysis has been frequently used to study public opinion on environmental and renewable energy topics. This field of research extracts the user's perspective from the text and identifies its related polarity (positive, negative or neutral) (Kastrati et al., 2023). This type of research is particularly useful for understanding public attitudes toward environmental strategies and the implementation of specific policy decisions (Jeong et al., 2023). However, recent changes in data accessibility pose challenges for social media research. Concerns have arisen over the declining feasibility of Twitter data analysis due to privacy policies and increased costs for data access. Since February 2023, Twitter data has required a paid subscription, making it prohibitively expensive for many researchers (Murtfeldt et al., 2024; Mehta, 2023). Unlike the qualitative insights offered by surveys or social media sentiment analysis, data collected from search engines provides a quantitative measure of public interest in specific topics over time.

This method offers distinct advantages, including access to large, cost-effective samples, frequent data updates, extended historical coverage (up to 20 years depending on the platform),

anonymity, and flexibility for addressing various research questions (Álvarez-García et al., 2023; Scheitle, 2011). Dabbous et al. (2023) suggests using the Environmental Awareness Index (EAI), based on Google Trends, as a proxy for gauging public interest in environmental topics. This approach, widely applied in empirical economic studies, is also useful in other sectors. However, it's important to note certain limitations of Google Trends data. The output, or Search Volume Index (SVI), is a relative measure influenced by variables such as search terms, timeframes, languages, and geographic regions (Cebrián & Domenech, 2023). We use data from the SEMrush software where Keyword Search Volume is the average number of times per month that a keyword was queried on Google (at the national/local level). According to Eurostat statistics from 2023, over 90% of the population across all V4 countries has internet access, with internet usage rates ranging from 88% to 92%, the lowest being in Poland. This high level of internet penetration allows for broad coverage and enables meaningful comparisons across these countries. By focusing on keywords related to photovoltaics, this study uses a familiar and accessible technology to analyze public engagement with renewable energy. Photovoltaics, being one of the most recognized and visible renewable energy technologies, provides a tangible measure of public interest in the V4 region, where renewable energy adoption is uncertain but increasingly important.

3. METHODOLOGY

This study utilizes data from Semrush. Semrush collects data from third-party providers who gather actual search engine results pages (SERPs) from Google. This data includes both organic and paid search results for popular keywords, capturing information on top-ranking domains and search terms, and is updated monthly to reflect changes in Google's search environment. From Semrush, we obtained the historical Keyword Search Volume, defined as the average number of times per month a keyword was searched on Google.

3.1 Data Collection Process

Data collection involved keyword identification and the creation of a panel dataset. Using the Keyword Magic Tool by Semrush and Keywords Everywhere software, we compiled lists of keywords derived from core terms related to solar energy, including "solar panels/batteries/modules," "solar energy," and "photovoltaics." Each tool generated a comprehensive list of terms related to the primary keywords. For each V4 country, keywords were collected in the national language and restricted to the country's geographic region (e.g., keywords for Poland were in Polish and specific to searches within Poland). Only keywords with a search volume of at least 10 were selected. The keyword lists were then refined to remove duplicates, defined as:

- Exact duplicates – keywords or phrases with identical words and word order, ignoring punctuation.
- Rearranged duplicates – keywords with the same words but in a different order, ignoring punctuation.

Irrelevant keywords that did not align with the research question were also removed. The resulting lists were unbalanced across countries, with sample sizes as follows: Poland (3,690 keywords), Czech Republic (281), Slovak Republic (253), and Hungary (552).

3.2 Keyword Classification

Semrush provides classifications for user intent associated with each keyword, indicating how users employ keywords based on their goals. The four intent categories are:

- Informational – users seeking answers to specific questions.
- Navigational – users searching for a specific page, site, or location.
- Commercial – users researching brands or services.
- Transactional – users aiming to complete an action, such as a purchase.

Keywords were further categorized into Regular, Locale (keywords containing geographic names), Brand (keywords with commercial names), and Government (keywords linked to regulation or subsidies).

3.3 Time Frame and Data Metrics

For each country, the 10 keywords with the highest search volume were selected. Search Volume data from Semrush were collected monthly for the period from December 2016 to September 2024.

3.3 Change point detection method

To identify significant shifts in search volume trends for photovoltaic-related keywords across V4 countries, we applied the Pruned Exact Linear Time (PELT) algorithm, known for its efficiency in comparison with other methods (Burg & Williams, 2022). PELT was coupled with a Radial Basis Function (RBF) kernel to capture non-linear variations and subtle shifts in search volume patterns over time. For this purpose was used the ruptures Python package (Truong et al., 2020).

4. RESULTS
4.1 Current descriptive keyword statistics

Monthly search volumes for each of the V4 countries varied, aligning logically with each country's size and population. *Table 2* presents the top 10 keywords for each country, along with average annual search volumes and search volumes per 10,000 people in 2023. Search volume data were sourced from Semrush, while population data as of late 2023 are from official statistics of each V4 country. The 2023 search data reflects the most recent yearly statistics available for now in each country. Keywords used are as follows (in Table 1 order):

- Slovak Republic: fotovoltaika, solarne panely, fotovoltaické panely, fotovoltika, fotovoltaika cena, solar, solarne panely na ohrev vody, fotovoltaický panel, zse fotovoltaika, fotovoltaika na ohrev vody.
- Czech Republic: fotovoltaika, solární panely, fotovoltaická elektrárna, fotovoltaické panely, fotovoltaika ohřev vody, solární elektrárna, dotace na fotovoltaiku, fotovoltaika na ohřev vody, ohřev vody fotovoltaikou, solární elektřina.
- Poland: fotowoltaika, panele fotowoltaiczne, kalkulator fotowoltaika, panele słoneczne, fotowoltaika na balkonie, fotowoltaika cena, fotowoltaika dofinansowanie, fotowoltaika 10 kw, fotowoltaika z magazynem energii, panel fotowoltaiczny 1000w.
- Hungary: napelem, napelem pályázat, napelem akkumulátor, napelem ár, szigetüzemű, napelemes rendszer, napelem rendszer, erkély napelem, napelem elszámolás, napenergia, 5 kw napelem rendszer árak.

| | Key_1 | | Key_2 | | Key_3 | | Key_4 | | Key_5 | | Key_6 | | Key_7 | | Key_8 | | Key_9 | | Key_10 | |
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
SK	11775	22	8750	16	5733	11	2208	4	2000	4	880	2	917	2	1078	2	1467	3	418	1
CZ	22608	21	23625	22	7250	7	8000	7	1275	1	3275	3	1475	1	427	0	970	1	90	0
PL	75375	20	48917	13	4400	1	5925	2	4750	1	3942	1	4133	1	1800	0	1875	0	2442	1
HU	33950	35	19458	20	5100	5	6133	6	6067	6	6300	6	1867	2	977	1	1850	2	1632	2

Table 2: Average annual search volumes (a) and search volumes per 10,000 people (b) in 2023
(Source: Own processing)

Across the V4 countries in 2023, approximately 41 million searches were made for these top 10 keywords, amounting to around 4,680 searches per hour. Poland accounted for the highest percentage of searches at 45%, while Slovakia represented the lowest with 10%; the Czech Republic and Hungary had 20% and 25%, respectively. These figures correspond to each country's population, with Poland's 37.6 million residents surpassing the combined population of the Czech Republic, Slovakia, and Hungary. However, in terms of average monthly searches per 10,000 people, Poland recorded the lowest at 4, whereas Hungary had the highest at 9. Slovakia and the Czech Republic showed similar figures, with averages of 6 and 7 per 10,000 people, respectively. Each country's keywords reveal unique characteristics. In the Czech Republic, Poland, and Hungary, was found keyword with reference to government subsidies, while Slovakia included both regular terms and one brand-related keyword. According to Semrush's classification of user intent, keywords in the Czech Republic and Slovakia were predominantly Commercial, indicating users were researching products or services. Polish keywords were primarily Informational, suggesting users were seeking answers to specific questions, while Hungary's keywords were split equally between Commercial and Informational. Slovakia uniquely included a Navigational term, where users searched for a specific company. Keywords with Transactional intent were found for the Czech Republic, Slovakia, and Poland, but in a much lower proportion to Informational and Commercial.

4.2 Time-Series Analysis of Photovoltaic-Related Keyword Searches

Examining the time series for photovoltaic-related searches across the V4 countries reveals several patterns (Figure 9). All countries experienced a relatively stable trend from 2018 to 2020, with Hungary showing more volatility. For Hungary, the Czech Republic, and Slovakia, search volumes began to rise in 2022, whereas Poland's increase began earlier, in late 2019.
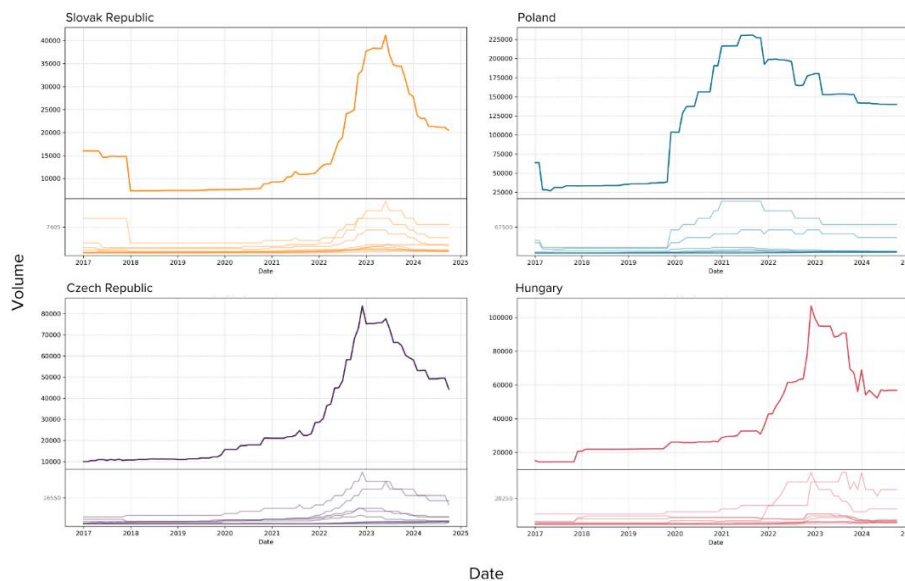
Figure 9: Time series for photovoltaic-related searches across the V4 countries
(Source: Own processing)

Trends for Hungary, the Czech Republic, and Slovakia were largely synchronized, as confirmed by high Pearson correlation coefficients (91-98%). In contrast, Poland's searches showed weaker correlations with other countries, with coefficients between 32-54%, the lowest being with Slovakia. According to the p-test, these correlations are statistically significant at the 5% level.
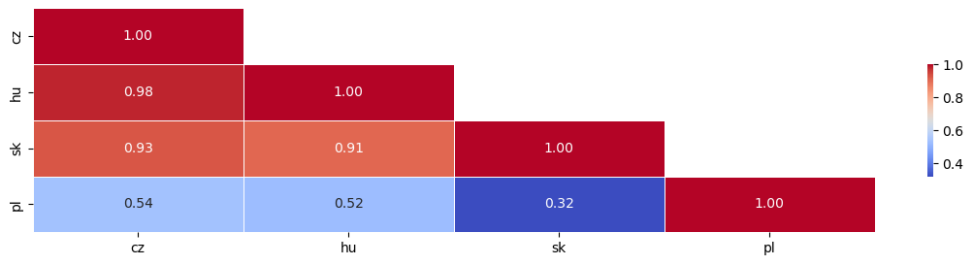
Figure 10: Pearson correlation matrix
(Source: Own processing)

4.3 Change point detection

To further analyze the time trends of aggregate search volumes from 31.12.2016 to 30.09.2024, we applied the Pruned Exact Linear Time (PELT) method to identify significant change points. The period preceding the change point is shown in blue on the chart, while the phase following the change point, marked in red, indicates a major shift in search volume patterns.

In Slovakia, the change point in search volume was identified in March 2022. Prior to this, search volumes were relatively low and stable, with an average growth rate below 1% and a standard deviation of 3%. After March 2022, search volume increased significantly, peaking in May 2023 before stabilizing at a level higher than that of the pre-change period. Between the change point and the peak, the average growth rate was 8.5% with a standard deviation of 10.4%.
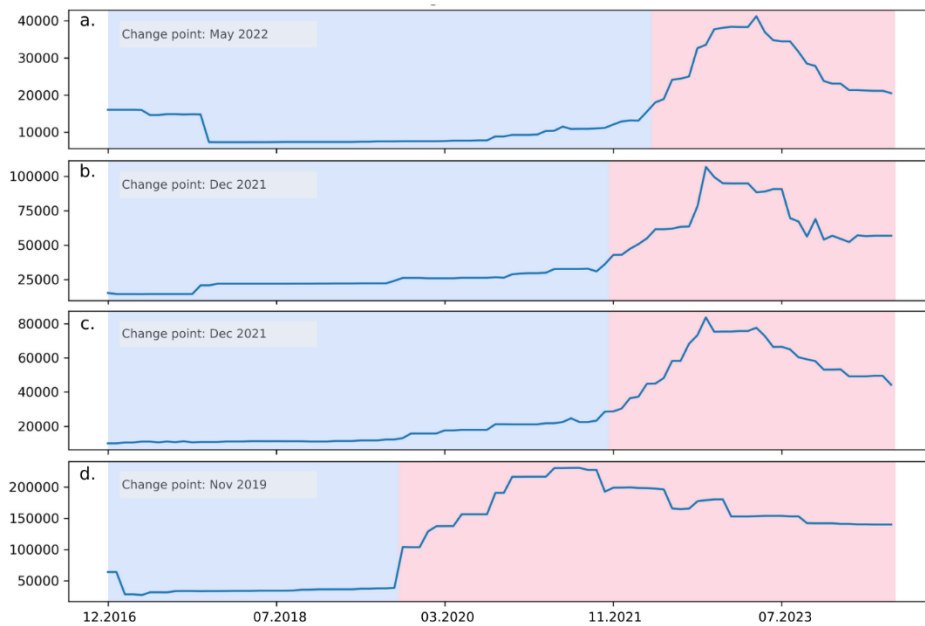
Figure 11: Results for change point detection using PELT for (a) Slovak Republic, (b) Hungary, (c)Czech Republic, (d) Hungary
(Source: Own processing)

In the Czech Republic and Hungary, change points were observed in December 2021, with both countries reaching peak search volumes in November 2022.

Prior to this change, search volumes were low and exhibited minimal fluctuations, with average growth rates of 2% for the Czech Republic and 1.7% for Hungary, and standard deviations of 5.3% and 6.6%, respectively. After December 2021, search volumes rose sharply, reaching peaks followed by moderate fluctuations. Between the change point and the peak, average growth rates were 10.5% for the Czech Republic and 9% for Hungary, with respective standard deviations of 8% and 11.5%. This pattern likely reflects a significant event or increased interest

237

beginning in late 2021, with sustained but decreasing interest after the peak. Poland exhibited a unique trend, with average growth rate in post-change period at 4.3%, alongside a standard deviation of 7.8%, which is twice as slow as in other countries. The growth period from the change point to the peak in Poland lasted 20 months, compared to a duration of 11-14 months in the other countries.

5. CONCLUSION

This study offers a comprehensive analysis of public interest in photovoltaics within the Visegrad Four (V4) countries, using search volume data from Semrush as proxies for public interest over an extended period. By identifying and analyzing change points in search volumes across the Czech Republic, Hungary, Poland, and Slovakia, we uncovered both shared and unique trends in the search volumes photovoltaics. Notably, significant spikes in public interest closely align with key geopolitical events, particularly the energy insecurities arising from the Russian invasion of Ukraine in 2022. This suggests that crises may significantly influence regional public awareness and willingness to explore renewable energy options. In Slovakia, the Czech Republic, and Hungary, public interest in photovoltaics surged in late 2021 and early 2022. The trends for these countries are highly positively correlated, as evidenced by a Pearson correlation coefficient of 92-98%. In contrast, Poland's trajectory was distinct, with a slower, prolonged increase in search volumes starting in 2019, which continued well into 2023. Poland's unique trend shows a relatively early but sustained interest in photovoltaics. This could potentially be due to national policy or economic conditions. The keyword analysis for each V4 country highlights distinct public interests and behaviors regarding photovoltaics, which may offer insights into the low social mobilization observed in recent public opinion studies. For all countries, the top 10 keywords are dominated by "Commercial" and "Informational" intent. This suggests that users seem to be focused on researching PV products and services or being curious and seeking insight, which potentially indicates interest but does not necessarily translate into action. However, this balancing act between "commercial" and "informational" intentions, suggesting both an interest in learning and a potential purchase opportunity. The transactional intent observed in a limited number of keywords in the Czech Republic, Poland and Slovakia—supports this, as relatively few users are seeking to take immediate action. While there is interest in renewable energy, this may not yet translate to active participation or investment, suggesting that fostering social mobilization efforts alongside public awareness could help bridge the gap between interest and action in the V4 countries. The keyword context in the Visegrad countries show different public interests in PV, shaped by local priorities. In the Czech Republic, Poland, and Hungary, keywords referring to government subsidies indicate that financial incentives are an important motive. Use of a brand-specific keyword in Slovak Republic likely indicates the presence of companies in the market that have successfully established brand recognition and can attract local consumers. This suggests that Slovak consumers are beginning to form brand associations with particular photovoltaic technologies, reflecting an advanced stage of market engagement where specific companies influence consumer choices in renewable energy adoption. This study offers new insights from digital data sources such as Semrush to track public interest in renewable energy over time. Traditional survey methods, while in-depth, lack the temporal and geographic granularity offered by search engine data.

Therefore, incorporating these tools into energy policy research can provide more timely, targeted information. The identified change points demonstrate a significant shift in interest in renewables in recent years, which should be further explored in relation to global geopolitical events, the climate situation, and energy transformation policies. Ultimately, this study emphasizes the importance of a diverse approach to understanding public opinion in the renewable energy transition. As the V4 countries continue to overcome energy security

challenges, public engagement will be essential to achieving a lasting energy transition. By tracking changes in public opinions, stakeholders can help create a more favorable environment for renewable energy initiatives, ensuring that policies are not only environmentally sound, but also socially supported and sustainable in the face of changing geopolitical realities.

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BENEFITS OF UPSKILLING AND RESKILLING

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ABSTRACT

The business environment has been changing rapidly in recent decades and after the Covid-19 pandemic, it is visible more than ever before. Changes followed primarily by growing dependency on digital systems and the increasing use of ICT, require new ways of doing business and new knowledge among employees. Business changes are impossible without employees, especially those who will be able to implement them. On the other hand, there is less and less adequate labor force on the labor market, which is why acquisition of new skills throughout upskilling and reskilling are becoming so important. There is a lot of benefits of upskilling and reskilling, for organizations and individuals as well. The state of the labor market and current changes are the circumstances in which organizations function, and training and development will become one of the key activities that HR managers will deal with in the years to come. However, often employees learn new skills on their own initiative, with or without financial support of organization. The benefits are certainly multiple, but many emphasize that the support of the public sector will certainly be necessary. The public sector needs to provide stronger support for reskilling and upskilling especially for workers at risk or displaced workers. Benefits and positive effects of upskilling and reskilling are the main topic of this paper work.

Keywords: Business environment, Communication, Human resources, Upskilling, Reskilling, Soft skills.

1. INTRODUCTION

Adoption of new technologies, digitalization and on-line businesses increased the demand for new skills and new job roles. At the same time qualified labor force on the labor market is decreasing, as shown in Figure 1.
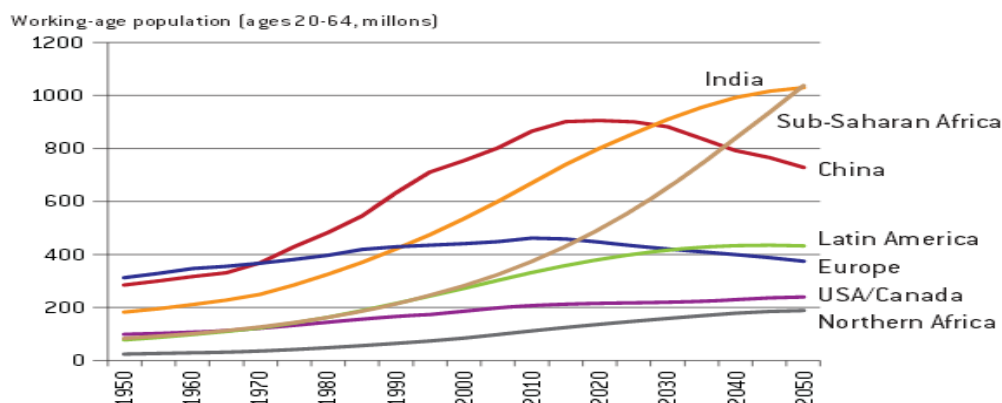

Figure 1: Change in working-age population, 1950-2050
(Source: Münz, 2014)

Although there are many people in the world, the number of highly qualified ones is small. According to McKinsey report (2018) „as many as 375 million workers—or roughly 14 percent of the global workforce—may need to switch occupational categories as digitization, automation, and advances in artificial intelligence disrupt the world of work". They found that "executives increasingly see investing in retraining and "upskilling" existing workers as an urgent business priority—and they also believe that this is an issue where corporations, not governments, must take the lead". There is not enough talents on the labor market, and with the tendency of their further decline, organizations will have to turn to existing workers. They will work more then ever befor on the development of new skills among employees, but organizations as well as individuals, will benefit from it. On the other hand unemployed show initiatives for learning, especially if it could be done on-line.

2. UPSKILLING, RESKILLING AND HUMAN RESOURCE MANAGEMENT (HRM)

Human resource management (HRM) refers to the policies, practices, and systems that influence employees' behavior, attitudes, and performance (Noe et al., 2012). In general, the basic activities within the HRM are: job analysis, human resource planning, human resources recruitment and selection, socialization and orientation of employees, training and education, performance evaluation of employees, rewarding and motivation, health and safety of employees, career management, degradation and dismissal of employees (Jovanović-Božinov et al., 2008). All those activities are interconnected and all have the goal of improving business through employees. Upskilling and reskilling are part of HRM training and education activity, but they will be central for other HR activities as well, to which they can directly or indirectly contribute, such as employee motivation, career management, etc. In order to achieve organizational success, HR managers will have to deal with individual employee development. Both strategies (upskilling and reskilling) will enable internal mobility of employees:

- "Upskilling helps develop employees for significant shifts in their current roles. For example, a retailer might upskill its employees with digital to prepare them for a business transition to e-commerce.
- Reskilling prepares an employee for a distinctly different role from their current one. Reskilling helps transition people from declining industries or functions to high growth, in-demand jobs" (HRM Asia, 2022).

Reskilling occurs when employees learn new skills that replace existing ones that are no longer relevant, allowing employees to take on entirely new roles within the company. Upskilling refers to the acquisition of new skills in order for employees to progress within their current career, thereby complementing their existing skill set. In companies, these activities are closely connected with the organization's strategy and the activities of the HR department.

3. STRATEGIES FOR UPSKILLING AND RESKILLING

With the Covid-19 pandemic, the potential skills gaps related to automatization and/or digitalization became even more obvious. That's the reason why for success of any upskilling or reskilling strategy, focus on soft skills and technical ability will be crucial. But for making decision what to do and how, organizations will need time. After organization asses employees skills, make skills inventory and find out what new skills will need, it will have to find is there employees with related competencies or how to develop missing competencies in existing employees. The next step would be to organize specific skills trainings combining different training methods/strategies (on-the-job training, on-line learning, peer learning, job shadowing by observing an experienced employee during the work, etc.).

However, before the organization chooses strategies for upskilling and/or reskilling SHR Executive Network explained that "strategies must address the facts head on. First, consider the following data from a variety of sources.

- 58 % of the existing workforce needs new skill sets to do their jobs.
- 83 % of industry association economists say employers in their sectors are finding it more difficult to fill jobs than they were five years ago.
- 55 % of employees still struggle to find and share organizational knowledge and 61 % are not completely satisfied with their company's workplace tools and technologies.
- Approximately 53 % of college graduates are unemployed or working in a job that does not require bachelor's degree" (SHR Executive Network, 2021).

McKinsey & Company found in their panel survey from 2017 that private-sector organizations with more than $100 million annual revenue who already view the skills gap as top 10 priority, will use retraining or mix of retraining and hiring as mains strategies for resolving that problem (McKinsey&Company, 2018). This was especially true for the Europe.
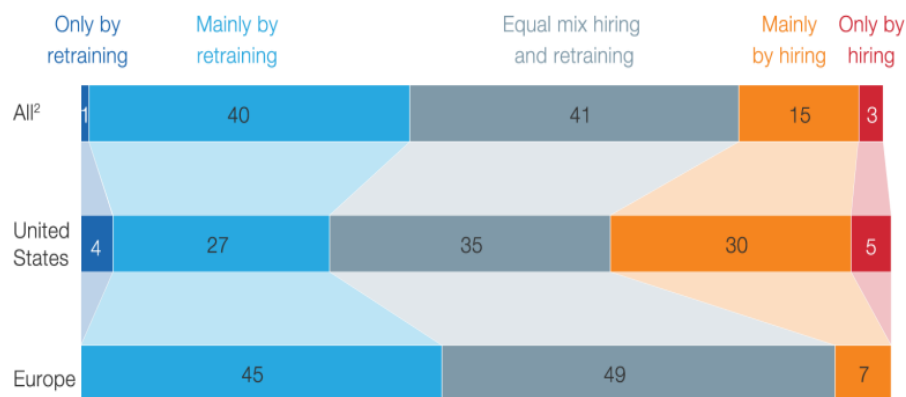
Figure 2: How organization will best resolve its potential skills gaps related to automation and/or digitalization over the next 5 years (% of respondents)?
(Source: McKinsey&Company, 2018)

So, organizations will have to undergo skills gap analysis and find what skills they will need in the future to stay competitive and what skills employees already have. For the process of upskilling and reskilling, it will be the first step. After that analysis, organization will be prepared to develop strategy for employee upskilling and/or reskilling. Organizations can use: On-the-job training, monitoring, peer coaching, online learning, Blended learning etc.

Valamis (2022) give precise steps for organizing reskilling program:
1. Create a list of potential positions where people can be relocated;
2. Define people who can be included in the program;
3. Define areas for improvements;
4. Choose methods;
5. Create a detailed plan for key roles/positions;
6. Define needed time and resources;
7. Negotiate with potential candidates;
8. Launch the program, adjust as needed.

Deborah Waddill, President of Restek Consulting LLC and author of Digital HR and e-HR Advantage, singled out four strategies for consideration (SHR Executive Network, 2021):

- A Focus on Skills,
- Agile Learning Opportunities and Knowledge Sharing,
- Apprenticeships,
- Business/Education/Student Partnerships.

Ryan Carruthers, suggested next steps that organizations should follow during the process of choosing the strategy to upskill and reskill workforce (Together platform, 2021):

1. "On-the-job training - This can include job shadowing, where you have an employee follow another worker around, watching what they do and learning how to do the work.
2. Mentoring - Mentoring helps support learning as informal conversations can encourage employees to get curious and motivated about what they're learning.
3. Peer coaching - In this approach, peers can act as coaches to help colleagues develop the skills that will help them grow. It establishes a safe atmosphere where employees can ask questions, experiment, and be guided rather than directed.
4. Online learning - Virtual training courses can be an effective and affordable tool for employee development. Some organizations create their own online learning platform and tools, while others rely on ones like LinkedIn Learning or Coursera.
5. Blended learning - This style of employee development program combines in-class and online learning to help solidify the exchange of knowledge."

According to survey done by World Economic Forum (2020), digitalization of upskilling/reskilling will be one of the strategies for adaptation in response to Covid-19 as well.
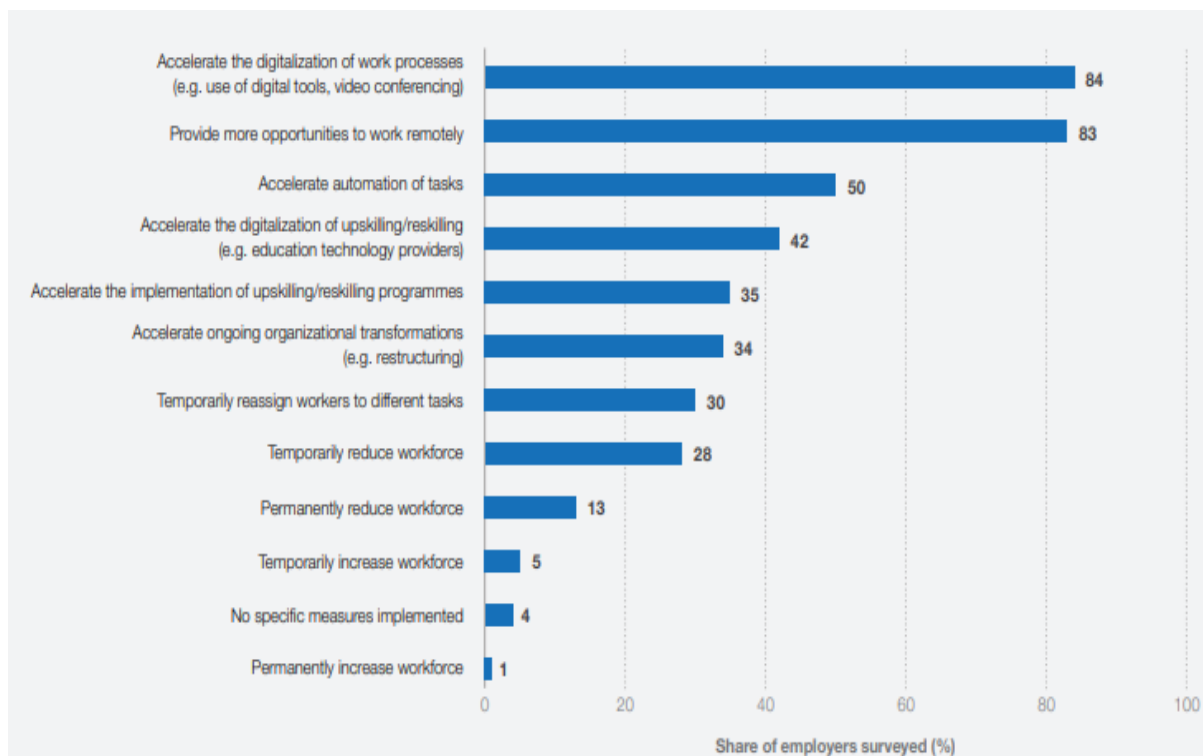
Figure 3: Planned business adaptation in response to COVID-19
(Source: WEF, 2020)

"According to Future of Jobs Survey data, employers expect to lean primarily on internal capacity to deliver training: 39% of training will be delivered by an internal department. However, that training will be supplemented by online learning platforms (16% of training) and by external consultants (11% of training)" (WEF, 2020). Since Covid-19 pandemic and imposed restrictions the trend toward on-line learning (for reskilling or upskilling) accelerated. Data from the online learning platform Coursera signals expansion in the use of online learning. Jeff Maggioncalda, Coursera CEO said "Since mid-March, over 21 million learners have joined Coursera, a 353% increase from the same period last year. Similarly, during that time, we've seen more than 50 million course enrollments on Coursera, a 444% increase" (Coursera Impact Report for 2020). "In fact, there has been a four-fold increase in the numbers of individuals seeking out opportunities for learning online through their own initiative, a five-fold increase in employer provision of online learning opportunities to their workers and an even more extensive nine-fold enrolment increase for learners accessing online learning through government programmes" (WEF, 2020). At the end, it is important see the results: Are employees applying the new skills and how they found themselves in their new role. Obviously, although digital technologies facilitate learning and access to information, they require time and financial resources.
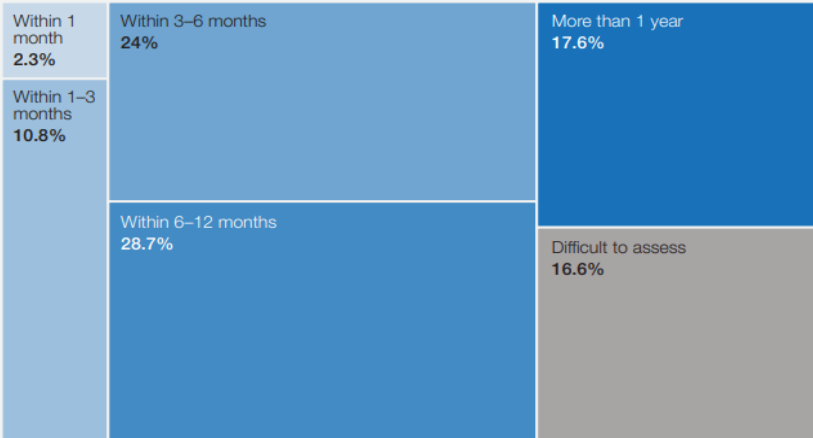
Figure 4: Perceived time period to receive return on investment into
employee reskilling and upskilling
(Source: WEF, 2020)

The most of respondents (more than 60%) return on investment from reskilling and upskilling workers expected within a one year or earlier after employees complete reskilling, while 17% of businesses said that it is difficult to estimate.

4. BENEFITS OF UPSKILLING AND RESKILLING

There are lot of positive effects of upskilling and reskilling are they are especially significant in young professionals helping them to find new, growing opportunities and jobs. Internal mobility enabled with upskilling and reskilling of employees, motivates employees to stay in the organization. LinkedIn Workplace-Learning-Report 2021 found that employees at companies with internal mobility stay almost 2 times longer.
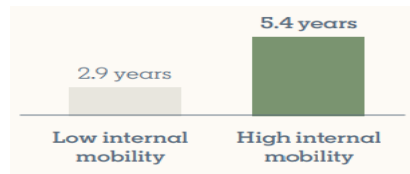
Figure 5: Median employee tenure for companies with high and low internal mobility (top and bottom quartile) (Source: LinkedIn, 2021)

Andrea Boatman, SHRM certified HR manager, named some advantages (AIHR, 2022):

- Improving employee retention - Investing in skills training shows workers that they have present and future value within the company.
- Reducing the cost of filling new roles - New employees will have to be trained not just for their specific role but also in organizations processes, culture, protocols and software. Human Capital Benchmarking Report (SHRM, 2016), revealed that in average 42 days is time-to-fill open position and that average cost-per-hire is 4129$.
- Attracting new talents – A Gallup report revealed that 59% of Millennials rank learning and growth opportunities as extremely important when looking for a job so it can be an advantage for sourcing and hiring motivated applicants.
- Supporting employee engagement - Understanding the different skill sets required in other areas promotes empathy.
- Boosting employees' confidence and morale - Those who are confident in their skills and abilities propel productivity and innovation. It means job security as well, because employees will see that if their current position will be eliminated they will have opportunity to work in new roles, with new knowledge.

Apart from the above mentioned, benefits can also be seen in the following:

- Upskilling and reskilling helps organization to keep knowledgeable employees and top employees.
- It ensures timely filling of skill gaps.
- It provides job security and stability in employment.
- It can be a starting point for promotion.
- It improves organization reputation and helps in employer branding.
- It is a way of promoting lifelong learning in the organization.
- It expands knowledge about the organization itself, processes and other areas of work, which is why employees can better understand the functioning and make a greater contribution.
- Also, more skilled positions usually imply higher salaries of those we will be hired and it can be avoided with upskilling and reskilling already employed.

Upskilling and reskilling should be supported by organization. Firstly, internal mobility must be accepted and further encouraged by top and line managers. It should enable employees to progress in their careers and the organization to progress in business. "Learning and Development is one of the main responsibilities of any organization's HR department. Implementing L&D initiatives that take into account development at all levels of the company is usually the responsibility of the HR manager" (Symonds, 2023). In order to acquire new skills, employees need mentoring support as well as financial support if they are ready to get involved and manage their career.

Often employees learn new skills on their own initiative, but in WEF's The Future of Jobs Report 2020 stressed support of public sector „The public sector needs to provide stronger support for reskilling and upskilling for at-risk or displaced workers. Currently, only 21% of businesses report being able to make use of public funds to support their employees through reskilling and upskilling. The public sector will need to create incentives for investments in the markets and jobs of tomorrow; provide stronger safety nets for displaced workers in the midst of job transitions; and to decisively tackle long delayed improvements to education and training systems" (WEF, 2020).

5. IMPORTANCE OF SOFT SKILLS AND TECHNICAL ABILITY IN THE FUTURE

Success in business depends on the characteristics of organization's workforce. It is particularly hard to find candidates with the right "soft skills" like communication, good work ethics, creativity, ability to work in team etc. (Cvetkovska Tomanović, Babić, 2018).

LinkedIn's Workplace-Learning-Report 2021 found that 49% of L&D pros worked with managers in organization, in order to build necessary skills among the employees, because managers are responsible for their teams, they now their people and their skills or lack of skills.

Figure 6: % of L&D pros globally who indicated that they are
using these tactics to upskill and reskill their employees
(Source: LinkedIn Learning Workplace-Learning-Report 2021)

„After the pandemic, at least 50% of workers will need to gain new skills to advance their occupations, as compared to only 6% before the pandemic" (Valamis, 2022). Human resources are important because of their intellectual activities - thinking, reasoning, problem solving, which are not peculiar to other resources.

1	analytical thinking and innovation
2	active learning and learning strategies
3	complex problem-solving
4	critical thinking and analysis
5	creativity, originality and initiative
6	leadership and social influence
7	technology use, monitoring and control
8	technology design and programming
9	resilience, stress tolerance and flexibility
10	reasoning, problem-solving and ideation
11	emotional intelligence
12	troubleshooting and user experience
13	service orientation
14	systems analysis and evaluation
15	persuasion and negotiation

Table 1. Top 15 skills for 2025
(Source: Future of Jobs Survey 2020, World Economic Forum)

"Skills gaps continue to be high as in demand skills across jobs change in the next five years. The top skills and skill groups which employers see as rising in prominence in the lead up to 2025 include groups such as critical thinking and analysis as well as problem-solving, and skills in self-management such as active learning, resilience, stress tolerance and flexibility. On average, companies estimate that around 40% of workers will require reskilling of six months or less and 94% of business leaders report that they expect employees to pick up new skills on the job, a sharp uptake from 65% in 2018" (WEF, 2020). "Communication is mentioned, directly or indirectly, by many authors as one of the strategies for dealing with effects of Covid-19 pandemic" (Cvetkovski, Cvetkovska Tomanović, 2021, pp 565). "We live in a period characterized by globalization. The impact of technology on our lives and businesses is significant. Multinational companies bring new cultural forms and strengthen intercultural communication" (Cvetkovski, Langović Milićević, 2018, pp. 238). According to McKinsey report "about one-third of executives feel an urgent need to rethink and upgrade their current HR infrastructure. Many companies are also struggling to figure out how job roles will change and what kind of talent they will require over the next five to ten years. Some executives who saw this as a top priority—42% in the United States, 24% in Europe, and 31% in the rest of the world—admit they currently lack a good understanding of how automation and/or digitization will affect their future skills needs." "Amazon has demonstrated their commitment to upskilling and reskilling their employees. noted the company has already contributed $700 million to the effort. Amazon said it intended to invest $1.2 billion by 2025. The money will go towards training programs and even college tuition for some employees" (Together platform, 2021).

6. CONCLUSION

Future of organizations will depend on adoption of new technologies and new technologies will be used by employees, so employees will need to have appropriate knowledge and skills. If organization wants to stay competitive, it must have employees with the right skills. Labor shortage and skill gaps in the local labour market, and lack of talents and inability to attract the right talents would be the main reasons that will push organizations to upskilling and reskilling activities. In the process of recruitment and selection of candidates, apart from knowledge and experience, variables such as gender, age, ethnicity, and religion are often significant.
Depending on these variables candidates will have different knowledge and experience, but also they will have different expectations and desires (Cvetkovska Ocokoljić, Babić, 2016, pp.

494). Reskilling and upskilling are way to avoid external recruitment of candidates, but to ensure employees have the skills they need to thrive and make transitions into new or upgraded roles in accordance with their desires and expectations. In Serbia, there are significant demographic changes, the rapid aging of the population, the decline in fertility rates, lack of the employees' skills and knowledge; poor mobility of students, high unemployment and consistently high brain drain. These trends significantly affect the planning of human resources and the possibilities of HR departments to recruit and select „the best one". In such circumstance organizations will have to rely more and more on themselves and on the ability to build the best workers, rather than looking for them on the labor market. Upskilling and reskilling are clearly an imperative of the new business environment. In such an environment, everyone has certain roles and responsibilities. "The current moment provides an opportunity for leaders in business, government, and public policy to focus common efforts on improving the access and delivery of reskilling and upskilling, motivating redeployment and reemployment, as well as signalling the market value of learning that can be delivered through education technology at scale. To address the substantial challenges facing the labour market today, governments must pursue a holistic approach, creating active linkages and coordination between education providers, skills, workers and employers, and ensuring effective collaboration between employment agencies, regional governments and national governments" (WEF, 2020). It seems that these changes are primarily felt by organizations but employees also feel the need to learn, in order to remain competitive on the labor market. Because of everything, we can talk about the benefits of learning, of upskilling and reskilling for all parties.

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GOVERNANCE AND PERFORMANCE IN MISERICORDIAS

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ABSTRACT

Over the last few decades, in the absence of government responses to the growing social challenges of contemporary societies, we have witnessed the proliferation of charitable institutions, without management models and governance practices keeping up with this evolution. Charities rely on resources that are outside their control, so governance must be structured to ensure that charities can access and manage these resources effectively. Governance practices must be geared towards ensuring that charities maintain and optimize their relationships with resource providers, just as inadequate governance practices lead to resistance from key resource providers to contribute to these charities. Therefore, it is essential to understand how governance practices may interfere with the financial performance of these institutions; which is why, in recent decades, there has been an increase in studies and research in this area, not only as a sustainability factor, but also as a way to modernize management and promote accountability and transparency in these institutions. Effective governance, accountability and transparency in the non-profit sector can help strengthen charities' ability to attract and retain financial resources essential to their operations and social impact, just as implementing sound governance practices can help charities to ensure continued access to the resources needed to achieve their objectives and fulfill their missions. Governance practices that promote accountability and transparency can increase the trust of stakeholders, including donors and partners, by demonstrating that resources are being managed effectively and responsibly, attracting financial support and other resources. However, there are few studies found in the literature that evaluate the relationship between governance and financial performance in charities and those related to Misericórdias, a Portuguese type of charity with social purposes, are practically none to almost non-existent. These institutions are secular in Portuguese society, have the nature of brotherhoods and have a significant weight in social support. Therefore, this study aims to analyze the influence that the governance environment exerts on the financial performance of Misericórdias, in which good governance is seen as a way of improving management, adding value and facilitating access to resources, contributing to better performance. effective and efficient and for its sustainability. In order for the Misericórdias to better respond to social problems, they need to modernize and professionalize, adopting management and information models that are contrary to the lack of formalism that characterizes them. It is natural that these institutions, given their dependence on resources that characterize and condition them, seek the best performance and avoid excessive dependence, minimizing vulnerabilities. Misericórdias must adapt to the uncertainties of the external environment to deal with the challenges of maintaining and actively managing the flow of resources they need to survive and must be agile and adaptable to changes in the external environment.

Governance practices that encourage innovation and flexibility can help these institutions respond quickly to new opportunities and challenges, thereby ensuring continued access to resources. Governance practices play a crucial role in helping charities make their resource providers want to contribute more money to the mission they intend to serve, as well as can be considered as resource management mechanisms that help to ensure the efficient and effective allocation of resources available to charities.

Keywords: *Governance, Financial Performance, Not-for-Profit Organizations, Misericórdias.*

1. INTRODUCTION

The reduction in the activity of the welfare state has led to the proliferation of charities (Helmig, Jegers & Lapsley, 2004), highlighting the importance of the services provided by these institutions, given their proximity to the citizen, the efficiency with which they distribute resources and the innovation, dedication and effectiveness they demonstrate (Liou, 2001). Given the public nature and scarcity of resources with which these institutions operate, the issue of governance is very important, as those who support these institutions seek to ensure that the resources invested have been and are being used honestly and efficiently. Inadequate governance practices lead to resistance from key resource providers to contribute to these institutions, so governance practices that promote accountability and transparency can increase the confidence of stakeholders, including donors and partners, by demonstrating that resources are being managed effectively and responsibly, attracting and guaranteeing access to the resources needed to achieve their objectives and fulfill their missions. In charities, there is a strong relationship between accountability, transparency and trust (Farwell, Shier & Handy, 2018), and in order for charities to obtain resources from stakeholders, they need to demonstrate accountability and transparency in the use of the resources they receive (Abraham, 2007). In the literature review, there are practically no studies evaluating the relationship between governance and financial performance in the Misericórdias, so it is imperative to analyze the influence that the governance environment has on the financial performance of these institutions, which have the nature of brotherhoods, are secular in Portuguese society, and have a significant weight in supporting the most socially vulnerable citizens. Good governance is seen as a way of improving the management of these institutions, adding value and facilitating access to the resources needed to achieve their missions, contributing to effective and efficient performance and guaranteeing their sustainability. Good governance plays a crucial role in helping charities make their resource providers want to contribute more money to the mission they aim to serve, as well as being seen as a resource management tool that helps ensure the efficient and effective allocation of the resources allocated. Charities should be seen as an example in good governance practices, since they are not self-sufficient, their survival depends on raising donations and other resources, and it is desirable that they develop (Vinten, 1997).

2. LITERATURE REVIEW

Charities, because they depend on donations, must be very careful in the use of these resources, and donors want to know to what extent their money has been allocated to the mission. Informing donors about the use of these resources and the activities carried out by the institution is vital for the continuity of their donation (Sargean, 2001). Donors' perceptions and expectations need to be valued in order to maintain the continued support of charities and charities need to be prudent in their spending and transparent with the donations they receive, so accountability and prudence are necessary components for maintaining donor support (Grey Matter Research, 2008). The scarcity of publicly available information about charities, their management and how donated resources are used makes it difficult for donors, as well as the general public, to select which charities to support, so exercising transparency is a necessary imperative for their survival today.

The public has an interest in adequate financial disclosure, which allows them to make informed decisions (when they contribute) and to monitor the use of their resources by charities. Charities are subject to strict accountability and transparency requirements from the state and other funders, as a way of ensuring that they are carrying out their work and using resources appropriately (Marshall, Vines, Wright, Kirk, Lowe & Wilson, 2018).

Milofsky and Blades (1991) highlight the importance of accountability and transparency in charities, especially when considering the significant increase in resources and donations received by these institutions. Governance practices that promote accountability and transparency can increase the trust of stakeholders, including donors and partners, by demonstrating that resources are being managed effectively and responsibly, attracting financial support and other resources (Bellante, Berardi, Machold, Nissi & Rea, 2018).

The Misericórdias are among the oldest non-profit institutions in Portugal (Andrade & Franco, 2007). They have been in existence for more than five centuries and aim to fill social needs, as well as practicing Catholic worship. They are wide-ranging and multifaceted institutions, present in every municipality in the country and work mainly in the area of health and social services, being recognized as institutions of public utility, collaboration and complementarity, namely with the State, through the signing of cooperation agreements. There are currently 388 Misericórdias in Portugal (União das Misericórdias", 2024), which, according to the results of the National Statistics Institute's Satellite Account of the Social Economy, generated almost 11% of GVA and around 10% of paid employment in 2020.

As for their governance model, Pereira (2002) considers its main characteristic to be its historical nature, in which the governing bodies and their relationship have remained unchanged. The Resource Dependency Theory highlights the importance of a charity's external relationships for its survival and success (Bellante et al, 2018), as well as highlighting the interdependence of charities with the external environment, whereby these charities are influenced and conditioned by the resources available in their environment, and the way they manage these dependencies affects their ability to survive and thrive (Pfeffer & Salancik, 1978). Charities depend on external resources for their survival and performance, and the way they manage these dependencies can affect their success.

Governance practices can be designed to maximize access to external resources, improve institutional sustainability and social impact, and ultimately increase the performance of charities. Good governance practices allow charities to access resources more easily, reduce capital costs, improve stakeholder reputation and institutional performance (Claessens, Djankor, Fan & Lang, 2002). Several studies positively relate good governance principles and practices to the performance of charities, either through efficiency and effectiveness in the use of resources and the fulfillment of objectives and mission (e.g., Dellaportas, Langton & West, 2012; Yetman & Yetman, 2012; Hyndman & McConville, 2016; Connolly & Hyndman, 2017) or through obtaining more resources (e.g. Gregg, 2001; Hilmer, 1998; Kiel & Nicholson, 2002; Dhanani, 2009; Hyndman & MacMahon, 2010; Zainon, Atan, Ahmad & Wah, 2012; Bellante et al, 2018).

Governance creates the conditions to optimize the performance of charities, protecting the interests of all stakeholders, so it is necessary to improve the practices that help in the way these institutions are managed and controlled, with a special focus on Misericórdias, due to their importance and weight in Portuguese society.

3. METHODOLOGY

Multiple Linear Regression was used to analyze how the governance principles and practices adopted by the Misericórdias influence the obtaining of resources, namely donations and transfers or subsidies. The sum of the percentage of donations and the percentage of transfers or subsidies obtained by the Misericórdias was used as a proxy for the dependent variable (performance), and the following were used as independent variables: the existence of time limits applicable to the exercise of the position of top executive in the Misericórdia, the use of key indicators in the monitoring/evaluation of the performance of the Misericórdia's activity, the use of the website and/or social networks for the purpose of presenting the Misericórdia and for the purpose of publicizing the activities carried out by the Misericórdia, the disclosure of the social impact report and the annual report and accounts on the Misericórdia's website/electronic page, the description of the Misericórdia's strategic posture, the number of senior management members with executive functions who are remunerated at the Misericórdia, the degree of autonomy of the senior management at the Misericórdia in terms of understanding and using information technologies, and the way in which the senior management at the Misericórdia is selected, all of which reflect governance practices and relate to the guidelines, principles and recommendations set out in the Code of Governance for Third Sector Entities. Initially, the assumptions needed to apply the linear regression model were checked. The Ordinary Least Squares method was used to adequately represent the dependent variable using the independent variables. The empirical data was obtained from the National Statistics Institute (INE, 2019), with the collaboration of the António Sérgio Cooperative for the Social Economy (CASES, 2019), through a survey launched between June and September 2019, to the members of the top management of Social Economy entities. The survey's reference period was 2018 and its target population included Social Economy (SE) entities active in 2018 and based in Portugal. The results of this survey were released on November 27, 2019 and were grouped by large families, including the Misericórdias, and focused essentially on analyzing the management practices of Social Economy entities. Because the highest response rate was precisely from the Misericórdias (76.7%), this sample can be classified as quite rich.

4. MODEL RESULTS

The model showed an R of 0.41, indicating a moderate correlation between the explanatory variables and the dependent variable. The R^2 was 0.17, suggesting that approximately 16.6% of the variation in the sum of donations and transfers or subsidies can be explained by the variables included in the model. Although the R^2 is relatively low, this is to be expected in studies involving social science data, where human and institutional behavior is influenced by various non-measurable or complex factors. According to Ozili (2023), the aim is to assess whether the explanatory variables have a significant effect on the dependent variable, so an R^2 square of at least 0.1 (or 10 percent) is acceptable on the condition that some or most of the explanatory variables are statistically significant. The adjusted R^2, which takes into account the number of predictors, was 0.13, which indicates that even after adjusting for the complexity of the model, the variability explained is still significant, but moderate. The overall significance of the model was confirmed by the F-statistic of 4.21 and a p-value of <0.001, indicating that, collectively, the independent variables included in the model contribute significantly to explaining the sum of donations and transfers or subsidies. After examining the coefficients of the variables in Table 1, the "Existence of limits on the exercise of the position of the senior manager in office", the "Purpose of using the website and social networks to present the organization", the "Disclosure of the social impact report on the website" and the "Description of the strategic stance" showed positive coefficients and statistically significant p-values, suggesting that these variables are associated with increases in fundraising.

The dissemination of information on the objectives, activities and action programs of charities is related to obtaining more than half of their income (Dhanani, 2009). Similarly, the "Description of strategic posture" had a strong statistical significance, with the "maintenance" (coefficient of 13.45; $p < 0.001$) and "survival" (coefficient of 13.40; $p = 0.004$) postures associated with greater sums of donations and transfers or subsidies, compared to a posture focused only on growth. On the other hand, "Use of key indicators to monitor the performance of the activities carried out" and "Disclosure of the report and accounts" were negatively associated with the dependent variable, with statistically significant p-values, which may indicate that monitoring/evaluating the performance of the activities carried out and the disclosure of the report and accounts may be associated with evaluating the success and effectiveness of the institution, which could potentially limit the obtaining of resources. On the other hand, the "Number of members of the top management with paid executive functions" showed a negative coefficient of -3.22 ($p < 0.001$), indicating that a greater number of paid executive members may be associated with less funding, as it is perceived as an indicator of inefficiency or poor allocation of resources, which ultimately affects the confidence of donors and funders. Finally, the "Form of selection of the top manager" revealed a strong influence on the dependent variable. Specifically, leaders who were "elected by the governing bodies" or selected through a "recruitment process" showed significant positive coefficients (34.61; $p = 0.01$ and 62.87; $p < 0.001$, respectively), suggesting that more rigorous and democratic selection processes are associated with greater fundraising. The significant impact of the top management recruitment process highlights the importance of participatory, merit-based governance, which is valued by resource providers, demonstrates a commitment to excellence and signals to donors and funders that the institution is trustworthy and committed to the efficient management of the resources received. This meritocratic approach can be seen as an indicator of institutional quality, which, in turn, reflects positively on obtaining resources. The model indicates that governance principles and practices that promote transparency, stability and strategic sustainability, and meritocracy in leadership, are key to maximizing resources in Misericórdias. The statistical significance of the variables related to strategic posture and the way in which the top leader was selected suggests that these areas are especially sensitive and must be managed with due care to ensure the financial sustainability of Misericórdias. Adopting governance principles and practices that promote accountability and transparency not only strengthens donor confidence, but can also attract additional resources through transfers or grants, which often depend on a positive public perception and robust institutional performance. When charities increase their level of accountability through the use of voluntary disclosure mechanisms and tools, such as the use of social media and reports with information on mission, governance, strategy, human resources and social outcomes, it confirms a positive impact on institutional performance, measured by the ability to obtain resources, which suggests that additional transparency and accountability can improve the trust of stakeholders, such as users, donors and regulators, and strengthen the institution's reputation (Bellante et al, 2018).

Table following on the next page

Table 1 - Results of the linear regression model for the sum of donations with transfers or subsidies (in % of total amounts received)

Predictor	Coeficiente estimado	Erro padrão	Valor t	p-valor
Intercept [a]	-9,39	14,63	-0,64	0,52
Existência de limites ao exercício do cargo do dirigente de topo em funções:				
sim – não	9,29	4,04	2,3	0,02
Utilização de indicadores-chave para monitorizar desempenho de atividades desenvolvidas:				
sim – não	-5,31	2,59	-2,05	0,04
Objetivo de utilização do website e redes sociais para apresentação da entidade:				
sim – não	5,83	2,6	2,25	0,03
Objetivo de utilização do website e redes sociais para publicitação das atividades desenvolvidas:				
sim – não	4,27	2,44	1,75	0,08
Divulgação do relatório de impacto social no website:				
sim – não	27,08	13,67	1,98	0,05
Descrição da postura estratégica:				
desenvolvimento – crescimento	9,82	3,82	2,57	0,01
manutenção – crescimento	13,45	3,28	4,11	<0,001
sobrevivência – crescimento	13,4	4,59	2,92	0,004
Número de Membros da direção de topo com funções executivas remuneradas:	-3,22	0,96	-3,36	<0,001
Grau de autonomia do dirigente de topo em funções relativamente à compreensão e utilização de tecnologias de informação:				
muito autônomo – moderadamente autônomo	1,24	2,52	0,49	0,62
nada autônomo – moderadamente autônomo	5,97	5,84	1,02	0,31
pouco autônomo – moderadamente autônomo	-4,28	4,04	-1,06	0,29
totalmente autônomo – moderadamente autônomo	2,46	2,61	0,942	0,35
Divulgação do relatório e contas no website:				
sim – não	-6,15	2,53	-2,43	0,02
Forma seleção do dirigente de topo em funções:				
eleito p/órgãos sociais – nomeado pela entidade	34,61	13,41	2,58	0,01
outra – nomeado pela entidade	16,93	23,05	0,73	0,46

5. CONCLUSION

In charities, governance factors play a crucial role in influencing donation behavior, making their donors want to donate more money to the mission they aim to serve, affecting transparency, effectiveness and donor confidence in the charity. Sound governance in charities promotes accountability, transparency and the effectiveness of their management, contributing to better performance results and the fulfillment of their mission. Trust is essential for these institutions to obtain the resources they need to fulfill their mission and trust depends on the quantity and quality of disclosures (the first step towards accountability) and transparency in the efficiency with which resources are used to fulfill objectives. In this context, the Misericórdias are particularly important in Portuguese society, as they are a benchmark in providing integrated responses and solutions in the area of social solidarity.

The regression analysis carried out in this study, which combined obtaining donations with obtaining transfers or subsidies, aimed to explore how the governance practices adopted by the

Misericórdias influence obtaining resources. The results reveal important insights into the most effective governance practices or the most assertive strategies that can maximize the obtaining of resources, with emphasis on the disclosure of social impact on the Misericórdia website and the adoption of a strategic stance based on stability or sustainability, which are more effective in mobilizing resources. The way in which the top manager is selected has also been shown to be a determining factor in obtaining resources, in which participatory and meritocratic governance is highly valued. In conclusion, the analysis suggests that governance principles and practices that emphasize transparency, stability and strategic sustainability, and meritocracy are fundamental to maximizing the collection of resources in Misericórdias. These results offer practical guidelines and recommendations for Misericórdias, which seek to improve their efficiency in obtaining resources through more effective and transparent governance. Charities depend on external resources, such as donations, transfers or grants, volunteering and partnerships, to finance their activities and fulfill their missions, so their survival can be explained by the skill with which they deal with environmental contingencies in order to guarantee the supply of resources necessary for their sustainability. Fundraising is increasingly understood as the product of governance systems (Phillips, 2012). Governance practices that encourage innovation and flexibility can help these institutions respond quickly to new opportunities and challenges, thus ensuring continued access to resources (Bellante et al, 2018). Effective governance, accountability and transparency in the non-profit sector can help strengthen charities' ability to attract and retain financial resources, which are essential for their operations and social impact, just as the implementation of sound governance practices can help charities ensure continued access to the resources they need to achieve their goals and fulfill their missions.

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HANDLING WITH PLANNED MISSING DATA IN LONGITUDINAL ANALYSIS

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ABSTRACT

Missing or incomplete data represents a persistent problem in several studies in different fields, such as education, psychology or marketing. For some authors, this is one of the most important statistical problems in the research, and the practice was to exclude the missing observations from the data modeling. The use of a planned missing design could help with this problem. In a planned missing design, missing data are structured purposely and according to the researcher's wishes. The goal of using such a design is to reduce the amount of effort required for inquiry and, as a result, panel desertion. On the other hand, latent growth curve models are a useful statistical approach for studying change with longitudinal data. This type of modeling, which estimates a latent trajectory over time allows the analysis of change both individually and across all individuals. When our data contains omissions, we can estimate a change process utilizing latent growth curve models using full information maximum likelihood (FIML) method. This work aims to emphasize the application of FIML in estimating a latent growth curve model, particularly within the context of a planned missing data design.
Keywords: *Full Information Maximum Likelihood, Latent Growth Curve Model, Planned Missing Design*

1. INTRODUCTION

Missing data is a common challenge in longitudinal research, with a key distinction typically drawn between time-point omissions and participant dropouts. Dropouts occur when an individual stops answering survey questions after a certain time point. If the individual does not respond at a specific time point, but responds again later, the omissions are said to be intermittent. However, omissions can also result from the research design. Thus, in a planned missing design, there is a missing data structure that occurs intentionally according to the researcher's plan. The purpose of such a design is to minimize researcher effort and the resulting panel abandon (Enders, 2010; Graham et al., 1996; Graham et al., 2006). Two of the most used contemporary statistical approaches to handling missing data are Full Information Maximum Likelihood (FIML) and Multiple Imputation (MI) estimation methods. However, for the purpose of statistical modeling, when choosing a method to handle missing data, it is necessary to consider the relationship between the observed variables and the probability of missing data, i.e., the missing data mechanism (Allison, 2002; Enders, 2010; Little and Rubin, 1987; Schaffer and Graham, 2002). The mechanism of data omission is said to be ignorable or non-ignorable depending on the need to estimate the parameters that establish the propensity for non-response. The FIML and multiple imputation methods are appropriate when assuming an ignorable data omission mechanism (Collins et al., 2001; Enders, 2010). The goal of planned missing design is to ensure data quality with lower effort of the participants. However, considering how missing data can negatively influence the results of the analysis, some researchers avoid planned missing design. Several authors, however, have demonstrated the opposite, for instance, see the work of Moore et al. (2020), Rhemtulla and Hancock (2016), Vicente (2023, 2024), Wu and Jia (2012). The application of the FIML technique for addressing omissions through design is exemplified by a longitudinal analysis of a material deprivation score along with the benefits that are emphasized.

2. PLANNED MISSING DESIGN

The advantage of considering a planned missing design is minimize the effort of answer to the survey and consequently avoid the abandon. So, it is a balance between data quality and data quantity. The aim is to efficiently collect high quality data while reducing participant burden. According to Rubin (1976), there are three types of missing data mechanisms: Missing Completely at Random (MCAR), Missing at Random (MAR) and Missing Not at Random (MNAR). MCAR occurs when the likelihood of data being absent for a particular variable is independent of both observed and unobserved values across all variables. MAR is characterized by the situation where the probability of missing data for a variable is associated with other measured variables within the study. Lastly, MNAR arises when the probability of missing data for a variable is influenced by the values that are missing. Researchers have suggested various forms of planned missing designs that yield data characterized by a mechanism that is MCAR (Enders, 2010). A particular case of a planned missing design is the 3-form design (Graham et al., 2006; Graham et al., 1996). This design, which can be used for both cross-sectional and longitudinal studies, involves dividing the survey questions into four blocks: X, A, B, and C. X block questions must be answered by all participants, followed by two of the remaining blocks (A, B and C), randomly selected. Consequently, instead of answering questions in the four groups, one-third of the participants answer questions in set XAB, one-third answer XAC and one-third answer XBC (Forms 1, 2 and 3, respectively, in Table 1).

	X	A	B	C
Form 1	O	O	O	NA
Form 2	O	O	NA	O
Form 3	O	NA	O	O

Table 1: 3-form design (O - observed; NA - not available)
(Source: Author's work)

3. METHODS
3.1. Latent Growth Curve Model

Latent growth curve models (LGCM) represent a valuable statistical approach for analyzing change through panel data. This modeling technique facilitates the estimation of a latent trajectory over time, enabling the examination of change both at the individual level and across all individuals. (Bollen and Curran, 2006; Preacher et al, 2008). The trajectory equation for an unconditional latent curve model is given by

$$y_{it} = \alpha_i + \lambda_t \beta_i + \varepsilon_{it},$$

where y_{it} is the value of the trajectory variable y for the individual i, at time t, α_i is the random intercept for individual i, β_i is the random slope for individual i. ε_{it} represents the residual term of the trajectory for individual i at time t. λ_t is the time trend and $\lambda_t = (t-1)$ when is considered a linear growth. Is assumed that residual term $\boldsymbol{\varepsilon}_t \sim N(\mathbf{0}, \boldsymbol{\Theta}_\varepsilon)$, where $\boldsymbol{\Theta}_\varepsilon$ is a diagonal matrix with θ_{ε_t} in principal diagonal.

The factorial loadings, that link the observed variables (y_{it}) to the random intercept (α_i) are fixed to one to set the initial moment. The factorial loadings that link the observed variables to the random slope (β_i) are set to 0, 1, 2, 3, … to reflect the time trend ($\lambda_t = t - 1$), as represented in figure 1.
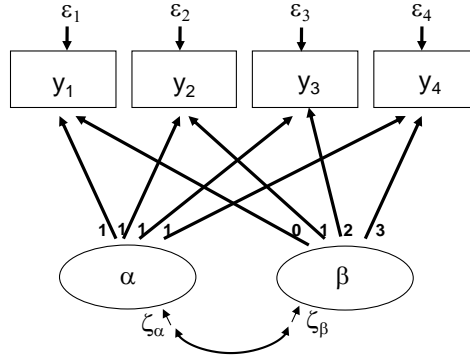
Figure 1: Latent growth curve model with four-time moments
(Source: Author's work)

The random variables of the model α and β are, respectively, the intercept and the slope of the trajectory and are given by $\alpha_i = \mu_\alpha + \zeta_{\alpha_i}$ and $\beta_i = \mu_\beta + \zeta_{\beta_i}$, where, μ_α and μ_β are the mean of the intercept and the mean of the slope, respectively. Is assumed that $Cov(\alpha_i, \alpha_j) = 0$, $Cov(\beta_i, \beta_j) = 0$ e $Cov(\alpha_i, \beta_j) = 0$ com $i \neq j$. ζ_{α_i} and ζ_{β_i} are the disturbances and represent the between individual's variability around global mean. These disturbances have a normal distribution with mean zero and are uncorrelated with the residual term ε_{it}. The variances of the disturbances ζ_{α_i} and ζ_{β_i} are $\psi_{\alpha\alpha}$ and $\psi_{\beta\beta}$, and the covariance is $\psi_{\alpha\beta}$. Thus, $\zeta_{\alpha_i} \sim N(0, \psi_{\alpha\alpha})$, $\zeta_{\beta_i} \sim N(0, \psi_{\beta\beta})$, $Cov(\varepsilon_{it}, \zeta_{\alpha_i}) = 0$ and $Cov(\varepsilon_{it}, \zeta_{\beta_i}) = 0$, with the variance of the intercept (α_i) equal to the variance of ζ_{α_i}, $\psi_{\alpha\alpha}$, and the variance of the slope (β_i) is equal to the variance of ζ_{β_i}, $\psi_{\beta\beta}$. The means and the variances of the intercept and the slope allows us to evaluate the initial rate and the mean rate of growth for all the individuals, so as the variability between individuals. Various measures are used to assess the goodness of fit of the latent growth curve model. The most common are the Tucker-Lewis Index (TLI), the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR). The recommended values for a good fit of the model to the data are TLI ≥ 0.95, CFI ≥ 0.95, RMSEA ≤ 0.05, and SRMR ≤ 0.05. However, if the TLI and CFI values are equal to or greater than 0.90, while the RMSEA and SRMR values are equal to or less than 0.08, the model's fit can be considered reasonably acceptable (Hu and Bentler, 1999; Schumacker and Lomax, 2010).

3.2. Full Information Maximum Likelihood

In cases where observations are absent, the estimation of a change process through a latent growth curve model can be performed using the FIML method, which presumes that the data distribution follows a multivariate normality. This approach utilizes all available data to enhance the estimation process. When data is MAR and follows a normal multivariate distribution, the FIML method provides parameter estimates, standard errors, and statistical tests that are consistent and efficient (Enders, 2010; Jia et al., 2014). Also, the fit indices used for assessing the model's quality indicate satisfactory values, provided that the sample size is sufficiently large (Vicente, 2023).

The log-likelihood function, with complete data, for observation *i* is

$$logL_i = -\frac{k}{2}\log(2\pi) - \frac{1}{2}log|\Sigma| - \frac{1}{2}(Y_i - \mu)^T \Sigma^{-1}(Y_i - \mu)$$

where *k* is the number of variables, Y_i is the vector for observation *i*, μ is the population means vector and Σ is the variance-covariance matrix.

With missing data, the log-likelihood function for observation i is

$$logL_i = -\frac{k_i}{2}\log(2\pi) - \frac{1}{2}log|\boldsymbol{\Sigma}_i| - \frac{1}{2}(\boldsymbol{Y}_i - \boldsymbol{\mu}_i)^T\boldsymbol{\Sigma}_i^{-1}(\boldsymbol{Y}_i - \boldsymbol{\mu}_i)$$

with k_i the number of complete cases for that observation and $\boldsymbol{\mu}_i$ and $\boldsymbol{\Sigma}_i$ are associated with the disposable observations. The calculations for the function $logL_i$ for observation i depends only on the variables and parameters for which that case has complete data (Enders, 2010). Thus, the maximum likelihood method for handling missing data estimates the parameters directly from the available data.

4. RESULTS AND DISCUSSION

In our study we consider two different planned missing designs resulting from panel data in four-time moments (T_1, T_2, T_3 and T_4). The EU-SILC panel data operates as a rotating panel, wherein 25% of families exit the study each year, while an equal proportion of new families is introduced. PMD1 and PMD2 represent parts of this rotating panel. A three-form design may be assumed to be the basis for these two designs, shown in table 2 and 3.

	T_1	T_2	T_3	T_4
Form 1	O	O	NA	NA
Form 2	O	O	O	O

Table 2: PMD1-Planned missing design 1 (O - observed; NA - not available)
(Source: Author's work)

	T_1	T_2	T_3	T_4
Form 1	O	O	O	NA
Form 2	O	O	O	O
Form 3	NA	O	O	O

Table3: PMD2-Planned missing design 2 (O - observed; NA - not available)
(Source: Author's work)

For analysis we consider two samples corresponding to the two planned missing designs in table 2 and 3, respectively with 1702 and 2846 observations. The data are from Portuguese participation in EU-SILC, and a score of material deprivation has been calculated. This score consists of nine items such as the financial capacity to keep home adequately warm or to have a meal with fish or meat every two days, for example. A latent growth curve model is adjusted to each sample to analyze the variations in the material deprivation score for families across four distinct time points. (from 2006 to 2009). A FIML approach has been used to estimate the model. The obtained results for the parameters estimates are displayed in table 4.

	PMD₁	**PMD₂**
Mean of intercept	2.430	2.377
Mean of slope	-0.010 (ns)	-0.017 (ns)
Variance of intercept	2.630	2.461
Variance of slope	0.093	0.109
Covariance between intercept and slope	-0.212	-0.239

Table 4: Parameter estimates for a latent growth curve model with data of planned missing design 1and 2 (ns – nonsignificant)
(Source: Author's work)

From the two samples (PMD1 and PMD2) the results are similar. It is possible to conclude that the meaning of slope is nonsignificant, suggesting that the average material deprivation does not change along the four-time moments. The estimated variances for the intercept and for the slope factors are both significant, leading to the conclusion that families vary, both regarding their material deprivation in 2006 and their growth trajectories over time. The covariance between intercept and slope is significant and negative what means that higher initial levels of material deprivation are related to a lower mean growth of material deprivation. The obtained results for the fit measures are displayed in table 5.

	PMD$_1$	PMD$_2$
RMSEA	0.055	0.058
SRMR	0.024	0.018
CFI	0.993	0.992
TLI	0.992	0.991

Table 5: Fit measures obtained for LGCM
(Source: Author's work)

From the two samples (PMD1 and PMD2) the results are similar and all of them show a good fit of the model, except for RMSEA. The values obtained for this measure exceed the cutoff of 0.05 but remain below 0.08, indicating that the model's adjustment can be considered acceptable. Overall, this study contributes to our understanding of the importance of considering omissions by design in the research combined with the use of FIML approach for dealing with nonresponses.

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THE MODERNIZATION OF JUSTICE IN MOROCCO THROUGH ICT AND ECONOMIC INTELLIGENCE: CURRENT STATE AND PERSPECTIVES

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ABSTRACT

This article explores the modernization of justice in Morocco through ICT and Economic Intelligence, focusing on the achievements made between 2022 and 2024. Key initiatives include the establishment of digital platforms, electronic document exchange, and digitized case management. These reforms have led to reduced processing times, enhanced transparency, and improved accessibility for citizens. However, challenges persist, particularly in terms of cybersecurity, technological infrastructure, and digital inclusion. The interaction between digitalization and economic intelligence is essential for anticipating changes, optimizing resources, and enhancing judicial efficiency. The article concludes with recommendations to sustain and expand these advancements.
Keywords: *Judicial Modernization, Information and Communication Technologies (ICT), Economic Intelligence (EI), Digitalization, Judicial Transparency*

1. INTRODUCTION

The modernization of justice in Morocco marks a pivotal transformation driven by the integration of Information and Communication Technologies (ICT) and Economic Intelligence (EI). As a response to growing public expectations for efficiency, transparency, and accessibility, Morocco's judiciary has embraced digital solutions that align with global governance standards. Between 2022 and 2024, several groundbreaking reforms have reshaped the judicial landscape. Key initiatives, such as the deployment of digital platforms, electronic document management, and videoconferencing, have significantly streamlined case processing and enhanced public trust.

However, this transition is not without challenges. Issues such as digital inclusion, technological infrastructure limitations, and cybersecurity risks continue to test the resilience of these reforms. Moreover, the interplay between digitalization and economic intelligence has introduced new opportunities for leveraging judicial data to inform decision-making and improve operational efficiency. This paper provides a comprehensive analysis of Morocco's judicial modernization, exploring its achievements, challenges, and potential for sustained transformation. By situating these developments within a broader strategic framework, the article highlights the critical need for inclusive policies, robust technological infrastructure, and continuous capacity-building efforts to ensure that the benefits of modernization reach all stakeholders equitably.

2. CONTEXT AND CHALLENGES IN JUDICIAL MODERNIZATION IN MOROCCO

The modernization of Morocco's judicial system is part of profound economic, social, and technological transformations. For several years, the country has sought to align its institutions with international governance and rule-of-law standards while addressing the growing expectations of citizens for faster, more accessible, and more transparent justice.

2.1. Institutional and Strategic Framework

The Moroccan institutional framework is built on several major reforms, including the 2011 Constitution, which strengthened the independence of the judiciary. Through the Strategic Plan for Judicial Reform (2013-2023), the government laid the groundwork for a modernized justice system. This plan focused on:

- Improving judicial infrastructure.
- Simplifying procedures.
- Introducing Information and Communication Technologies (ICT).

However, the integration of ICT into the judicial sector became an absolute priority starting in 2020, particularly in response to the challenges posed by the COVID-19 pandemic. The crisis accelerated the digitization of many public services, including justice (World Bank, 2022).

2.2. Structural and Operational Challenges

Despite these efforts, Morocco's judicial system suffered from several shortcomings before the digital transition:

- *Prolonged processing times:* Judicial cases often took several years to resolve, leading to overburdened courts (Organization for Economic Co-operation and Development [OECD], 2023).
- *Limited accessibility:* Citizens in rural areas faced difficulties accessing judicial services (Ministry of Justice, 2023).
- *Opaque procedures:* A lack of transparency fueled public mistrust of the judicial system (Benzakour, 2022).
- *Administrative burdens:* Manual processes, heavily reliant on paper, increased costs and the risk of errors (World Bank, 2022).

2.3. Opportunities Offered by Digital Modernization

The introduction of ICT and economic intelligence provides several opportunities to address these challenges:

- *Process automation:* Dematerializing procedures reduces delays and increases efficiency (Ministry of Justice, 2023).
- *Participatory justice:* Citizens can more easily access online services, particularly through dedicated portals and platforms (OECD, 2023).
- *Fighting corruption:* Digitization limits physical interactions, thereby reducing the risk of illicit practices (World Bank, 2022).
- *Improved decision-making:* Data analysis and economic intelligence help identify trends and better inform public policy (Benzakour, 2022).

Indicators	Before 2020	2022-2024
Average processing time (months)	18	10
Online service accessibility (%)	15	65
Citizen satisfaction rate (%)	50	78

Table 1: Comparison of Processing Times Before and After Digitization
(Source: Ministry of Justice (2023))

The table 1 compares the processing times for judicial cases before and after digitization, clearly illustrating the positive impact of digital reforms on the functioning of Morocco's judicial system. Before digitization, the system was slow and inefficient, with processing times often exceeding 18 months for complex civil cases. This excessive duration was attributed to several factors:

- *Administrative burden:* The heavy reliance on paper documents increased the risks of loss and duplication of tasks.
- *Weak coordination among stakeholders:* The absence of an integrated system prevented the rapid sharing of information between courts, lawyers, and litigants.
- *Uneven workload distribution:* Some courts were overwhelmed, while others had underutilized resources.

These constraints not only caused frustration among litigants but also tarnished the image of the justice system in the eyes of foreign investors and international institutions.

3. MAJOR DIGITALIZATION INITIATIVES (2022-2024)
3.1. Integrated Justice Access Portal
Since 2022, the centralized justice access portal has consolidated various online services for citizens and professionals. This portal, accessible to all, offers functionalities such as:

- Real-time tracking of judicial cases.
- Consultation of court decisions.
- Electronic submission of documents.

The "e-Justice Morocco" portal recorded more than 500,000 consultations per month in 2023 (Ministry of Justice, 2023). This initiative has strengthened transparency and simplified administrative procedures.

The graph below shows the growth in the number of users of the portal between 2022 and 2024, illustrating a steady increase driven by improved accessibility and awareness.
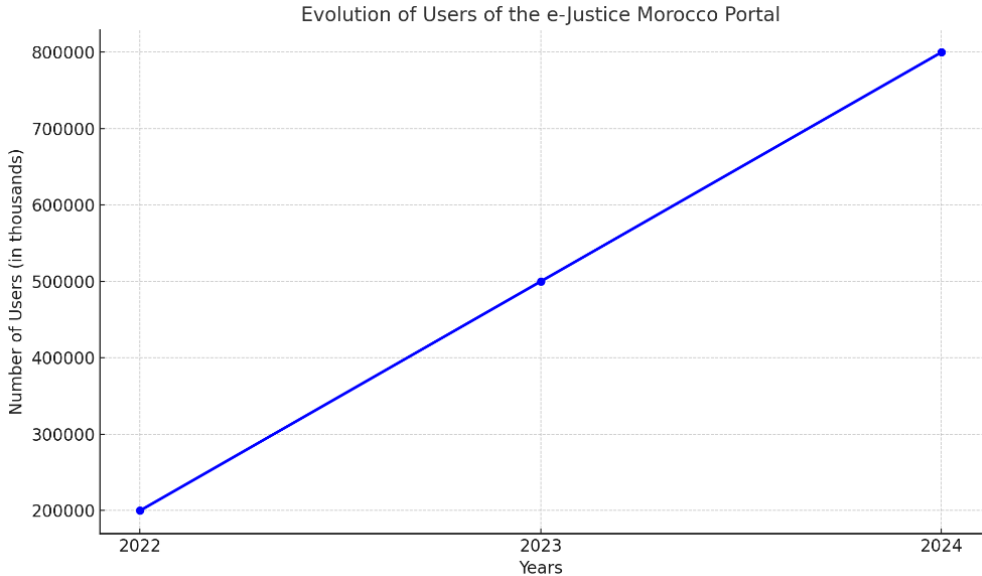

Figure 1:Evolution of Users of the e-Justice Morocco Portal
(Source: Ministry of Justice (2023))

The graph shows a significant increase in the number of users of the e-Justice portal between 2022 and 2024. This growth reflects the continuous improvement of digital services and the growing adoption by citizens.

3.2. Electronic Document Exchange

Since 2022, electronic document exchange has been widely implemented among courts, lawyers, and other stakeholders. This initiative aims to reduce paper usage and accelerate judicial procedures.

According to the Ministry of Justice (2023), the average case processing time decreased by 35% thanks to this digitalization.

Before Digitization	After Digitization
Average processing time: 180 days	Average processing time: 117 days
High administrative costs	25% reduction in costs
High paper consumption	70% reduction in paper usage

Table 2: Benefits of Electronic Document Exchange
(Source: Ministry of Justice (2023))

The digitization of records has enabled smoother and more secure case management. Judges and lawyers can access documents online, significantly improving efficiency.

By 2023, more than 80% of civil case records in the courts of Rabat and Casablanca were fully digitized (Benzakour, 2023).

3.3. Adoption of Digital Technologies in Court Hearings

The COVID-19 pandemic accelerated the use of videoconferencing in judicial hearings. This practice was institutionalized in 2022, particularly for civil and commercial cases.

The observed impacts include:

- Reduced physical travel for litigants.
- Continuity of judicial services even during periods of health restrictions.

By 2024, nearly 15,000 hearings were conducted via videoconference (Ministry of Justice, 2024).

4. POST-DIGITIZATION: SIGNIFICANT IMPROVEMENTS

The introduction of digital technologies into judicial processes has reduced case processing times to an average of 12 months, a decrease of over 33%. These improvements can be attributed to the following factors: (1) Simplification of Procedures; (2) Automation of Administrative Tasks; (3) Videoconference Hearings; and (4) Optimization of Human Resources.

4.1. Simplification of Procedures

The integration of digital technologies has streamlined judicial operations, ensuring greater transparency, efficiency, and accessibility for all stakeholders involved in the legal process:

- *Digitized records:* Transitioning to electronic files has eliminated issues related to the handling of physical documents (loss, damage, duplication).
- *Enhanced information accessibility:* Stakeholders can now track cases in real-time via platforms like Mahakim.ma, reducing waiting times for updates or copies of documents.

4.2. Automation of Administrative Tasks

The adoption of digital tools has transformed routine administrative operations, significantly improving the speed and accuracy of case management.

- *Accelerated document processing:* Electronic signatures and automated workflows have replaced manual processes, shortening critical steps such as case assignment and decision drafting.

4.3. Videoconference Hearings

The use of videoconferencing technology has revolutionized the conduct of hearings, ensuring uninterrupted judicial processes and minimizing logistical barriers.

- *Impact on hearings:* Remote hearings have ensured a continuous flow of trials, even in complex situations like the COVID-19 pandemic. This has also reduced delays caused by travel.

4.4. Optimization of Human Resources

The use of data collected through economic intelligence has allowed for a more balanced distribution of workloads among courts, preventing bottlenecks in overburdened jurisdictions.
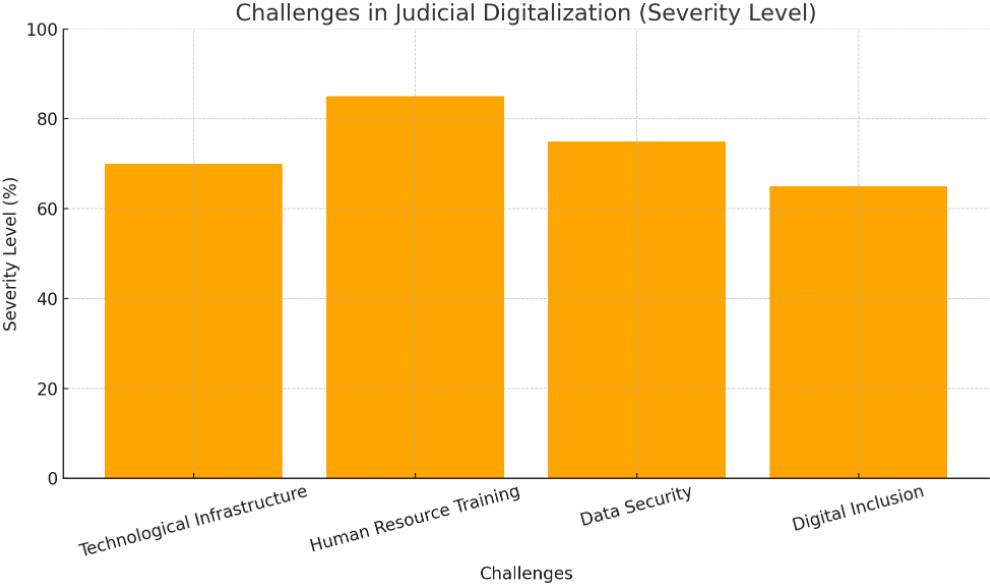
Figure 2: Progress of Major Digitalization Initiatives
(Source: Ministry of Justice (2023))

The Figure 2 demonstrates the varying degrees of progress across different digital initiatives:

- *The Integrated Justice Access Portal* leads with an 85% adoption rate, reflecting its effectiveness and user-friendly design.
- *The Electronic Document Exchange* stands at 70%, indicating room for improvement, particularly in addressing regional disparities.
- *Digitalized Management of Judicial Records* has reached 90%, showcasing significant success in digitizing case files for efficient access.
- *Digital Technologies in Hearings* are at 75%, highlighting the need for further enhancements, especially to support rural areas lacking robust technological infrastructure.

5. CRITICAL ANALYSIS OF RESULTS

Despite the clear progress achieved through digitalization, it is essential to contextualize these improvements and address the remaining challenges that hinder the full realization of a modern judicial system.

5.1. Inequalities in Access to Digitalization

Rural areas or regions with limited connectivity have not benefited from these advancements at the same pace as urban centers. These geographical disparities must be addressed in future reforms to ensure inclusivity.

5.2. Transition Period Challenges

The deployment phase of these technologies experienced delays due to implementation errors or insufficient training for stakeholders, which temporarily slowed the expected gains.

5.3. Cybersecurity Concerns

While case processing times have decreased, the digitalization process has introduced risks regarding the protection of sensitive data, potentially affecting citizens' trust in the system.

Challenges	Severity Level (%)
Technological Infrastructure	60%
Human Resource Training	80%
Data Security	65%
Digital Inclusion	65%

Table 3: Challenges in Judicial Digitalization
(Source: Ministry of Justice (2023))

The table highlights remarkable progress in reducing processing times through digitalization, contributing to faster and more accessible justice. However, to maximize these results:

- *Strengthening Infrastructure:* Additional investments are necessary to ensure inclusion of remote regions.
- *Continuous Training:* Increased awareness and regular training sessions for judges, lawyers, and administrative staff will enhance the effective use of new technologies.
- *Enhanced Security:* Implementing robust cybersecurity protocols will ensure the sustainability of the results achieved.
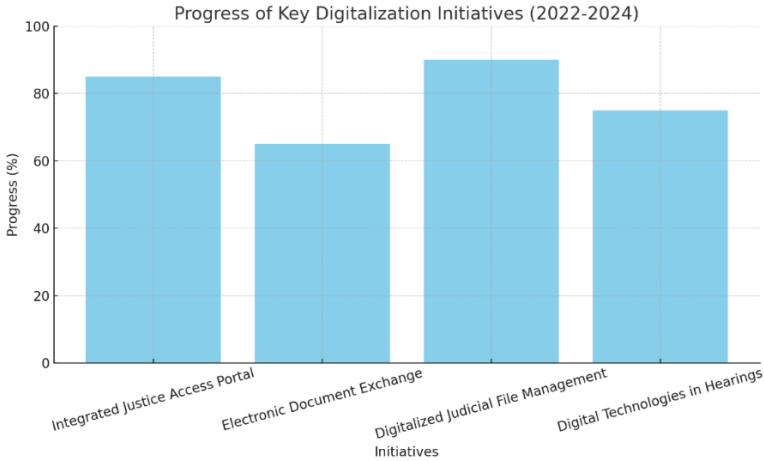
Figure 3: Challenges in Judicial Digitalization
(Source: Ministry of Justice (2023))

This graph highlights the main challenges faced by the judicial system in its digital transition:

- *Technological Infrastructure (70%):* Uneven coverage, particularly in rural areas, poses a significant barrier.
- *Human Resource Training (80%):* A crucial challenge as judicial personnel must master new tools and technologies.
- *Data Security (65%):* Cyber threats remain a major concern.
- *Digital Inclusion (60%):* Vulnerable populations require additional support to access digital services.

Digital transformation represents a promising advancement, but it must be accompanied by strategic measures to become truly inclusive and sustainable. This initial phase demonstrates that the Moroccan context is marked by urgent needs for transformation, as well as by promising opportunities offered by digitalization and modern technologies.

6. ROLE OF ECONOMIC INTELLIGENCE (EI) IN JUDICIAL MODERNIZATION

Economic Intelligence (EI) has proven to be a pivotal factor in the transformation of Morocco's judicial system. Between 2022 and 2024, it enhanced efficiency, anticipated changes, and optimized resources.

6.1. Data Analysis in Judicial Processes

Large-scale data analysis is essential for modernizing legal systems. Courts collect information on case types, delays, and decisions, which EI structures and leverages.
The impact of data analysis is:

- *Trend identification:* For example, commercial disputes in Casablanca showed a 20% increase in conflicts related to international contracts in 2023 (Ministry of Justice, 2023).
- *Blockage detection:* Statistics reveal that 60% of delays stem from inefficient administrative procedures.

6.2. Strategic Monitoring

Strategic monitoring anticipates legislative and technological changes, allowing the judicial system to adapt its strategies.
For examples:

- *Evolution of international laws:* In 2024, a comparative analysis of African legislation led to the introduction of new procedures for digital contracts.
- *Technological advancements:* Morocco adopted automated transcription software for court hearings, inspired by French innovations.

6.3. Secure Information Sharing

Secure information sharing among judicial institutions is a critical component. Digital platforms facilitate collaboration between courts, lawyers, and law enforcement.
For example: A platform integrated between the Ministry of Justice and the General Directorate for National Security (DGSN) reduced information transfer times in criminal cases by 40% in 2024 (World Bank, 2024).

7. DIGITALIZATION OF THE JUDICIAL SYSTEM AND ECONOMIC INTELLIGENCE: SYNERGIES AND CHALLENGES

7.1. Impact of Digitalization on Justice

Digitalization facilitates access to justice and accelerates processes. It also provides a solid foundation for leveraging Economic Intelligence (EI) tools.
Key Advantages:

- *Process Automation:* Reduces human errors and delays through digital workflows.
- *Enhanced Transparency:* Citizens can access case files and decisions online, increasing trust in the judicial system.
- *Real-Time Data Analysis:* EI, coupled with digitalization, enables instant exploitation of judicial data.

7.2. Challenges of Integrating EI and Digitalization

Despite progress, several challenges remain in creating synergy between digitalization and EI in Morocco's judicial system (Benzakour, R., 2024):

- *Data Security:* Platforms must ensure the confidentiality of sensitive information.
- *Judicial Personnel Training:* Judges and clerks need to master these new tools.
- *Digital Accessibility:* It is crucial to ensure inclusivity, especially for citizens in rural areas.

The graph illustrates the synergies between digitalization and economic intelligence within the justice system, emphasizing their mutual contributions to efficiency, transparency, and decision-making.
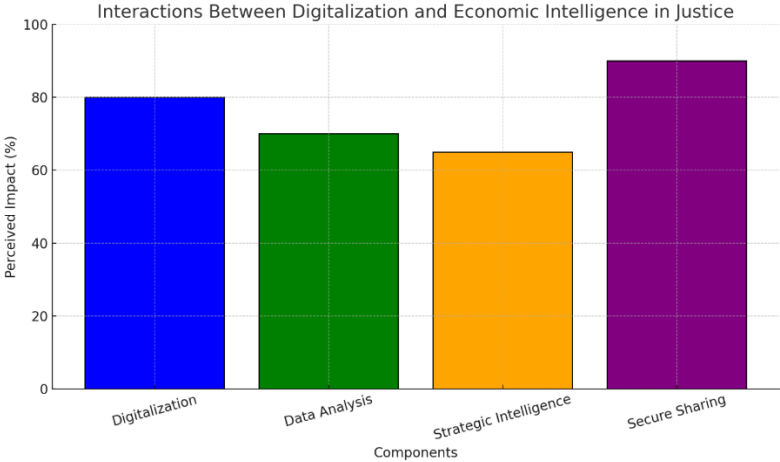
Figure 4: Interactions between Digitalization and Economic Intelligence in Justice (Source: Ministry of Justice (2024))

The graph illustrates how the key components of digitalization and economic intelligence interact to improve the judicial system. Categories such as secure information sharing and data analysis show a significant impact, underscoring their strategic importance. The interaction between digitalization and economic intelligence (EI) is profoundly transforming Morocco's judicial system by offering unique synergies that enhance the management and transparency of procedures. Digitalization, through the automation of administrative tasks and the digitization of documents, creates a rich and real-time exploitable database for EI tools. These tools allow for the analysis of litigation trends, anticipation of court needs, and optimization of resource allocation. For example, digital data analysis enabled the Casablanca Commercial Court to reduce the processing time of certain complex cases by 15% in 2023 (OECD, 2023). However, this convergence requires robust technological infrastructure and continuous training for judicial personnel to ensure optimal use of these tools. By overcoming challenges related to cybersecurity and digital inclusion, this synergy promises to make the judicial system more accessible, faster, and fairer.

8. CONCLUSION

The integration of ICT and EI into Morocco's judicial system represents a transformative shift that has redefined the country's approach to justice delivery. Between 2022 and 2024, digitalization initiatives have achieved notable successes, including reduced case processing times, enhanced transparency, and greater public accessibility. Platforms like Mahakim.ma and the implementation of electronic document exchanges have set a benchmark for efficient judicial management.

However, the journey toward a fully modernized judiciary remains incomplete. Persistent challenges such as unequal digital access, cybersecurity vulnerabilities, and the need for comprehensive judicial training highlight the areas requiring urgent attention. To sustain these advancements, Morocco must prioritize investments in infrastructure, particularly in underserved regions, while fostering strategic collaborations between public and private sectors. Moreover, ensuring inclusivity and protecting sensitive data are paramount for maintaining public trust and maximizing the potential of these reforms. The interaction between digitalization and economic intelligence offers promising opportunities for creating a more dynamic, data-driven judicial system. By leveraging these synergies, Morocco can pave the way for a judicial system that not only meets the demands of its citizens but also aligns with international standards of efficiency, fairness, and transparency. The lessons drawn from this experience can serve as a model for other nations embarking on similar modernization journeys.

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COMMUNICATION ASPECTS OF ESG REPORTING

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ABSTRACT

To achieve a socially responsible reputation, modern business organizations introduce an ESG system that monitors the environmental, social and governance activities of the company and regularly reports on this to key stakeholders who have an interest in monitoring these aspects of organizational activity. Reporting on ESG activities to stakeholders presents a complete and transparent picture of the business organization. For some organizations it is an imposed obligation, which depends on the legislative bodies, but it is becoming a growing trend among organizations that do not have an obligation and carry out ESG reporting voluntarily. The paper presents a preliminary analysis of theoretical assumptions about the communication aspects of such reporting to build up a theoretical path for developing a scientific study that will synthesize all the advantages and benefits of such communication but as well all elements of the same and good practices. The following paper has the aim of seeking the link of ESG reports with particular communication level: internal communication that promotes organizational values that are in harmony with the general social and personal values of employees, including team communication required due to the synergy of different parts of the organization in ESG reporting and crisis communication through the need for honest communication to develop the trust and integrity of the organization, but also the opportunities provided by reporting on corrective measures and future activities to improve operations at critical points; external communication that as well includes crisis communication management but as well marketing communication to emphasize differentiation on the competitive market. Finally, strategic communication itself, which closes the communication process with feedback using ESG reporting.

Keywords: *ESG reporting, socially responsible communication of organizations, communication aspects of reporting, business reporting*

1. INTRODUCTION

Sustainability reporting is a form of non-financial reporting by business entities, for which the abbreviation ESG reporting is used. By monitoring environmental, social and governance factors as the three fundamental pillars of modern management and reporting on them, business entities transparently present to the wider public the risks they face in these areas within their operations, as well as the ways in which they counteract them. These are the three pillars of sustainability, which encompass numerous issues, from waste management, energy efficiency and protection of natural resources, through human rights and working conditions, inclusion, specific needs and requirements of the local community to monitoring corporate risks, business transparency, control systems and quality assurance, and many others. The directive on non-financial reporting in Croatia has been applied to most of these topics since 2017, and since then the obligation has included economic entities in the category of large entrepreneurs, entities of public interest and those with more than 500 employees. However, the intensification of the need for sustainable growth and development strengthens the need for more significant promotion, but also the realization of the goals arising from the Green Plan, so in 2023 the EU will adopt a new regulatory framework called the Corporate Sustainability Reporting Directive, which member states of the European Union must regulate within their legislative acts within two years of the Directive being accepted at the level of the European Union.

The news is the increase in the scope of ESG reporting obligations to medium and small companies listed on the stock exchange, but also all large companies with more than 250 employees, and/or a balance sheet of more than 20 million euros and/or a turnover of more than 40 million euros. The reporting obligation under the new European Union Directive will be implemented in the period from 2025 to 2029, with each year being a phase that encompasses a new scope of reporting entities. Despite not yet being covered by these legal regulations, many entities recognize the importance and benefits arising from this form of non-financial reporting and, in order to improve organizational reputation, i.e. transparent and socially responsible business, choose ESG reporting of their stakeholders on a voluntary basis.

This paper starts from the recognized importance of the three pillars of modern business by both regulatory bodies and the entities themselves who voluntarily choose to inform the public about key issues arising in this regard. In recent years, ESG reporting has become a tool for achieving competitive advantage. Addressing the problems of modern management and strategic organizational communication at all levels, the question arises as to what benefits this form of non-financial reporting brings to organizations and to what extent this tool is connected to different organizational communication levels.

In addition to answering this problematic question, the fundamental question to which this work provides an answer is whether the ESG concept as an extremely complex system is recognized by the scientific community and whether scientific studies were conducted with the aim of determining the scientific legality of this concept. The aim of this paper is to determine whether there is scientific knowledge about the impact of the ESG concept on internal and external communication, and whether ESG reporting is connected to all communication levels within the entity: internal communication, team communication, crisis communication, marketing communication and strategic communication in general, since as a concept it improves organizational transparency and strengthens communication with key stakeholders of the organization.

2. METHODOLOGY

In order to answer these questions, the systematic literature review as a scientific method was used in the research, in which the number of results was limited to the last five years (from 2020 to 2024) in the WOS and Scopus scientific databases. Related keywords that include a combination of ESG reports and some of the levels of organizational communication, that is, keywords that refer to the specific impacts of this reporting, were used to review the papers.

The combinations included in the search in all cases included the first keyword ESG reports, and as the second one of the following: transparency, strategic communication, internal organization communication, internal organizational communication, internal communication, internal organization, external organization communication, external organizational communication, external communication, reputation, corporate reputation, image, crisis communication, marketing communication and team communication.

Chart following on the next page

Chart 1 - Presentation of communication levels in a corporation
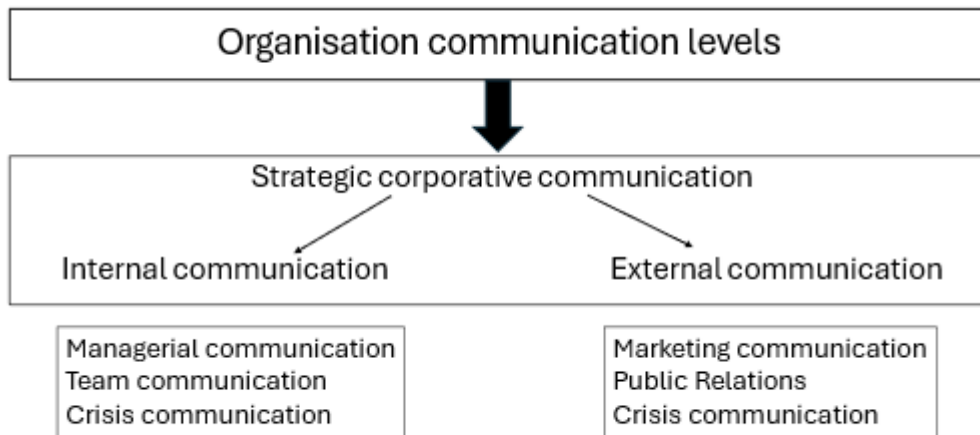
3. RESULTS

According to the given and previously described limitations regarding the time of publication of the papers, the language in which the paper was published and the field of science within which the topic is observed and discussed, the total numbers of published papers were obtained and are shown in Tables 1-3. There were 15 combinations searched, but the table shows only 13 keyword links because no results were found in the remaining ones, that is, there are no published papers in the WOS and Scopus databases that connect ESG reporting with the selected key link. In addition to the communication levels that were of primary interest, the keywords transparency, reputation and image were investigated, which significantly affect both basic communication levels, internal and external. In the area of connecting ESG reports and transparency or reputation the largest number of scientific papers was found. The smallest number of scientific papers, only 1, connects the field of ESG reporting with crisis communication, while not a single scientific paper was recorded on the connection with team communication.

The connection between ESG reporting and strategic corporate communication

According to Gassmann (2021), the ESG concept encompasses reporting, strategy and business transformation, but it needs to be approached from new perspectives and strategic reinvention, and the communication process of reporting to key stakeholders in the business process needs to be reimagined. Business organizations have always been reexamining what they report to their public, but sometimes formal non-financial disclosures are gaining in importance and are no longer non-binding. According to the same authors, as many as 90% of S&P 500 companies published their sustainability reports in 2019. According to this, it can be concluded that in practice organizations have recognized the importance of changing the topics they communicate to their stakeholders.

Table following on the next page

Table 1 - SLR 1 Results

1. ESG reports – transparency	TITLE-ABS-KEY (esg AND reports AND transparency) AND PUBYEAR > 2019 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English")	36	56
2. ESG reports - strategic communication	TITLE-ABS-KEY (esg AND reports AND strategic AND communication) AND PUBYEAR > 2019 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English")	4	2
3. ESG reports reputation	TITLE-ABS-KEY (esg AND reports AND reputation) AND PUBYEAR > 2019 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English")	19	28
4. ESG reports- corporative reputation	TITLE-ABS-KEY (esg AND reports AND corporation AND reputation) AND PUBYEAR > 2019 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English")	1	/
5. ESG reports - image	TITLE-ABS-KEY (esg AND reports AND image) AND PUBYEAR > 2019 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English"))	4	8

Source: Authors

Chechelashvili et.al. (2024) believe that the creation of a strategically oriented social responsibility management system can become a key factor of competitive business and that social responsibility management should be approached strategically, integrating it into corporate strategy and focusing on solving real social and environmental problems. Wai-Khuen et.al. (2023) based on Ullmann's model of corporate social impact (1985) propose a new conceptual framework for determining the relationship between external stakeholders and ESG and suggest a lack of scientific presentation or empirical evidence on the effects of ESG reporting and its connection with the organization's strategic communication.

Bhattacharya, A., Bhattacharya, S. (2023) study the critical factors that influence the business model of biopharmaceutical companies and came to the conclusion that ESG pillars can help in the innovation of business models, as in designing of strategies for the creation of sustainable value. Their results indicate that social and environmental factors are important but rated with a lower priority level, that is, they are associated with organizations at a higher level of maturity, while less mature organizations are concerned with satisfying basic hygiene factors.

These authors list the factors that are a priority for business model innovation: patient health and safety, ethical marketing and advertising, waste/wastewater management, employee health, safety and well-being, patient value propositions, building strategic resources and competencies, product quality and safety, and business ethics and competitive behavior. They believe that integrated reporting is a dimension of added value because it allows for a seamless and transparent communication channel with all stakeholders. The commitment of small agri-food companies to the environment, society and governance (ESG) revealed by 279 Italians was studied by Brunella et.al.

They (2024) observed the absence of social reporting and disclosure of corporate governance, including sustainability strategy, and poor reporting on environmental and social pillars, in addition to product innovation, product quality and responsible marketing topics, thus highlighting the importance in fostering a sustainability paradigm shift since commitment to the internal and external community of companies seems to positively predict their ability to access credit.

The impact of ESG reporting on internal communication in the organization

ESG reporting improves internal communication by promoting a culture of transparency and ethics. Employees often feel more motivated and involved when they are aware of the company's positive initiatives towards sustainability (Deloitte, 2021). Examples of corporations that have improved communication through ESG practices include companies such as Unilever that regularly report on sustainable practices, and ESG reporting contributes to building trust among employees by providing clear direction to business goals. Internal communication in companies that use ESG reporting often becomes more structured and transparent. Employees are better informed about sustainability strategies, which can increase motivation and productivity. A 2022 PwC study shows that 70% of employees trust their employer more when there is transparent reporting on ESG goals. A study by Huh and Lee (2022) links ESG management and the perception of organizational justice. Organizational justice is recognized as an important element of internal organizational communication with organizational trust and organizational identification. These authors confirmed the connection between employee perceptions of a company's ESG activities and the effects on organizational justice.

Table 2 - SLR 2 Results (table 1 continued)

6.	ESG reports internal organisation communication	-	TITLE-ABS-KEY (esg AND reports AND internal AND organisation AND communication) AND PUBYEAR > 2020 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English")	2	/
7.	ESG reports internal communication	–	TITLE-ABS-KEY (esg AND reports AND internal AND communication) AND PUBYEAR > 2020 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English")	2	/
8.	ESG reports- internal- organisation		TITLE-ABS-KEY (esg AND reports AND internal AND organisation) AND PUBYEAR > 2020 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English")	5	4
9.	ESG reporting team communication	-	TITLE-ABS-KEY (esg AND reports AND team AND communication) AND PUBYEAR > 2020 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English")	/	/

Source: Authors

In the process of HR management, i.e. internal organizational communication, the importance of integrated thinking is emphasized. Favato et. Al. (2021) talk about integrated reporting that results as a product of the process of integrated thinking, and connects three organizational problems: synergy processes between sectors, integration of other reports production, and integrated thinking chain development for the entire organization. The same authors conducted a case study at ITAU UNIBANCO, which showed that implemented integrative reporting procedures change the perspective of employees from a sectoral to a multidimensional approach and view.

The influence of ESH reporting on the organization's external communication
Nassar and Pereira (2022) found that 86% of the external public (including customers, but also suppliers and business partners) ask questions about the achievements og an organization in the field of sustainability, and such questions are also asked by the media in 84% of cases. Studying the ways in which organizations communicate ESG topics, they believe that communication should be adapted to the target public, but they certainly emphasize the importance of communicating sustainability within all three fundamental pillars of ESG through demonstrable and verifiable sources.

External communication about ESG often results in an improved reputation and stronger relationships with stakeholders. Studies have shown that companies that dedicate themselves to ESG practices are more attractive to investors and the public (Harvard Business Review, 2020) and through improving the organization's reputation directly influence the increase in client loyalty and enable better two-way communication with partners and investors. External communication is becoming more sophisticated as ESG reports adapt to stakeholder needs. Companies that publicly report on ESG activities typically see an increase in investor confidence and increased public interest.

Investors, especially funds that focus on sustainable investments, are becoming the main driving force for the implementation of ESG practices. For example, Nestlé presented an extensive ESG report in 2022, which resulted in increased transparency and strengthened relations with local communities. By analysing various case studies, it was noticed that companies with robust ESG practices communicate more easily with external partners. For example, Unilever has seen a reduction in investor complaints due to transparent reporting of greenhouse gas emissions.

Table following on the next page

Table 3 - Results SLR 3 Results (tables 1 and 2 continued)

10.	ESG reports - external organisation communication	TITLE-ABS-KEY (esg AND reports AND external AND organisation AND communication) AND PUBYEAR > 2020 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English")	/	2
11.	ESG reports - external organisation	TITLE-ABS-KEY (esg AND reports AND external AND organisation) AND PUBYEAR > 2019 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English")	5	8
12.	ESG reporting - crisis communication	TITLE-ABS-KEY (esg AND reports AND crisis AND communication) AND PUBYEAR > 2020 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English")	/	1
13.	ESG reporting - marketing communication	TITLE-ABS-KEY (esg AND reporting AND marketing AND communication) AND PUBYEAR > 2021 AND PUBYEAR < 2024 AND (LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English")	3	7

Source: Autors

The connection between ESG reporting and crisis communication has been observed, but given the number of scientific papers, it is insignificant. According to the given criteria, which include business and management, only one scientific paper was found in the WOS database, while an 'all fields' search found two additional papers in Scopus, which, upon detailed analysis, show greater significance for the observed area. In any case, it is undeniable that the crisis in business is reflected both on the internal and external organizational public, in this sense it is opening up significant space for potential scientific interest.

The only scientific paper within the field of business and management is by Hamzeh et.al. This group of authors (2024) investigated the relationship between the level of terrorism and the social and environmental impact measured by the ESG score. The results of their study indicate a significant negative impact of the occurrence of terrorist events on the ESG effect. The growth of the threat of terrorism results in the flight of investors and the interruption of development projects. Terrorist threats challenge stakeholder priorities, impact corporate legitimacy, and reshape the institutional landscape as companies face multifaceted challenges, balancing immediate stakeholder concerns, restoring reputation, compliance obligations, and rising social expectations.

Omazić et.al. (2020) link crisis communication with ESG reporting, but do not provide specific scientific results in this regard, but rather a presentation of the ESG concept. Badr et.al. (2024) observed changes in organizational image before, during and after the Vale Co. crisis in Brazil during the collapse of a dam. They conducted the research through content analysis covering a nine-year time frame from 2013 to 2021. Although the scientific paper refers to a link with ESG reporting, in the observed time this concept has not yet been developed in such a form and actually speaks of the importance of socially responsible business for harmonizing with external perceptions.

Marketing communication should be a significant segment of external corporate communication, however, despite the fact that only 3 published papers were found within the Scopus database, and 7 in the WOS database, marketing communication was not taken into account when connecting with the impact of ESG reporting. A detailed analysis of the papers determined that those found here have little to do specifically with marketing communication. Some of the papers generated by the system have already been processed in combination with other key words, for example within strategic communication.

4. DISCUSSION

The conducted research showed that organizations have recognized the benefits of changing the communication discourse towards all target groups and that it is being implemented in practice. Most of the information about this is obtained from practitioners and expert papers (Deloitte, PwC) or the reflections of those who practically deal with strategic communication. On the other hand, a search of scientific databases shows insufficient interest from the scientific community and only a few scientific guidelines for the development of the ESG concept.

It is undoubtedly a complex management system that changes communication elements, that is, reformulates the message itself and the elements of the message that management should focus on when managing the communication process. It can be concluded that the scientific assumptions of ESG reporting related to the transparency and reputation of the organization are well-founded, but there is a lack of research results on the connection of such communication with employee commitment and loyalty, or the key elements of the connection of ESG reporting with internal communication and, consequently, with the impact on employee productivity.

5. CONCLUSION

Research on scientific databases shows certain limitations or shortcomings in the settings because searching for areas of specific interest does not show all scientific works of importance. Given the small total number of published works, the research was possible only by expanding it to 'All fields', but for scientific topics that are more significantly covered by scientific publications, this would not be possible. It can be especially emphasized that the observed area of papers found in 'All fields' is perhaps even more significant than those found in the narrowly filtered area of business and management.

All the changes that are taking place in the social and economic area of business, but especially the awareness of environmental issues, lead to an increasing need to develop non-financial metric instruments. The ESG concept is not a metric instrument, but today it is already a well-developed system that still needs to be standardized so that its elements are comparable and by that to create the prerequisites for developing the necessary qualitative or perhaps even quantitative measures.

Given the acceptance of this concept not only by the general public, which influences the imposition of ESG reporting obligations on organizations, it has also been accepted by organizations that do not have a legal obligation, but have recognized this framework for communicating with target audiences as having multiple benefits for their business. In this sense, it becomes clear that there is an open area that cries out for scientific assumptions to further development of the concept, especially to define which communication models for organizational management should be established.

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AN ANALYSIS OF THE CONCEPT OF SUSTAINABLE HOSPITALITY: THE INFLUENCE OF ENVIRONMENTAL PRACTICES ON CONSUMER VISITING INTENTIONS

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ABSTRACT
The adoption of sustainable practices has put pressure on hotels to implement new environmental policies in response to the demands of the emerging responsible tourism segment. In this context, the present study aims to explore sustainable hotel policies. Thus, the main objectives are to understand the importance of sustainability in hospitality and to capture a ground perspective that justifies the influence of good practices on attracting new consumers. This research is supported by a quantitative research, based on a questionnaire delivered to a total of thirty respondents, which allowed to examine the influence of environmental practices on consumer behaviour, measured by visiting intentions.
Keywords: Tourism, Hospitality, Sustainability, Environmental Management

1. INTRODUCTION

In the context of the research topic of analysis of investment projects in hospitality, the primary goal of paper is study is to assess the significance of sustainability in the hospitality sector and

develop a comprehensive understanding of how sustainable practices can attract new consumers. Additionally, this research aims to address the research question: *"Do sustainable practices adopted by hospitality organizations influence consumers' purchasing intentions?"* To achieve this purpose, the authors conducted a literature review alongside a quantitative survey distributed to thirty participants. Environmental sustainability increasingly resonates with consumers, driven by mounting concerns over climate change and resource scarcity. This consumer pressure has fundamentally reshaped strategic operations in the hotel sector, positioning sustainable practices as a competitive advantage (Almeida, 2016). The concept of sustainability, linked to social justice and conservation movements, culminated in the concept of "Sustainable Development" by the late 20th century: "Sustainable development refers to development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (OECD, 2013). Tourism in harmony with the environment enhances overall environmental quality, fosters local awareness of nature's value, and promotes sustainable tourism for all stakeholders. As IPDT (Tourism Planning and Development Institute) states "The future of tourism hinges on adopting a model that prioritizes sustainability for businesses and destinations." (IPDT, 2024).

2. LITERATURE REVIEW

Tourism is one of the largest industries worldwide, sustained by an extensive network of companies, services, and infrastructure. It involves a diverse range of stakeholders, including private tourism companies, governmental and non-governmental organizations, consumers, and host communities. Until 2020, tourism was the third-largest export industry globally. According to the 2019 edition of the UNWTO International Tourism Highlights, international tourist arrivals grew by 5% in 2018, reaching 1.4 billion. "These results were driven by favourable economic conditions, a growing middle class in emerging economies, affordable travel costs, and streamlined visa processes." (UNWTO, 2021). The UNWTO has committed to ensuring that this continuous growth is managed responsibly and sustainably, positioning tourism as a key driver of social and economic development, job creation, and equality. The tourism industry is constantly expanding, making it crucial for the sector to find sustainable ways to utilize natural systems while maintaining the delicate balance necessary for natural destinations to survive. (Meschini et al., 2021). The term sustainability was first used in the development context in 1974 during a series of conferences on forestry issues, while sustainable development is referred to "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (OECD, 2013). Furthermore, a sustainable society can be regarded as "one that can meet its needs without jeopardizing the survival chances of future generations." (Brown, 1981, p. 20). Concerning sustainability and tourism, it seems obvious that is crucial to make the tourism industry more environmentally sustainable. The behaviours tourists adopt while on vacation are critical in reducing their environmental footprint, and, therefore many authors suggest ways to promote better practices (vid. e.g. Filho, 2008, Parpairi, 2017, Nilashi et al. 2019, Bergquist et al*.,* 2019). Studies show that many guests choose accommodations based on their sustainable actions and certifications. However, despite having certifications, many hotels fail to effectively communicate this to guests, causing these efforts to go unnoticed (Oliveira, 2015). According to (Sofia Pinto, 2021), adapting to environmental sustainability is increasingly common in business strategies within the hospitality sector. However, to build greater customer trust, companies must demonstrate an environmental commitment and enhance the transparency and credibility of their sustainability practices. It is essential to empower industry professionals to discourage environmentally unsustainable tourist behaviours or encourage environmentally friendly habits.

For example, reducing the size of breakfast buffet plates can prevent guests from serving excessive portions that lead to food waste. Displaying signs encouraging guests to take multiple

smaller servings rather than a single large portion can also help. It is important to highlight the growing awareness of the limitations of natural and cultural resources and the negative impacts of their overuse on the environment, society, and individuals. While efforts are being made to preserve these resources for future generations, there is still significant demand for them to produce goods and services for commerce. This creates a need for strategies that balance organizational development with sustainable tourism growth. Important to note as well that "the principles of sustainability refer to the environmental, economic, and sociocultural aspects of tourism development, and a balance must be established to ensure its long-term sustainability." (UNWTO, 2021). In September 2015, world leaders agreed on 17 Sustainable Development Goals (SDGs) to guide global development until 2030. Since then, there has been a shift toward more inclusive development with a green approach worldwide. However, many destinations face challenges in preserving environmental quality.

3. METHODOLOGY

The development of this study was based on a quantitative approach, conducted through a survey. More specifically, the research followed a well stablished methodology, using quantitative methodologies, comprising hypotheses, "which are tested or refuted through experimentation and frequency calculations applied to the measurement and scaling of data or variables, or their correlations." (Rangel et al., 2018). The choice of methodology was influenced by the need to address the primary objective of this paper, which is to understand whether adopting sustainable practices in hotel units influences consumer visits. To verify the formulated hypotheses based on the chosen methodology, a survey was conducted with 30 randomly selected individuals. "Statistical inference, in its classical approach, is based on a simple random sample, a method that requires each member of the population to have an equal and independent chance of being selected." (Szwarcwald & Damacena, 2008).

The hypotheses formulated in the study were as follows:
- **H1:** The adoption of environmental sustainability practices in hotels influences consumer visits.
- **H2:** A consumer's intention to visit a hotel depends on the importance attributed to sustainable practices.

The questionnaire was designed to explore the potential influence of sustainable practices on consumer choices and attraction to hotels.
In this context, a closed questionnaire was constructed, comprising six questions segmented as follows:
- One single-choice question aimed at analysing demographic data ("age").
- Three dichotomous questions ("Yes" or "No").
- One Likert scale question (from 1 to 5) to measure the perceived importance of sustainable policies and the level of agreement with sustainable hotel development.

Illustration following on the next page

Illustration 1 – Survey descriptive questions (Source: Google Forms, 2022)

4. ANALYSIS AND DISCUSSION OF RESULTS

4.1 Data Validation: Exclusion Criteria

The Google Forms tool was configured to ensure only fully completed questionnaires were accepted, automatically excluding incomplete submissions to guarantee data consistency. All 30 questionnaires considered for this analysis were validated.

4.2 Data Coding

After ensuring data consistency, responses were converted into numerical data for statistical measurement and interpretation. For example:

- Age data were categorized into four age groups for representation.
- Questions 2, 3, and 4 were coded as binary responses ("Yes" or "No").
- Question 5 utilized a 5-point Likert scale to evaluate the importance attributed to sustainable policies.

These coding options were implemented in Google Forms for subsequent statistical analysis.

4.3 Data Analysis

From the data collected, as illustrated in Figure 1, among the 30 respondents:

- Approximately 60% were young adults aged between 20 and 30 years.
- The 30 to 40 age group accounted for 23.3%.
- The 40 to 50 age group represented 13.3%.
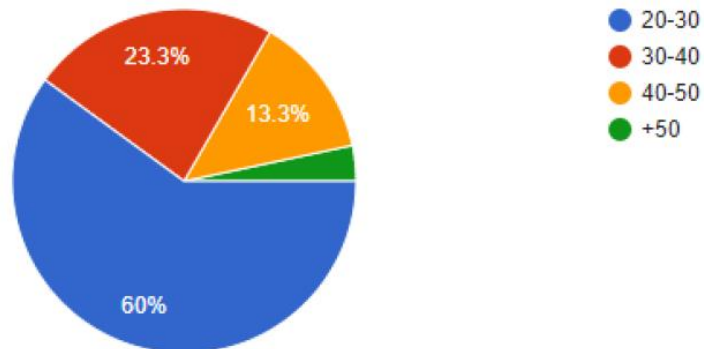- Respondents over 50 years old comprised just 3.4%.

Idade

30 responses

Figure 1 – Age of Respondents

In terms of sustainable lodging experience, 56.7% of respondents reported having stayed in hotels that adopt sustainable practices.

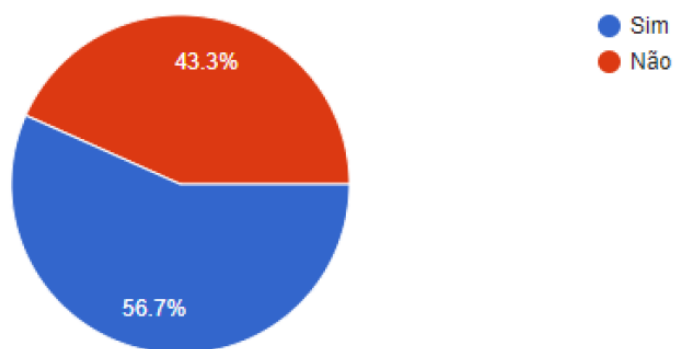Já esteve hospedado num hotel com práticas sustentáveis?

30 responses

Figure 2 – Accommodation in Sustainable Hotels (Yes: "Sim"; No: "Não")

The average preference for choosing a hotel based on environmental sustainability practices was 50%. Despite this, an overwhelming majority of 96.7% believe sustainable practices in hospitality are important.

288

Tem preferência na escolha de um hotel quando este aplica práticas de sustentabilidade ambiental?
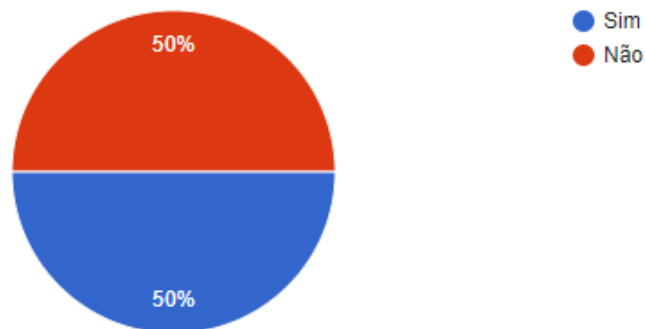
30 responses

● Sim
● Não

Figure 3 – Importance of Choosing Sustainable Hotels (Yes: "Sim"; No: "Não")

Acredita que a aplicação de práticas sustentáveis na hotelaria são importantes?
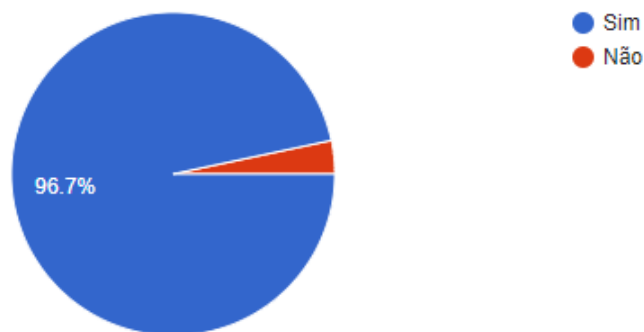
30 responses

● Sim
● Não

Figure 4 – Importance of Sustainable Practices in Hospitality (Yes: "Sim"; No: "Não")

Furthermore, the perceived importance of adopting sustainable practices in hotels showed a majority selecting the highest levels of importance:
- 46.7% rated it as "very important" (level 5).
- 43.3% rated it as level 4.
- Only 10% assigned an intermediate importance (level 3).
- Levels 1 and 2 ("less important") received no responses.

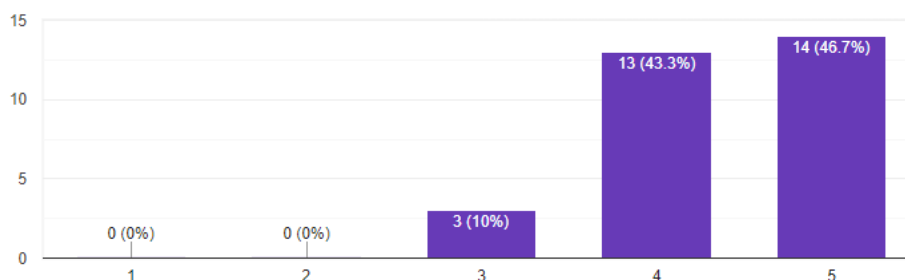*Figure following on the next page*

289

Figure 5 – Rating the Importance of Sustainable Practices in Hospitality (1 Low to 5 High)

The data suggests that while consumers highly value sustainable policies in hospitality (96.7%), this preference is not strongly reflected in their hotel choices (50%). The majority (90%) attributed high importance (levels 4 and 5) to sustainable practices in hotels.

This indicates that investment in sustainable policies in hospitality yields indirect profitability as a supplementary factor influencing consumer choice, rather than being a direct determinant.

4.4 Hypotheses Analysis

In accordance with the results obtained, the authors can suggest the following for the two hypotheses outlined for this research:

- **H1:** *The application of environmental sustainability practices in hotels influences consumer visits.*
    - *Validated,* although indirectly, as demonstrated above.
- **H2:** *A consumer's intention to visit a hotel depends on the importance attributed to sustainable practices.*
    - *Not validated,* as it is one factor among many but not a determining one.

5. CONCLUSION

The hospitality industry has undergone significant environmental shifts in recent years, particularly in adapting to competitive markets where prices are increasingly similar, products more alike, and customers more diverse. Differentiation often lies in subjective factors like comfort and intangible benefits. Protecting the environment has become one of society's greatest challenges, with everyone bearing responsibility for contributing to its recovery. The hospitality sector, long considered harmless compared to other industries, must now address its environmental impacts by incorporating sustainable management practices into hotel classification matrices to reduce ecological harm. By implementing environmental management strategies focused on preservation, the industry can:

- Identify, evaluate, and control environmental risks.
- Detect inefficiencies in operational processes.
- Provide alternative solutions to environmental challenges.

Sustainability is crucial for the continuity of hospitality activities, as tourism is inherently tied to culture and leisure. It is vital to show consumers the sector's commitment to preserving destinations and fostering collaboration in minimizing environmental impacts. In conclusion, consumers are becoming increasingly attentive, concerned, and collaborative, while managers aim to enhance offerings for their clients. As environmental sustainability gains more importance among guests, it will drive more measures and actions within the hospitality industry.

6. LIMITATIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

This study faced some limitations, mainly due to the novelty of the topic in society. In Portugal, steps toward environmental sustainability began in the early 2000s, and progress has been slow. Similarly, the hospitality industry has only recently acknowledged the urgency of reducing its ecological footprint, limiting the scope of available literature on this topic. Furthermore, the scales used in the survey restricted participant responses to predefined options (e.g., 1 to 5 for importance levels, "Yes" or "No" for dichotomous questions), preventing more personalized insights while facilitating result analysis. Additionally, the surveys were conducted in Portuguese and targeted residents of the Autonomous Region of Madeira, excluding external perspectives. The sample size was also small, with only 30 respondents. Most participants (60%) were aged between 20 and 30 and held undergraduate degrees, as the survey was conducted primarily among peers. This limits the diversity of the sample, as sustainability requires input from all generations. Accordingly, the authors recommend, as further research and on a first stage, to expand this research to other regions of Portugal. On a second stage would be really interesting to expand this research internationally, in particularly to countries and regions more dependent on touristic activity.

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NATIVE ADVERTISING IN THE CONTEXT OF ETHICS

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ABSTRACT
Native advertising is regularly encountered in the digital space, and the year-on-year increase in this phenomenon raises the need to address ethical issues related to its elements. This raises the question of whether this form of advertising is sufficiently transparent and respects the ethical aspects of advertising. Marketers and publishers are using innovative methods to create, format and deliver digital advertising. Native advertising as content that has similarities to news, feature articles, product reviews, entertainment and other material surrounding it online must be clearly recognizable. The Federal Trade Commission (FTC) Act prohibits deceptive or unfair practices. The FTC's role is to ensure that longstanding consumer protection principles are applied in the digital marketplace, including native advertising (Federal Trade Commission, 2015). In this paper, we focus on elements of native advertising that, by their characteristics, could violate ethical rules of marketing, such as transparency, manipulation, truthfulness of information, and recognizability of advertising from the digital environment. The aim of the present study is to identify the influence of native advertising elements from an ethical perspective on consumers' attitudes towards native advertising. We were inspired to do this by, among other things, a finding from a Reuters Institute report (2015), which found that 33% of UK internet users and 43% of US internet users felt "disappointed or cheated" after reading an article and later discovering that the article had been sponsored by a brand or company. Despite these findings, however, a report by the Reuters Institute suggests that readers were more accepting of sponsored content that was clearly labelled and differentiated (Breiner, 2021).
Keywords: Advertising Recognition. Content marketing. Ethics in marketing. Manipulation. Media. Native advertising. Transparency.

1. INTRODUCTION

In 2024, native advertising is neither a new concept nor a new form of advertising. The Slovak market already experienced its "boom" between 2016 and 2018 and according to the *Handbook on Native Advertising and Content Marketing* (originally: *Príručka o natívnej reklame a obsahovom marketingu)* published by the Internet Advertising Association IAB Slovakia (Kuna et al., 2018), there was a 590% increase in the application of native advertising by Slovak advertisers between the first half of 2016 and the first half of 2017. In February 2024, IAB Slovakia released a *Report on the Development of Online Advertising Expenditure* (Slovenská online reklama dosiahla v roku 2023 rast 8 %, 2024), according to which native advertising is growing at a standard year-on-year rate (+28%) and thus, together with digital audio advertising, is in the top two positions, with a significant difference compared to other forms of online advertising (see Figure 1). This is due to the increasing media space and reach on youth media, where native advertising is predominant (Slovenská online reklama dosiahla v roku 2023 rast 8 %, 2024), such as Instagram and TikTok. Speaking of which, the social media

TikTok was exclusively dependent on this type of advertising, as until August 2024 it was not possible to advertise or place paid advertising on TikTok in the Slovak market, i.e. to pay for advertising, publish paid posts, etc.

ADVERTISING FORMAT	2023	2022	CHANGE	SHARE
Non video display	72 079 678 €	68 209 725 €	6%	35%
Paid for search	42 510 023 €	41 037 339 €	4%	21%
Video display	42 706 170 €	39 393 836 €	8%	21%
Classifields and directories	26 710 575 €	22 961 871 €	16%	13%
Native	13 028 809 €	10 158 251 €	**28%**	6%
Other	7 694 193 €	7 277 933 €	6%	4%
- Affiliate advertising	3 948 500 €	4 250 128 €	-7%	2%
- Digital audio advertising	2 334 865 €	1 688 755 €	38%	1%
TOTAL	**204 729 448 €**	**189 038 955 €**	**8%**	**100%**

Figure 1: Development of Online Advertising Expenditure by Format in 2023
Source: redrawn according to Slovenská online reklama dosiahla v roku 2023 rast 8 %, 2024

A significant feature that keeps sponsors investing in this form of promotion is its ability to blend into the environment in which it is published. The recipient thus does not feel disturbed or ripped off; they receive the content natively and naturally. And furthermore, without the prejudices that are common to advertising. In this context, however, we come to the question, or rather dilemma, of whether this form of advertising can be considered ethical. The main attributes that make native advertising so specific and unique can, if not given enough attention, violate the ethical standards of advertising and threaten the overall impression of native content. Therefore, in this article, we will focus on the elements of native advertising that could violate the ethical rules of marketing by their characteristics, namely transparency, manipulation, truthfulness of information, and the recognizability of advertising from the digital environment.

2. OBJECTIVES AND RESEARCH QUESTIONS OF THE AUTHOR'S RESEARCH

To meet the objectives defined below, we chose a research design implementing a questionnaire survey method, which included attitudinal scales. We considered this exploratory method to be the most adequate choice in the search for answers to our research questions. The questionnaire consisted of 20 items; the items were of the closed-ended question type, and we also used specific examples of native advertising in the last three items. The aim of the examples was to identify how respondents evaluate the transparency, recognizability, and trustworthiness of native advertising and, based on the results, to analyze how the different labeling of native advertising affects the receiver of such content. The main research objective was to find out how the elements of native advertising influence consumers' attitudes towards native advertising. We focused on 4 elements of native advertising, namely transparency, recognizability, manipulation, and truthfulness of information. Based on the objective, we set 3 research questions:

RQ1: How do consumers perceive the transparency of native advertising from an ethical perspective?

RQ2: For which products/services do consumers perceive native advertising as inappropriate in the context of ethics?

**RQ3:** Which aspects of advertising ethics are most susceptible to violation in native advertising?

2.1. Characteristics of the Research Sample

A total of 136 respondents completed the questionnaire, however, based on the supplementary question, we identified two respondents whose answers demonstrated insufficient knowledge of what native advertising is. In the open-ended item, they stated their use of ad blocking apps, which means that native advertising is actually not displayed to them as one of the main specific features and benefits of native advertising is that it cannot be blocked by add-on apps. For this reason, we excluded these two respondents from the research sample, thus, it consisted of 134 respondents. The research sample consisted of 107 females (79.9%) and 27 males (20.1%). The gender disparity in the responses does not pose a barrier as this data served us as indicative information and was not a key variable. The age distribution of the respondents in the sample was as follows: 18 to 25 years of age constituted 70.1% of the study sample, 26 to 35 years of age constituted 16.4%, another 9% of the respondents were in the age group of 36 to 50 years, the category of 51 to 65 years of age constituted 3%, and the remaining 1.5% belonged to the age group of 66 years and above.

3. RESULTS OF THE AUTHOR'S RESEARCH
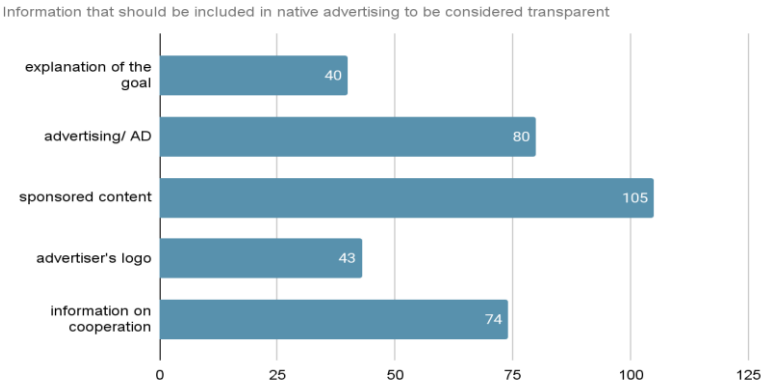### 3.1. Native Advertising Transparency

Whether or not the respondent is aware that it is an advertisement may influence their perception of the transparency of native advertising in the context of ethics. The option "I am always aware that it is an advertisement" was chosen by 47% of respondents and one less respondent chose the option "I am sometimes aware that it is an advertisement". From this we can conclude that respondents are generally aware of the presence of advertising. The finding that almost 95% of the respondents perceive that it is an advertisement, either always or sometimes, indicates the transparency and recognizability of the native advertisement, which means that the ethicality of the advertisement is upheld. 91% of respondents agreed with the statement "*Transparency is key to the ethical implementation of native advertising*". 2.2% of respondents disagreed and the remaining 6.7% chose *I do not know*. Recipients of media content in the form of native advertising are aware of the importance of transparency in advertising and are not indifferent to it. Within the questionnaire, we included one more item, identical in meaning, by which we wanted to verify and confirm the correctness of the results from the aforementioned item. We used different wording and measured the importance of transparency on a scale of *very important*, *important*, *less important*, *not important* or *I do not know*. Transparency was very important to 38.1% of respondents, important to 48.5%, and less important to 6% of consumers (see more in Chart 1).
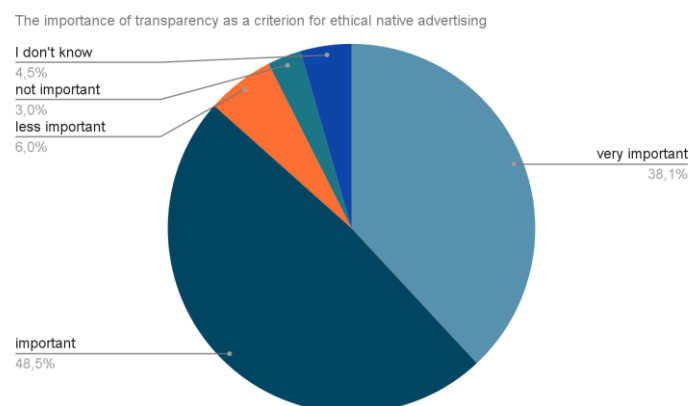
Chart 1 *Level of Importance of Transparency in the Context of Ethics*
Source: Own Elaboration

After summing the responses of *very important* (38.1%) and *important* (48.5%), agreement with the importance of native advertising transparency was close to the responses in the first item. While 91% of respondents answered positively to the key importance of transparency, the percentages in the validation item were 86.6%. As respondents were given a choice of multiple options in this item, between which the answers were spread, there is less difference in the percentages, but the fact that respondents consider transparency important in the context of ethical handling of native advertising is maintained.

The way native advertising is labelled is equally related to transparency. We therefore asked what information respondents thought should be included in native advertising for it to be considered transparent (see Chart 2). Up to 105 times (78.4%) the answer chosen was that native advertising should be labelled as "*Sponsored Content*". Labeling as "*Advertising*" should be included according to 59.7% of respondents. Including information about the collaboration with the advertiser was chosen by 55.2% of respondents. According to 32.1% of respondents, native advertising should include the advertiser's logo, and they consider it less important to explain the objective or purpose of the advertisement, where 29.9% of respondents chose this option. According to the respondents' answers, native advertisements that are labelled as "*Sponsored Content*" contribute to the transparency of the native advertisement and thus to the compliance with the ethical rules of advertising.


Chart 2 Overview of Information that Increases the Transparency of Native Advertising
Source: Own Elaboration

Although our respondents consider transparency to be key and important, 47% perceive native advertising to be less transparent compared to other forms of promotion. The possibility that it is not less transparent compared to other forms was identified by 17.2% of respondents. The neutral answer *"not sure"* was chosen by 35.8%. Based on this finding, we conclude that despite the importance of transparency, consumers are aware that native advertising tends to be less transparent. This finding is followed by another, namely how satisfied the respondent/consumer is with the level of transparency of native advertising they have come into contact with in the past. Consumer satisfaction with the level of transparency of native content may influence perceptions of native advertising as ethical or unethical. Only one respondent (0.7%) was very satisfied with the transparency of native advertising, 34.3% of respondents indicated *"I am satisfied"*, 42.5% of recipients indicated *"slightly dissatisfied"*, 5.2% of respondents answered *"very dissatisfied"* and the remaining 17.2% were unsure. Satisfaction with transparency was thus on the negative side of the scale.

One solution to prevent recipients' dissatisfaction with the lack of transparency of advertisements is to incorporate the company's logo or to correctly label the advertising message as *"sponsored by", "in cooperation with ..."* etc. Although native advertising is specifically subtle, the emphasis on a more sophisticated but correct way of labelling content clearly contributes to its ethicality, which influences the attitude of recipients towards advertising as such. Influencers as a medium are a special category. As stated in the *Handbook* (2018), the average age of influencers is between 18-24 years old, and they live in a legal vacuum. They often do not label paid collaborations at all and only consider the need to do so after a wave of criticism in the comments from their own fans. This often affects the brand itself. The Native Advertising Group therefore recommends that commissioners, whether advertisers or agencies, require their suppliers (influencers) to label such collaborations (Kuna et al., 2018).

We decided to test transparency as an important factor of native advertising in the context of ethics through associations. Respondents were presented with a list of 12 attributes, from which they were asked to select the ones they associated with native advertising. The adjectives from which respondents could choose were polarized evenly for both positive and negative attributes.
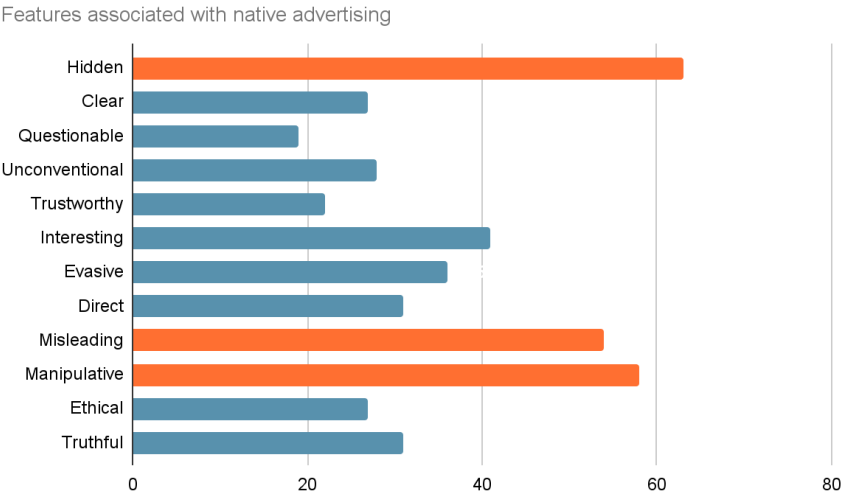
Graph 3 Attributes Associated with Native Advertising
Source: Own Elaboration

After subsequent analysis**, we find a dominance of traits with a negative charge**, such as *manipulative* (43.3%)*, misleading* (40.3%) and *covert* (47%). Attributes with positive overtones reached lower values (see Graph 3), indicating a more negative attitude of respondents towards native advertising in the context of ethicality. In conjunction with the transparency of native advertising and the importance respondents attach to it, the percentage of the word *"clear"* is at a lower level, which could lead to viewing native advertising as unethical.

We also decided to test the transparency on specific examples of native advertising. One of the native articles (see Figure 2) contained the bank's logo, and was also marked on the top bar of the page with *"this article is brought to you by ..."*

Zo šoférovania už strach nemá, prvý raz sa za volant posadil asi 10 mesiacov po nehode. Vyhýba sa však šoférovaniu v noci, lebo práve vtedy sa mu nehoda stala. „Asi rok po nehode ma okolnosti prinútili šoférovať večer. Nešiel som viac ako sedemdesiatkou a čakal som, kde mi čo vybehne na cestu.To jednoducho človek z hlavy nevymaže."

Lekári v Jarovom prípade veľmi dobré prognózy nemajú. Hoci je dnes sebestačný, už nikdy si nenájde plnohodnotnú prácu, ani sa nevráti k milovanému športu. Napriek tomu si však uvedomuje, že môže byť rád, že nehodu vôbec prežil. „Môj kamarát, ktorý je farár, ten mi nič iné nepovie, keď ma stretne len to, že každú nedeľu sa mám ísť modliť a ďakovať za to, že som ešte tu."
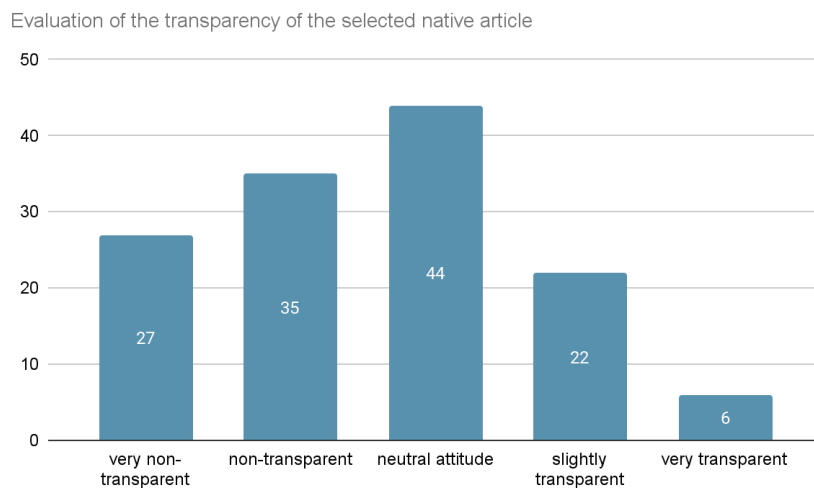
Splátka hypotéky vyššia než príjem

Nehoda mala v prípade Jara vplyv aj na jeho finančnú situáciu. Pár rokov pred ňou si vzal hypotéku na byt v jeho rodnom meste, ktorej mesačná splátka je 350 eur. Počas PN-ky dostal od sociálnej poisťovne len 250 eur a z toho hypotéku platiť nevládal: „V prvých dvoch či troch mesiacoch mi museli pomáhať rodičia. Inak by som to nevedel splatiť a určite by som mal v byte exekútora."
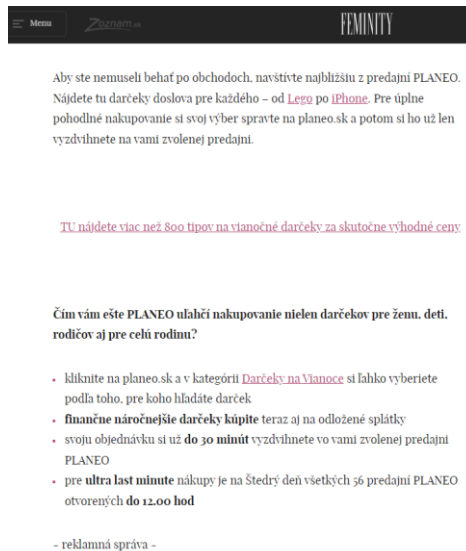
Jaro pri nehode strpel zranenie chrbtice, nevydrží dlho chodiť ani sedieť. (zdroj: Wofin Nagyová)

Figure 2 *Sample Native Article on sme.sk in Cooperation with ČSOB Bank*
Source: https://domov.sme.sk/c/20472751/prezil-som-autonehodu-teraz-som-vdacny-za-kazdy-den.html

Only 4.5% of respondents rated the native article as very transparent. Based on the above data, we conclude that in this example of a native article, despite the sufficient labelling of the article and the presence of the company logo, respondents found the advertisement to be more opaque than transparent (see Graph 4).
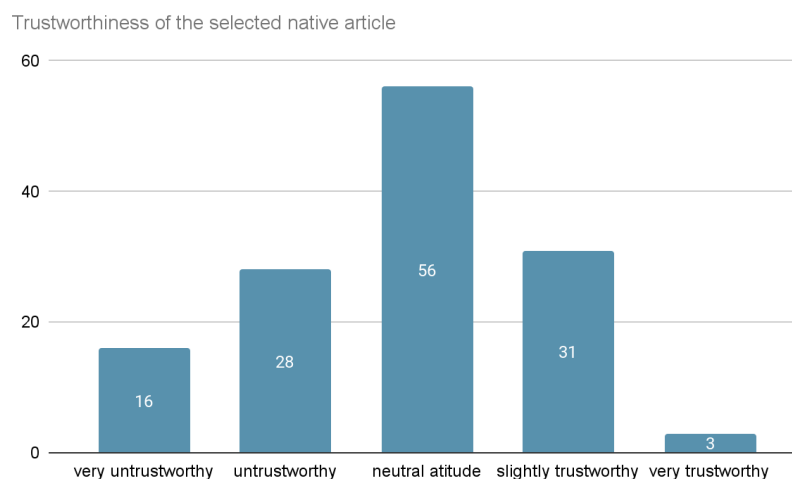
Evaluation of the transparency of the selected native article

Category	Value
very non-transparent	27
non-transparent	35
neutral attitude	44
slightly transparent	22
very transparent	6

Graph 4 *Evaluation of Transparency of the Selected Native Article*
Source: Own Elaboration

This phenomenon may have occurred because of the amount of text. Whereas in the first example (see Figure 3) the native article was short, concise, and used prominent hyperlinks, and respondents rated it mainly neutral and positive (see Graph 5), in the second example the text is continuous and it is less recognizable at first glance that it is an advertisement.

Figure 3 *Sample of Native Article on feminity.sk in Cooperation with PLANEO Shop*
Source:https://feminity.zoznam.sk/c/916793/kde-kupite-darceky-este-aj-na-vianoce-a-ako-sa-nedat-nachytat-na-falosny-obchod


Graph 5 *Evaluation of the Credibility of the Selected Native Article*
Source: Own Elaboration

The length of native articles was also dealt with by the author Ráciková (2021), who on the basis of her analysis found that the average number of paragraphs in native articles is 29, while in PR articles it is only 6 paragraphs on average, and also that native advertising texts, or native articles in their scope exceed PR articles, more than four times.

3.2. The Position of Transparency among the Other Criteria of Ethicality of Native Advertising – Manipulation, Truthfulness, and Recognizability

We tested the basic criteria of ethical native advertising: manipulation, truthfulness, recognizability, and transparency on a scale of *"susceptibility to violation"*, and also on a scale of *"importance in the context of ethics"*.

According to consumers, recognition of native advertising is the least susceptible to violation (7.5%), while most respondents chose manipulation as the most susceptible factor (43,3%). When comparing transparency and recognition of native advertising with manipulation and truthfulness of information, respondents attributed greater susceptibility to violation to manipulation. Thus, we obtained an answer to our third research question: *"Which aspects of advertising ethics are most susceptible to violation in native advertising?"* According to consumers, it is the manipulation aspect.
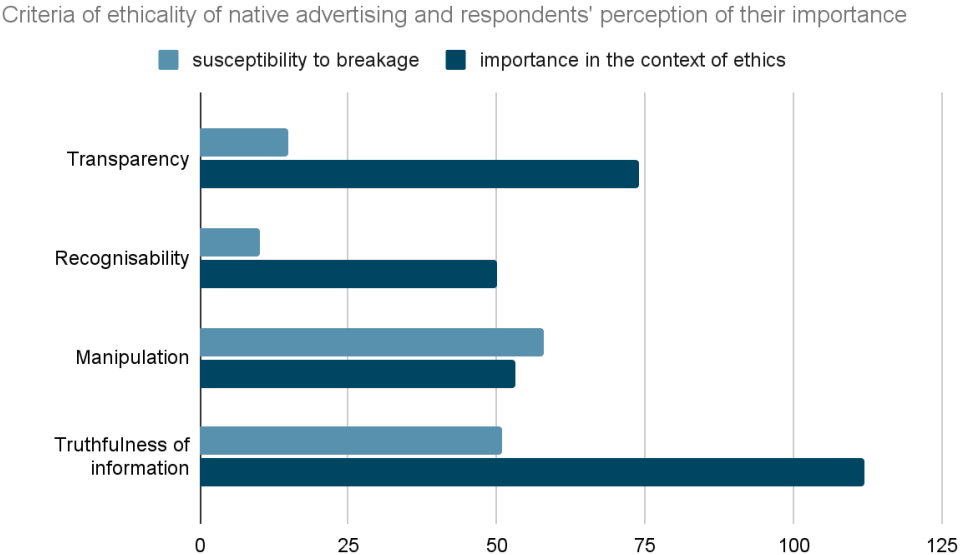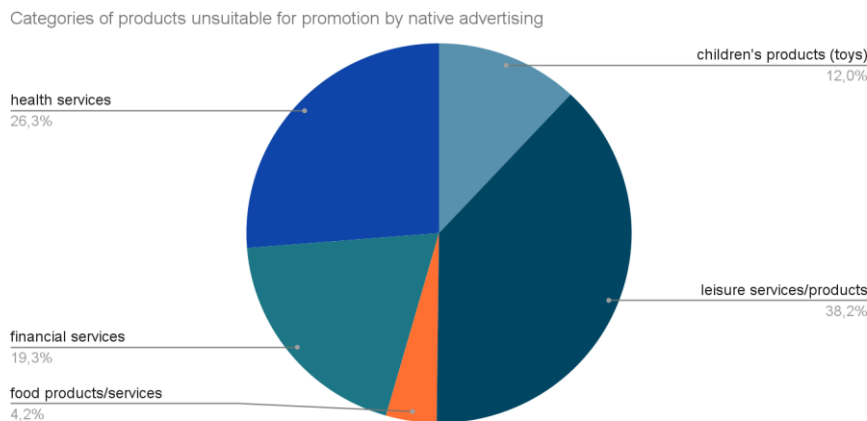

Graph 6 *Criteria for the Ethicality of Native Advertising and
the Degree of their Importance and Risk of Violation
Source: Own Elaboration*

We have already confirmed in the previous sections that transparency was identified as important by recipients, but we were interested to see whether transparency was also most important compared to other important factors. It turned out that if the content aspect of native advertising is added to the key factors, it will play an important role for the respondents – in fact, the option of *truthfulness of information* received the highest percentage (83.6%). Manipulation was identified as the most important factor in assessing the ethicality of native advertising by 39.6% of respondents, with transparency being the most important factor for 55.2% of respondents (see more in Graph 6). While transparency is key for respondents and recipients are aware of its importance, they express some dissatisfaction with the level and intensity of labelling in terms of ethicality.

3.3. Suitability of Native Advertising in the Context of Promotion of Selected Products/Services

As part of our study, we were also interested in which products/services consumers perceive native advertising as inappropriate in the context of ethics. The most inappropriate products/services to promote through native content are considered by respondents to be leisure products – specifically casinos, gambling, betting. As many as 73.9% of respondents identified these services as unsuitable for promotion through native advertising from an ethical perspective (see more in Graph 7).

Categories of products unsuitable for promotion by native advertising

children's products (toys)
12,0%

leisure services/products
38,2%

health services
26,3%

financial services
19,3%

food products/services
4,2%

Graph 7 *Overview of Products/Services Inappropriate to Promote through Native Advertising*
Source: Own Elaboration

Our findings can be contrasted with a study by Professor Per Binde (2014), in which he takes a critical look at the promotion of gambling and the manipulation of the recipient of advertisements with such topics. The psychological and rhetorical means employed by gambling advertising is skewed towards more positive emotions – the advertisement does not intend to provide the viewer with a balanced picture of gambling and this raises the question of whether some advertisements can be considered false and misleading. An example would be a lottery advert showing lucky winners and stacks of banknotes – this is in fact relatively true as the player has a chance to win, but it is reasonable to assume that for some viewers the advertisement creates a misconception about the possibility of winning. The advertisement suggestively highlights a highly improbable situation, while saying nothing about the statistical odds of winning (Binde, 2014). This explanation allows us to identify the reasons why our respondents rated gambling as unsuitable to be promoted through native advertising.

4. CONCLUSION

Many marketing studies have addressed the issue of native advertising transparency, and one of them is a study by the Reuters Institute Digital News Report (2015). A survey conducted in 2015 found that 33% of UK respondents and 43% of US respondents felt "disappointed or cheated" after reading an article when they later found out that the article was in collaboration with a brand or company. Despite these findings, however, the Reuters Institute report suggests that readers were more accepting of sponsored content that was clearly labelled and differentiated, i.e. transparent (Reuters Institute, 2015).

In comparison with the results obtained from our research, we find that the findings are very similar, as respondents to our questionnaire identified transparency as key to adhering to ethical native advertising (91%). Respondents are more lenient towards native advertising if the ethical aspect of transparency is adhered to, and thus the recipient's ability to distinguish between regular editorial content and advertising is enhanced.

A study conducted by the Association of National Advertisers (ANA) in 2014 came to findings that support the results of our questionnaire investigation. The ANA study evaluated results on transparency from 127 respondents, but these respondents are in the marketing industry, so these are the views of experts. The survey results showed that 13% of respondents felt that labelling of advertising content was unnecessary. However, two-thirds of the respondents agreed that native advertising must have a clear indication that it is advertising, otherwise it could violate the ethical standards of advertising (ANA, 2014).

Native advertising in the context of ethics has also been discussed in terms of promoting specific services or products. The use of native advertising to promote food products is, according to our respondents (8.2%), the least problematic in terms of ethics. On the other hand, our research showed that respondents consider it unethical to promote gambling and casinos through native advertising (73.9%). In the work of K. A. Hunt (2017), the author focused on a similar question: *Which product categories are most often promoted by native advertising?* By analyzing the articles, the author came to the findings that the most common category promoted in this way was financial services – 13% of the articles (Hunt, 2017). In our research, 37.3% of the sample rated *financial services* as inappropriate to promote by native advertising. Thus, from the given results, we may conclude that the frequency of using native advertising to promote *financial services* might not have a negative impact on the respondents, and thus the ethicality of the advertisement would be within the norms of the respondent. In order for native advertising to inspire trust and a sense of respect in the recipient, we recommend the use of graphic elements to mark native content, such as the advertiser's logo. Such elements make it easier for consumers to know that it is a promotion and reduce the likelihood that consumers will feel "tricked".

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