AGORA INTERNATIONAL JOURNAL OF ECONOMICAL SCIENCES

https://univagora.ro/jour/index.php/aijes

Year 2024

Vol. 18
No. 2

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SCIENTIFIC-THEORETICAL ISSUES IN THE FORMATION OF A GREEN ECONOMY

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Abstract: The late 20th and early 21st centuries witnessed significant global changes, including transformative shifts that have profoundly impacted the world economy. Energy consumption plays a pivotal role in both the competitiveness of goods and the achievement of sustainable economic growth. In this context, the concept of a green economy has gained increasing prominence amid deepening globalization. Since the 2020s, rising carbon emissions have underscored the urgent need for enhanced decarbonization efforts. For the first time in history, global calls to prioritize decarbonization are surpassing concerns over energy security. This shift reflects growing ecological imbalances and environmental stress caused by excessive carbon emissions. During the mid-20th century, economic crises and geopolitical tensions were largely centered on controlling energy resources. While this led to the development of numerous oil and gas fields, contemporary challenges associated with traditional energy sources have accelerated efforts toward decarbonization. Global climate change further compounds these challenges, making the transition to renewable energy and green technologies imperative. The formation of a green economy is thus crucial to restoring ecological balance and fostering sustainable development.

Keywords: green economy, green technologies, renewable energy, non-renewable energy, green development, ecological balance, sustainable agriculture, water management, wind energy, hydro energy.

1. INTRODUCTION

The concept of the green economy and the necessity for its development stem directly from the aforementioned arguments. It is worth noting that the term green economy was first introduced into economic discourse in 1989 by leading British economists David Pearce, Edward Barbier, and Anil Markandya (Pearce, Markandya, & Barbier, 1989). Research indicates that although these authors were the first to formally coin the term, discussions surrounding the need for a green economy can be traced back to the mid-20th century, driven by concerns over the excessive consumption of natural resources. In 1972, the Club of Rome published its seminal report, *The Limits to Growth*, which highlighted the depletion of natural resources, the negative environmental impacts of human activities, and the growing issue of waste (Club of Rome, 1972). Analyzing the report's findings, it becomes evident that the overuse of natural resources—particularly non-renewable ones—is predominantly associated with industrial production.

Consequently, the report's authors argue for imposing limits on industrial output, as such measures could ultimately reduce reliance on non-renewable resources. Scientific studies on the green economy suggest that David Pearce, a prominent British economist, is a leading figure in this field (Pearce, 1973, 1976). Pearce's works, including *Studies in Environmental Economics* (1973) and *Environmental Economics* (1976), lay the foundation for understanding the depletion of natural resources and the overall loss of biodiversity caused by anthropogenic impacts on the environment. In 1992, Pearce further explored the characteristics of the green economy, proposing that it represents a self-sustaining economic system. According to Pearce, sustainability is a defining feature of the green economy. Moreover, he posited that as the structure of the economy evolves—resulting in a decreased ratio of materials and energy used in the production of economic goods—its capacity for self-reproduction is enhanced (Pearce, 1992). Building upon Pearce's arguments, it can be inferred that distinct differences exist between the green economy and non-renewable economies. While both are inherently linked to nature, the green economy emphasizes sustainability and resource efficiency, contrasting with the finite resource consumption characteristic of non-renewable economies.

These are similar points; however, when focusing on the differences, it is important to note that the extraction of non-renewable energy resources, such as fossil fuels, leads to increased carbon emissions (Shkradyuk, 2010). Moreover, a defining characteristic of non-renewable energy resources is their expansion of anthropogenic impacts on the environment, resulting in continuous exploitation of natural resources (Ushakov, 2009). This exploitation diminishes the ability to preserve these resources for future generations, relegating their intergenerational sustainability to the background, particularly in terms of economic efficiency. Additionally, the use of non-renewable energy resources elevates carbon intensity, further exacerbating environmental degradation. (Hajiyeva, et al., 2024)

In contrast, as noted by David Pearce, a defining feature of the green economy is its reliance on renewable and self-reproducing economic systems (Pearce, 1992). The green economy is essentially a subset of ecological economics, which, although a relatively recent field, emphasizes the intricate relationship between nature and society. Ecological economics is currently in a developmental phase, with foundational contributions by scholars such as Robert Costanza and Herman Daly (Costanza, 1991; Daly, 1991). Their joint monograph, *The Scientific and Managerial Basis for Sustainability of Ecological Economics*, published in 1989, underscores the critical role of economic mechanisms in preserving nature and biodiversity (Costanza & Daly, 1989). Viewed from this perspective, it is arguable that the foundational ideas of the green and ecological economy trace back to the early 20th century, with significant contributions from the Ukrainian biologist and former Soviet scientist V. I. Vernadsky (Vernadsky, 2004). Vernadsky's early work on environmental conservation laid the groundwork for sustainable resource management, emphasizing the efficient use of natural resources and their preservation for future generations. His contributions can be regarded as the rudimentary basis for the development of the green economy.

The conceptual foundations of the green economy began to gain momentum in the late 20th and early 21st centuries. These foundations are closely linked to the fundamental principles of sustainable development. Notably, the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro adopted the concept of sustainable

development (United Nations, 1992). This was followed in 2012 by the "Rio+20" Conference, which produced the *Future We Want* declaration. The declaration highlighted the interconnectedness between the green economy and sustainable development, emphasizing the critical role of a sustainable future in eradicating poverty (United Nations, 2012).

The declaration took a conceptual approach to the green economy within the broader framework of sustainable development, asserting that the green economy is a tool for achieving sustainability. It also called for global cooperation, advocating the exchange of best practices, the application of various models and technologies, and the sharing of methodologies for assessing green economy development strategies. Both the 1992 and 2012 UN conferences identified three fundamental pillars for sustainable development: economic growth, social efficiency, and ecological balance. In this context, the green economy is most closely aligned with the first and third pillars. Ensuring ecological balance, a core objective of the green economy, is central to its mission.

The use of green technologies aims to ensure economic growth while reducing environmental harm, including carbon emissions, which is reflective of the world's ecological stability and sustainability. From this perspective, it can be argued that significant progress has been made in the conceptual foundations of the green economy, particularly from the late 20th century and into the early 21st century. Efforts to address the impacts of global climate change on countries have continued systematically. Since the 1990s, the growing focus on the economic and socio-economic implications of climate change, along with coordinated international efforts, has become an imperative. In this regard, the UN Framework Convention on Climate Change was adopted in 1995, and the first Conference of the Parties (COP) meeting was held in Berlin in the same year. The hosting of COP29 in Baku, Azerbaijan, is significant, not only in terms of enhancing the country's international image but also as an important contribution to the advancement of green economy initiatives.

As mentioned previously, the green economy aims to reduce carbon emissions. In this context, Article 6 of the Paris Agreement, within the COP framework, notes that implementing national climate plans can result in savings of up to 250 billion USD annually. Although the formation of the green economy plays a crucial role in ensuring ecological balance, it must be acknowledged that the process is complex and multifaceted. This involves, first and foremost, the limitation of the use of non-renewable energy resources, the establishment of ecological balance, and the significant reduction of harmful carbon emissions, all of which require substantial financial investment. A key aspect of establishing the green economy is the transition to green energy sources and technologies across all sectors of the economy.

1.2. The classification of sectors hindering economic development and shaping the green economy.

Households, particularly in developing countries, are significant contributors to environmental pollution, especially by carbon dioxide. Additionally, the release of waste pollutants from households into the environment often leads to harm to both soil and air resources (UNEP, 2016). In developing countries, households tend to rely more on traditional energy resources. For example, in cities, fuel and energy resources such as natural gas are commonly used, which results in the emission of carbon dioxide into the atmosphere (IEA,

2018). To eliminate carbon dioxide emissions from households, it is essential to first transition the technologies used in households to renewable energy sources (World Bank, 2020).

The second sector hindering the green economy is the transportation sector. The use of diesel fuel and gasoline in automobiles, particularly in developing countries, increases the release of carbon dioxide into the environment (International Transport Forum, 2021). The industrial sector also has a significant contribution to this issue, as industrial activities in both developed and developing countries cause environmental pollution, including contamination of soil, air, and water (UNIDO, 2018). These sectors require fundamental changes. For example, when analyzing the carbon emissions released by these sectors in Azerbaijan, it can be concluded that the consumption of non-renewable energy resources in household accounts for 33.5%, in the transportation sector 23.5%, and in the industrial sector 13.5% (Ministry of Ecology and Natural Resources of Azerbaijan, 2020).

The remaining consumption of non-renewable energy resources is observed in other sectors. It can be argued that, with the exception of the industrial sector, there are potential resources available to limit the consumption of non-renewable energy sources in other sectors. For example, to reduce the consumption of non-renewable energy sources such as oil and gas in households, it is crucial to improve household technologies, upgrade gas pipelines, and install solar panels on homes, which would help reduce carbon emissions (IRENA, 2019). Similar trends can be observed in the transportation sector. For instance, customs duties on electric vehicles entering the country have been reduced to zero, and there are also lower customs duties for hybrid vehicles (Azerbaijan State Customs Committee, 2022). However, challenges still remain in this sector. The number of battery charging stations for electric vehicles is still quite low, and the widespread installation of charging stations in residential areas could create significant opportunities for the sector (ADB, 2021).

As for the industrial sector, since it is primarily composed of the oil and gas sector and the chemical industry in Azerbaijan, it is expected that problems in this area will persist for a certain period. There are also sectors that stimulate the development of the green economy, or more specifically, form the green economy. These sectors include:

- Forestry;
- Agriculture;
- Sustainable water management;
- Fisheries sector;
- Renewable energy sources;
- Tourism sector;
- Waste recycling process.

Regarding forestry, it is important to note that forests absorb carbon dioxide and release oxygen into the environment, playing a crucial role in preventing soil erosion. Forestry is essential for the protection of ecosystems. Therefore, actions such as preventing deforestation and protecting forests from fires could serve as traditional methods for safeguarding the green economy.

Figure 1
Showing the classification of sectors that either hinder or promote the green economy
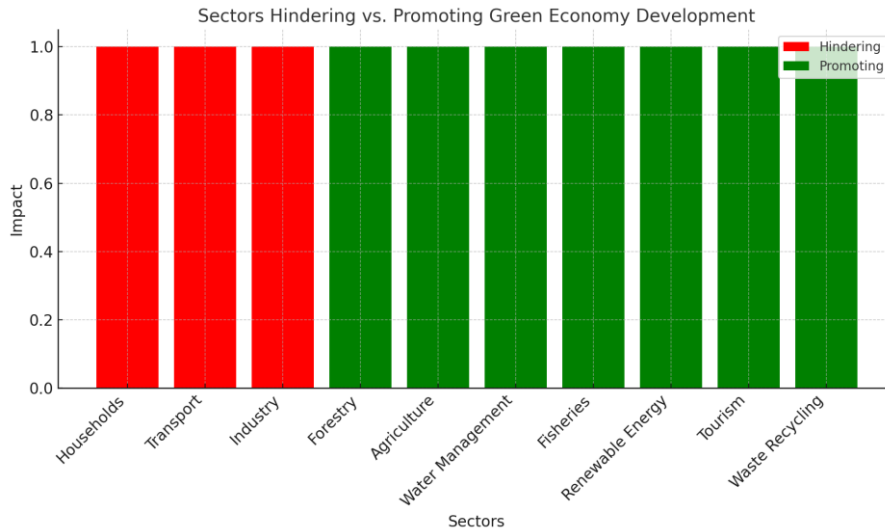
Source: Author's own analysis based on the classification of sectors hindering and promoting green economy development, derived from the provided content on the topic.

Agriculture, which plays a vital role in meeting the food demands of the population, also has a key role in preserving biodiversity. If agriculture focuses on low-water consumption crops, reduces agrochemical loads, implements integrated pest management, and employs anti-erosion technologies, it can significantly contribute to the green economy. Therefore, it is necessary to implement the required measures for the development of green agriculture and increase government subsidies for the development of ecological farming. Water management also plays an important role in the development of the green economy. Balancing water usage, particularly preventing wasteful use of water resources, can significantly help in the case of water scarcity. Additionally, the recycling of used water, except for potable water, can play a critical role in meeting the water demands of other sectors. It is known that agriculture accounts for approximately 70% of total water usage. Therefore, efficient use of water resources should be emphasized.

Fishing, particularly in natural and artificial fisheries, can provide a source of income for the population. Additionally, the development of fishing can contribute to the protection of ecosystems and create favorable conditions for expanding renewable energy resources. Thus, attention should be given to preventing the sharp decline in fish stocks. As for waste management and recycling, this sector plays a significant role in reducing carbon emissions. Moreover, it also lowers production costs, ensures the availability of raw materials, and, in our opinion, the waste recycling sector can be a source of the green economy while increasing the competitiveness of produced goods.

2. DISCUSSIONS AND RESULTS

The use of green technologies primarily serves to reduce the cost of living within social categories, that is, to prevent social inflation. The calls for the use of green technologies in everyday life have become particularly relevant in recent times. These calls also include the utilization of renewable energy sources and the use of low-cost energy resources based on high

technologies. One of the key factors conditioning the objective necessity of using green technologies is, first and foremost, the issue of limited resources, which is one of the fundamental economic challenges. The use of limited resources ultimately leads to the high cost of resources and the high production costs of manufactured goods. The application of green technologies serves, above all, to produce more competitive products economically. In this regard, the application of resource-saving technologies and the use of technologies related to the recycling of resources are crucial. Moreover, the diversity of resources aimed at recycling increases the attractiveness of this process.

As is known, resources are divided into renewable and non-renewable energy sources. Therefore, the resources that have been consumed should be differentiated not only based on their consumption but also in terms of their resource potential. In this context, one of the most significant factors that makes the use of green technologies an objective necessity is the elimination of the harmful effects of anthropogenic emissions on the natural environment. The use of low-waste production technologies not only enhances the efficiency of energy equipment but also reduces the consumption of various material resources as well as the level of harmful emissions. The fundamental basis of green technologies is natural resources. In this regard, green technologies include wind energy, solar energy, hydro energy, geothermal energy sources, as well as biofuel production technologies and energy efficiency technologies.

As productive forces and production relations develop within society, and with the deepening of the globalization process, the anthropogenic impacts on nature are intensifying. Among the most significant problems humanity faces today are environmental pollution, the depletion and poor restoration of natural resources, and issues like hunger. The rapid and efficient solution of these problems will directly depend on the application of green technologies and the formation of a green economy. One of the characteristic features of green technologies is the application of environmentally clean production processes with low carbon emissions. All of these elements play an important role in various sectors of the economy, including households, industry, construction, transportation, and agriculture.

Figure 2
The trends for three key areas: the percentage of energy from renewable sources, the sales percentage of electric vehicles, and the increase in green building projects
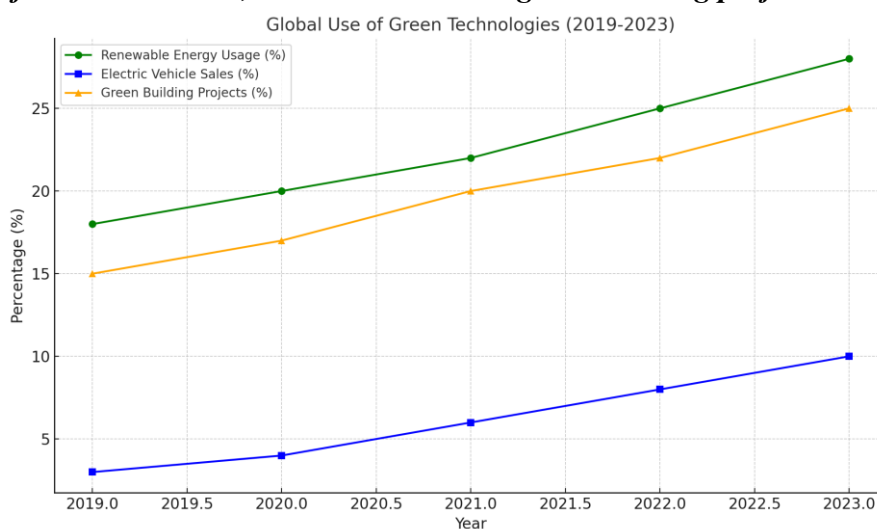
Source: IEA website.

Thus, focusing on the application of green technologies from a single perspective, such as reducing carbon emissions through the use of solar, water, and wind energy, would not, in our view, provide a comprehensive understanding. The application of green technologies should be approached in a more complex, multifaceted manner. Green technologies are aimed at reducing environmental pollutants, producing ecologically clean products, and applying less harmful production processes. Green technologies also include issues such as waste recycling, air and water pollution, soil restoration, the reduction of harmful emissions into the atmosphere, and the production of alternative energy sources, among other factors. (Muradov & Hajiyeva, 2024) The use of traditional technologies, or more specifically, non-renewable energy resources, primarily leads to an increase in the energy consumption of the produced goods. It is no coincidence that, particularly in post-Soviet and post-socialist countries, the cost of goods produced is higher compared to their counterparts produced in developed countries, primarily due to the higher energy consumption. All of this results in a decrease in the competitiveness of the produced goods. From this perspective, the application of green technologies has its own unique advantages, which can be classified as follows:

- Recycling of waste generated during the production process and ensuring its use;
- Reduction of energy consumption and the decrease in the energy cost of production;
- The use of green technologies leads to a reduction in carbon emissions into the environment, which ultimately prevents air and environmental pollution;
- The use of clean water resources and the implementation of water recycling;
- Stimulating the offer of competitive commodities in the global market;
- Creating favorable conditions for stimulating economic development.

As for the first advantage of using green technologies, it should be noted that recycling waste ultimately leads to the offering of cheaper products in the market. This is one of the reasons why China now has the capacity to produce sufficiently competitive products for the global market. In China, the use of waste materials has significantly reduced the share of raw material costs in the structure of production costs. It is no coincidence that several companies and firms that export products to the global market now prioritize environmentally friendly alternatives. In this regard, products are being made from recycled paper, plastic mass, fabrics, glass, organic materials, metals, and even asphalt scraps. Overall, modern global economics increasingly favors the production of goods based on recycling, which is particularly important in reducing the production cost of goods. The importance of the recycling process is primarily significant in terms of reducing the amount of waste and the decreased use of raw materials. The recycling process, after the utilization stage, opens up vast opportunities for producing more environmentally friendly products. (Humbatova et al., 2024)

Figure 3
The renewable energy share in total energy production for the top 10 developed and developing countries over the past 5 years (2019-2023).
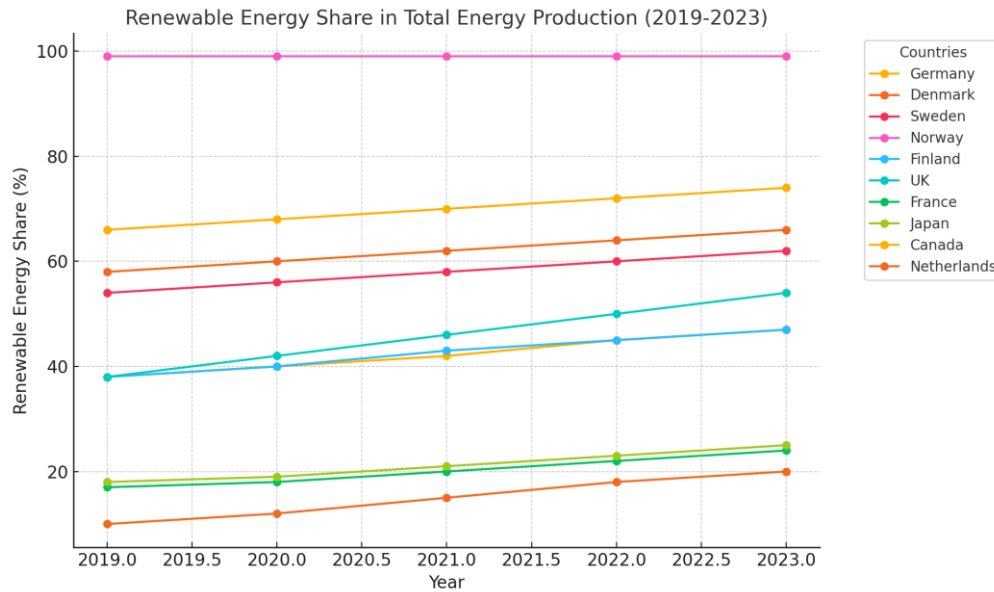
Source: IRENA and World Bank

It can be said that not only in developed countries but also in the markets of developing countries, products made from recycled materials are increasingly preferred. For instance, in stores, one can already see bags made from recycled plastic, packaging materials made from cardboard or paper, which, in addition to being environmentally friendly, also incur lower production costs. In other words, their production costs are lower, making these products more competitive in the market (Pearce, Markandya, & Barbier, 1989).

The second factor driving the superiority of green technologies, as mentioned above, is the reduction of energy consumption through their application. This, in turn, contributes to the decrease in the use of non-renewable energy resources, including hydrocarbons. The excessive consumption of limited resources has become one of the most pressing issues of the modern era. This process also creates favorable conditions for the reduction of harmful carbon emissions into the atmosphere (Costanza, 1991). It is also important to note that non-renewable energy resources are primarily used in sectors such as industry, mining, transportation, and households. The use of non-renewable energy sources results in increased carbon emissions, which, in turn, leads to environmental pollution. Particularly in urban areas, the intensive use of transportation vehicles accelerates the consumption of non-renewable energy resources, thereby generating significant carbon emissions. As noted earlier, one of the key advantages of green technology is its contribution to water purification and recycling.

In addition to carbon emissions, water pollution and the scarcity of water resources have become critical global concerns. For instance, one in every nine people on Earth lacks access to clean drinking water near their living areas. Consequently, many developed firms worldwide are prioritizing water recycling and reuse. After the initial use of water, purification and recycling processes are carried out, allowing water to be repurposed for non-potable uses such as irrigation, cleaning sanitation systems, washing vehicles, firefighting, and meeting the water demands of other economic sectors (Brodach, 2022).

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Another advantage of green technology is its role in enhancing the competitiveness of products. The use of traditional resources typically increases the production cost of goods, whereas recycling waste leads to the creation of more competitively priced products, making them more accessible to consumers. Green technologies contribute to reducing production costs, thereby fostering more affordable products for consumers (Piskulova, 2013). The final advantage discussed is the stimulation of economic development. The use of green technologies plays a crucial role in modernizing economies and applying advanced technologies. In particular, the recycling of waste leads to the production of various products that are safe for humans and can, in some cases, become branded goods. The application of green technologies in developing countries could create favorable conditions for their rapid development, and in this regard, China's experience could be especially beneficial.

3. CONCLUSIONS

The experiences of developed countries show that the application of green technologies, as a crucial component of the green economy, is widespread, particularly in Scandinavian and Northern European countries. For example, Iceland is a global leader in green energy production per capita, accounting for 80%. In Sweden, a significant portion of investments is directed toward the application of green technologies. This includes investments in ecologically clean transportation and renewable energy sources like solar and wind power. Denmark has implemented measures to phase out non-renewable energy sources almost entirely by 2050. In 2014, Denmark achieved a near-world record by sourcing nearly 40% of its total energy from green energy (Vernadsky, 2004).

As green technologies enhance the competitiveness of the products they are used to produce, member countries of organizations like the OECD pay increasing attention to boosting their budgets for scientific research in both energy and environmental protection. In these countries, state expenditure on green energy accounts for approximately 5%, and in European Union member states, this figure exceeds 7%. The highest proportion is found in New Zealand (14%) and Japan and Korea (12-13% in 2012). In contrast, countries like the U.S., Russia, Switzerland, and Israel allocate less than 2% of their state budget to the implementation of environmental technologies. Additionally, the U.S. spends slightly more than Japan on green technologies, with $4.2 billion allocated to environmental protection, compared to Japan's $3.7 billion (United Nations, 2012).

Developing countries are also increasing their focus on environmental protection through green ecological technologies. In China and India, for instance, state expenditures on these technologies are on the rise. China currently has over 1,600 government-owned incubators and scientific parks, most of which are involved in green technology projects. The country has become a global leader in six key sectors, including wind energy, biofuels, and clean coal, with the most significant patents in these areas (Piskulova, 2021).

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MARKETING PROBLEMS IN AGRICULTURE: ESPECIALLY IN THE FIELD OF GRAPE FARMING

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*Abstract: **Purpose**. The main purpose of the research study is to compare viticulture, one of the leading branches of Azerbaijani agriculture, in the world market and to develop this field by eliminating the marketing problems that arise during the analysis. **Need for the study.** The concept of marketing in agriculture includes all the activities in the process of preparation, standardization, storage, delivery to the market and finally delivery of the agricultural product, starting from the quantity and quality of the product to be produced by the producer. Recent times, the growing demand for food due to population growth has led to an increase in the demand for agricultural products. What needs to be done at this point is that agricultural producers can influence market demand with proper marketing efforts. Because the awareness of consumption of natural agricultural products affects the choice of products and purchasing behavior of consumers, and the reason for this is the presence of chemical substitutes for agricultural products in many countries. **Methodology.** The data required for the article were collected by survey method. Then, the statistical relationships of the data collected by the survey method were investigated. **Findings.** As a result, important problems of marketing of agricultural products were discovered in a number of regions of Azerbaijan. **Practical Implications.** Advertising factors were seen as the main negative effect during the research. It was recommended that work be done in this direction.*

Keywords: agriculture marketing; farming; development; agricultural economy; environmentally sensitive

INTRODUCTION

It is obvious that agricultural marketing refers to a system that includes processes such as purchase, sale and distribution of agricultural products and so on. It includes activities such as identifying consumer needs, promoting products, determining prices, advertising products, transporting, storing and distributing goods. Agricultural marketing is an important part of the agricultural industry for most countries in the world and plays an important role in the economy of many countries. Therefore, marketing and agriculture are closely related, and marketing plays an important role in the success and profitability of the agricultural industry. First of all, it can be noted that marketing is an important and integral part of market-oriented production, which realizes the production of agricultural products that meet the needs of customers. That is, by understanding customer demand, farmers can produce products that are more likely to sell at a fair price. Marketing, on the other hand, helps farmers differentiate their products from competitors in the marketplace by emphasizing quality, sustainability, or other unique features.

Thanks to this, farmers will stand out in a crowded market and offer products at a higher price. Effective marketing can help farmers introduce their products to new markets, both domestically and internationally. At the same time, marketing can help farmers improve their distribution channels, making it easier to market their products and increase sales, which means working with wholesalers, retailers and other intermediaries to ensure that their products reach customers in a timely and efficient manner.

It is also important to know the problems in this area after marking the importance of marketing in agriculture. If we look at the agricultural marketing of countries around the world, one of the most important problems is the price variability. The reason for this change is the issue of supply and demand, due to changes in weather conditions and other factors. Economic and environmental variating such as economic and environmental variations can effectively implement and manage production and marketing strategies. Another problem is little or no market information. That is, farmers cannot have modern market information. However, this information helps to produce, and decide where to be sold products. Problems in quality and standardization are also reflected in agriculture. Thus, in many cases, agricultural products are sold based on the quality and standards owned by small farmers. These standards (equipment, training and infrastructure) emerge large problems when small farmers do not respond. One of the main problems of agricultural marketing is the presence of market competition. Because farmers and agribusinesses enter the market, the competition in agriculture is growing and it can make them difficult to sell their products at a fair price. Consumers require a continuous growing product and weaken the production of organic and other sustainable agricultural products that can be difficult for manufacturing and marketers.

In many developed countries, industrial agriculture, characterized by large farms and high-yield production systems, dominates, and this process is gradually spreading to developing countries. GM crops, which are widely accepted in the United States and many other countries, remain a controversial issue in some countries due to their negative effects on the environment (Masters and Nelson 1995). A number of world researchers have mentioned the high post-harvest losses in agricultural fields in their countries, as well as in countries around the world, and have attributed these problems to farmers' lack of market information and weak marketing infrastructure (Jemal and Genet 2019). While discussing marketing challenges, lack of market information and poor road networks have led to significant losses of agricultural produce (Njaya 2014). Miljkovic (2015) says that most countries' food security efforts are based on the availability of supplies. Households in agricultural areas invest more in agriculture than in areas with less agricultural potential (Daidone et al. 2019). Dani Rodrik (2011) professor of economics at Princeton University, has conducted valuable research on emerging and existing problems in agricultural marketing worldwide. In his studies, he emphasizes that the development of the field as a solution to the problem in the field of agriculture will be provided by the joint activity of the public and private sectors. Amartya Sen (1999), an Indian economist and Nobel Prize laureate, draws attention to the problems of valuation and product standards in agricultural marketing in his research. In its study, the importance of applying a fair and transparent product standards and evaluation system is brought to the fore.

While investigating this area, it turned out that the views on agricultural marketing vary depending on the individual's field and experience. For example, according to scientists,

marketing is a critical component of the agricultural industry. Emphasizing the importance of use of information and scientific research, it is important to inform market trends and marketing decisions such as clear consumer choices. They also note that the role of marketing in promoting continuous agricultural practices such as waste reduction, increase efficiency and minimizing the environmental impact. According to scientists, agricultural marketing causes environmental degradation such as deforestation, soil erosion and water pollution. To solve these types of problems, marketing should prioritize practices that minimize these effects. They say that agricultural products must be safe for human consumption and contain no harmful contaminants, pesticides or antibiotic residues. Economists view agricultural marketing primarily through the lens of supply and demand. In other words, they say that efficient markets are essential, where information flows freely between buyers and sellers and where prices reflect the true value of agricultural products. On the other hand, they note that marketing has the potential to create market distortions and exacerbate income inequality for smallholder farmers. In addition, economists emphasize the importance of government policies and regulations to ensure that markets are fair and competitive. Marketers emphasize the importance of identifying target markets, developing effective advertising and promotion strategies, and building strong relationships with customers. That is, they see agricultural marketing as an important tool for farmers and agribusinesses to promote their products and increase brand awareness. According to marketers, digital platforms are the biggest chance for farmers in the era of digitization.

Introduction to agricultural marketing and agricultural economy

Any economic activity aimed at the production of plant and animal products or making these products more valuable is included in the definition of agriculture, and according to this definition, forestry and fishing is also included in the scope of agriculture. In other words, agriculture is the process of producing plant and animal products, improving their quality and effectiveness, protecting these products under appropriate conditions, developing them and putting them on sale. Agriculture has an important place in the economy. In recent years, as in all fields, marketing problems have emerged in the field of agriculture, and this has made the science of Agricultural Marketing more important than other disciplines included in its scope (Topcu 2004). Economic aspects of micro and macro economy are analyzed in agricultural economics. Issues aimed at improving agriculture in the country, regulating agricultural products in accordance with public interests, raising the welfare level of farmers, and protecting producers and consumers from excessive price fluctuations are discussed in the Macro evaluation. The topics covered at the micro level are mostly business management, business planning, production economics, accounting, investment, finance, marketing and cooperatives. However, it should be known that the topics discussed at the macro and micro level are closely related to each other. Given the recent developments and increased competitive conditions, as in all fields, marketing challenges have emerged in the field of agriculture, which has made the science of Agricultural Marketing more important than any other subject under its purview. Therefore, this area is one of the main areas that require recent research. Agricultural marketing is a branch of science that studies the events from the producer to the final consumer just as marketing studies the events on the way of commodities from the producer to the final consumer.

MARKETING PROBLEMS IN AGRICULTURE: ESPECIALLY IN THE FIELD OF GRAPE FARMING

Agricultural marketing is an important field of activity that affects the economic development of every country (Government of Khyber Pakhtunkhwa 2012; Branson and Dauglass 1983). These effects can be seen in the table below:

Table 1. Factors affecting the country's economy

To reduce costs by increasing economic and technical efficiency;
To increase the purchasing power of producers in the modern market economy;
Increasing competition in the marketing system and reducing marketing margins;
Improve management skills in marketing organizations;
Increase the supply of high-quality products;
End waste reduction and inefficient use of resources;
Providing sufficient information about supply and demand and other market issues, changes in consumer preferences and general market conditions;
Build understanding and communication between manufacturers, marketing organizations and consumers.

The most important event in the sale of goods in the market is the formation of the price, and although the price in the market is thought to reflect the supply and demand, on the other hand, it may be necessary to support products that are important for the country's economy. In this case, agricultural marketing examines how prices are formed, checks whether the method of price formation is appropriate, and determines how and at what level products should be valued. Agricultural marketing has a significant impact on producer and consumer incomes, and therefore on the national economy, by delivering the product to the consumer without any loss, processing it, presenting it to the market in a good form, within the appropriate profit rates. In the period of closed economy, the first goal of the farmer in agricultural activity was to directly meet the needs of himself and his family. This type of situation is called auto consumption in economics. With the development of the barter economy, producers increasingly used agricultural products to buy other goods and services they needed (Reardon and Timmer 2005). Over time, farmers began to produce not only for themselves, but also for consumers. Consumers want the products they need at the most appropriate time, at the most affordable price, in the most appropriate quantity and in the most appropriate quality. It is clear that agricultural products go through a certain channel from the producer to the consumer and are subjected to some processes that increase their utility and economic value. Ways of bringing products to the market and the services provided for them are classified in different ways by different scientists.

Purpose of the Research: Hypotheses Testing

The aim of the research is analyzing whether the variables selected have positive impacts on marketing success/performance or not. Below, the hypotheses used in the research are listed:

✓ "The marketing success of grape is positively correlated with the effectiveness of the distribution system".
✓ "Price favorably influences grape marketing performance."
✓ "Product features favorably affect grape marketing performance."
✓ "Promotional factors favorably affect grape marketing performance."

Research Approach

The deductive technique was applied in this study. The adoption of the deductive method was motivated by the statement made by Saunders et al (2013) that using the deductive approach, research hypotheses are formed and research strategies are advanced with the purpose of evaluating them. Arbitrary sampling processes, empirical testing and controlled variables such as independent and dependent variables are all included in this technique (Scotland, 2013).

Sample Size

The sample size was calculated using Yamane's (1968) calculation for a population of 220 farmers.

$$n = \frac{N}{1+N \cdot (e)^2}), \text{ where}$$

n - estimated sample size
e - level of precision (e = 0.05 for the research)
N - population size

After the calculation estimated sample size was obtained to be equal 142. According to Kotler (2001), excellent reliability may be achieved with a sample size of 1.5% drawn from the population. According to Sekaran (1992), a sample size of larger than 25 but fewer than 450 is suitable for most investigations. According to the data, 142 is greater than 25 but less than 450, as indicated by Sekaran (1992).

Data collection

Data are opinions, facts and statistics that have been gathered and documented for future study or reference (Saunders et al. 2013). For this research particularly, data was collected by questionnaire. Two types of the data used in the research: primary data, and secondary data. Primary data were obtained with the help of the survey conducted, and from literature review the secondary data results were used to confirm whether the obtained results are similar or not.

Questionnaires

Snell-Hornby (2006) defines this term as a series of questions that should be answered by a certain number of individuals in order to acquire the appropriate data. A closed-ended questionnaire was created for the current research in order to obtain data from the study's intended respondents. The benefit of utilizing this approach is that it is simple to collect a big amount of information from the responder in a short period of time.

Table 2. Summary of Measurement of Parameters

Parameters	Items	Scales
Place/Distribution	• We possess distribution systems that are efficient and effective. • We have secure and economical transportation systems.	STRATADAPT

	• Our product has a sufficient channel for distribution. • To store the harvested grapes, we have an effective storage system. • We have an extensive clientele for our goods.	
Pricing	• The grapes have resulted in high prices. • The price of grapes is high due to the increased demand from consumers • We are knowledgeable on how to negotiate for the price of our grapes. • The cost of grapes is as anticipated. • We are extremely pleased with the present grape pricing.	STRATADAPT
Product	• We are paid more for our product. • We pay particular attention to the grape's quality. • We make grapes in the color the consumers prefer. • We make grapes that meet the clients' taste requirements. • We produce grapes in the size and weight that our consumers like. • We have the resources, expertise, and understanding necessary to create superior grapes.	STRATADAPT
Promotion-related factors	• We put a lot of effort into packing our grape fruits. • We have been promoting our grape fruits through public relations. • To boost grape fruit sales, we deploy sales promotion. • For personal sales of our grape fruits, we offer a skilled sales team. • We are promoting our goods through advertising approach.	STRATADAPT
Marketing performance	• Grape sales are quite profitable for us. • Grape have a significant profit margin where we operate. • We are happy with the payment.	FOS (financial output scale)

Source: Compiled by the author

2.6 Data Analysis. Descriptive statistics and multiple regression analysis were applied in the current research to assess the data collected. The descriptive statistics including percentages, frequencies, and figures were utilized to analyze the responses' data. The correlation between the dependent variable (marketing profitability of grapes) and the independent factors (pricing, distribution system, product features and promotion related elements) were examined using multiple linear regression. Multiple regression equation therefore has the following form:

$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4$, where:
X_i – independent variable i;
a – constant;
b_i – regression coefficient of the ith independent variable.

Assumptions Underling Multiple Regression Analysis
Shayo (2018) argued that in order to prevent drawing the wrong conclusions, assumptions must be tested. Consequently, the following presumptions were examined in this study; Linearity was tested using multidimensional scatter plots for each of the variables. Additionally, this study used kurtosis and skewness to make sure the data it had obtained was normal. Multicollinearity and homoscedasticity were also examined.

Validity
According to Saunders et al. (2013), valid data collecting methods evaluate exactly what they were designed to measure. The methodology was piloted on a small group of chosen respondents in the Azerbaijan to determine the validity of this study. It was observed that the few chosen responders, however, had no trouble answering the questionnaire.

Reliability
According to Saunders et al. (2013), reliability refers to how well data gathering procedures provide consistent results. However, the reliability of this research was examined using Cronbach's Alpha method. It has been emphasized that a study with an internal consistency coefficient of 0.7 or higher is more reliable, and vice versa (Santos 2000).

Ethical Issues
Research ethics is concerned with how we define and justify our research subject, plan our study and secure access to gathering information, store and process our data, analyze our data, and properly and morally communicate our findings (Saunders et al. 2013). The researcher in this study made sure that the respondents' privacy, rights and welfare were protected throughout the process of data collecting, presentation, analysis, and reporting. The researcher also gave harmlessness, free consents, secrecy, and anonymity some thought.

Results overview
Based on the respondents' gender, educational background, and years of grape fruit farming and marketing experience, the results are presented. Additionally, it gives research results based on the study's particular goals on variables influencing grape marketing performance.

Results of Reliability Statistics

This study used Cronbach Alpha to gauge statistical reliability. The study's findings showed that the Cronbach Alpha scores fall between 0.737 and 0.793. This suggests that the research's data were more internally consistent. The claim made by Santos (2000) that research with a coefficient of 0.7 or higher expected to exhibit a strong internal consistency of results, and vice versa, is therefore validated by the findings of this study. Table 3 displays the reliability statistics findings.

Table 3. Reliability Statistics

	Cronbach's Alpha	Number of Items
Price	0.760	6
Promotion aspects	0.763	5
Product attributes	0.737	5
Distribution system	0.775	5
Price	0.793	3
Promotion aspects	0.760	6

Source*:* Public information.

Background Information of the Respondents

According to their gender, educational background, and duration of grape farming and marketing experience, the responses are profiled in this section.

Gender of the Respondents

This study found that 14 (or 10%) of the total respondents were female, with 128 (90%) of the respondents being men. This suggests that men are responsible for grape farming and commercialization in Azerbaijan. The findings of the respondents' gender are displayed in Table 4.

Table 4. Respondents' Gender Data

Female	Frequency	Percentage
Female	14	10
Male	128	90
Sum	142	100

Academic Qualification of the Respondent

The results of this survey show that over half of the respondents—66 (47%)—had received their elementary education certificates, 39 (28%) had completed their secondary education, and 6 (4%) had received their certificates. Therefore, it was shown that 8 (6%) of the participants had a diploma, 20 (14%) of all respondents had earned a bachelor's degree, and a tiny portion of all respondents had earned a master's degree. These results suggest that the majority of individuals with just an elementary education are responsible for a large portion of the grape production and commercialization in Azerbaijan. In Table 5, the results of the respondents' academic background are shown.

Table 5. Respondents' Educational Background

Education	Frequency	Percentage
Primary	66	47
Secondary	39	27
Certificate	6	4
Diploma	8	6
Bachelor	20	14
Master	3	2
Sum	142	100

Experience in Grape Marketing and Cultivation

According to the research's findings, 109 (77%) of the total respondents had between 4 and 10 years of experience in grape cultivation and marketing, compared to 19 (13%) of the total respondents who had experience between 0 and 4 years. Accordingly, 13 (or 9.2%) of the total respondents said they had between 10 and 15 years of experience in grape marketing and cultivation, while just 1 said he had more than 15 years.

These findings show that many participants had substantial expertise in the manufacturing and marketing of grapes and were thus aware of the variables affecting the marketing success of the fruit. The results of the participants' years of marketing and agricultural experience for grape fruits are shown in Table 6.

Table 6. Respondents' Experience

Years of Experience	Frequency	Percentage
0-4	19	13.38
4-10	109	76.76
10-15	13	9.15
15+	1	0.71
Sum	142	100

Correlation Matrix and Factor Analysis

Here, 4 predictor variables -Distribution systems (DS) Price (PR) Product characteristics (PC), Promotion related features (PF), and one dependent variable – Marketing

Performance (MP) were used in order to build a regression model. Before doing the regression analysis, factor analysis should be performed, and Correlation Matrix should be constructed:

Figure 1. Correlation Matrix
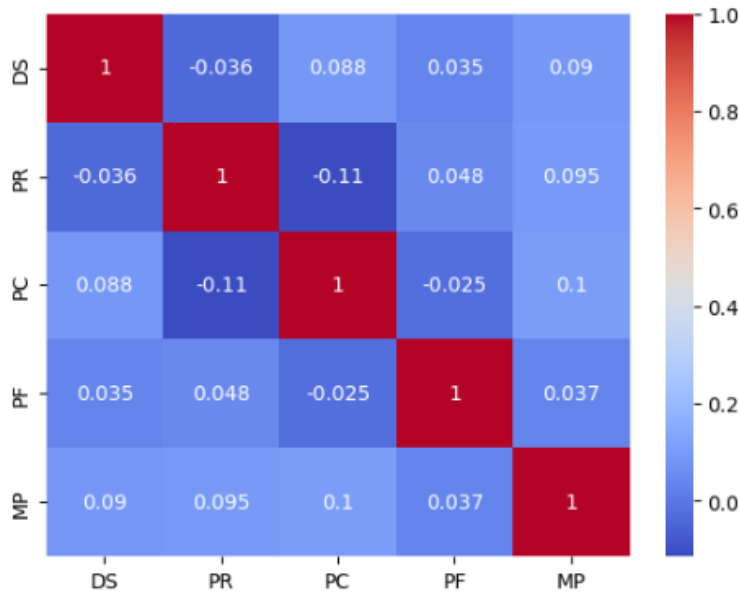
Here, lower coefficients indicate that neither of variable has a dependency with the other ones, and factor analysis conducted, and eigenvalues for these variables will give this the array of [2.1, 4.6, 7.9, 1.6, 3.3] respectively, as a consequence as the eigenvalue values are greater than 1, all variables should be recommended to kept for further analysis.

Model Coefficients and P- Values

Price was discovered to have an impact on the market performance of grapes with a positive coefficient and statistical significance at the 5% level ($\beta = 0.371$, $P = 0.031$). This suggests that a rise in price per unit is correlated with an increase in grape market performance of 0.032 times. Price thus had a significant role in how well this fruit did on the market. Additionally, according to the research's findings, product characteristics had a positive coefficient and were statistically significant at the 5% level of significance in affecting the market performance of grapes ($\beta = 0.292$, $P = 0.0028$). This translates to a 0.292 times improvement in market performance for grapes for every unit increase in product characteristics. This indicates that a key factor affecting the market performance of grape fruits was their product characteristics. Additionally, it was shown that promotion related features did not significantly impact the market performance of grapes ($\beta = -0.098$, $P = 0.411$) and had negative coefficients. This suggests that increasing promotional methods by more units won't result in better grape market performance. Furthermore, it was shown that the distribution systems exhibited a positive coefficient and was significant in statistical terms ($\beta = 0.430$, $P = 0.0068$) to affect the performance of the grape market. This suggests that a distribution systems unit increase is correlated with 0.429 times rise in grape market performance. As a result, the grape market performance included the distribution system as a key factor. Table 7 summarizes the findings of the model confidences and P-Values for each variable included in the regression model on the variables impacting marketing performance.

Table 7. Coefficients and P –Values

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Error (std)	β		
Coefficient	-0.136	0.482		-0.282	0.001
Distribution systems	0.430	0.157	0.227	2.746	0.007
Price	0.371	0.171	0.181	2.171	0.031
Product characteristics	0.292	0.096	0.252	3.050	0.028
Promotion related features	-0.098	0.119	-0.072	-0.828	0.411

In accordance with the research's outcomes, the correlation formula is as follows:
Marketing performance = - 0.136 (Coefficient) + 0.430 (Distribution systems) + 0.371 (Price) + 0. 292 (Product characteristics)

Promotional factors, nevertheless, are not included in the formula since they were determined to be negligible; as a result, they make no impact to the research's model.

Testing of Regression Assumptions

Testing for regression assumptions has been advised as being crucial to prevent drawing incorrect inferences (Shayo 2018). The assumptions of normality, multicollinearity, homoscedasticity and linearity were examined in this research.

Multicollinearity Test

Multicollinearity, as defined by Pallant (2011), happens when variables that are independent have a significant correlation. Nevertheless, in this study, tolerance and the variance inflation factor (VIF) were used to test for multicollinearity. According to Shiu et al. (2006a; 2006b) the tolerance values for multicollinearity ought to be in excess of 0.1 and the values for the VIF ought to be lower than 5. Additionally, the findings of the current research's multicollinearity test indicate that tolerance values range from 0.872 to 0.942, whereas the values for VIF range from 1.062 to 1.146. This result suggests that the multicollinearity condition was satisfied by the research's data. The outcomes of the test for multicollinearity are shown in Table 8.

Table 8. Multicollinearity Test

Model	Collinearity Test	
	VIF	Tolerance
Coefficient	-	-
Price	0.926	1.082
Promotion related factors	0.872	1.146
Distribution system	0.935	1.070
Product attributes	0.942	1.062

Normality Test

Skewness and kurtosis have been used in this investigation to evaluate the assumption of normalcy. Hair et al. (2014) and Osborne and Waters (2019) emphasized that the skewness and kurtosis values for the parameters must be between +2.5 and -2.5 in order to achieve the normality condition. Nevertheless, the research's results showed that skewness levels fall between -0.002 and 0.734. As a result, the range of kurtosis values is between -0.145 and 1.067. These results suggest that the research's normality criterion was met. The test's outcomes are shown in Table 9.

Table 9. Skewness and Kurtosis outcomes

	Skewness		Kurtosis	
	Stat.	**Error (Std)**	**Stat.**	**Error (Std)**
Price	0.300	0.202	-0.145	0.404
Promotion related factors	0.734	0.202	-0.410	0.404
Distribution system	0.721	0.202	1.067	0.404
Product attributes	-0.002	0.202	-0.165	0.404

Linearity Test

To determine if the connection between the variables is linear, a linearity test was carried out. By employing a scatterplot of the results, the linearity assumption in this study was verified. According to Pallant (2011), the requirement of linearity has to be satisfied for the scatterplot of scores to follow a straight line. According to the research's outcomes, title circles move along straight lines. This indicates it has a linear relationship between the variables in this research. The outcomes of a linearity test are shown in Figure 2.

Figure 2. Linearity Test
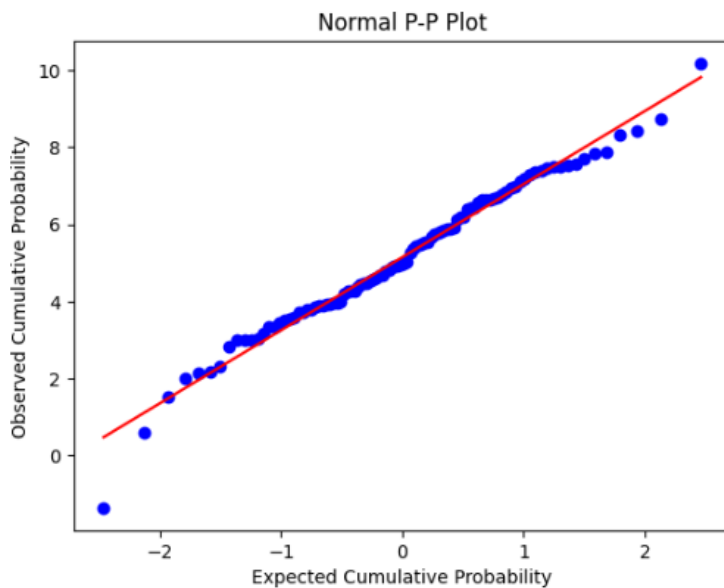
The Ramsey test coefficients are also greater than 0.05 (0.86 -linear and 0.83-logarithmic). This concludes that the data can be approximated as linear.

Homoscedasticity Test (White test)

According to this presumption, there should be little variation in the scores for variable X across the board for all values of variable Y. If residuals do not spread equally throughout the line, heteroscedasticity is shown (Hair et al. 2014; Osborne and Waters 2019). Additionally, the assumption of homoscedasticity was verified using a visual study of the plot of the standardized regression residuals. According to the research's outcomes, residual values are equally distributed on the X-axis below and above zero and on the Y-axis scatterplot to the left and right of zero. Thus, the hypothesis of homoscedasticity was satisfied by the investigation. The White test is a statistical significance test used to identify heteroscedasticity in regression analysis. Heteroscedasticity is a circumstance where the variance of the errors in the regression model cannot stay constant throughout the whole range of values for the independent variable. This violates homoscedasticity, a fundamental tenet of linear regression models. The White test is used to determine whether heteroscedasticity exists in the data being investigated by correlating the squared residuals from the regression model with the independent variables. If the test's p-value is less than the chosen significance limit, which is frequently 0.05, there may be evidence of data variability. In our research the p value is 0.24, and the results passes White test. The homoscedasticity test results are shown in Figure 3.

Figure 3. Homoscedasticity Test
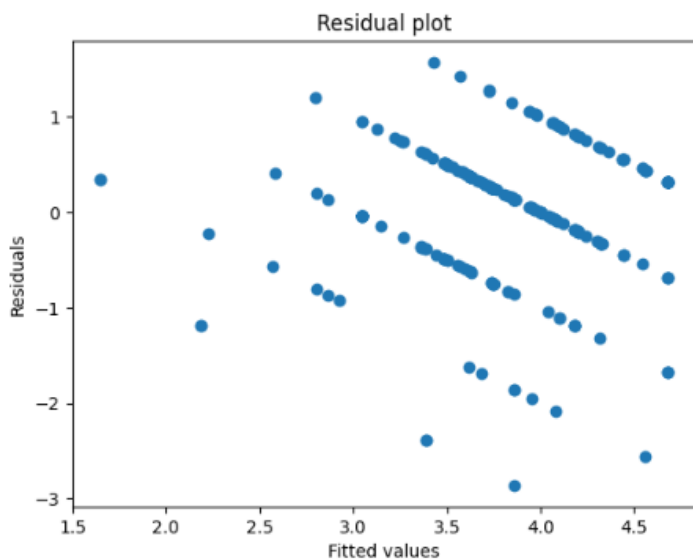
Results of the Grape Marketing Performance Factors study

The findings of the elements influencing the marketing effectiveness of grapes are presented in this part: ANOVA testing, P-values and model coefficients were applied.

Findings of ANOVA test

The degree to which the data were gathered fit the model of regression was evaluated using the ANOVA test. F (Regression df (4), Residual df (137) = 5.06, P = 0.001 is what the model reveals. Given that the significance value (P) is less than 0.05, the regression model is a significant predictor of the variables influencing grape marketing success. Table 10 provides a summary of the ANOVA test findings.

Table 10. ANOVA test outcomes

Model	SS – sum of squares	Df	Mean square	F	Sig.
Regression	4.6	4.0	1.13	5.06	0.001
Residuals	30.8	137.0	0.23		
Sum	**35.4**	141.0			

Research Hypotheses Testing

The results of testing hypotheses are presented in this section. Using multiple regression analysis, the proposed relationships were evaluated against various correlation values.

According to this study, there is a strong correlation between grape marketing success and the efficiency of the distribution system. Consequently, it was proposed that: *"The marketing success of grape is positively correlated with the effectiveness of the distribution system".*

Nevertheless, the results showed that the distribution system's effectiveness had correlation coefficient values of 0.430 and P values of 0.0068. It follows that that the effectiveness of the distribution systems is statistically important at the 5% level of significance and is thus more likely to have an impact on the marketing success of grapes, supporting the study's initial premise that: *"The marketing success of grape is positively correlated with the effectiveness of the distribution system".*

Additionally, this research revealed a favorable correlation between grape price and marketing success. The study nevertheless managed to discover a regression coefficient of 0.371 and a P value of 0.031. This suggests that price had a statistically important effect on the market performance of grapes at the 5% level of significance, validating the investigation's second hypothesis (H2) that: *"Price favorably influences grape marketing performance".*

Additionally, the study indicated a favorable correlation between grape product features and marketing performance. Outcomes of the regression showed a coefficient of 0.292 and a P value of 0.0031. This suggests that product features were statistically significant at the 5% level of significance and more likely to have an impact on the market performance of grape fruits, supporting the research's third hypothesis (H3). That: *"Product features favorably affect grape marketing performance."*

In addition, it was suggested in this study that there is a positive correlation between promotion-related factors and the marketing effectiveness of the fruit. Nevertheless, the outcomes of the regression showed a coefficient value of -0.098 and a P value of 0.411. This refutes the fourth hypothesis (H4) of the present investigation, which states that: *"Promotional factors favorably affect grape marketing performance."*

The overview of the testing of hypotheses is shown in Table 11.

Table 11. Hypotheses Testing

Hypotheses	β	T	Sinq	Result
H1	0.430	2.746	0.008	Accept
H2	0.371	2.171	0.033	Accept
H3	0.292	3.050	0.004	Accept
H4	-0.098	-0.828	0.411	Decline

DISCUSSION

The purpose of the research was to evaluate the variables influencing the marketing success of grapes in Azerbaijan. As a consequence, the discussion of the results of the research takes into account how they compare to and contrast with earlier findings on the topic.

The Connection Between the Grape Market Performance and the Distribution System. The present investigation aimed to determine if grape marketing performance was favorably influenced by the distribution system, subsequently was found that the distribution system was statistically significant and positively correlated with market performance of Azerbaijan grapes. The results of this study are consistent with those of Farooq et al. (2017), who found that road accessibility had an impact on Pakistani fruit producers' productivity.

The Connection Between Grape Marketing Success and Price. The purpose of this study was to investigate the connection between grape prices and marketing success. However, it was discovered that price had a significant and positive correlation with the market success of grapes. The results presented imply that a particular product's market success depends on the price of grape fruits. The results of this research seem to agree with those of MITM (2009) who found that pricing had a significant impact on Tanzanian farmers' productivity. On the other hand, according to (Anand and Negi 2016) pricing was not mentioned as a major variable impacting the fruit sector in India.

The Connection Between Grape Market Performance and Product Attributes. This study was designed to determine whether product characteristics may have a favorable effect on grape market performance. Nevertheless, it was discovered that product characteristics significantly affected the marketing success of grape fruits and had a strong positive correlation with it. The conclusions of this study are consistent with those of Nguni (2014) and MITM (2009) who found that bad harvests and product standards were the main problems affecting farmers in Tanzania. Classification and uniformity hampered the selling of agricultural goods in Timor Leste, according to Diaz and Negi (2006) on several occasions.

The Connection Between Market Performance and Grape Promotion. The primary finding of this research was that grape fruit marketing effectiveness is favorably influenced by promotion factors. The findings of the hypotheses test, however, showed that marketing had a negative connection and was not statistically important in affecting grape fruit market performance. The findings of this study conflict with those of Farooq et al. (2017) and Lasvai et al. (2019) who anticipated that marketing of fruits was highly impacted by promotion factors such packing, purchase locations, and marketing information.

CONCLUSIONS AND RECOMMENDATIONS

Using the research's findings as a foundation, this chapter presents a number of recommendations and conclusions.

Grape Market Performance and Distribution System. The current research aimed to investigate the connection between grape market success and distribution system. Distribution system was discovered to have a positive link and be statistically significant in influencing grape fruit market performance. As a result, it was determined that the distribution system is a significant factor affecting the market performance of grapes.

Grape Market Performance and Price. The current research investigates the connection between grape fruit pricing and marketing success. It was shown that pricing had a

substantial impact on the market success of grape fruits and was positively connected with it. The findings from this study implies that a certain item's market performance might benefit from a greater pricing for grape fruits. The results of this study are corroborated by MITM's (2009) results that the performance of Tanzanian farmers was significantly influenced by price. Therefore, it can be claimed that a fair price for grapes is crucial to the success of grape marketing in Azerbaijan.

Grape Market Performance and Product Attributes. This study looks at the connection between grape fruit market performance and product features. Nevertheless, the outcomes of the research showed that the characteristics of the product had a strong positive correlation and had an important influence on how well grapes were marketed. Thereby, it may be established that agriculturalists should continuously maintain and improve the characteristics of grapes, such as teste, color, weight, and size, since these features tend to show an enormous effect on how well it performs on the market.

Grape Market Performance and Promotion Aspects. The primary assumption made in this research was that grape fruit marketing effectiveness is favorably influenced by promotion factors. The findings of the hypothesis test showed that the influence of promotion on the market success of grapes had a negative connection and was not statistically important. Therefore, it can be coming to the conclusion that, in the context of Azerbaijan, the promotion factor is not an important consideration when evaluating the marketing effectiveness of grapes.

Recommendations

Price has been found to be a significant factor affecting the market success of grapes. Therefore, the research suggests that producers of grape fruits be paid well. The research's results also showed that grape marketing success was significantly influenced by product features. Farmers are advised to enhance and preserve product characteristics. In addition, since it plays a significant role in the grape market performance, the distribution system's enhancement needs to be put into consideration. Farmers are going to be able to keep, maintain, and represent their goods to the intended clients effectively and efficiently with an adequate distribution system.

Limitations and Subjects Deserving More Research

The focus of this investigation was grape products. Other fruits do exist, though, and they weren't included in this study. Future research should thus concentrate on additional fruit varieties in an effort to evaluate the factors affecting those fruits' market performance.

This study also concentrated on the elements influencing the success of fruit products on the market. Future research may therefore be conducted on other categories of agricultural goods, including cucumber and tomato.

The impact of promotional factors on the market performance of grapes was also shown to be minimal. As a result, additional research may examine its relevance in evaluating the performance of other fruits on the market.

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HOW IMPORTANT IS SUSTAINABILITY FOR VISITORS OF ROCK AND POP FESTIVALS? INSIGHTS FROM A BROAD AUDIENCE ANALYSIS IN GERMANY

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Abstract: The study examines the significance of sustainability among festival attendees (N = 3,503), revealing that a substantial majority of 90.4% do not consider it a primary factor in their festival experience. The analysis highlights demographic influences, indicating that factors such as age, gender, and educational background have minimal impact on the perceived importance of sustainability. The paper synthesizes these findings, concluding that sustainability is not a central aspect of the festival experience for most visitors. Why is this the case? The answer lies in a key aspect of the experience that guests seek at festivals: escapism. The study suggests that traditional approaches, such as strict regulations on non-sustainable practices, may be counterproductive. Instead, it advocates for the development of innovative nudging strategies that promote sustainable behaviors while preserving the escapist nature of festivals. By fostering a culture of engagement rather than prohibition, event organizers can enhance the integration of sustainability into the festival experience, ultimately encouraging more responsible participation among attendees.
Keywords: festivals, sustainability, escapism, nudging strategies

1. INTRODUCTION

According to a 2010 study, large music festivals leave a CO_2 footprint on a single weekend that is equivalent to that of a small town for the whole year. (Bottrill et al., 2010) Depending on the type of festival and its organization, the main factors responsible for this high environmental impact are transport (including logistics), food and high-emission energy production. (Aßmann, 2022) Festivals therefore have a special role to play when it comes to environmental sustainability within the event industry. However, the interplay between the individual protagonists influencing the sustainability of a festival is complex.

Legislation has already intervened in individual areas: One example is the so-called 'plastic ban', which has been in force throughout the EU since 2021 and prohibits single-use plastic products such as disposable cutlery, tableware and plastic drinking straws. (Aßmann, 2022). However, the main responsibility for sustainability lies in the hands of festival organizers and festival visitors. While the former—supported by associations, agencies and non-profit organizations—are already taking more and more measures, festival guests remain

an uncontrollable factor in this equation. Why is this the case? The answer lies in a key aspect of the experience that guests seek at festivals: escapism. (Kirchner, 2011; Taylor, 2016). The term refers to the perceived escape from reality—or to put it simply: an escape from everyday life. Escapism manifests as actions of avoidance tactics, unconscious or conscious, through which societal objectives and accepted norms are rejected. (Stangl, 2024) This phenomenon suggests that even people who are strongly sustainability-oriented in their everyday lives do not place any increased value on sustainability when attending a festival. The following explanations examine this hypothesis on the basis of a survey of festival visitors in Germany.

2. QUANTITATIVE SURVEY
2.1 Survey procedure

For this study, data was subjected to a secondary analysis. The data was collected in 2023 as part of a study on the determinants of *festival loyalty* based on a quantitative investigation of visitor satisfaction and loyalty and the derivation of recommendations for action for rock and pop festivals in Germany. (Michel, 2024; Bauer et al., in print) The survey was conducted using an online questionnaire. The data collection took place from January 2, 2023 to February 24, 2023. The quantitative data analysis was carried out using SPSS. (Michel, 2024). A total of 6,411 people took part in the survey for this study. Of these, 2,514 people (39.21%) dropped out of the survey, therefore their responses could not be included in the data analysis. Of the remaining 3,897 participants, 394 people (10.11%) answered "never" to the introductory question "How often have you been to music festivals of the pop or rock genre in Germany?". These 394 people therefore did not belong to the population described and defined above and were therefore not included in the data analysis. The evaluable sample size after adjustment therefore ultimately comprised N = 3503. (Michel, 2024). 35.5 % of respondents were male, 63.3 % female, 0.8 % identified as diverse and 0.4 % did not specify their gender. (Michel, 2024)

2.2 Survey instrument

The questionnaire, which was created for the original study, was in German only an consisted of a total of 58 items in a largely closed format. In order to answer the secondary analysis carried out here, item 5 ("Which aspects are particularly important to you at a festival?", 26 predefined aspects and one free field) and the demographic questions of items 6 to 9 (gender, age, relationship status and highest level of education) are of particular interest. (Michel, 2024)

In addition, items 19 (agreement with the statement "The festival site was clean [there was no garbage lying around on the site]"), 31 ("Public transport to the festival site was sufficient"), 47 ("Waste disposal on the festival site was well organized") and 48 ("At the festival, attention was visibly paid to sustainability [e.g. deposit system for cups, no single-use plastic]") were also considered. (Michel, 2024)

From question 12 onwards, the items of the questionnaire were to be rated on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). When designing the questionnaire, the items were formulated exclusively positively in terms of language and content (Porst, 2014, pp. 106-107). (Michel, 2024)

2.3 Method of secondary analysis of the survey

For this secondary analysis, only descriptive statistical methods were used to describe the data in terms of its frequency distributions and to gain a comprehensive understanding of the relevant characteristics examined. The methods used include, in particular, the calculation of mean values and the presentation of cross-tabulations. As this is a secondary analysis, inferential statistical methods were deliberately avoided. (Gisske, 2021)

3. RESULTS
3.1 Sustainability as an (un)important aspect

This analysis (item 5, see above) sheds light on the importance festival fans attach to the aspect of sustainability when attending a festival. It also examines whether demographic differences such as age, gender, relationship status and level of education have an influence on the relevance of sustainability to the participants

3.1.1 Results on sustainability and gender distribution

Only 9.6% of respondents stated that sustainability is important to them at a festival, while 90.4% did not consider this to be a priority. However, this does not necessarily mean that sustainability is completely irrelevant to the majority—nevertheless, the topic of sustainability was not important enough to mark it as one of the maximum six most important aspects of a festival in the survey.

The gender distribution shows that sustainability is considered important to 10.14% of women compared to 8.69% of men. Despite the slight difference between the genders, however, this result was not statistically significant. Respondents who indicated their gender as diverse and those who did not indicate their gender tended to find sustainability even less important, but these groups are so small overall that they are not meaningful here.

3.1.2 Differences between age groups

A comparison of the age groups shows that Generation Y (millennials) and Generation Z in particular rated the aspect of sustainability as less important (92.24% and 89.42% respectively). Surprisingly, this proportion is lowest among Baby Boomers, although 83.33% of them also stated that they considered sustainability to be less important. At 86.26%, Generation X occupies a middle position within the groups. Overall, it can be observed that younger generations such as Gen Z, contrary to common assumptions about their higher environmental awareness, do not consider sustainability to be significantly more important than older generations.

3.1.3 Marital status and the importance of sustainability

Marital status also has little influence on the prioritization of sustainability. 100% of widowed respondents, whose share of the total is extremely low (less than 1%), did not cite sustainability as an important factor. The relevance of this aspect is equally low for divorced people (94.47%; also less than 1% overall) and for participants in a relationship (91.45%). Married respondents (91.06%) and single respondents (89.3%) follow this trend, albeit to a lesser extent.

3.1.4 Educational background and importance of sustainability

An analysis of the respondents' level of education shows that the proportion of those who rate sustainability as important varies depending on their level of education, albeit only slightly. For example, 87.1% of participants with a bachelor's degree stated that sustainability was not particularly important to them, while this proportion was 95.45% for people with a doctorate and even 100% for people with a professorship. In contrast, the figures for the groups with secondary school and lower secondary school qualifications were 93.19% and 92.98% respectively, indicating that higher academic degrees do not necessarily contribute to greater environmental awareness.

3.1.5 Discussion

The results indicate that sustainability does not play a primary role for the majority of festival visitors. Interestingly, the data does not indicate a systematic increase in the importance of sustainability with younger generations or higher levels of education, which calls into question the assumption of a generally higher level of environmental awareness in these groups. These findings may suggest that a targeted nudging (Aßmann, 2022; Bär & Korrmann, 2020; Bär et al., 2022) is needed from event organizers to make sustainability a more attractive and central aspect of the festival experience. Initiatives that communicate more conscious sustainability measures and actively involve the commitment of visitors could be effective approaches here.

3.2 Other aspects of sustainability and their significance for visitors

In order to understand the priorities and preferences of festival visitors in more detail, they were asked in the survey (also item 5, see above) to rate various aspects of the festival experience according to their importance. The results show clear differences in the weighting of the factors of cleanliness and waste or transportation options. This provides information about which features are important for the positive experience of a festival and how important these aspects of sustainability are for visitors.

3.2.1 Cleanliness of the premises

The aspect of "cleanliness of the site", which includes the presence of garbage cans and the absence of litter lying around, was named as an important factor by 27.4% of respondents. This indicates that a certain group of festival-goers certainly value a well-kept and tidy environment, which is perceived as a pleasant part of the overall experience. However, 72.6% of respondents rated the cleanliness of the site as less important, suggesting that this factor is not a priority for the majority of participants.

3.2.2 Transportation to the festival site

The vast majority of respondents (94.2%) rated transportation to the festival site as unimportant and did not select it as a relevant factor. Only 5.8% of respondents stated that this aspect was important to them. This low priority could indicate that most visitors either do not see any problems with their journey as such—or they prefer alternative means of transportation. It is also possible that the accessibility aspect takes a back seat if the festival content and the on-site experience are the main motivation for attending the festival.

3.2.3 Importance of cleanliness and transportation options

The evaluation shows that the preferences of festival visitors vary greatly with regard to the two sustainability factors of site cleanliness and transportation options. Overall, cleanliness and transportation options appear to be less important or at least less important than other factors.

3.3 Visitors' perception of sustainability measures

Although aspects of sustainability are an increasingly discussed topic in event planning, the previous results indicate that this aspect does not play a primary role for the majority of festival visitors. The analysis of the perception of sustainability measures, cleanliness and transportation options by the visitors themselves (items 19, 31, 47 and 48, see above) can be contrasted with this.

3.3.1 Perception of sustainability measures

Overall, 56.9% of respondents agreed or completely agreed with the statement that the festival they attended "visibly paid attention to sustainability", while 26% were neutral and 17.1% disagreed (item 48). Although this indicates that sustainability measures such as a deposit system or the avoidance of single-use plastic are definitely perceived, the other results show that this is not a decisive factor for the majority of visitors (see above).

3.3.2 Cleanliness of the festival site

The answers to the question on the perception of the actual cleanliness of the site (item 19) show a mixed picture: 28.8% agreed with the statement that the site was clean and only 8.1% completely agreed. A considerable 31.6% took a neutral stance, with 23.9% disagreeing and 7.7% strongly disagreeing. This indicates that although cleanliness is perceived, it is less important for the satisfaction and experience of many visitors than other quality features.

3.3.3 Availability of public transportation

The perception of transportation availability (item 31) is mixed: 15.4% disagreed and 7.9% strongly disagreed on whether public transportation options to the festival were sufficient. A neutral position was taken by 43.9% of respondents. 19.5% agreed and 13.4% completely agreed. Transportation options and accessibility of the festival site were not a decisive factor for 94.2% of respondents. Only 5.8% of visitors rated this aspect as important (see above). This also shows that although many visitors are aware of this aspect, they consider it to be relatively irrelevant.

3.3.4 Evaluation of waste disposal

The statement that waste disposal at the festival site was well organized (item 47) was completely disagreed with by 5.8% and disagreed with by 17.7%. 33.0% were neutral. 30.9% agreed with the statement and 12.6% completely agreed. This also shows that although waste disposal is perceived, its importance is not the focus of visitor interest (see above).

4. CONCLUSIONS ON THE NEED FOR NUDGING STRATEGIES

This study leads to the conclusion that sustainability is not a central aspect of the experience for the majority of festival visitors. Regardless of socio-demographic factors such as gender, age or level of education, it is clear that ecological considerations at festivals are of little to no importance to many participants. These results reflect the hypothesis mentioned in the introduction that festivals offer many people an opportunity to escape from everyday life, in which normative ideas and obligations—including the sustainability principles often internalized in everyday life—are consciously or unconsciously disregarded. The phenomenon of escapism therefore seems to play a central role in this context. (Bennett et al., 2016; Kirchner, 2011) Thus, festival organizers need a special approach to promote ecological behavior. As the relevance of sustainability for festival visitors is limited, a strategy based on restrictive measures, such as a comprehensive ban on non-sustainable products and practices, appears to have only limited success. A culture of prohibition aimed at strict adherence to sustainability measures would surely meet with resistance and reduce the willingness of visitors to comply with such regulations. (Aßmann, 2022) Instead, alternative strategies are needed to promote sustainable behavior at festivals without compromising the experience-oriented and escapist motivation of participants. One approach that can be used in this context is *nudging*. Nudging (Aßmann, 2022; Bär & Korrmann, 2020; Bär et al., 2022) refers to subtle incentives that aim to steer people's behavior in a certain direction without explicitly forcing them to change their behavior. (Stangl, 2024) This approach stems from behavioral economics and could make it possible to integrate environmental measures without compromising the event experience. By gently 'nudging' visitors towards more sustainable choices, it could be possible to promote pro-ecological behaviors without visitors feeling coerced. (Aßmann, 2022)

The use of nudging methods is now well researched and has already shown positive results at many festivals. (Aßmann, 2022; Bär & Korrmann, 2020; Bär et al., 2022) Even though this study does not focus on specific nudging strategies, the results nevertheless underline the relevance of such measures, as they could offer an effective way of influencing visitors' behavior in the long term without restricting their escapism. The results of this study make it clear that the sustainable design of festivals requires not only technical or organizational solutions, but also a deeper understanding of the motivations and needs of festival visitors. The central challenge is to promote sustainable behavior in such a way that it contributes to the value of the experience and does not contradict the intention of escaping everyday life. Research such as that by Aßmann (2022) and Bär (2022, 2020) investigated which nudging measures are particularly suitable for festival settings and how they can be used effectively to support environmental behavior change. For example, if vegan food is cheaper than non-vegan food, visitors may choose this more sustainable option. If a free train ticket is included in the festival ticket, more people may travel by public transport. (Aßmann, 2022)

In summary, the way to more sustainable festivals is not through restrictive measures, but rather through the targeted steering of behavior through positive incentives and subtle changes in event design. By integrating innovative nudging approaches, festival organizers could not only reduce their environmental impact, but also increase the long-term value of their events and thus create a broader awareness of sustainable action in the event industry. Or to put it in a nutshell: No sustainable festival without nudging.

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DIRECTIONS OF APPLICATION OF THE ECO-MUSEUM APPROACH TO THE CONSERVATION OF THE NATURAL AND CULTURAL HERITAGE OF THE EAST ZANGEZUR REGION OF THE REPUBLIC OF AZERBAIJAN

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Abstract: The article analyzes the features of the creation of eco-museums in world practice and its application for the organization of eco-museums in the reconstructed East Zangezur region of the Republic of Azerbaijan. The functions of eco-museums in conservation of the natural and cultural heritage and their role in the development of regional tourism are described in detail, and 5 pilot zones in the corresponding administrative districts of Eastern Zangezur are proposed for the creation of eco-museums. The authors compared the corresponding indicators characterizing eco-museums and natural and cultural features of the region and gave a description of the development of potentially privileged areas of the region's tourism sector.

Keywords: eco-museums, ecotourism clusters, natural heritage, cultural heritage, eco-friendly approaches, nature-based solutions, tourism, East Zangezur, Azerbaijan, tourism destinations

INTRODUCTION

The Republic of Azerbaijan has a huge potential of natural and cultural resources, which in turn constitute the resource base for the development of the tourism and recreation sector of the economy. At the current stage of the country's socio-economic development and the adoption of national priorities for sustainable development, the topic of developing new, more sustainable and nature-based types of tourism is becoming increasingly relevant. One of these types of tourism is ecotourism.

The ecotourism approach is one of the most sustainable types of tourism. It includes the introduction of tourism management, the organization of tourist trips and other tourist activities, which again emphasizes the importance of the rational and optimal use of natural resources and contributes to the moral and physical recreation of tourists in nature and increased attention to the preservation of natural heritage.

The eco-museum approach, which emerged in the last century, has found its successful application in the restoration of territories after a long war, including the social participation of local communities and indigenous people in the preservation of the natural and cultural heritage

of a particular area. An eco-museum combines the life and culture of local communities and reflects the natural, ecological, cultural and historical features of the area.

This is a unique and inimitable type of creating natural and cultural monuments. Synthesizing nature with culture, eco-museums are an important object that has enormous tourist-attractive potential.

METHODOLOGY

Eco-museums have huge conservation power, which consists in preserving and maintaining the territory, natural and cultural heritage, as well as the characteristics of local communities. Eco-museums play a role not only in the development of tourism, but also in the preservation of the natural and cultural heritage of the region. Eco-museums are places or structures where culture meets nature, customs meet modernity, and traditions meet innovation. In this regard, eco-museums have enormous conservative power (*Figure 1*) (Badia et al., 2023; Doğan, 2019; Doğan et al., 2019).

Figure 1
Conservation power of eco-museums
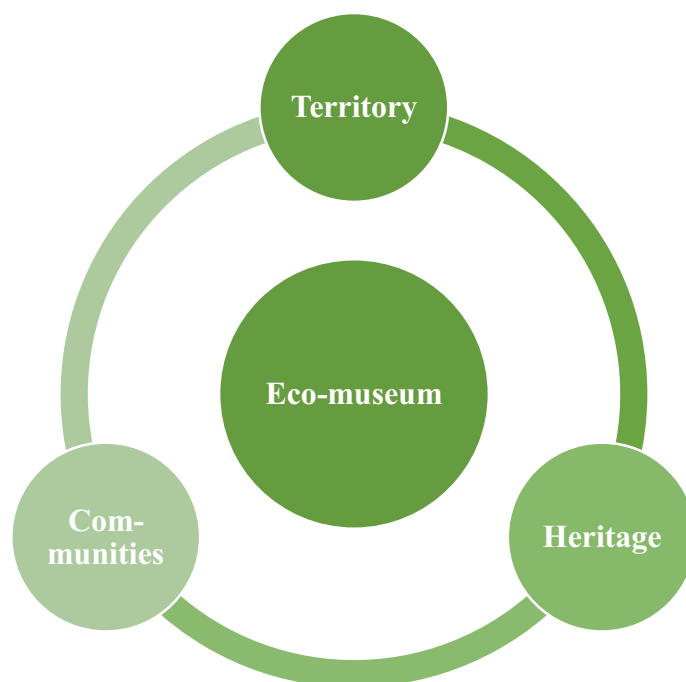
In terms of restoring settlements and resettling the population in newly created and reconstructed territories, the issue of employment of the population arises. Considering the nature of the settlement, as well as the resource potential of the territory of the East Zangezur economic region, the creation of tourist and recreational zones (TRZ) and the corresponding infrastructure here is advisable in terms of socio-economic sustainability.

The eco-museum concept can be well reflected in the plan of tourist representation of a separate village. The creation of open access eco-museums primarily forms the landmark of the territory and increases its tourist attractiveness.

Eco-museums and the infrastructure created around them will serve as a center for the development of local businesses of small and medium-sized enterprises. The concept of creating and developing eco-museums contributes to the formation of individual eco-tourism clusters (ETC) in the region (*Figure 2*). Considering that the economic region consists of five administrative districts, 5 pilot territories were selected at the first stage of creating eco-museums (*Table 1*) (Pasternak, 2018).

Figure 2
Cluster approach in the development of eco-museums in East Zangezur
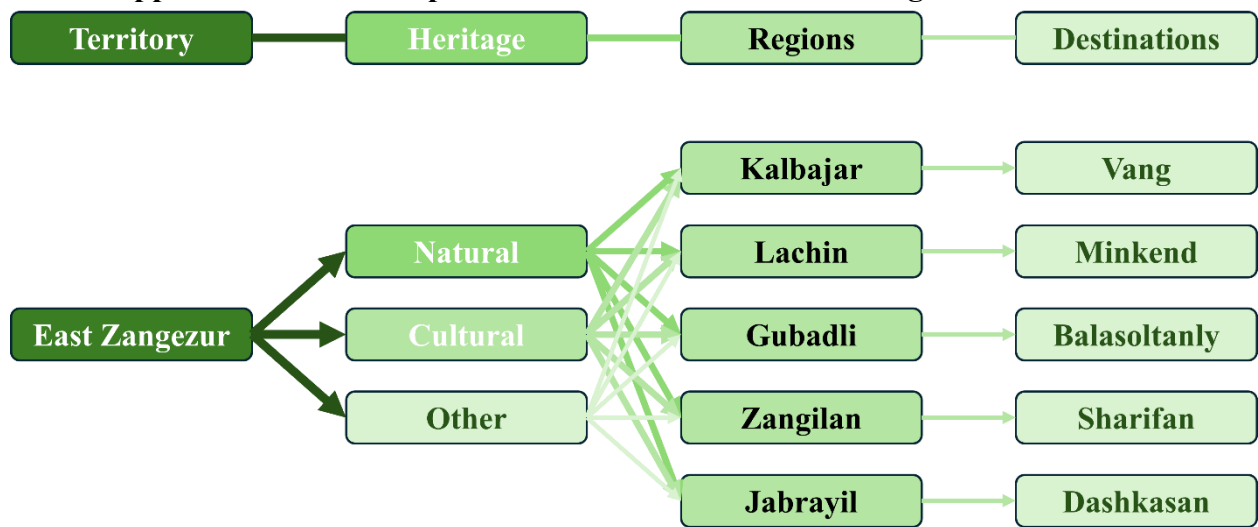
Table 1
Suitable places for the establishment of eco-museums in the administrative districts of East Zangezur

№	Planned location	Administrative district	Distance from the city center	Distance from the nearest airport	Population
1.	Vang	Kalbajar	29 km	51 km	150–200
2.	Minkend	Lachin	43 km	58 km	250–300
3.	Balasoltanly	Gubadli	23 km	35 km	200–250
4.	Sharifan	Zangilan	22 km	15 km	150–200
5.	Dashkasan	Jabrayil	11 km	29 km	150–200

The above-mentioned destinations have a huge natural and cultural heritage and can combine the ecological and cultural-historical interests of tourists regarding the customs and traditions of local communities (*Figure 3*). The development of villages and small settlements will be characterized by "reverse migration" in the region, which will contribute to maintaining

the socio-economic stability and independence of local communities. The significant eco- and agrotourism potential of the region is a stimulating factor for the development of nature-based tourism, including the use of the eco-museum approach (Navajas Corral et al., 2022; Simeoni et al., 2018).

It should be noted that the development of small settlements in the plan for the reconstruction of the region will be carried out in accordance with the state program "Great Return" and the unification of several settlements, considering their historical, geographical and social features. This will create the opportunity to attract an even larger segment of tourists and increase the number of stakeholders interested in the development of eco-museums, eco-, agro- and rural tourism (Bayramov et al., 2024; Pavlis, 2024).

The selected pilot settlements have favorable natural, cultural, agricultural and socio-demographic characteristics for the application of the eco-museum approach.

Figure 3
Location and general appearance of eco-museums
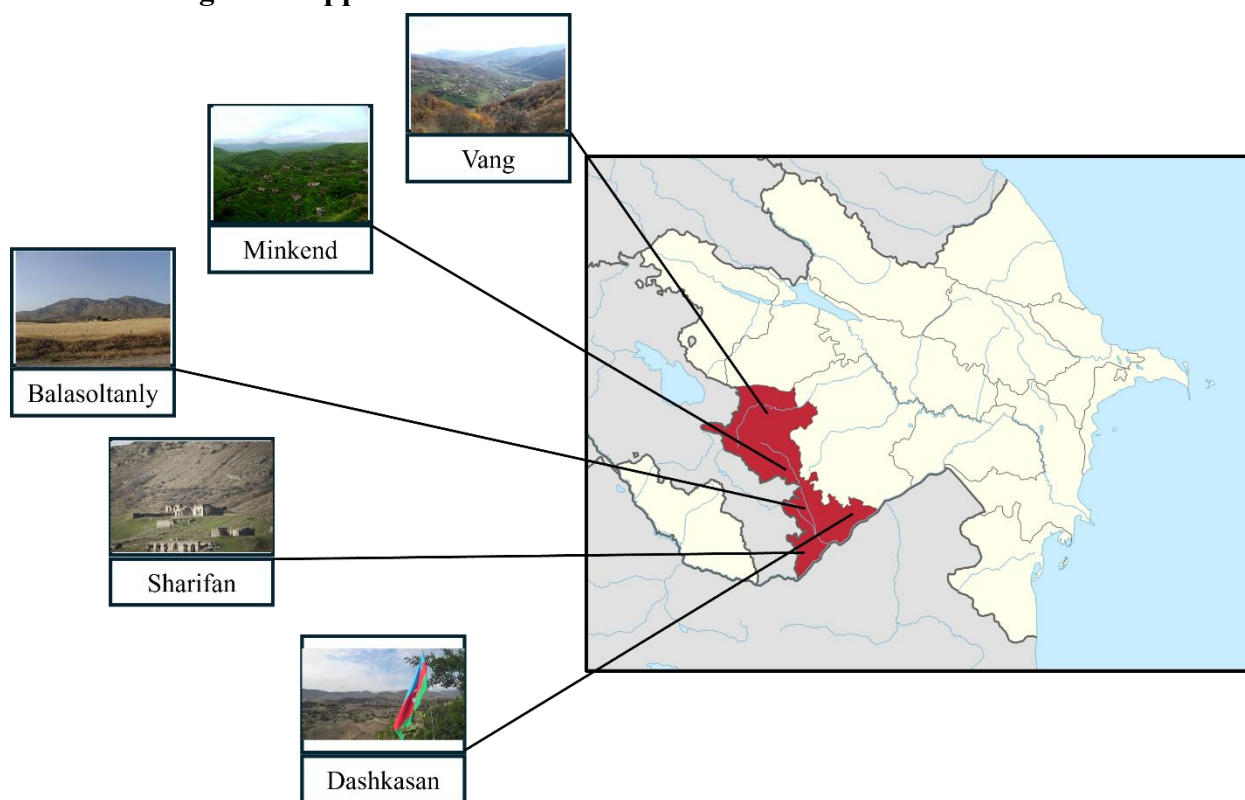
The criteria for selecting sites for the establishment of eco-museums were chosen based on international approaches and considering local historical and geographical conditions:

(1) The presence of historical and cultural monuments or ruins with a known history of origin or legends are of interest to visitors;

(2) The presence of a set of interconnected and interdependent natural landscape ecosystems that are intact or slightly altered by anthropogenic and technogenic impacts;

(3) The presence of identified species of animals and plants that are characteristic of a given region (area) and that are capable of maintaining their vital functions under current environmental circumstances;

(4) The presence of traditional cultural and everyday customs of local communities and the identification of their preservation and ability to be passed on from one generation to next;

(5) Assessment of the tourist and recreational potential of a given region (settlement) and establishment of its accessibility in terms of transport, tourist routes, and hiking trips. (Belliggiano et al., 2021; Buczek-Kowalik et al., 2013)

Regarding the organization and management of eco-museums, it should be noted that state support is needed for the restoration and renovation of both settlements and individual infrastructure components that are closely related to tourism activities. In this regard, support and encouragement from small and medium-sized businesses for their independent initial functioning in the region is necessary. In addition, it should be noted that stakeholders are not only the state and entrepreneurs, but also representatives of local communities and organizers of tourist trips.

Table 2 shows the presence/absence of relevant indicators that characterize the tourist attractiveness of the location of eco-museums:

Table 2
Presence/absence of indicators characterizing the tourist attractiveness of the location of eco-museums

№	Indicator	Vang	Minkend	Balasoltanly	Sharifan	Dashkasan
1.	Interdistrict highway	🛣️	🛣️	🛣️	❌	🛣️
2.	Intra-district road communication	🛤️	🛤️	🛤️	🛤️	🛤️
3.	Flowing rivers	🌊	🌊	🌊	🌊	❌
4.	Standing river / Dry-river valley	❌	❌	❌	❌	〰️
5.	Lake or reservoir	❌	❌	❌	🏞️	❌
6.	Attractive landscapes	🏞️	🏞️	🏞️	🏞️	🏞️
7.	Forests and shrubs	🌳	🌳	❌	🌳	❌
8.	Historical monuments	🏛️	🏛️	❌	🏛️	❌

RESULTS

The study concluded that eco-museums, as attractive landmarks, can accelerate the development of local and regional tourism in terms of heritage, cultural and ecological tourism. They are also able to accelerate and promote the socio-economic and infrastructural development of local communities and small settlements.

On the other hand, eco-museums are effective for self-employment of the rural population, as well as the formation of small and medium-sized business entities in the territory. It is worth noting the role of the development of individual rural areas in the diversification and, especially, decentralization of the regional and national economy of the country. And the fact that with the development of tourist services and products, the share of the tertiary sector in the structure of economic activity will grow again emphasizes the sustainable and social orientation of this idea. Eco-museums are practical, and suitable tourist approaches in the territory of the East Zangezur economic region. This region has an ancient history and many cultural and natural monuments to attract the attention of tourists.

In addition, the region serves as a natural habitat for many rare species of plants and animals that live both in Azerbaijan and throughout the Lesser Caucasus, which creates an anthropogenically untouched terrestrial ecosystem for the habitat and residence of the living world. This contributes to the development of ecotourism and the maintenance of the biodiversity of the region.

Figure 4 shows mind maps of areas where we consider it favorable to create eco-museums. Common to all five points is the presence of a river or river system (including a former watercourse valley) in the immediate vicinity, the location of points on the main and connecting inter-district automobile routes, as well as the presence of an intra-district road and communication network for better accessibility for tourists and the population.

In addition, all these locations have the corresponding historical, cultural, natural and ecological potential for the creation of ecotourism clusters or eco-villages to attract more tourists, as well as supporting sustainable socio-economic development of the population and the balance of natural ecosystems in terms of implementing state policy in the field of greening and the use of "green production" in these territories (Bayramov et al., 2024).

Figure 4
Mind maps of eco-museum destinations (villages)

| **(1) – Vang village *(Kalbajar)*** | **(2) – Minkend village *(Lachin)*** |

(3) – Balasoltanly village *(Gubadli)*   **(4) – Sharifan village** *(Zangilan)*

(5) – Dashkesan village *(Jabrayil)*
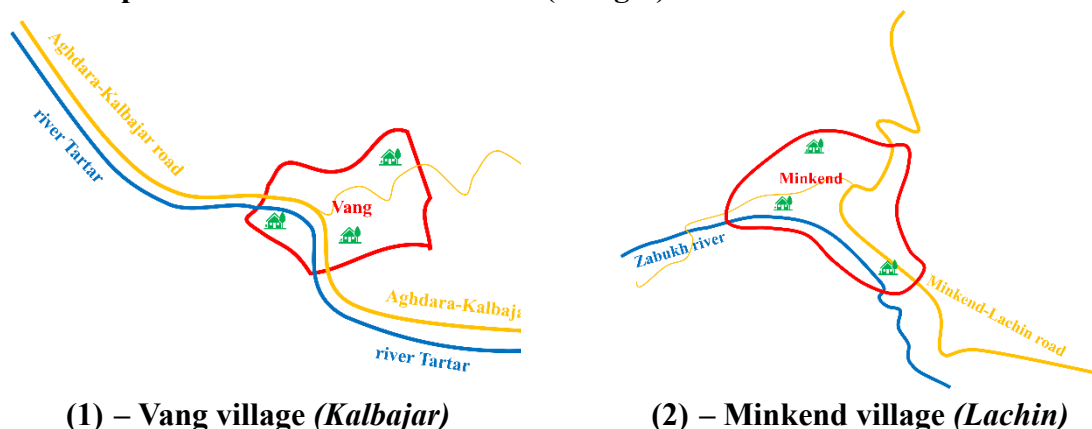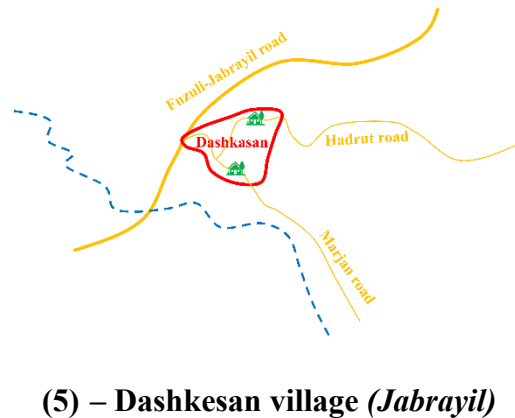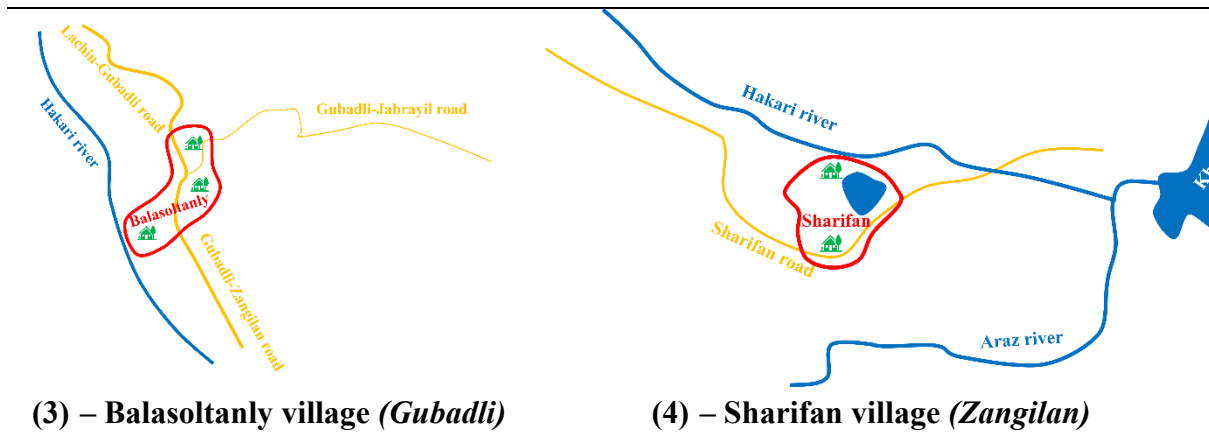
It should be noted that the promotion of eco-friendly projects and nature-based solutions contributes to the development of responsible tourism, which corresponds to the conceptual foundations of the development of tourism services at the current stage.

CONCLUSIONS AND DISCUSSIONS

Following from the above arguments, it can be said that the most appropriate thing is to reconstruct the historical quarters of these settlements and organize an eco-museum in these streets (quarters) of the villages. It is advisable to display examples of local art and craftsmanship in eco-museums to ensure their tourist appeal and to support the work of eco-museums. Weekly master classes for children and schoolchildren, as well as enthusiasts who are interested in arts and creativity, can be organized here.

Eco-museums can also play the role of a culinary center, where, apart from historical and cultural values, samples of folk cuisine will be baked. This will turn eco-museums into popular centers for the everyday social and public activity of the rural population, as well as tourists visiting this region.

To integrate eco-museums with nature, it is advisable to identify its landscape design with the landscapes of the territory, which will ensure a smooth visual-aesthetic transition and contrast between landscape units.

All this will lead to the development of tourism in the region in the following aspects:

(i)   **Historical tourism** will once again acquire its appearance and will be reflected in historical monuments and elements of eco-museums and adjacent areas;

(ii)   Favorable conditions will be created for the development of **cultural tourism** from the point of view of encouraging the socio-cultural values of local communities and small ethnic groups;

(iii)   Development of **gastronomic tourism** associated with national dishes and baked goods of the inhabiting peoples;

(iv)   Natural and **ecological tourism** will be reflected in landscape and ecological design and planning of neighborhoods in harmony with the natural environment;

(v)   **Rural tourism** will be reflected in the customs and skills of the local population, as well as in the local climate conditions favorable for agriculture;

(vi)   **Creative tourism** will be represented by elements of art and folk crafts;

(vii)   **Sustainable and regenerative tourism** will be reflected both in the combination of the above factors and in low-carbon and nature-based tourism activities (Ghorbanzadeh, 2018; Moreno Mendoza et al., 2021).

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GENERAL PERSPECTIVES OF CAREER MANAGEMENT

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Abstract: The best way to predict the future is to build it. (Abraham Lincoln). Each of us, the moment one focuses its attention on a field, aspiring to have a certain profession, implicitly thinks about a certain profession. Career management integrates career planning and development and also, in a broader sense, implies multiple functional interdependences of planning the career individually, of planning the organizational career and the career development. Career management is a point of interest both for the employee and the employer, representing a planning and implementation process of targets, strategies and plans, which allow the organization to satisfy its needs of human resources and the people to fulfill their career purposes. There are individual differences regarding career orientation. Humans are not all the same, they differ when it comes to abilities, values, objectives and preferred activities. Although different from one another, people do have many things in common. Starting from this approach, specialists in this field have revealed modalities of classifying people, modalities that focus on the major models of resemblances and differences regarding career orientation.

Keywords: career, career management, career orientation, individual career planning, planning organizational career, career development, career strategies.

1 INTRODUCTION

All definitions from specialized literature, through their content, point out psychological domains that are related to aptitudes, aspirations, individual ambitions, in connection with the requirements of the system where the subject works. The important area is the one of individual perception, in relation with its own career, correlated with personal aptitudes and realization possibilities. Here it is about to the realism of the person when it comes to its own assessment, an aspect which the counsellor can identify, as well as the aspiration level and the individual motivation (Baban, 2003).

The field of human resources management defines professional career as a succession of stages, which after being got through, will take the person to an important position, with a better social recognition and better paid. If we also take into consideration the psycho-social aspects hatched by a professional career, from the need to give importance and safety to the individual, the foreign specialists have led the conclusion that this aspect has different connotations, that actually constitute different modalities of individual perception on career.

2 CAREER MANAGEMENT

Therefore, we identify more "senses" of career: advancement, profession, succession of positions during lifetime, a series of roles during lifetime, connected with experience,

individual perception of the succession of attitudes and behaviour (subjective career), the dinamic frame where life, as a whole, is perceived by a person. From here, we have the distinction between objective career (that includes the development of personell and implies promotion, specialisation, motivation, human resources planning etc.) and subjective career (that focuses on self perception and the role of profession in each person`s life).

We consider that it is not desired to emulate such a difference unless from scientific and pedagogical aspects, since practice does not differentiate between social and individual. The only disparity is the one of the perspective of question – of the person or of the organisation. In 1995, V. Lefter and A. Manolescu stated that "a paper that intends to approach a certain field of management is, undeniably, an act of courage" (Lefter et al., 1995). This statement refers, both the multiple senses of management, and the special complexity of its problemtics. Later on, the variety of the approaches of this field rises. The issue studied is to what extent this activity is seen fair and organised as a normal usance, by employees and also, by employers. It is certain that a huge evolution has happened and there are companies that take this activity to the level of normality.

Regarding this aspect, professional managers can be identified, but an insufficient number compared to the existing possibilities. Thus, the problem that arises is a matter of flexibility and adaptability to dynamics and of being open and receptive towards newness. We understand that in order to define career, it is necessary to take into consideration:

- individual contribution to career development;
- the contribution of the organizations where they evolve;
- the contexts they encounter;
- the quality of specific legislation and the modality of applying it.

The career dimension integrates a succession of activities and professional positions that a person can reach, such as attitudes, knowledge and other associated components, which develop throughout time. Specialized literature presents three important elements in order to understand what a career is: (Johns, 1998)

- Career is a dynamic process along time, which has two dimensions: external career represented by the objective succession of positions that the person has along the years and the internal career resulted from the interpretation that the person gives to the objective experiences by means of his subjectivity;
- Career represents the interaction between the organizational and the individual factors. The perception of the position, as well as the position taken by the subject depend on the compatibility between what the subject sees as suitable for oneself (aptitudes, needs, preferences), and what the position really represents.
- Career offers an occupational identity: profession, position held, organization where the person works, all are part of the person`s identity.

Undoubtedly, people are different, but at the same time, we also have the possibility to identify aspects that they have in common, this leading to the appreciation of similitudes and differences regarding career orientation. Therefore, career orientation is a relatively stable pattern of talents, values, attitudes and occupational activities.

The career orientation of a person is relevant when we compare it to the profession that the person has. From the compatibility area of the two, we discover important consequences

for the subject, such as one`s behavior and attitudes at one`s workplace, and also for his state of balance and fulfillment. It is of major importance that each person chooses cautiously his profession; the approach has to be a long term one, activities to be specific, types of organizations, opportunities, possibilities that allow the valorization of natural potential; it is possible to exist a difference between the perception about what the respective profession represents and what it actually means. The career, a term that comes from French, is understood in Romanian as profession, occupation and, by extent, either as a good situation, or a position in society. It is different from careerism, perceived as the tendency to make one`s way in the world, no matter what, no matter how. The English dictionary of human resources defines it as a job that you have been prepared for and that you expect to practice your entire life.

In a broader sense, the career concept is related to the idea of evolution or advancement of a person in a certain field of activity with the purpose of obtaining increased incomes, higher responsibility, more prestige and more power. The term of career is given different authors multiple meanings (Constantinescu et al., 1999):

- Regarded under the mobility aspect, of ascension in an organization, career is seen as an "advancement";
- Regarded as an occupation, it is appreciated that certain occupations represent a career (military people, teachers, managers), while other occupations are designed as positions (waiter, driver, shop assistant etc.);
- In another vision, career is seen as "a succession of jobs along lifetime" or a "a succession of positions" in a ranking order of the prestige that the employee has based on a predictive rule;
- With respect to the person, the career is considered "an evolving succession of professional activities and professional positions that a person reaches, as well as the attitudes, knowledge and competences developed throughout time".
- In a subjective perception, the career is presented as a series of roles connected to life experience (one`s own conceptions, aspirations, successes, failures etc.), a succession of a person`s roles in the field of work or a succession of separate experiences, correlated among them;
- From an individual perspective, career is seen as a succession of attitudes and types of behavior, connected with the work experiences and activities along personal lifetime. This approach refers to the subjective career given by the experiences and roles that appear in a subject`s life and also to the objective career which is based on the job attitudes and behavior;
- Other authors, in a subjective way, see career from the perspective of the dynamic frame where a person perceives one`s life and gives sense to personal qualities, actions and things that have happened to him or her.

Carrer management reflects in the progress made in the field of human resources management alongside with the areal of career management. Human resources, by their functional values, have become the essential element of competitiveness, at the level of organizations and also at a national level, "becoming the only ones able to differentiate the contribution of each stat in the global competition of technologized economy", realizing the difference between the success and failure of the organization.

It is of outmost necessity that career management is approached from a point of view of people`s interest and also the one of organizations. Within this context, career management takes into account both the career planning process that regards the employee` modalities of advancement in an organization as per its necessities, employees` performances, their potential and their preferences, and also ensuring the managerial succession with the purpose to provide the organization, as long as possible, with the people that it needs so as to reach its objectives. With a view to these interests, the field of career management imposes three general purposes:

- To ensure the fulfillment of the organization necessities in the matter of managerial succession;
- To offer its employees that have a potential practical instruction and experience in order to prepare them for the level of responsibility that they could reach;
- To offer its employees that have a potential the guidance and encouragement they need to develop or not a successful career in the organization, according to their talent and their own aspirations. In such an approach, career management is understood as a process of planning and implementation the purposes, strategies and plans in order to provide the needs of organization in terms of human resources and also the people`s fulfillment in terms of their career purposes.

The exactness of career management imposes planning and adjusting the employees` progress in the organization in accordance with the organizational needs analysis, but also in accordance with the potential performances and the employees` individual preferences. Sure enough, in the theories of human resources management, career management represents a model that implies multiple functional interdependencies between individual career planning, organizational career planning and career development. With regard to this, a relevant example is Michael Armstrong`s model who begins with self-assessment, continues with career planning, induction instruction and initial experience and then get to managerial development, career guidance, mentoring and managerial instruction, culminating with career progress.

Thus, the evolution dynamic regarding career targets the career progress modality, the way in which employees build their professional career, advancing by means of promotion, enlargement or enrichment of roles, taking on higher responsibilities and utilizing the available potential and aptitudes. In this context, the career approach takes three stages: expansion at the beginning of career, stabilization of career path and maturing. (Marinescu, 2003)

The organization policies from career management perspective impose decisions regarding the proportions to which it forms and develops its own managers (internal promotion), it recruits systematically from exterior and it is forced to bring employees from exterior, then a future deficit is previsioned (Manolescu, 2001). In the career planning process, specific procedures are used, these referring to: planning personal development, managerial instruction and development, mentoring, career guidance. We understand that career orientation is a pattern of talents, values, attitudes and preferred occupational activities.

A company that implements an efficient career management system has the following advantages:

- Rising the employees` motivation level with direct effects on work productivity and their fidelity level;
- Lowering of personnel fluctuation;
- Rising the image capital of the company;

If we ask ourselves what is the modality to implement a career management, we understand that there is a need for: in-puts, transformations and out-puts. In-puts are translated as previsions regarding the personnel need on different hierarchic levels, in the results of assessments of employees` potential which give a clear image of the level to which a person can assimilate a type of personal development, a development that can be used as a basis of his or her ascension in the organizational pyramid.

The area of assessment is poorly understood and implemented, the firms having to assess performances as in-put in the career management system. The segment of transformations imposes knowledge of company need on all hierarchic levels. The instruments used to go through the journey of employees` development differs according to the employee`s psychological profile, and also according to the intensity of transformations that are necessary to be made by him. Therefore, we emphasize the following instruments:

- Modifications in the structure of tasks/responsibilities at the level of the positions;
- Rotating the positions;
- Extension of positions: rising the number of tasks related to the position and/or rising the level of accountability;
- Enrichment of positions: modifying the structure of accountabilities and/or adding new levels of accountability;
- Training – it is, probably, the most efficient instrument of transmitting knowledge and, partially, of developing certain abilities;
- Coaching
- Mentoring;
- Delegating – eventually, represents a real simulation of the way in which the employee can handle tasks, that, as some point will be attributed to him. We also need to mention that, in spite of the fact that it seems simple and quick, the pathway of professional development of an efficient career management system can last between 1 and three years for each hierarchical stage.

Outputs are represented by human resources professionally prepared to cover responsibilities that are of superior importance in the company.

The career strategies define the following objectives:

- Developing competences for defining career strategy;
- Identifying and correctly analyzing the strategy determinants for career management;
- The possibility to establish and justify the role and specific features of didactical career management strategy.

Career strategies intend to anticipate problems and to plan on a long term. We enumerate some of these aspects below: (Mathis et al., 1997)

- *Know yourself* proposes an in-depth analysis of career orientation, of week and strong points, of the position in the company.
- *Take care of your professional reputation* means to emphasize your abilities and realizations, everything that makes you unique, everything that demonstrates special qualities, the possibility to invest and the capacity to finalize projects.

- *Stay mobile, vendible, always in evolution* means to follow the correspondence between personal competences and those wanted on the job market, those that can easily be transferred.
- *Be both a specialist and a generalist* refers to developing a field of expertise, of speciality, but keeping a certain flexibility, without limiting yourself. Mastering a narrow area makes you inflexible and vulnerable.
- *Document your own successes* means to be able to offer the proof of what you have already achieved, the results and identifiable realizations that are more valuable on job market.
- *Always prepare a back-up plan and be ready to take action* refers to the will to always be active.
- *Be financially and mentally stable* means to always have a secured basis, a comfort and a balance from a mental and financial point of view. These strategies refer to the person and the role of the organization is to care for its internal need but also for the employees` career.

3   CONCLUSIONS

Career development is the result of interaction between aptitudes, the subject`s desire to succeed and the opportunities offered by the employer. This means that the more possibilities and professional routes the employer can provide to valorize his studies and to develop his aptitudes, the more the person is satisfied with his career. Some specialists in the field regard career development, firstly, as the person`s experience, not related to the organization, this meaning that the responsibility for career development belongs to the person, although the organization can play an important role in facilitating and sustaining the individual career.

All these come as a consequence of rapid and continual development of technologies and services, that directly influence career development more and more, and for maintaining a job mentoring and coaching activities are necessary. The development process of a successful career is not an easy thing, it is something built throughout lifetime. Nowadays world imposes flexibility and adaptability.

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ANALYZING THE DYNAMIC RELATIONSHIPS BETWEEN MACROECONOMIC VARIABLES AND GDP GROWTH IN ALBANIA: A PANEL DATA APPROACH

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Abstract: *This study examines the impact of various macroeconomic factors on GDP growth in Albania during the period 1997-2023. Using a panel data approach, the analysis investigates the relationship between GDP growth and variables such as trade openness, inflation, government expenditure, domestic credit, population growth, final consumption expenditure, gross fixed capital formation, and the current account balance. The results indicate that government expenditure and trade openness are statistically significant determinants of GDP growth. Granger causality tests reveal that domestic credit and government expenditure Granger-cause the current account balance, while domestic credit and trade openness Granger-cause GDP growth. The findings suggest that policies aimed at increasing government spending and promoting trade integration can positively impact economic growth in Albania. However, further research is needed to explore the long-term effects of these variables and to address potential limitations of the study.*
Keywords: *GDP Growth, Macroeconomic Factors, Trade Openness, Inflation, Government Spending, Domestic Credit, Final Consumption Expenditure, Gross Fixed Capital Formation.*

1. INTRODUCTION

The relationship between macroeconomic variables and economic growth has garnered significant attention among economists. The study presented by the authors specifically examines the impact of several important factors such as trade openness, inflation, government spending, domestic credit to the private sector, population growth, final consumption expenditure, gross fixed capital formation and the balance of current account in the growth of GDP in Albania. Understanding these relationships is essential for policymakers seeking to implement effective strategies to foster sustainable economic development. Albania has experienced fluctuations in economic conditions during this 26-year period of time, which the authors have taken into consideration. Analysing the dynamics between these variables and GDP growth will provide valuable insights into the effectiveness of fiscal policies and monetary policies. By employing a panel data analysis using secondary statistical data provided by the World Bank Database. This research aims to isolate the individual effects of each variable on real GDP growth in Albania.

2. LITERATURE REVIEW

The relationship between various macroeconomic variables and economic growth has been the focus of extensive research, revealing a diverse range of findings. Trade openness, defined as the sum of exports and imports relative to GDP, is widely acknowledged as a significant driver of economic growth. Frankel and Romer (Frankel, 1999) demonstrate that increased trade openness enhances productivity and stimulates growth by facilitating access to international markets. Similarly, studies such as Rodriguez and Rodrik (Rodriguez, 2001) emphasize the positive effects of trade on economic performance, particularly in developing countries. Conversely, inflation is frequently considered detrimental to economic growth. High inflation rates erode purchasing power and contribute to uncertainty, which can deter both investment and consumption (Cochrane, 2011). Additionally, inflation destabilizes financial markets, which poses risks for both borrowers and lenders, potentially undermining long-term economic growth (Boyd, Levine, and Smith, (Boyd, 2001); Fischer, (Fischer, 1993). Government expenditure has a complex and dual impact on economic growth. Productive public spending on infrastructure and education has been shown to enhance growth potential, while excessive or poorly allocated spending can lead to inefficiencies and diminished economic performance Alesina and Tabellini, (Alesina, 1990); Barro, (Barro, 1979).

The effectiveness of government expenditure on GDP growth is thus contingent upon its quality and efficiency. Domestic credit to the private sector (DCPS) is another critical factor influencing economic growth. (Levine, 2005)asserts that a robust financial system, which provides adequate credit to private enterprises, can significantly foster investment and spur economic activity. Conversely, a lack of credit availability can severely constrain growth, especially in developing economies (King, 1993). Population growth plays a dual role in influencing GDP growth. A growing population can increase the labor force, driving economic expansion if adequately trained and educated. However, rapid population growth without corresponding economic opportunities can strain resources and infrastructure, leading to potential adverse effects on economic performance (Bloom, 2004). Final consumption expenditure (FCE) represents a substantial portion of total economic activity and is a key driver of GDP growth. Increased consumption typically reflects rising household incomes and consumer confidence, which in turn can stimulate further economic growth (Kuznets, 1955). Gross fixed capital formation (GFCF) is vital for capital accumulation and long-term economic growth. Higher levels of GFCF indicate that an economy is investing in its productive capacity, which is essential for sustainable growth (Ram, 1986). Lastly, the current account balance (CAB) serves as an important indicator of an economy's position in international trade.

A balanced current account suggests sustainable economic practices, while persistent deficits may indicate structural economic issues that could hinder growth (Obsfeld, 1996). In the context of Albania, understanding the interactions between these variables and their collective impact on GDP growth is crucial for formulating effective fiscal policies aimed at ensuring sustainable economic development. By systematically analyzing the effects of trade openness, inflation, government expenditure, domestic credit to the private sector, population growth, final consumption expenditure, gross fixed capital formation, and the current account balance on GDP growth, this study endeavors to provide valuable insights for policymakers to enhance economic resilience and promote growth.

3. METHODOLOGY

3.1 Data

The data for this study was obtained from the World Bank's World Development Indicators (WDI) database (WorldBank, 2024), covering the period from 1997 to 2023. The specific variables used include: GDP growth (GDPG): Measured as the annual growth rate of GDP. Current account balance (CAB): Represented as a percentage of GDP. Domestic credit to the private sector (DCPS): Measured as a percentage of GDP. Final consumption expenditure (FCE): As a percentage of GDP. Government Expenditure (GEXP): Total Government Spending as a percentage % of GDP. Gross Fixed Capital Formation (GFCF): As a percentage % of GDP. Inflation Rate (INFLATION): Measured as the percentage change in the Consumer Price Index (CPI). Population growth (POPG): Expressed as a growth rate. Trade Openness (TRADEOPEN): The sum of Exports and Imports as a percentage of GDP.

3.2 Econometric Model Specification

This study aims to investigate the impact of these macroeconomic variables on GDP growth in Albania over the period from 1997 to 2023. The econometric model is specified as follows:

$$GDPG_t = \beta_0 + \beta_1 CAB_t + \beta_2 DCPS_t + \beta_3 FCE_t + \beta_4 GEXP_t + \beta_5 GFCF_t + \beta_6 INFLATION_t + \beta_7 POPG_t + \beta_8 TRADEOPEN_t + \varepsilon_t$$

Where: $GDPG_t$: Annual growth rate of GDP in year t. CAB_t: Current account balance as a percentage of GDP in year t. $DCPS_t$: Domestic credit to the private sector as a percentage of GDP in year t. FCE_t: Final consumption expenditure as a percentage of GDP in year t. $GEXP_t$: Government expenditure as a percentage of GDP in year t. $GFCF_t$: Gross fixed capital formation as a percentage of GDP in year t. $INFLATION_t$: Percentage change in the CPI in year t. $POPG_t$: Population growth rate in year t. $TRADEOPEN_t$: Trade openness as a percentage of GDP in year t. ε_t: Error term capturing other factors affecting GDP growth.

Expected Signs of Coefficients

β_1 (Current Account Balance): Expected positive; a surplus can enhance economic growth. β_2 (Domestic Credit to the Private Sector): Expected positive; more credit may stimulate business activity. β_3 (Final Consumption Expenditure): Expected positive; higher consumption can drive GDP growth. β_4 (Government Expenditure): Expected ambiguous; depends on the nature of spending. β_5 (Gross Fixed Capital Formation): Expected positive; investment in fixed assets can boost growth. β_6 (Inflation Rate): Expected negative; high inflation may deter investment and savings. β_7 (Population Growth): Expected positive; a growing population can contribute to labor supply and demand. β_8 (Trade Openness): Expected positive; greater openness can lead to improved economic efficiency and growth.

Model Estimation

Given the time-series nature of the data, the model will be estimated using an autoregressive distributed lag (ARDL) model or Vector Error Correction Model (VECM), depending on the results of stationarity tests. These methods allow us to capture both the short-term and long-term dynamics between the variables.

Stationarity and Cointegration Testing

ADF Test: To assess the stationarity of individual variables. Johansen Cointegration Test: To determine if there is a long-run equilibrium relationship among the variables.

Error Correction Model (ECM) Representation (if Cointegration Exists)

$$\Delta GDP\_Growth_t = \alpha + \sum_{i=1}^{p} \beta_i \Delta X_{t-i} + \lambda ECM_{t-1} + \varepsilon_t$$

Where: Δ represents first differences. ECM_{t-1} is the lagged error correction term capturing the long-term relationship. XXX represents the independent variables. This model will allow us to examine both the short-run fluctuations and the long-term relationship between public debt and GDP growth, accounting for other macroeconomic factors.

3.3 Time-Series Analysis

Before performing the regression analysis, it is crucial to assess the stationarity of the variables to avoid spurious regression results. The main variables used in this paper by the authors are: GDP growth (GDPG), Current account balance (CAB), Domestic credit to the private sector (DCPS), Final consumption expenditure (FCE), Government expenditure (GEXP), Gross fixed capital formation (GFCF), Inflation rate (INFLATION), Population growth (POPG), Trade openness (TRADEOPEN). Ensuring that these variables are stationary is essential for the validity of the regression analysis.

Augmented Dickey-Fuller (ADF) Test.

The Augmented Dickey-Fuller (ADF) test (Mushtaq, 2011) is used to determine the presence of unit roots in each time series, assessing whether the series is stationary. If a series is non-stationary at its level, we apply differencing until stationarity is achieved. In this case, the first difference of a series represents the change between the current and previous values. If necessary, further differencing (e.g., second differencing) can be applied to ensure stationarity. The general form of the ADF test equation is:

$$\Delta Y_t = \alpha + \beta Y_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta Y_{t-i} + \varepsilon_t$$

Where: ΔY_t: First difference of the variable Y at time t, α: Intercept term, β: Coefficient of the lagged level of Y, γ_i: Coefficients of the lagged first differences, p: Lag order, ε_t: Error term.

Hypothesis Testing

Null Hypothesis (H0): The series has a unit root (non-stationary).
Alternative Hypothesis (H1): The series is stationary.

If the ADF test statistic is significantly negative (i.e, smaller than the critical values), we reject the null hypothesis and conclude that the series is stationary.

Table 1: *Null Hypothesis: GDPG has a unit root.*

Null Hypothesis: GDPG has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=6)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-6.340664	0.0000
Test critical values:	1% level		-3.711457	
	5% level		-2.981038	
	10% level		-2.629906	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(GDPG)				
Method: Least Squares				
Date: 11/05/24 Time: 01:20				
Sample (adjusted): 2 27				
Included observations: 26 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPG(-1)	-0.931678	0.146937	-6.340664	0.0000
C	4.359202	0.874893	4.982558	0.0000
R-squared	0.626192	Mean dependent var		0.552274
Adjusted R-squared	0.610616	S.D. dependent var		5.199993
S.E. of regression	3.244828	Akaike info criterion		5.265805
Sum squared resid	252.6938	Schwarz criterion		5.362582
Log likelihood	-66.45547	Hannan-Quinn criter.		5.293673
F-statistic	40.20402	Durbin-Watson stat		1.210973
Prob(F-statistic)	0.000001			

Source: Data processed from World Bank Database using Econometric Software, EViews 13 (Nov 2024).

The results from the Augmented Dickey-Fuller (ADF) test indicate that the variable GDPG is likely stationary. Here's a breakdown of the test results:

ADF test statistic: The value of -6.340664 is significantly less than the critical values at all levels (1%, 5%, and 10%), suggesting that we can reject the null hypothesis of a unit root. This indicates that GDPG is stationary. P-value: The p-value of 0.0000 is much less than 0.05, providing strong evidence against the null hypothesis of a unit root. Regression output: The coefficient on the lagged GDPG term (GDPG(-1)) is negative and significant, suggesting that there is a strong negative relationship between GDPG and its lagged values. This is consistent with the stationarity of GDPG. The analysis suggests that the variable GDPG is stationary, which means it can be directly used in time series models without requiring any differencing. This is a good sign for your analysis, as stationary variables are more suitable for modeling and forecasting.

4.   REGRESSION ANALYSIS

The primary objective of the regression analysis is to quantitatively assess the influence of key economic variables on GDP growth (GDPG) in Albania. By employing a multiple linear regression model, we aim to determine the magnitude and statistical significance of the relationships between GDP growth and variables such as public debt, investment rate, inflation,

and trade openness. The multiple linear regression model can be expressed as follows: GDPGt=β0+β1·CABt+β2·DCPSt+β3·FCEt+β4·GEXPt+β5·GFCFt+β6·INFLATIONt+β7·PO PGt+β8·TRADEOPENt+εtGDPG_t = \beta_0 + \beta_1 \cdot CAB_t + \beta_2 \cdot DCPS_t + \beta_3 \cdot FCE_t + \beta_4 \cdot GEXP_t + \beta_5 \cdot GFCF_t + \beta_6 \cdot INFLATION_t + \beta_7 \cdot POPG_t + \beta_8 \cdot TRADEOPEN_t + \varepsilon_tGDPGt=β0+β1·CABt+β2·DCPSt+β3·FCEt+β4·GEXPt+β5·GFCFt+β6 ·INFLATIONt+β7·POPGt+β8·TRADEOPENt+εt. Where: GDPG_t: GDP growth at time ttt (dependent variable), CAB_t: Current account balance at time ttt, DCPS_t: Domestic credit to the private sector at time ttt, FCE_t: Final consumption expenditure at time ttt, GEXP_t: Government expenditure as a percentage of GDP at time ttt, GFCF_t: Gross fixed capital formation at time ttt, INFLATION_t: Inflation rate at time ttt, POPG_t: Population growth at time ttt, TRADEOPEN_t: Trade openness at time ttt, β0\beta_0β0: Intercept (constant term), β1,β2,...,β8\beta_1, \beta_2, ..., \beta_8β1,β2,...,β8Coefficients of the independent variables, representing their respective effects on GDP growth, εt\varepsilon_tεt: Error term, capturing unobserved factors that influence GDP growth. This model posits that GDP growth is a linear function of the independent variables, where each coefficient βi\beta_iβi indicates the marginal impact of the corresponding variable on GDP growth. For example: β1\beta_1β1 measures the effect of the current account balance on GDP growth. β2\beta_2β2 reflects the contribution of domestic credit to the private sector. β3\beta_3β3 captures the effect of final consumption expenditure on economic growth. The error term εt\varepsilon_tεt accounts for any unexplained variation in GDP growth that is not captured by the included variables. This model allows us to assess which factors play the most significant role in driving economic growth in Albania and identify potential policy areas for improvement.

Table 2: *Method: Least Squares.*

Dependent Variable: GDPG				
Method: Least Squares				
Date: 11/05/24 Time: 01:45				
Sample: 1 27				
Included observations: 27				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-14.52817	14.82079	-0.980256	0.3400
CAB	0.487309	0.253959	1.918847	0.0710
DCPS	0.001918	0.124172	0.015447	0.9878
FCE	0.532604	0.265559	2.005596	0.0602
GEXP	0.897604	0.325787	2.755192	0.0130
GFCF	-0.181954	0.159444	-1.141178	0.2688
INFLATION	-0.226011	0.174002	-1.298896	0.2104
POPG	-2.122212	1.883771	-1.126576	0.2747
TRADEOPEN	0.003717	0.163104	0.022788	0.9821
R-squared	0.780750	Mean dependent var		4.062137
Adjusted R-squared	0.683305	S.D. dependent var		4.332646
S.E. of regression	2.438223	Akaike info criterion		4.881618
Sum squared resid	107.0088	Schwarz criterion		5.313563
Log likelihood	-56.90184	Hannan-Quinn criter.		5.010058
F-statistic	8.012255	Durbin-Watson stat		2.130772
Prob(F-statistic)	0.000133			

Source: Data processed from World Bank Database using Econometric Software, EViews 13 (Nov 2024).

The model's R-squared value is approximately 0.780, indicating that about 78.0% of the variability in GDP growth can be explained by the independent variables included in the model. The Adjusted R-squared of 0.683 suggests that when adjusting for the number of predictors, about 68.3% of the variability is explained.

4.1.1 Significant Variables.

GEXP (Government Expenditure): The coefficient for government expenditure is 0.8976, with a t-statistic of 2.7552 and a p-value of 0.0130, indicating it is statistically significant at the 5% level. This suggests that an increase in government spending is associated with higher GDP growth, highlighting its positive impact on economic activity. FCE (Final Consumption Expenditure): The coefficient is 0.5326, with a t-statistic of 2.0056 and a p-value of 0.0602, indicating it is marginally significant at the 10% level. This implies that higher final consumption expenditure may contribute positively to GDP growth, supporting economic theory. CAB (Current Account Balance): The coefficient is 0.4873, with a t-statistic of 1.9188 and a p-value of 0.0710, suggesting it is marginally significant at the 10% level. This indicates that a better current account balance may be associated with GDP growth.

4.1.2 Non-Significant Variables.

DCPS (Domestic Credit to Private Sector): The coefficient is 0.0019, with a t-statistic of 0.0154 and a p-value of 0.9878, indicating it is not statistically significant. GFCF (Gross Fixed Capital Formation): The coefficient is -0.1820, with a t-statistic of -1.1412 and a p-value of 0.2688, suggesting no significant relationship with GDP growth. INFLATION: The coefficient is -0.2260, with a t-statistic of -1.2989 and a p-value of 0.2104, indicating it does not significantly affect GDP growth. POPG (Population Growth): The coefficient is -2.1222, with a t-statistic of -1.1266 and a p-value of 0.2747, showing no significant impact on GDP growth. TRADEOPEN (Trade Openness): The coefficient is 0.0037, with a t-statistic of 0.0228 and a p-value of 0.9821, suggesting it is not statistically significant.

4.2 Model Fit and Diagnostics.

The R-squared value of 0.7808 indicates that approximately 78.1% of the variability in GDP growth is explained by the included variables. The Adjusted R-squared of 0.6833 indicates that about 68.3% of the variability is explained when adjusting for the number of predictors. The F-statistic of 8.0123 with a p-value of 0.000133 indicates that the overall model is statistically significant, meaning at least one of the predictors significantly relates to GDP growth. The Durbin-Watson statistic of 2.1308 suggests that there is no significant autocorrelation in the residuals, which is a positive sign for model validity. Policy Implications. The significant relationship between government expenditure and GDP growth suggests that policymakers in Albania should prioritize fiscal policies that enhance public spending to stimulate economic growth. Additionally, the positive association between final consumption expenditure and GDP indicates that consumer spending plays a crucial role in economic activity. Further Research. The results highlight the need for further investigation into the dynamics of non-significant variables, such as domestic credit and trade openness, to explore their potential indirect effects on GDP growth. Expanding the dataset or examining different

time periods may provide deeper insights into these relationships. In summary, while government expenditure is a significant predictor of GDP growth, further exploration of other factors is essential for a comprehensive understanding of the Albanian economy's dynamics.

4.3 VAR Model.

VAR models are a popular method for multivariate time series, such as the one in this study. These results are from a Vector Autoregression (VAR) model, which is a type of time series model used to analyze dynamic relationships between multiple variables.

Table 3: *Vector Autoregression Estimates.*

Vector Autoregression Estimates			
Date: 11/05/24 Time: 02:15			
Sample (adjusted): 3 27			
Included observations: 25 after adjustments			
Standard errors in ( ) & t-statistics in [ ]			
	GDPG		
GDPG(-1)	**-0.623281**		
	(0.14067)		
	[-4.43084]		
GDPG(-2)	**-0.313280**		
	(0.07346)		
	[-4.26440]		
C	**-45.03738**		
	(9.24472)		
	[-4.87169]		
CAB	-0.206349		
	(0.18104)		
	[-1.13980]		
DCPS	-0.461302		
	(0.09496)		
	[-4.85790]		
FCE	-0.399823		
	(0.18118)		
	[-2.20674]		
GEXP	**1.199383**		
	(0.24124)		
	[4.97179]		
GFCF	**-0.223691**		
	(0.09690)		
	[-2.30844]		
INFLATION	**-0.125073**		
	(0.20363)		
	[-0.61422]		
POPG	**-5.244338**		
	(1.09203)		
	[-4.80237]		
TRADEOPEN	**0.489246**		
	(0.10734)		
	[4.55807]		
R-squared	0.915674		
Adj. R-squared	0.855442		
Sum sq. resids	19.96013		

S.E. equation	1.194037		
F-statistic	15.20228		
Log likelihood	-32.65922		
Akaike AIC	3.492738		
Schwarz SC	4.029043		
Mean dependent	4.470730		
S.D. dependent	3.140479		

Source: Data processed from World Bank Database using Econometric Software, EViews 13 (Nov 2024).

The results from the Vector Autoregression (VAR) model provide valuable insights into the dynamics of GDP growth (GDPG) in relation to several macroeconomic variables. Here are the key observations:

Lagged GDP Growth**:** The coefficients for GDPG(-1) and GDPG(-2) are both negative and statistically significant, indicating that previous GDP growth rates negatively influence current growth. This suggests a persistence in growth rates, potentially reflecting adjustment processes in the economy.

Government Expenditure (GEXP): The positive coefficient for GEXP (1.199) is significant, suggesting that increased government spending is associated with higher GDP growth. This supports the notion that productive government investment can stimulate economic activity.

Domestic Credit to the Private Sector (DCPS): The negative coefficient (-0.461) and significant t-statistic indicate that higher domestic credit can have a negative effect on GDP growth. This could imply issues with credit allocation or inefficiencies in how credit is utilized in the economy.

Final Consumption Expenditure (FCE): The negative coefficient (-0.399) for FCE suggests that increases in final consumption do not necessarily lead to GDP growth, potentially reflecting crowding-out effects where consumption detracts from investment.

Gross Fixed Capital Formation (GFCF): The negative impact of GFCF (-0.223) is statistically significant, indicating that higher fixed capital investment may not correlate with GDP growth under the current conditions, possibly due to misallocation or inefficiencies. Inflation: The coefficient for inflation (-0.125) is not statistically significant, suggesting that its immediate effect on GDP growth may be negligible in the short term.

Population Growth (POPG) : The highly negative coefficient (-5.244) shows that population growth has a significant negative impact on GDP growth, which could imply that without adequate economic opportunities, a growing population may lead to resource strain.

Trade Openness (TRADEOPEN): The positive coefficient (0.489) indicates that increased trade openness positively influences GDP growth, aligning with literature that emphasizes the benefits of integration into global markets. Model Fit: The R-squared value of 0.916 suggests that the model explains a substantial portion of the variance in GDP growth, and the F-statistic of 15.202 indicates that the overall model is statistically significant.

Overall, these results highlight the complex interplay between macroeconomic factors and GDP growth in Albania, with government expenditure and trade openness emerging as significant positive drivers, while high domestic credit, population growth, and fixed capital formation present challenges to growth.

4.4 Granger casualty test

To examine the direction of causality among the variables, we perform Granger causality tests (Lopez, 2018). These tests assess whether the past values of one time series provide useful information for forecasting another, offering insights into the predictive relationships between variables.

Table 4: *Pairwise Granger Causality Tests.*

Pairwise Granger Causality Tests			
Date: 11/05/24 Time: 02:25			
Sample: 1 27			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
DCPS does not Granger Cause CAB	25	5.59981	0.0117
CAB does not Granger Cause DCPS		0.67835	0.5188
FCE does not Granger Cause CAB	25	0.41622	0.6651
CAB does not Granger Cause FCE		1.78393	0.1937
GDPG does not Granger Cause CAB	25	0.45147	0.6430
CAB does not Granger Cause GDPG		1.15504	0.3352
GEXP does not Granger Cause CAB	25	6.73216	0.0058
CAB does not Granger Cause GEXP		0.64294	0.5363
GFCF does not Granger Cause CAB	25	1.75646	0.1983
CAB does not Granger Cause GFCF		2.84306	0.0819
INFLATION does not Granger Cause CAB	25	0.04883	0.9525
CAB does not Granger Cause INFLATION		0.58834	0.5646
POPG does not Granger Cause CAB	25	0.24999	0.7812
CAB does not Granger Cause POPG		0.79031	0.4674
TRADEOPEN does not Granger Cause CAB	25	0.01329	0.9868
CAB does not Granger Cause TRADEOPEN		0.00872	0.9913
FCE does not Granger Cause DCPS	25	0.53969	0.5912
DCPS does not Granger Cause FCE		3.76079	0.0411
GDPG does not Granger Cause DCPS	25	0.27067	0.7656
DCPS does not Granger Cause GDPG		6.78899	0.0056
GEXP does not Granger Cause DCPS	25	1.34596	0.2829
DCPS does not Granger Cause GEXP		4.53606	0.0237
GFCF does not Granger Cause DCPS	25	1.96304	0.1666
DCPS does not Granger Cause GFCF		9.88816	0.0010
INFLATION does not Granger Cause DCPS	25	0.55772	0.5812
DCPS does not Granger Cause INFLATION		0.27064	0.7656
POPG does not Granger Cause DCPS	25	0.73279	0.4930
DCPS does not Granger Cause POPG		0.17729	0.8388
TRADEOPEN does not Granger Cause DCPS	25	2.55571	0.1027
DCPS does not Granger Cause TRADEOPEN		1.50146	0.2469
GDPG does not Granger Cause FCE	25	0.26264	0.7716
FCE does not Granger Cause GDPG		0.60083	0.5580
GEXP does not Granger Cause FCE	25	0.24847	0.7824
FCE does not Granger Cause GEXP		0.49219	0.6185
GFCF does not Granger Cause FCE	25	5.12571	0.0160
FCE does not Granger Cause GFCF		1.32938	0.2870
INFLATION does not Granger Cause FCE	25	0.35366	0.7064
FCE does not Granger Cause INFLATION		0.76395	0.4789
POPG does not Granger Cause FCE	25	0.70865	0.5043
FCE does not Granger Cause POPG		0.22839	0.7979
TRADEOPEN does not Granger Cause FCE	25	1.87841	0.1788

FCE does not Granger Cause TRADEOPEN		0.62627	0.5447
GEXP does not Granger Cause GDPG	25	2.04622	0.1554
GDPG does not Granger Cause GEXP		1.71115	0.2061
GFCF does not Granger Cause GDPG	25	3.17864	0.0633
GDPG does not Granger Cause GFCF		3.46465	0.0511
INFLATION does not Granger Cause GDPG	25	2.35894	0.1203
GDPG does not Granger Cause INFLATION		4.88221	0.0188
POPG does not Granger Cause GDPG	25	1.20360	0.3209
GDPG does not Granger Cause POPG		0.07095	0.9317
TRADEOPEN does not Granger Cause GDPG	25	6.80379	0.0056
GDPG does not Granger Cause TRADEOPEN		0.03006	0.9704
GFCF does not Granger Cause GEXP	25	2.22589	0.1340
GEXP does not Granger Cause GFCF		1.67348	0.2128
INFLATION does not Granger Cause GEXP	25	0.11561	0.8914
GEXP does not Granger Cause INFLATION		0.30004	0.7441
POPG does not Granger Cause GEXP	25	0.92812	0.4117
GEXP does not Granger Cause POPG		0.87645	0.4316
TRADEOPEN does not Granger Cause GEXP	25	0.11619	0.8909
GEXP does not Granger Cause TRADEOPEN		0.95634	0.4012
INFLATION does not Granger Cause GFCF	25	6.80298	0.0056
GFCF does not Granger Cause INFLATION		1.27408	0.3014
POPG does not Granger Cause GFCF	25	0.46819	0.6328
GFCF does not Granger Cause POPG		0.47910	0.6263
TRADEOPEN does not Granger Cause GFCF	25	7.77968	0.0032
GFCF does not Granger Cause TRADEOPEN		0.07896	0.9244
POPG does not Granger Cause INFLATION	25	22.5465	7.E-06
INFLATION does not Granger Cause POPG		0.05735	0.9444
TRADEOPEN does not Granger Cause INFLATION	25	3.22437	0.0611
INFLATION does not Granger Cause TRADEOPEN		1.18507	0.3263
TRADEOPEN does not Granger Cause POPG	25	0.45611	0.6402
POPG does not Granger Cause TRADEOPEN		0.76895	0.4767

Source: Data processed from World Bank Database using Econometric Software, EViews 13 (Nov 2024).

The results of the pairwise Granger causality tests indicate significant relationships among the variables under consideration, providing valuable insights into the dynamics of economic factors.

Domestic Credit and Current Account Balance: The results reveal that domestic credit (DCPS) Granger causes the current account balance (CAB) (F-statistic = 5.59981, p = 0.0117), suggesting that fluctuations in domestic credit may influence the current account. Conversely, CAB does not Granger cause DCPS (p = 0.5188), indicating a unidirectional relationship.

Government Expenditure and Current Account Balance: Similarly, government expenditure (GEXP) is found to Granger cause CAB (F-statistic = 6.73216, p = 0.0058), reinforcing the notion that government spending decisions have significant implications for the current account. The reverse direction (CAB → GEXP) is not significant (p = 0.5363). Gross Fixed Capital Formation and Current Account Balance: Although GFCF does not Granger cause CAB (p = 0.1983), the reverse causality (CAB → GFCF) approaches significance (p = 0.0819), suggesting a potential link that merits further investigation.

Inflation and Current Account Balance: The lack of significant Granger causality in both directions between inflation and CAB (p = 0.9525 for inflation → CAB; p = 0.5646 for

CAB → inflation) implies that inflation may not be a leading factor for the current account balance.

Population Growth and Current Account Balance: The tests indicate no significant Granger causality between population growth (POPG) and CAB in either direction, suggesting that demographic factors may not be directly influencing the current account in this context.

Trade Openness and Current Account Balance: Trade openness (TRADEOPEN) does not Granger cause CAB (p = 0.9868), nor does CAB Granger cause TRADEOPEN (p = 0.9913), highlighting a lack of causal relationship. Domestic Credit and Final Consumption Expenditure: The tests show that final consumption expenditure (FCE) does not Granger cause DCPS (p = 0.5912), but there is a significant causal link in the opposite direction (DCPS → FCE) (F-statistic = 3.76079, p = 0.0411).

GDP Growth and Domestic Credit: A significant causal relationship is observed where DCPS Granger causes GDP growth (GDPG) (F-statistic = 6.78899, p = 0.0056), indicating that domestic credit plays a role in influencing economic growth. Inflation and GDP Growth: The causality tests reveal that inflation Granger causes GDP growth (p = 0.0188), suggesting that inflationary pressures may impact economic growth, while the reverse does not hold (GDPG → INFLATION, p = 0.1203).

Trade Openness and GDP Growth: Notably, trade openness Granger causes GDP growth (F-statistic = 6.80379, p = 0.0056), indicating that increased integration into the global economy may positively influence economic growth.

Overall, the Granger causality tests provide insights into the directional relationships among economic variables, highlighting significant causal links, particularly from domestic credit and government expenditure to the current account balance and GDP growth. These findings underscore the importance of fiscal and monetary policies in shaping economic outcomes and warrant further research to explore the underlying mechanisms driving these relationships.

5. CONCLUSIONS

This study investigated the impact of various macroeconomic factors on GDP growth in Albania. The empirical analysis, employing a panel data approach, revealed that government expenditure and trade openness are statistically significant determinants of GDP growth. These findings align with economic theory, suggesting that increased government spending and trade integration can stimulate economic activity.

However, the impact of other variables, such as domestic credit, final consumption expenditure, gross fixed capital formation, inflation, population growth, and the current account balance, was found to be statistically insignificant in the short run. This suggests that while these factors may have long-term implications for economic growth, their immediate impact might be less pronounced.

The Granger causality tests provided additional insights into the dynamic relationships between these variables. The findings indicate that domestic credit and government expenditure Granger-cause the current account balance, suggesting that these factors can influence the country's external balance. Additionally, domestic credit and trade openness were found to Granger-cause GDP growth, highlighting their role in driving economic activity.

The analysis used in this article is based on a specific time period and data set, and the findings may not be generalizable to other contexts. Furthermore, model specification and the inclusion of additional variables can potentially affect the results.

Future research may consider expanding the sample period, incorporating additional variables, and employing more advanced econometric techniques to provide a more comprehensive understanding of the determinants of GDP growth in Albania. Additionally, exploring the long-term effects of these variables and their potential non-linear relationships could yield further insights.

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THE INTERSECTION OF CORPORATE GOVERNANCE, ETHICS, INTERNAL AUDIT, AND BANKRUPTCY RISK MANAGEMENT: A BIBLIOMETRIC ANALYSIS

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Abstract: This study employs a mixed-methods approach to delve into the intricate interplay among corporate governance, bankruptcy risk, forensic accounting, internal auditing, and ethics. While prior research has highlighted the correlation between weak governance, increased bankruptcy risk, and ethical lapses, the synergies among these factors necessitate deeper investigation. The authors conducted a meticulous bibliometric analysis of the Scopus database, focusing on the realms of accounting, internal audit, forensics, bankruptcy, and ethics within the overarching domain of corporate governance. Emphasizing the importance of robust governance principles in mitigating risks in accounting, the study revealed a substantial coverage of resources across various disciplines, with accounting (54.6%) and ethics (25.1%) leading the distribution. The dataset, comprising 5990 resources from 495 publications cited 151,911 times spanning from 1978 to March 2024, serves as a valuable resource for scholars aiming to fortify organizational resilience by integrating critical concepts identified in this research.

Keywords: Corporate governance, Bankruptcy risk, Forensic Accounting, Internal audit, Ethics.

INTRODUCTION

Corporate governance is the one-setting framework for business ethical behavior, which in turn shapes the organizational culture and guides the business operations to ensure corporate performance. In recent decades, corporate governance and business ethics have faced increased scrutiny due to high-profile corporate failures and scandals. Weak governance and unethical practices can pose significant risks to an organization's long-term viability, including financial distress, fraud, and regulatory noncompliance. However, the complex relationships between governance, ethics, forensic accounting controls, internal auditing, and bankruptcy outcomes have not been thoroughly explored as part of financial resilience within corporate governance.

This study aims to address young researchers toward an academic approach to the interplay of the areas covering accounting, internal audit, forensics, bankruptcy, and ethics

throughout a complex bibliometric output from the Scopus database to define the authors' perspective of organizational resilience. The authors consider this as a start for further research within the frame of sustainability and resilience domain.

The first step in ensuring a company can become sustainable from the financial, environmental, social, and risk management perspective is to ensure financial resilience. A struggling company that faces a lot of financial challenges may have a very hard time having concerns regarding environmental and social issues, no matter how important and necessary they may be.

Analysing these issues through the magnifying glance of ethics, risk management, and internal audit processes can provide insights to help organizations strengthen resilience against threats to their sustainability.

Literature review

On May 2023, Dun & Bradstreet defined "resilience" in business terms as those organizations that can " identify risks early, adapt to negative external changes and maintain business operations during difficult situations" (Dun & Bradstreet, 2023), combined with corporate sustainability and purpose for business continuity or long-term survival (Florez-Jimenez, Lleo, Danvila Del Valle, & Sánchez-Marín, 2024), thus building the concept of "corporate sustainable development performance" (Yao & Wang, 2024)

The economic environment has been so often impacted by globalization (Lama, 2013), financial distress (Otivbo & Ofuan, 2023), financial scandals and repercussions (Ajayi-Nifise, Olubusola, Falaiye, Mhlongo, & Daraojimba, 2024), Covid-19 pandemic supply chain disruptions (Mohammed, Lopes de Sousa Jabbour, & Diabat, 2021), war business conditions (Obłój & Voronovska, 2024), extreme environmental events (Wu & Tham, 2023), artificial intelligence challenges (Singh & Goyal, 2023) and made companies understand that all financial risk-driven decisions include a company's ability to obtain critical information on all probable risks identified.

Although many companies are following corporate governance principles, it does not automatically translate into becoming more sustainable or recognizing the added business value of a result. (Beloff, Tanzil, & Lines, 2004)

A significant role in managing all the risk factors within a company increased the need for big data tools and then analysis specialists to identify and implement" ways to achieve improved competitive advantage and to build internal and external capabilities" (Bag, Dhamija, Luthra, & Huisingh, 2023) to help companies to identify, assess, mitigate, reduce, and eliminate risks in business resilience goals.

"Bibliometrics is to scientific papers as epidemiology is to patients" (Lewison & Devey, 1999) by following the trajectory of a research area of published information and the related data in the form of authors, citations, abstract, keywords by visualization of their relationships in the form of network nodes' plots (Ninkov, Frank, & Maggio, 2022). As in accounting and finance, a bibliometric analysis uses quantitative and qualitative approaches (Ellili, 2023), the quantitative study for relationships and interconnections of the bibliographic material and the qualitative analysis to examine them in depth for better understanding (Charl de Villiers, Dumay, & Maroun, 2019).

Data and methodology

Corporate governance is a vast and longtime approached subject by the academic community, so a Vosviewer (Van Eck & Waltman, 2009) technique was used since it is a popular method of measuring the dimension and the novelty of the research area.

Vosviewer was selected as the research method due to its technical robustness and friendly user approach in finding correlations between concepts (Kirby, 2023) to undertake a useful starting approach for more complex further research. Using the Vosviewer computer programming for text mining for the above concepts and keywords used by authors in their research in the Scopus database, bibliometric research and providing a visual correlation were established. A search in Scopus for the keywords bankruptcy, internal audit, forensic, ethics, corporate governance, and accounting, separately generated impressive numbers of articles written. A search for all the concepts together generated through 0 results, even a mix of four or 3 concepts combined did not produce significant data to be analyzed. So, a mixed-methods study was conducted, by generating individual bibliometric queries of only two concepts keywords, corporate governance & accounting, corporate governance & internal audit, corporate governance & forensic, corporate governance & ethics, corporate governance and bankruptcy. Then the results exported individually in CSV file type were combined into a single file, transformed in xlsx file for the descriptive analysis, and also uploaded in VOS to create the interconnectivity of the keywords for all the concepts, thus generating the results for the initial query. The case studies provided context to help authors find the resources for all the concepts involved and to have a good perspective of the references' quantity and quality input, demonstrating the interconnectivity between corporate governance, accounting, internal audit, forensics, bankruptcy, and ethics within academic research.

Results and discussions

The data set obtained by combining the concepts was further analyzed using a mix of tools, like Vos Viewer, excel, and Jasp to assess what kind of analysis would help young researchers in their quest. Performing descriptive statistics in Excel we find that out of a total of 5,990 articles, 15% benefited from funding, 28% are open access and 89% have an identification DOI number, as per the below figure for open access frequencies analysis, worked in the statistical program Jasp.

Figure 1: Descriptive statistics: frequencies for open access articles

Frequencies for Open Access

Open Access	Frequency	Percent	Valid Percent	Cumulative Percent
All Open Access; Bronze Open Access	185	3.088	11.171	11.171
All Open Access; Bronze Open Access; Green Open Access	57	0.952	3.442	14.614
All Open Access; Gold Open Access	308	5.142	18.599	33.213
All Open Access; Gold Open Access; Green Open Access	262	4.374	15.821	49.034
All Open Access; Green Open Access	461	7.696	27.838	76.872
All Open Access; Green Open Access; Hybrid Gold Open Access	213	3.556	12.862	89.734
All Open Access; Hybrid Gold Open Access	170	2.838	10.266	100.000
Missing	4334	72.354		
Total	5990	100.000		

Source: authors

Examining the number of articles written over time from 1978 to early 2024, we find that very few articles combine the author's keywords corporate governance and forensic (50 articles in total representing 1%) and bankruptcy (366 articles in total representing 6%).

Table 1: Breakdown of the dataset into categories

Keywords	No. of Titles	%	No. of Funding Details	%	No. of Open Access	%	No. of DOI	%
Accounting	3,271	55%	573	62%	956	58%	2,920	55%
Bankruptcy	366	6%	53	6%	94	6%	304	6%
Ethics	799	13%	117	13%	232	14%	686	13%
Forensic	50	1%	7	1%	12	1%	44	1%
Internal audit	1,504	25%	178	19%	362	22%	1,364	26%
Grand Total	5,990	100%	928	100%	1,656	100%	5,318	100%
%	100%		15%		28%		89%	

Source: authors

Generating a histogram for the number of articles within the time frame, we find an asymmetrical distribution, a left-skewed distribution (negatively-skewed), with high density for the years 2000 to 2024, when we have an average of 236 articles per year, comparing with the previous period 1978 – 1999 when we had an average of 6 published articles per year. The pivot table output generated in Excel can be reviewed in the Annex of this article.

Figure 2: Frequencies histogram chart for the number of articles
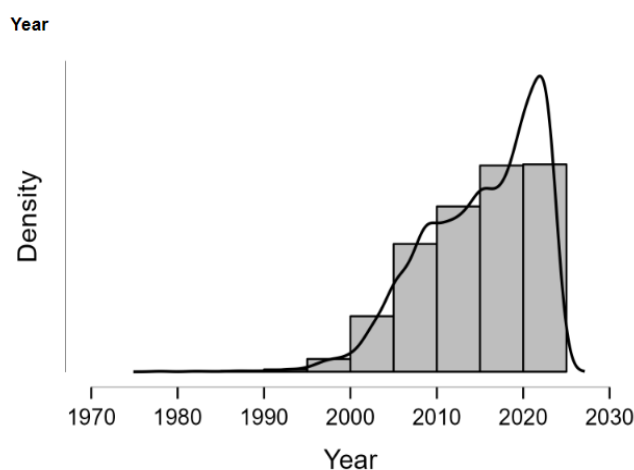
Source: authors

In Excel we generated a combo chart to combine the number of articles written per year with the number of citations, resulting a table showing the maximum number of articles have been published in 2023 (a total of 574 articles) and the highest number of citations are met in the year 2008 (12,424), followed closely by the year 2010 (10,263). Most probably the articles written in the last 10 years will generate more citations within the next years, as new academic research will probably follow.

Figure 3: Chart for articles evolution and citations
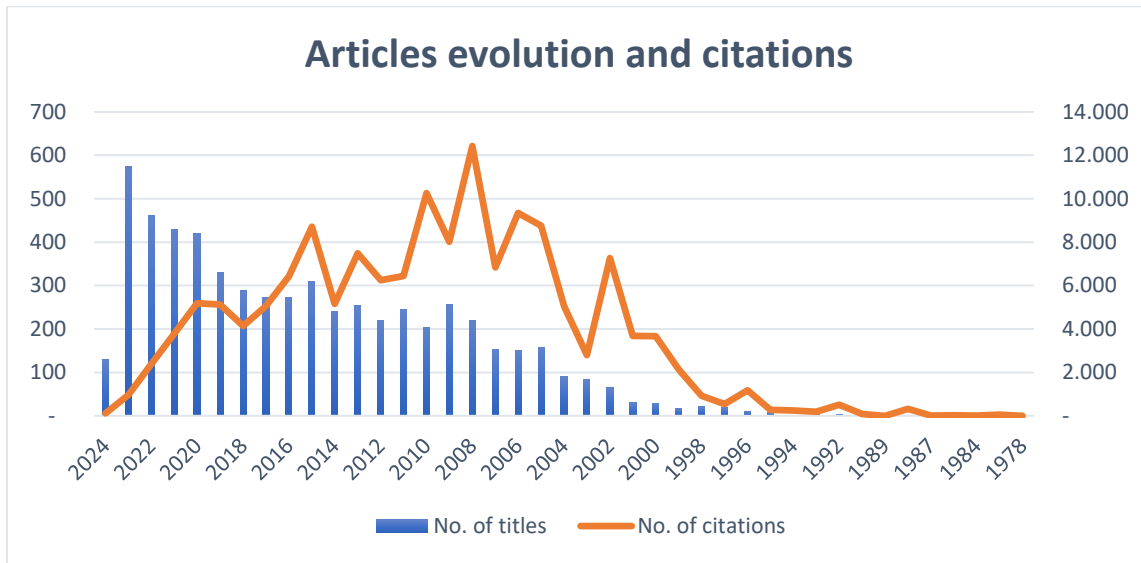
Source: authors

Below we can find the generated image extracted from Vos Viewer after combining all five .csv documents extracted from the Scopus database for co-occurrence of the authors keywords selection. It was expected for corporate governance to be the most visible since is it the common link to all the datasets and searches.

Figure 4: Vosviewer co-occurrence of keywords
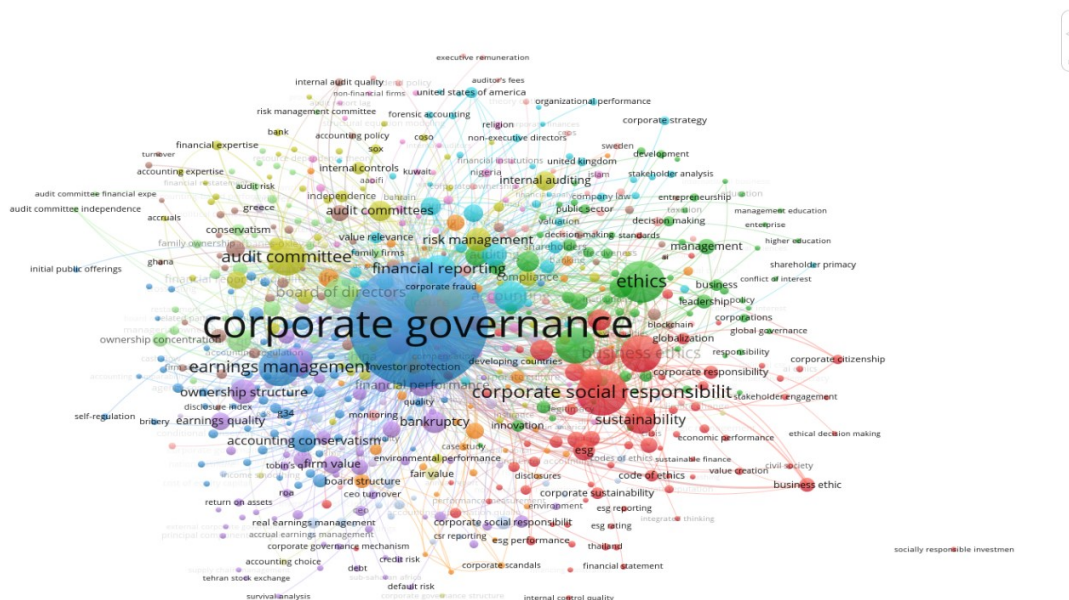
Source: authors

Vos viewer generated a number of 14 clusters for 637 items with 9505 links between them. Changing to density visualization we can assess better the dimension of the clusters connecting corporate governance with ethics, financial reporting, risk management, audit committee, earnings management, corporate social responsibility, and very small density for bankruptcy, forensic, and internal auditing.

Figure 5: Vosviewer co-occurrence of keywords by density

Source: authors

To have a better understanding of the Vosviewer network visualization analysis, since there are so many items, a clustersț review was performed, choosing for each cluster the most relevant keywords considered by the authors helpful for further literature review research.

- Cluster 1 (79 items) built around the keyword corporate social responsibility brings co-occurrence connectivity with the main keywords selected as important by the authors in their research: governance, business ethics, sustainability, integrated reporting, accountability, financial performance, accounting, transparency, sustainable development.
- Cluster 2 (69 items) is built around the keyword ethics brings co-occurrence connectivity with the main keywords selected as important: management, fraud, risk management, auditing, accounting, compliance, corruption, corporate culture, corporate social responsability, artificial intelligence, business ethichs, decision making, sustainability.
- Cluster 3 (68 items) is built around the keyword corporate governance brings connectivity with earnings management, accounting conservatism, accounting conservatism, financial regulation, earnings management, risk-taking, ceo duality.
- Cluster 4 (61 items) is built around the keyword board of directors brings connectivity with audit committee, financial reporting quality, internal control, risk management, internal auditing, risk assessment, ethics, corporate responsibility.
- Cluster 5 (61 items) is built around the keyword firm performance brings connectivity with accounting fraud, bankruptcy prediction, corporate social responsibility disclosure, machine learning, survival analysis, performance measures, financial ratios, default risk, agency problem, credit risk.
- Cluster 6 (45 items) is built around the keyword accounting brings connectivity with: auditing, corporate fraud, forensic accounting, information technology, fraud triangle, organizational performance, fraud detection, corporate strategy, fraud prevention, corporate fraud.

- Cluster 7 (42 items) is built around the main keywords: bankruptcy risk, corporate governance standards, financial crisis, organizational culture, crash risk , code of best practice, corporate scandals, accounting standards.
- Cluster 8 (42 items) is built around the main keywords: artificial intelligence, internal audit function, management accountability, financial accounting, corporate governance mechanisms, international financial reporting standard.
- Cluster 9 (35 items) is built around the main keywords: bibliometric analysis, financial statement fraud, cybersecurity, Vosviewer, accounting and finance, audit report lag, control.
- Cluster 10 (35 items) is built around the main keywords: accounting research, theory of the firm, corporate ethics, agency theory, Sarbanes-oxley.
- Cluster 11 (34 items) is built around the main keywords: accounting scandals, meta-analysis, external auditing, internal governance, audit committee independence, restatement.
- Cluster 12 (34 items): codes of conduct, multinational companies, related party transactions, corporate social responsibility (csr), accounting disclosure, sustainable development goals.
- Cluster 13 (19 items): accounting choice, international accounting, profitability, crisis management, income smoothing.
- Cluster 14 (14 items): agency conflicts, external audit, management accounting, external audit, top management team, supervisory board.

Further research of the nationality of the authors who published these articles brings us a total of 107 countries, generating 17 clusters, out of which Romania is interconnected with other 14 countries: Australia, Cape Verde, Colombia, Germany, Iceland, Malta, Mexico, Netherlands, Panama, Peru, Slovakia, Spain, Trinidad and Tobago, Ukraine.

Figure 6: Vosviewer network visualization of authors per country
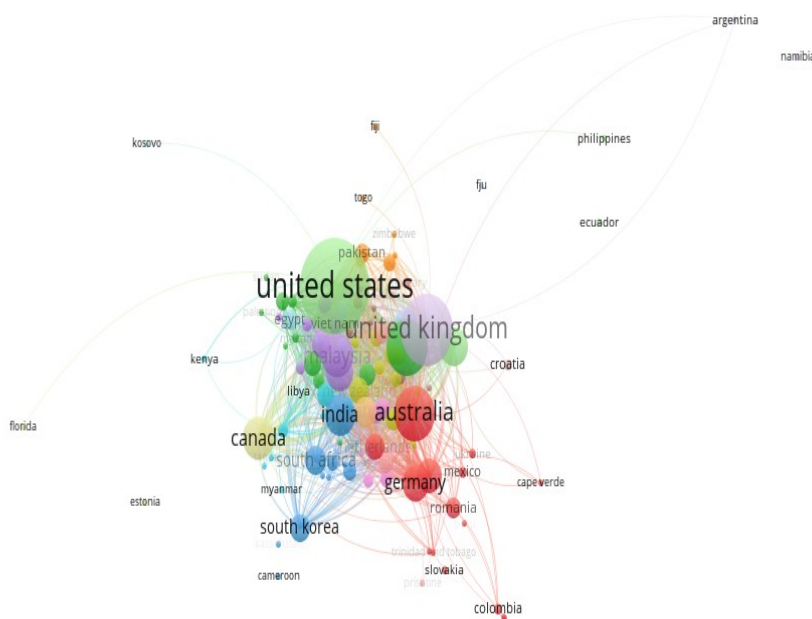
Source: authors

CONCLUSIONS

This study extends previous research by demonstrating the complementary roles of internal controls, forensic accounting, credit risk management, and ethics initiatives in governance's influence. When integrated within an ethical culture and robust control environment, these functions contribute to effective governance in practice for resilience and sustainability.

This research identified the gap between several limited articles written on bankruptcy, forensic accounting, and ethics within the area of corporate governance. The internal audit component can be the link of governance principles and audit procedures to better enhance the company's resilience in terms of risk management for financial sustainability and fraud detection for resilience purposes as well.

Another aspect since the bibliometric study was performed combining accounting, ethics, bankruptcy risk management, internal audit, and forensic accounting was the lack of financial indicators and ratios involved taken into account for corporate resilience and sustainability except only one cluster where financial ratios had the occurrence 7 times. In the authors' opinion, all techniques and tools for fraud detection, risk management, and internal auditing are done on the accounting information in the form of ratios, and financial indicators.

A search involving a large amount of data can have limitations in terms of lacking the in-depth search of the area, going article by article, which would mean a lot of time allocation to identify other gaps as well, maybe having a more qualitative significance than the quantitative approach by using Vosviewer. Maybe artificial intelligence tools will offer shortly the possibility to interconnect big data analysis with qualitative information generated in an easier way for both the scientific committee and corporations.

In conclusion, this study provides empirical evidence of the intricate relationship between corporate governance, internal controls, forensic accounting, ethics, and bankruptcy risk. To enhance sustainability, organizations should consider these issues holistically, adopting an enterprise risk management approach rather than addressing them in isolation. Therefore, a comprehensive examination of the interplay between soft and hard controls is warranted. The findings offer guidance to practitioners on strengthening organizational resilience through coordinated reforms in these interconnected domains.

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Annex 1: Pivot table analysis of the dataset

Year	No. of ISBN	No. of ISSN	No. of titles	No. of citations	No. of DOI	No. of Open Access
2024	3	129	130	116	127	64
2023	86	501	574	970	543	211
2022	58	413	462	2,392	447	208
2021	61	373	429	3,784	392	191
2020	44	381	419	5,186	380	168
2019	31	302	331	5,125	285	119
2018	40	251	289	4,142	262	93
2017	51	225	273	5,050	239	63
2016	45	228	274	6,431	242	67
2015	39	276	310	8,710	263	77
2014	45	205	241	5,161	205	53
2013	29	231	254	7,492	229	54
2012	43	178	220	6,249	198	50
2011	49	200	246	6,442	206	45
2010	41	164	204	10,263	174	31
2009	54	207	256	8,023	217	37
2008	32	194	219	12,424	189	38
2007	23	129	153	6,831	132	21
2006	37	119	151	9,350	132	29
2005	24	137	157	8,755	136	14
2004	5	86	91	5,046	80	7
2003	11	73	84	2,799	52	6
2002		63	65	7,269	53	4
2001		30	30	3,688	29	1
2000		29	29	3,669	25	3
1999		18	18	2,132	15	1
1998		22	22	927	20	
1997		12	19	547	12	
1996		10	10	1,177	8	
1995		7	7	280	7	
1994		2	2	244	2	
1993		4	5	194	5	
1992		4	4	511	2	
1990		2	2	83	2	1
1989		1	1	1		
1988		1	1	323	1	
1987		2	2	19	2	
1986		1	1	21	1	
1984		1	1	20	1	
1982		2	2	61	2	
1978		2	2	4	1	
Grand Total	**851**	**5,215**	**5,990**	**151,911**	**5,318**	**1,656**

Source: authors

MEDIA SENTIMENT AND STOCK PRICES: ANALYSING TEMPORAL DYNAMICS AND PREDICTIVE RELATIONSHIPS IN TESLA AND META

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Abstract: The study investigates the relationship between media sentiment and stock price fluctuations. Using quantitative techniques, the research examines data from Tesla and Meta from 2019 to 2024. Headlines and adjusted stock prices were processed into monthly averages to reduce noise, enabling statistical analysis through cross-correlation and Granger causality tests. The results indicate a link between sentiment and stock prices, suggesting that sentiment may have some predictive capability for stock price movements. The research underscores the importance of addressing media sentiment in financial decision-making.

Keywords: media sentiment, stock prices, cross-correlation, Granger causality

1. INTRODUCTION

In today's digitized world, characterized by an overwhelming abundance of information, news and social media play an increasingly significant role in shaping public opinion. The media wield considerable influence over social attitudes, emotional responses, and decision-making processes through mechanisms such as agenda-setting, framing, priming, and emotional engagement, among others. This influence extends to financial markets, where investor behavior is often impacted by media narratives. Studies like Singh, Aggarwal, and Chauhan (2022) have demonstrated the power of sentiment analysis on social media platforms for predicting stock market trends. Building on these insights, this study focuses on sentiment from media headlines to evaluate its relationship with stock prices, extending sentiment analysis to professional sources. The rapid proliferation of digital platforms has further amplified the importance of understanding how media content shapes financial outcomes and decision-making processes. Fama (1970), in his foundational work on Efficient Market Hypothesis, posited that financial markets are "informationally efficient," implying that prices reflect all available information at any given time. However, the emergence of behavioral finance suggests that emotional factors, such as media sentiment, may cause deviations from efficiency. This study has two primary objectives: first, to examine whether media sentiment has a statistically significant relationship with adjusted stock closing prices; and second, to evaluate whether past sentiment data can predict future stock price trends. To achieve these goals, the study employs cross-correlation analysis and Granger causality tests, using sentiment data extracted from headlines scraped from Business Insider and stock price data retrieved

through Python's yfinance library. The findings of this research aim to shed light on the complex interplay between media sentiment and stock prices, offering valuable insights into how sentiment influences market dynamics and investor behavior.

2. Summary of Research Design and Methods

This study explores the connection between media sentiment and corporate stock prices. It focuses on two globally recognized companies, Tesla and Meta, using data from *January 2019 to October 2024*. The research aims to evaluate correlation dynamics and test predictive capabilities.

3. Research Objective

The primary goal is to analyze whether media sentiment can influence or predict changes in stock prices. Similar studies have demonstrated the utility of sentiment analysis in understanding market trends, especially in emerging economies, where Mohan, Vemuri, and Mandal (2019) identified a significant relationship between sentiment shifts and financial market behavior. Their work focused on the unique dynamics of developing markets, so this research extends the analysis to high-visibility.

4. Study Sample and Analysis Period

Two companies — *Tesla* and *Meta* — were selected for their high visibility, strong market positions, and frequent media coverage. According to the information on CompaniesMarketCap website, Tesla, a leader in electric vehicles, had a market capitalization of $1.09 trillion in 2024. Its stock price fluctuated widely between $138.80 and $358.64, reflecting growth potential and volatility. Meta, valued at $1.49 trillion in 2024, represents innovation in artificial intelligence and virtual reality. Its stock price grew by 77% over the year, with forecasts predicting $575.93. These companies' media portrayal, often polarizing and dynamic, made them ideal for sentiment analysis.

The *January 2019–October 2024* timeframe provided a robust dataset for longitudinal analysis, covering significant global events such as the COVID-19 pandemic and geopolitical shifts. This aligns with other studies, which often rely on five-year periods to explore long-term patterns.

5. Data Sources, Collection and Processing
Media Sentiment Data

Headlines from *Business Insider,* a leading financial and business news outlet, were chosen for their global reach and relevance. The platform's straightforward and well-structured HTML format facilitated efficient web scraping, enabling the extraction of approximately 35,000 headlines related to Tesla and Meta. These headlines were analyzed using the *VADER (Valence Aware Dictionary and Sentiment Reasoner)* model, a machine learning tool optimized for short text sentiment evaluation. The approach builds on methodologies from prior research, such as Loughran and McDonald (2011), who emphasized the importance of context-specific dictionaries for financial textual analysis. Their work demonstrated that sentiment analysis in financial contexts benefits from tailored linguistic tools to capture nuances in language.

Therefore, recent advancements in deep learning, as demonstrated by Xue (2023), have pushed the boundaries of sentiment analysis in financial markets. Xue's approach utilized advanced neural networks to capture complex patterns in sentiment data, enabling deeper insights into market behaviors. In addition, it was proposed in 2014 by C.J. Hutto and Eric Gilbert in their paper titled "VADER: A Parsimonious Rule-based Model for Sentiment Analysis of Social Media Text". VADER computes positive, negative, neutral, and compound sentiment scores, making it suitable for analyzing headlines' emotional tones.

Stock Price Data

Stock prices were retrieved using Python's *yfinance l*ibrary. Adjusted closing prices were chosen as the primary indicator because they account for corporate actions like dividends, stock splits, and market adjustments, offering a more accurate measure of stock value.

Data Processing

To reduce daily noise and emphasize trends, sentiment scores and adjusted closing price data were aggregated *into monthly averages*. Then temporal alignment between sentiment scores and stock prices was performed, enabling consistent statistical analysis.

6. Research Methods and Techniques

Quantitative Analysis

Cross-Correlation   *Analysis*

Cross-correlation was used to examine the relationship between monthly sentiment scores and stock prices over time. This method identifies the strength and direction of associations at varying time lags, from *−6 months to +6 months*, revealing whether sentiment changes lead or lag behind stock price movements. Mohanty and Roy (2021) have demonstrated the effectiveness of cross-correlation in analyzing sentiment's influence on market trends, particularly for identifying leading or lagging relationships between variables. Their research underscores the importance of selecting appropriate time lags to uncover nuanced dynamics in sentiment-driven market behavior.

Granger Causality Testing

The Granger causality test evaluated whether past sentiment scores could predict future stock prices. This method is widely applied in financial studies to uncover predictive relationships between variables. As first developed by Granger (1969), the method assesses whether a time series provides statistically significant information about another series' future values. The Granger causality test was used to determine the predictive power of sentiment data on stock price movements for Tesla and Meta.

The suitability of these methods for similar studies is confirmed by the analysis conducted in V. Grigaitė's 2021 master's project, *"Analysis of the Relationships Between Macroeconomic Indicators and Stock Market Sectors,"* where they were successfully applied to identify connections between macroeconomic indicators and stock market sectors at the level of economic activity sectors in the United States.

7. Research Findings Overview

Preliminary results showed:

For Meta, the strongest correlation between sentiment scores and stock prices was observed with lags of 1–2 months. In contrast, for Tesla, a significant correlation was found only at a lag of 1 month, with correlation values at later lags proving to be insignificant.

8. Research Results

Results of Quantitative Research Part

Analysis of Time Series for Media Sentiment and Tesla Stock Price Averages

The initial examination of the relationship between Tesla's media sentiment and adjusted closing prices was conducted by analyzing two graphs.

Figure 1

The monthly averages of sentiment scores for Tesla-related media coverage from 2019 *to* October 2024
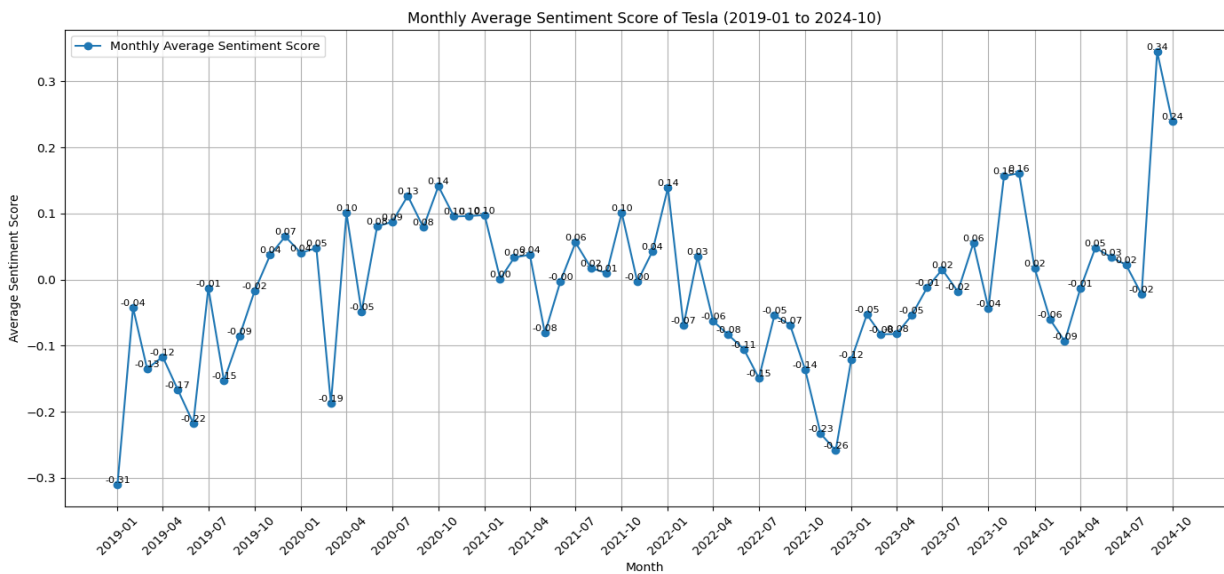
Figure 2

The monthly averages of Tesla's adjusted closing stock prices from 2019 *to October 2024*
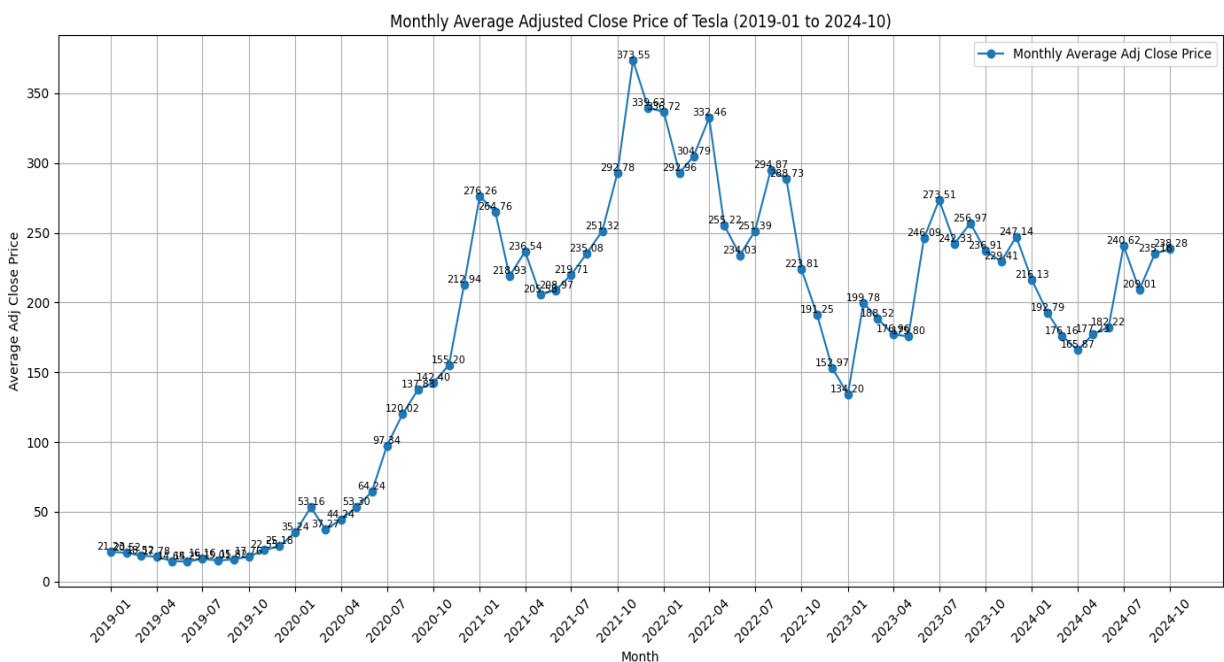
The first chart presents the monthly average sentiment scores, while the second displays the monthly average stock adjusted closing prices. By analyzing both graphs, it was observed that during certain periods, the two variables—average sentiment scores and average stock prices—exhibited similar trends, moving in the same direction, either increasing or decreasing simultaneously. However, in other periods, the variables showed divergent movements. For instance, during certain months, sentiment scores rose while stock prices fell, and vice versa.

A preliminary analysis of the data reveals that in approximately 60% of the time periods, sentiment and stock prices exhibited a tendency to move in the same direction. This suggests a potential relationship between the two variables. However, the direction of the relationship was not consistently direct, as the two variables did not always move in parallel.

This observation provided the foundation for further analysis into a potential statistical relationship between media sentiment and stock prices. However, due to the complex and nonlinear nature of this relationship, further statistical testing was conducted using cross-correlation analysis and Granger causality tests, as traditional methods were deemed unsuitable for analyzing the observed dynamics.

Cross-Correlation Results for Tesla Media Sentiment and Stock Price Averages

The cross-correlation analysis was performed to determine the relationship between the monthly averages of Tesla's media sentiment scores and the company's average monthly adjusted closing prices at different time lags. The analysis aimed to assess whether there is a correlation between current sentiment and future stock prices, or if current stock prices influence future sentiment.

Table 1: *Cross-correlation values between Tesla's media sentiment scores and the company's adjusted closing prices*

No	Time lags (in months)	Correlation values
1	-6	-0.26613
2	-5	-0.17692
3	-4	-0.12489
4	-3	-0.05812
5	-2	0.06159
6	-1	0.11237
7	0	0.27895
8	1	0.3036
9	2	0.26269
10	3	0.28215
11	4	0.26897
12	5	0.26934
13	6	0.26065

The cross-correlation results show the following patterns:

- For negative lags (where current stock prices are compared with future sentiment), the correlation weakens progressively. At a lag of -6 months, the correlation value is -0.26613, indicating a weak inverse relationship between stock prices and sentiment six months later.
- As the lag decreases, the correlation becomes less negative and eventually positive. At a lag of -1 month, the correlation increases to 0.11237.
- At zero lag (when both variables are considered in the same month), the correlation reaches 0.27895, indicating a moderate positive relationship between sentiment and stock prices.
- The strongest positive correlation occurs at a lag of +1 month, with a value of 0.3036. This suggests that sentiment has a weak positive correlation with stock prices in the following month.
- The correlation decreases slightly at lags of +2 months (0.26269) and +3 months (0.28215), before stabilizing around 0.26 at lags from +4 to +6 months.

The cross-correlation results indicate a weak positive correlation between Tesla's media sentiment and stock prices in the short term, particularly at a lag of +1 month. Correlations at other time lags are even weaker and do not provide substantial evidence of a strong relationship.

Granger Causality Test Results for Tesla Media Sentiment and Stock Prices

The Granger causality test was conducted to assess whether past media sentiment has predictive power for Tesla's future stock prices.

Table 2: *Granger causality test results assessing the predictive power of Tesla's media sentiment over stock prices*

No	Time lags (in months)	P-value	F-statistical value
1	1	0.81998	0.052198
2	2	0.641396	0.447253
3	3	0.154161	1.814482
4	4	0.088564	2.131913
5	5	0.189398	1.552058
6	6	0.142962	1.688090

The Granger causality test results indicate that, for all time lags, Tesla's media sentiment has little to no predictive power for Tesla's future stock prices. Specifically:

- At a lag of 1 month, the p-value is 0.81998 and the F-statistic is 0.052198, suggesting no significant relationship between sentiment and stock prices.
- At a lag of 2 months, the p-value is 0.641396 and the F-statistic is 0.447253, further indicating no significant predictive power.
- At a lag of 3 months, the p-value is 0.154161, and the F-statistic is 1.814482, which is not statistically significant.

- A lag of 4 months shows a slightly higher potential for a relationship, with a p-value of 0.088564 and an F-statistic of 2.131913, but this does not meet the conventional 5% significance threshold.
- For lags of 5 and 6 months, the p-values (0.189398 and 0.142962) and F-statistics (1.552058 and 1.688090) further confirm the lack of predictive power for sentiment.

The results suggest that media sentiment does not have strong or consistent predictive power for Tesla's stock prices. While there is some weak evidence of a potential delayed effect (especially at a 4-month lag), the relationships are not statistically significant enough to draw firm conclusions.

Relationship Between Media Sentiment Regarding "Meta" and Company's Stock Prices
Media Sentiment and Meta Stock Prices: Time Series Analysis

The initial examination of the relationship between Metas media sentiment and adjusted closing prices was conducted by analyzing two graphs.

Figure 3

The monthly averages of sentiment scores for Meta-related media coverage from 2019 to October 2024
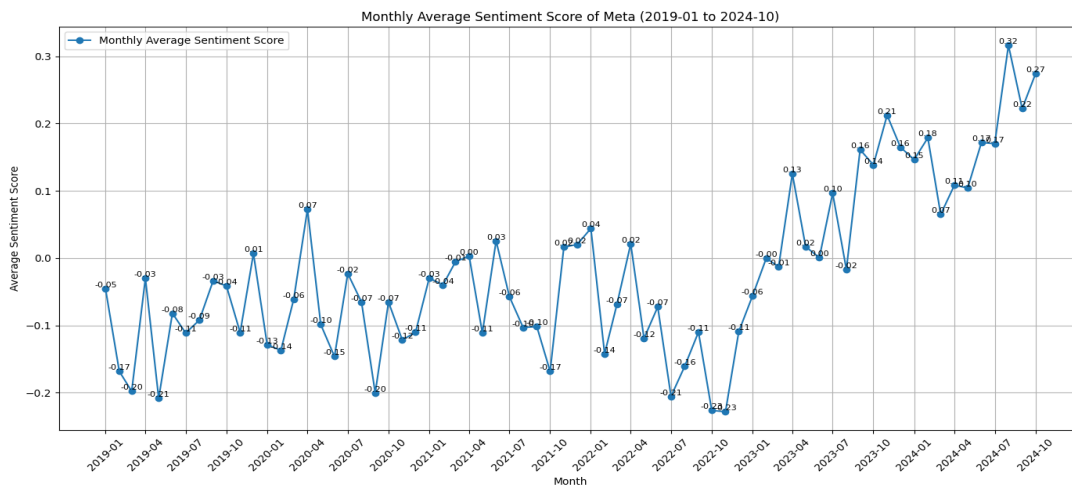
Figure 4

The monthly averages of Meta's adjusted closing stock prices from 2019 to October 2024
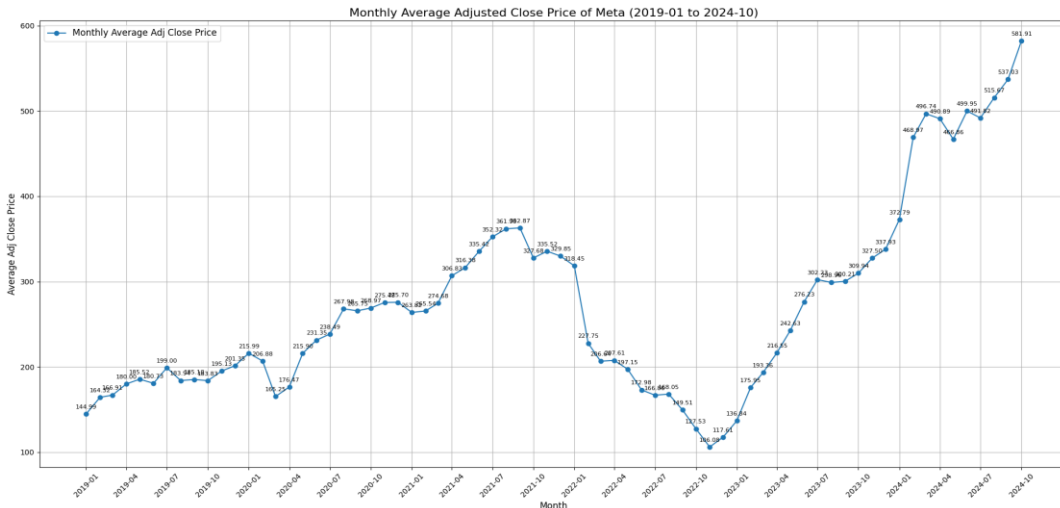
The analysis showed variability in monthly average sentiment scores throughout the period. In contrast, stock prices demonstrated clearer trends, with increases observed from 2019 to mid-2021, followed by a significant decline at the start of 2022 and recovery beginning in early 2023.

Periods of alignment between the two variables were identified, where both sentiment scores and stock prices moved in the same direction—either increasing or decreasing. However, such occurrences were less frequent compared to Tesla's case. In other periods, the variables moved in opposite directions. For instance, between early 2022 and early 2023, sentiment scores were largely negative, but stock prices showed a recovery trend.

These observations suggest a statistical relationship between sentiment scores and stock prices, warranting further analysis. Due to the non-linear nature of the observed relationship, cross-correlation and Granger causality analyses were used to examine these interactions in greater detail.

Cross-Correlation Results for Meta Media Sentiment and Stock Prices

The cross-correlation analysis evaluated the relationship between Meta's monthly sentiment scores and stock prices at varying time lags.

Table 3: *Cross-correlation values between Meta's media sentiment scores and the company's adjusted closing prices*

No	Time lags (in months)	Correlation values
1	-6	0.28661
2	-5	0.37115
3	-4	0.45333
4	-3	0.49859
5	-2	0.57393
6	-1	0.62808
7	0	0.72365
8	1	0.70140
9	2	0.67714
10	3	0.60854
11	4	0.59320
12	5	0.55159
13	6	0.50189

Key findings include:

- Negative Lags (Stock Prices Influencing Future Sentiment): Correlation values increase as the lag decreases, starting from 0.28661 at a lag of -6 months and reaching 0.62808 at -1 month. This indicates that current stock prices may moderately influence media sentiment in the following months.
- Direct Correlation (Lag of 0 Months): The highest correlation value (0.72365) was observed at lag 0, indicating the strongest relationship between sentiment and stock prices occurs within the same month.
- Positive Lags (Sentiment Influencing Future Stock Prices): At a lag of +1 month, the correlation was strong at 0.70140 but slightly weaker than the direct correlation. Correlation values decreased further with increasing positive lags, stabilizing between 0.55159 and 0.50189 for lags of +4 to +6 months.

The results demonstrate strong short-term correlations between sentiment scores and stock prices, particularly within the same month (lag 0) and in the following 1–2 months. Moderate correlations persist at longer lags.

Granger Causality Analysis for Meta Media Sentiment and Stock Prices

The Granger causality analysis was conducted to determine whether media sentiment scores could predict Meta's stock prices.

Table 4: *Granger causality test results assessing the predictive power of Meta's media sentiment over stock prices*

No	Time lags (in months)	P value	F statistical value
1	1	0.004630166	8.594116922
2	2	0.059407634	2.953726074
3	3	0.312826958	1.212948449
4	4	0.406054845	1.017605095
5	5	0.483301078	0.907217268
6	6	0.058736101	2.192667189

- Short-Term Predictive Power (Lags of 1–2 Months): At a lag of 1 month, the p-value (0.00463) and F-statistic (8.594117) indicate strong statistical significance, suggesting that sentiment scores effectively predict stock prices one month later. At a lag of 2 months, predictive power remains notable with a p-value of 0.059408.
- Mid-Term Predictive Power (Lags of 3–5 Months): For lags of 3–5 months, p-values exceed significance thresholds, ranging from 0.312827 to 0.483301, and F-statistics remain below meaningful levels, indicating no significant predictive power.
- Long-Term Predictive Power (Lag of 6 Months): At a lag of 6 months, the p-value (0.058736) and F-statistic (2.192667) indicate a marginal predictive relationship. However, the significance level is insufficient to establish a robust link.

The analysis shows that Meta's sentiment scores have strong predictive power for short-term stock price movements (1–2 months), but this diminishes over longer time frames.

Further Examination of Time Lags: Insights from Cross-Correlation and Granger Causality Test

Following the cross-correlation results and Granger causality test, a detailed examination was conducted for each month within the analyzed period (January 2019 to October 2024). This analysis aimed to practically assess how frequently the monthly average of sentiment scores and the monthly average of adjusted stock closing prices moved in the same direction at the specific time lags identified in the cross-correlation and Granger causality tests. By doing so, the study seeks to validate the observed relationships and gain deeper insights into the temporal dynamics of sentiment-driven stock price movements for Tesla and Meta.

For Tesla, the strongest negative correlation was identified at -6 months (-0.2661), the strongest positive correlations – in the same period (0 month) (0.27895), and +1 month (0.3036).

Table 5: *Further examination of cross-correlation and Granger causality test results for Tesla*

Time lag (in months)	Cases moving in the same direction	Cases moving in the opposite direction
0	24	
1	22	
-6		13
In total	*46*	*13*

For Meta, the strongest correlations were identified at 0 months (-0.72365), +1 month (0.70140), and +2 months (0.67714).

Table 6: *Further examination of cross-correlation and Granger causality test results for Meta*

Time lag (in months)	Cases moving in the same direction
0	15
1	19
2	40
In total	*74*

The results indicate significant correlations between selected time lags and the dynamics of sentiment and stock prices. For Tesla, the largest number of cases occurred at 0 and +1 month lags, while for Meta, the most significant intervals were +1 and +2 months. Furthermore, directional movement analysis reveals that after conducting a cross-correlation study and examining months in practical terms, and analyzing directional movements, sentiment and stock prices for Tesla are most strongly correlated within the same period. In contrast, for Meta, sentiment is most closely related to price changes after a two-month lag.

9. DISCUSSIONS/CONCLUSIONS

Cross-correlation analysis examining the Tesla case revealed a weak but noticeable relationship between Tesla's stock prices and media sentiment, depending on the time lag. Negative time lags demonstrated a weak and often negative correlation between current stock prices and future sentiment scores, with the most significant negative correlation (-0.26613) observed at a -6-month lag. While this suggests a potential inverse relationship, the correlation is too weak to draw firm conclusions. As the negative lag decreases, the correlation weakens further and eventually fades away.

Positive time lags indicated a slightly stronger positive correlation between current sentiment and future stock prices. The highest positive correlation (0.3036) was observed at a +1-month lag, suggesting that current sentiment has a short-term impact on stock prices over the next month. Over a longer horizon (from +2 to +6 months), the correlations remain minimal and gradually diminish. Cross-correlation analysis revealed that changes in media sentiment about Tesla have the greatest impact on stock prices in the short term, with the market responding almost immediately to sentiment changes. However, the weak correlation values indicate that this impact is not substantial.

The Granger causality test was conducted to evaluate the predictive power of Tesla-related sentiment scores for future stock prices. The results showed that sentiment is not a reliable indicator for predicting future stock price movements. Even with a 1-month lag, where cross-correlation analysis indicated some influence of sentiment on stock prices, the predictive power was low. These findings suggest that sentiment has a limited impact on Tesla's stock price movements and is not suitable as a primary factor for predicting stock price dynamics.

Cross-correlation and Granger causality tests on the relationship between Meta's media sentiment and stock prices revealed a stronger positive relationship throughout the analyzed period, especially in the short term. Cross-correlation results indicated that current sentiment is most closely linked to stock closing prices in the same period (correlation 0.72365) and has a significant effect on prices observed after 1–2 months. It was also noted that current stock prices could influence future sentiment, particularly with a 1–2 month time lag.

Granger causality analysis demonstrated that media sentiment about Meta could be useful for predicting short-term stock price changes. The most significant predictive potential was observed at a 1-month lag (p-value = 0.0046), though the predictive strength diminished for longer time lags.

The analysis concluded that both Tesla and Meta's media sentiment are linked to their stock prices, though the strength and nature of this relationship vary by time frame. For Tesla, sentiment impact on stock prices is noticeable only in the same period or the following month, though the effect is not highly significant. Conversely, Meta's sentiment impact is stronger, most evident in the same period and in stock prices over the next 1–2 months. These findings align with previous studies, such as Zhang, Fuehres, and Gloor (2020), who demonstrated the predictive power of social media sentiment, particularly Twitter, for stock market indicators. These results suggest that the market reacts almost immediately to sentiment changes for both companies, though the intensity of reactions differs. Additionally, Tesla's current stock prices exhibit a certain inverse relationship with future sentiment, which becomes more significant over a longer horizon.

The Granger causality test revealed that media sentiment about Tesla is not useful for predicting future stock prices over any time frame. Meanwhile, sentiment about Meta may be valuable for predicting stock prices in the short term, particularly with a 1–2 month lag.

These findings indicate that both companies, particularly Meta, are sensitive to media sentiment, which drives market reactions and shapes investor expectations. For Meta, sentiment proves to be a valuable tool for predicting short-term stock price changes, while Tesla's market reactions appear more immediate. These results align with observations by Rishi (2022), who noted that behavioral biases often influence closing stock prices, leading to deviations from market efficiency. Rishi's comprehensive analysis suggests that such biases may exacerbate the impact of external factors like media sentiment, particularly when markets are influenced by emotional or psychological triggers.   By contrasting these findings with traditional notions of market efficiency, as proposed by Fama (1970), this study underscores the dynamic interplay between rational market behavior . Tesla's rapid market responses may be influenced by the high-profile personality and active media presence of its CEO, whereas Meta's 1–2 month delays could reflect its reliance on long-term strategic narratives. However, these assumptions require further investigation to better understand such factors.

This study is not without limitations. While the use of monthly averages effectively identifies broader trends, it may obscure daily or weekly variations and does not account for external influences such as macroeconomic events. Future research could address these limitations by exploring additional variables, incorporating a wider range of companies, or utilizing intraday data to develop a more granular understanding of the interplay between media sentiment and stock price movements.

Practical Implications of the Study

1. Investor Strategies: Investors may use sentiment analysis as a supplementary tool for short-term trading strategies, particularly during periods of heightened media activity. For example, Meta's sentiment-driven short-term stock price changes provide actionable insights for traders.
2. Corporate Communication: Companies should monitor and respond to media sentiment promptly. For instance, Tesla and Meta could benefit from active management of public narratives to stabilize market perceptions and reduce volatility.
3. Risk Management: Financial institutions and asset managers can integrate sentiment analysis into risk assessment models, identifying periods of potential market overreaction to negative sentiment.

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THE ROLE OF ENTREPRENEURIAL MINDSET IN DRIVING INVESTMENT IN SELF-DEVELOPMENT THROUGH ONLINE COURSE

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Abstract: This study investigates the impact of the entrepreneurial mindset on purchasing behavior, specifically focusing on investing people for online self-development courses. Using logistic regression analysis, the study examines how different entrepreneurial traits impact consumers' decisions to invest in self-development. Key findings show a significant positive correlation between execution-oriented traits and the likelihood of purchasing self-development courses. These results offer valuable insights for marketers and entrepreneurs in the e-learning industry.

Keywords: entrepreneurial mindset, purchasing behavior, self-development courses, online education, self-investment

INTRODUCTION

The entrepreneurial mindset is widely recognized as a critical factor in navigating the complexities of today's dynamic market environment. Defined as a set of cognitive processes that guide individuals in evaluating opportunities, alternatives, and outcomes under conditions of limited resources, ambiguity, and uncertainty (Guerrero et al., 2015), this mindset has become essential in business and consumer domains alike. As markets become increasingly digital and competitive, understanding how the entrepreneurial mindset shapes consumer behavior offers valuable insights, particularly in sectors like online education, where self-directed learning is paramount.

In recent years, entrepreneurship research has evolved from a purely economic focus to a multidisciplinary perspective, encompassing behavioral, psychological, and sociological dimensions (Zou, 2015). This shift reflects a broader understanding of entrepreneurship as a mindset that can influence individuals' choices across various contexts, including purchasing behavior. Consequently, examining the entrepreneurial mindset in relation to consumer behavior—especially within the context of online self-development training—addresses a significant gap in current research. Self-development products are growing in demand, and understanding the characteristics of consumers inclined to invest in these products can provide valuable insights for marketers, entrepreneurs, and educators.

The primary research question of this study is: *What is the impact of the entrepreneurial mindset on the purchasing behavior for online self-development training?* This study hypothesizes that individuals with an entrepreneurial mindset, characterized by traits such as

action orientation and execution skills, are more likely to invest in self-development, regardless of personal circumstances such as socio-economic status, family obligations, or current employment conditions. Exploring this relationship contributes to existing literature on both entrepreneurship and consumer behavior, offering practical implications for marketing strategies in the digital learning sector.

Literature Review

The literature suggests that an entrepreneurial mindset encompasses various traits such as independence, risk acceptance, and passion. Previous studies have demonstrated that individuals with an entrepreneurial mindset tend to engage in riskier and more innovative behaviors. This study builds on existing literature by linking entrepreneurial traits with purchasing behaviors for online courses.

Entrepreneurial Mindset

Entrepreneurial activity can be broadly classified into two distinct types: *venture entrepreneurship* and *innovation entrepreneurship*. Venture entrepreneurship is defined as activities that lead to the establishment of new businesses, such as creating new ventures, expanding existing enterprises, or pursuing self-employment (Alvarez, 2003). This form of entrepreneurship is often associated with start-up businesses, where the emphasis is on creating new economic opportunities. Innovation entrepreneurship, in contrast, involves enhancing existing organizations through novel processes or ideas. This approach includes infusing entrepreneurial thinking and practices into established entities, such as non-profits, governmental organizations, and educational institutions (McHenry, 2018). In this study, both categories are considered essential components of the entrepreneurial mindset, recognizing the distinct yet interrelated roles they play in fostering economic growth and societal advancement

The entrepreneurial mindset is understood as a collection of cognitive processes that empower individuals to identify opportunities, assess alternatives, and pursue desired outcomes in uncertain and resource-constrained environments (Guerrero et al., 2015). This mindset fosters adaptability and innovation, which are essential for navigating today's competitive and rapidly evolving markets. Scholars have approached entrepreneurship from diverse perspectives, including psychological, sociological, and behavioral dimensions, signifying a shift from its traditional economic roots to a more multidisciplinary approach (Zou, 2015).

The entrepreneurial mindset also encompasses a capacity for action-oriented behavior. Researchers have defined it as the ability to "recognize opportunities in markets, identify new customers or products, and generate avenues for innovation," essential attributes for individuals within dynamic industries like digital marketing and online education (Ireland et al., 2003). This mindset is not only applicable to new business ventures but also fosters innovation within established organizations and various sectors, including education and government, through novel solutions and approaches (McHenry, 2018).

The literature distinguishes between two main categories of entrepreneurial activity: *venture entrepreneurship* and *innovation entrepreneurship*. Venture entrepreneurship involves creating or expanding a new business, typically exemplified by startups and self-employment. In contrast, innovation entrepreneurship focuses on transforming current organizational frameworks by integrating entrepreneurial thinking, which may involve activities within non-

profits or educational institutions (Alvarez, 2003; Tang & Koveos, 2004). Both categories, despite their differences, play an essential role in the development of an entrepreneurial mindset.

Measurement of Entrepreneurial Mindset and Characteristics

The entrepreneurial mindset can be analyzed through specific personality traits and competencies, assessed using various psychological models. The Big Five Personality Model, also known as the OCEAN model, categorizes personality into five dimensions—Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism—helping to gauge an individual's entrepreneurial potential through traits such as creativity, reliability, sociability, and emotional resilience (John & Srivastava, 1999).

An advanced tool for evaluating entrepreneurial traits is the Entrepreneurial Mindset Profile (EMP). Developed by the Leadership Development Institute at Eckerd College, the EMP assesses entrepreneurial skills and traits across 14 dimensions. These dimensions are divided into entrepreneurial skills—such as future focus, idea generation, execution, self-confidence, optimism, persistence, and interpersonal sensitivity—and entrepreneurial traits, which include independence, a preference for limited structure, non-conformity, risk acceptance, action orientation, passion, and a need to achieve (Davis et al., 2016).

Entrepreneurial Traits

1. **Independence**: The desire to work autonomously, with minimal reliance on external support or approval.
2. **Preference for Limited Structure**: A comfort with ambiguous or unstructured tasks and an ability to navigate undefined roles.
3. **Non-conformity**: A tendency to think and act uniquely, often challenging conventional approaches and norms.
4. **Risk Acceptance**: Willingness to pursue goals despite uncertain outcomes, emphasizing potential rewards over risks.
5. **Action Orientation**: A drive to initiate projects and make decisions swiftly, valuing rapid results over prolonged planning.
6. **Passion**: A strong enthusiasm and engagement in work, perceiving it as fulfilling and enjoyable rather than burdensome.
7. **Need to Achieve**: An inner motivation to accomplish goals and a desire for high levels of performance.

Entrepreneurial Skills

1. **Future Focus**: The ability to plan and strategize long-term, considering future implications and setting visionary goals.
2. **Idea Generation**: Creativity in developing multiple solutions and approaches for achieving objectives.
3. **Execution**: Skill in transforming ideas into actionable steps, focusing on practical implementation and follow-through.
4. **Self-confidence**: A belief in one's abilities and potential, enabling resilience and goal commitment.

5. **Optimism**: A generally positive outlook on personal and external circumstances, aiding persistence in the face of challenges.
6. **Persistence**: The ability to endure setbacks and obstacles, maintaining determination toward long-term objectives.
7. **Interpersonal Sensitivity**: Awareness of others' needs and emotions, fostering supportive and empathetic relationships.

This profile provides a comprehensive view of an individual's readiness for entrepreneurial activities, thus informing strategic planning for personal development in fields like digital marketing and e-commerce.

Relevance of Entrepreneurial Mindset in Modern Market Dynamics

The entrepreneurial mindset not only drives business success but also influences consumer behavior. Within the scope of this study, individuals with a strong entrepreneurial orientation are more inclined to invest in self-development, including digital products and online courses, as they actively seek knowledge and resources to maintain competitive advantages. Understanding how entrepreneurial traits correlate with purchasing behavior, particularly in digital self-development sectors, contributes to both academic research and practical applications in marketing and consumer engagement.

Consumer Behavior in Online Contexts

Consumer behavior encompasses the psychological processes individuals or groups go through when selecting, purchasing, using, or disposing of products or services to satisfy their needs and desires (Solomon & Panda, 2004). In particular, online consumer behavior includes unique factors like web experience, which heavily influences decision-making. The adoption of online platforms has led to the emergence of new determinants such as convenience, trust, and pricing sensitivity (Fuciu et al., 2015).

The decision-making process for online purchases is comprised of five stages: need recognition, information search, evaluation of alternatives, purchase decision, and post-purchase behavior (Kotler & Armstrong, 2012). These stages remain consistent across online and offline contexts, but digital environments emphasize ease of access, security concerns, and the immediacy of information, impacting consumer trust and choices.

To understand how the entrepreneurial mindset might influence purchasing decisions in digital environments, this study examines how individuals driven by traits like risk acceptance and action orientation engage with online self-development products. The analysis focuses on whether entrepreneurial attributes correlate with higher investment in self-improvement, particularly in e-learning platforms.

Theoretical Background

The entrepreneurial mindset is characterized by a dynamic approach to opportunity-seeking, creativity, and calculated risk-taking, embodying what Betta et al. (2010) describe as *creative destruction*. This mindset not only prepares individuals for innovation but also promotes personal growth by fostering independence, nonconformity, and a readiness for change. Such characteristics enable entrepreneurs to leverage resources creatively, even outside traditional business contexts (Betta et al., 2010).

In measuring this mindset, tools like the Entrepreneurial Mindset Profile (EMP) emphasize traits such as risk acceptance, action orientation, and execution capabilities. These metrics align with foundational theories of entrepreneurship, such as those by Drucker, who defines entrepreneurs as agents of change, continually seeking and capitalizing on new opportunities (Davis et al., 2016; Drucker in Tang & Koveos, 2004). The EMP's dimensions underscore the intersection of entrepreneurial traits and consumer behaviors, particularly within digital and e-learning environments where entrepreneurial-minded individuals actively pursue self-development opportunities.

With the rise of digital education platforms like Coursera and Udemy, consumers—especially those with entrepreneurial traits—are increasingly investing in personal development. Online self-development courses have thus become an ideal market for studying the entrepreneurial mindset's impact on purchasing behaviors, as they allow consumers to pursue continuous improvement and adaptability in competitive digital landscapes.

Personal Development Courses: Structure and Design

In this study, personal development courses are organized according to a progressive framework that enhances the depth and complexity of content in a tiered structure. Based on the "value ladder" concept from Russell Brunson's sales methodologies and adapted from Sam Ovens' consulting models, the course structure targets different stages of entrepreneurial development, offering increasingly advanced content aligned with the participants' evolving needs and experience levels.

1. **Consultancy Challenge Training**
   This introductory course, priced at $29, spans 21 days and provides daily videos accompanied by supporting work files. It covers the basics of the consulting business model, including mindset fundamentals and introductory social media advertising strategies. As an accessible entry point, this course appeals to entrepreneurial-minded individuals seeking an affordable way to begin their self-development journey.

2. **Consultancy Academy Training**
   Following completion of the introductory course, this intermediate program is marketed through a webinar and targets individuals committed to further developing their skills in digital marketing consulting. Priced at $250, it provides in-depth tools and training, particularly for social media advertising, catering to those seeking to advance their expertise in digital consulting.

3. **Millionaire Project Training**
   Positioned as the most advanced level in the course framework, this training is designed for experienced digital marketers aspiring to establish their own agency or monetize online training. With a price point of $500, it focuses on advanced sales and marketing automation techniques, equipping participants with comprehensive skills to achieve significant entrepreneurial growth.

The tiered approach to course offerings allows for the examination of how different levels of entrepreneurial orientation affect purchasing behavior across varied price points and complexities. This design aligns with the study's aim to assess the impact of entrepreneurial traits, such as risk acceptance and achievement orientation, on self-development investment decisions.

By understanding how these factors influence the decision to engage in personal development, this study provides insights valuable for both educators and marketers within the e-learning sector.

Methodology

Research Design and Approach

This study adopts a quantitative research approach to explore the relationship between entrepreneurial mindset and purchasing behavior in the context of online self-development courses. A survey-based data collection method was employed to enable the structured gathering of quantitative data aligned with the study's objectives.

Sample and Data Collection

The sample consists of individuals interested in self-development and online learning. A convenience sampling method was utilized, targeting customers of an online training company specializing in personal development, business management, and consultancy services. The company shared its customer database with the author, allowing survey invitations to be distributed via personalized email correspondence. The survey remained open on Google Forms for a two-week period, after which it was closed, resulting in a total of 220 completed responses.

Survey Design and Distribution

The questionnaire was organized into three sections:

- **Section A**: Captured demographic information of respondents.
- **Section B**: Assessed respondents' entrepreneurial traits and skills based on the Entrepreneurial Mindset Profile (EMP).
- **Section C**: Focused on online purchasing behavior, specifically for self-development courses.

Respondents were encouraged to complete the survey, which took approximately one hour. The structured design facilitated the collection of comprehensive data on entrepreneurial characteristics and purchasing behaviors.

Measures and Variables

1. Dependent Variable

- **Purchasing Behavior**: The dependent variable in this study is the likelihood of purchasing online self-development courses. This variable was measured as a binary outcome, where participants indicated whether they had purchased any self-development course in the past 12 months (1 = Yes, 0 = No). By using logistic regression, we analyze how this outcome is affected by various entrepreneurial traits, allowing us to assess the influence of an entrepreneurial mindset on purchasing behavior.

2. Independent Variables (Entrepreneurial Mindset)

- The entrepreneurial mindset was evaluated using the **Entrepreneurial Mindset Profile (EMP)**, which measures dimensions including **action orientation**, **risk acceptance**, and **passion**. Each dimension was recorded on a 5-point Likert scale (1 = Strongly

Disagree to 5 = Strongly Agree), reflecting participants' self-perceived alignment with these entrepreneurial characteristics. This measurement approach allows for precise assessment of how specific entrepreneurial traits might influence purchasing behavior in the self-development course market.

3. Control Variables

- **Demographics**: Several demographic characteristics, including age, educational attainment, and employment status, were controlled for to ensure the analysis focused on the effects of entrepreneurial traits rather than demographic influences. These control variables help to isolate the unique contributions of entrepreneurial traits to purchasing behavior.

4. Reliability and Validity

Reliability was assessed by calculating Cronbach's Alpha coefficients for each construct, with values above 0.70 indicating acceptable internal consistency. Additionally, confirmatory factor analysis in SPSS was performed to establish construct validity, examining both convergent and discriminant validity of the measured constructs. Table 1 shows the Entrepreneurial Traits items and the Cronbach's Alpha scores for the sub-dimensions.

Table 1: List of Items and Reliability Scores for Entrepreneurial Traits

Entrepreneurial Traits
Independence
I am not happy taking direction/instructions from other people.
I do not feel comfortable working under someone else's direction.
I am not comfortable being a team player.
I am uncomfortable when expected to follow other's rules.
I do not like to consult with others on important decisions.
Cronbach's Alpha Score: .752
Limited Structure
I find that too much structure stifles my creativity.
I find it boring to work on clearly structured tasks.
I perform best when I do not have to follow a step-by-step process.
I do not like solving problems by following step-by-step solutions.
I do not prefer tasks that are clearly structured.
Cronbach's Alpha Score: .718
Non-Conformity
I pride myself on doing things differently than the crowd.
People would describe me as a nonconformist (unique minded).
I like to stand out from the crowd.
I will argue for my beliefs even when everyone else disagrees.
I do not feel comfortable when I fit in with the crowd.
I don't tend to go along with what other people think is right.
Cronbach's Alpha Score: .787
Risk Acceptance
I am willing to take some risks if the payoff is big enough.
I don't prefer to play it safe in most things.
I'm willing to take a certain amount of risk to achieve real success.

If at all possible, I do not avoid taking risks.

I like to take chances.

Cronbach's Alpha Score: .771

Action Orientation

My decision-making style is not slow and deliberate.

While others are still talking, I'm doing.

My friends would describe me as someone who makes things happen.

Others would describe me as quick to take action.

If I have a choice, l' d rather take action than wait.

I tend to make decisions quickly.

Cronbach's Alpha Score: .791

Passion

My interest in my work is constant and ongoing.

Working long hours on a project is exciting for me.

I am excited by the work that I do.

I'm passionate about the work that I do.

I don't mind working long hours on an interesting project.

Cronbach's Alpha Score: .826

Need to Achieve

I try to excel at whatever I do.

It is important to me that I achieve at a high level.

It is important to me to be the best.

I try to be the best at whatever I do.

I'm driven by a desire to achieve significant goals.

Cronbach's Alpha Score: .900

Table 2: List of Items and Reliability Scores for Entrepreneurial Skills

Entrepreneurial Skills

Future Focus

It's more satisfying for me to spend time thinking strategically about the future, than to see quick results.

I'm focused on the long term.

I care less about immediate results and more about long-term success.

I usually think more about what I have to accomplish this year than this week.

I'm more focused on the long-term than the here-and-now.

Cronbach's Alpha Score: .843

Idea Generation

Brainstorming is a particular strength of mine.

I do not have difficulty generating creative ideas.

I rarely run out of new ideas.

Sometimes the ideas just flow endlessly out of me.

I don't have much trouble coming up with new ideas.

Cronbach's Alpha Score: .849

Execution

I'm good at taking a strategy and translating it into tactical action steps.

Often when I come up with a great idea, it's not too hard to know how to make it a reality.

I have a reputation for being able to take an idea and make it work.

I'm good at turning others' ideas into reality.

Cronbach's Alpha Score: .884

Self Confidence

I hardly worry that I won't be able to reach my goals.

I do not have significant doubts regarding my abilities.

I feel good about my skills and abilities.

I am a self-confident person.

I rarely doubt myself.

Cronbach's Alpha Score: .823

Optimism

Others might describe me as a positive person.

Even when things aren't going well, I look on the bright side.

My friends would describe me as an optimistic person.

I can usually see the bright side of most challenges.

I rarely think that there's more bad in the world than good.

Cronbach's Alpha Score: .827

Persistence

I am persistent when pursuing a goal.

When faced with a problem, I keep working toward a solution.

I do not give up easily.

I do not get discouraged easily.

When I encounter obstacles along my path, I find a way to overcome them.

Cronbach's Alpha Score: .907

Interpersonal Sensitivity

I try not to be a difficult person to work with.

Others will not describe me as abrasive (harsh).

I try not to rub people the wrong way.

I'm sensitive to others' feelings.

People describe me as easy to work with.

Cronbach's Alpha Score: .768

5. Logistic Regression Analysis

- Logistic regression analysis was chosen due to the binary nature of the primary purchasing decision (Purchase = 1, No Purchase = 0), assessing how various entrepreneurial traits impact the likelihood of making a purchase. This method enabled the study to estimate the influence of individual traits while controlling for other factors, providing insights into which specific entrepreneurial characteristics significantly predict purchasing behavior.

6. Logistic Regression Assumptions

- **Binary Dependent Variable**: Purchasing behavior was defined as a binary variable, coded as 1 for respondents who had made a purchase and 0 for those who had not.
- **Multicollinearity**: Variance Inflation Factors (VIF) were checked to confirm that no multicollinearity issues existed among predictor variables, ensuring the reliability of regression results.

- **Sample Size**: With a sample size of 220 respondents, the study meets the minimum requirements for logistic regression, ensuring robust and generalizable findings.

Data Analysis and Results

The logistic regression analysis revealed that individuals with higher scores in execution-oriented traits were significantly more likely to purchase online self-development courses. The following entrepreneurial traits showed significant effects:
- **Action Orientation:** Positively correlated with a higher likelihood of purchasing.
- **Risk Acceptance:** Showed a marginal effect but was not statistically significant.

The descriptive statistics indicated that individuals with a background in digital marketing or consultancy were more likely to invest in higher-priced self-development courses such as the Millionaire Project Training.

Table 3: Logistic Regression Results

	Challenge	Academy	Millionaire
Explanatory Variables	Coefficient	Coefficient	Coefficient
Gender: Male=1(1)	-0.093	0.247	-0.195
	(0.703)	(0.348)	(0.651)
Age of Participant	-0.148*	0.004	0.010
	(0.061)	(0.034)	(0.058)
Educational Attainment(1)	18.265	2.125	2.223
	(18140.736)	(1.829)	(26763.383)
Educational Attainment(2)	2.482	1.885	20.266
	(1.745)	(1.309)	(19360.220)
Educational Attainment(3)	2.345	1.522	21.339
	(1.714)	(1.327)	(19360.220)
Educational Attainment(4)	0.790	1.320	20.695
	(1.484)	(1.257)	(19360.220)
Educational Attainment(5)	3.024	1.544	19.888
	(1.944)	(1.315)	(19360.220)
Marital Status(1)	-0.357	-0.210	-1.017
	(0.736)	(0.389)	(0.694)
Work Experience	0.137*	-0.018	-0.029
	(0.060)	(0.033)	(0.056)
Work Status(1)	0.292	0.479	-0.337
	(1.606)	(0.793)	(1.546)
Work Hours	-0.966	0.205	0.324
	(0.726)	(0.391)	(0.680)
Income Levels(1)	5.133*	-2.476	18.736
	(2.078)	(1.434)	(18310.255)
Income Levels(2)	5.694*	-1.639	19.702
	(2.174)	(1.401)	(18310.255)
Income Levels(3)	3.819*	-1.159	18.610
	(1.643)	(1.316)	(18310.255)
Income Levels(4)	4.240*	-1.060	18.636
	(1.591)	(1.326)	(18310.255)

Income Levels(5)	22.883	-0.048	18.900
	(9039.859)	(1.391)	(18310.255)
Income Levels(6)	2.455	-0.040	18.452
	(1.638)	(1.469)	(18310.255)
Income Levels(7)	2.775	-0.201	19.076
	(1.997)	(1.561)	(18310.255)
Income Levels(8)	1.132	-0.890	18.855
	(1.759)	(1.552)	(18310.255)
Entrepreneurial Traits: Independence	-0.054	0.056	-0.089
	(0.115)	(0.053)	(0.090)
Entrepreneurial Traits: Limited Structure	-0.050	-0.051	0.097
	(0.097)	(0.048)	(0.077)
Entrepreneurial Traits: Non Conformity	-0.042	0.013	0.085
	(0.108)	(0.051)	(0.088)
Entrepreneurial Traits: Risk Acceptance	-0.184	0.067	0.142
	(0.126)	(0.063)	(0.129)
Entrepreneurial Traits: Action Orientation	0.080	-0.039	-0.049
	(0.103)	(0.048)	(0.087)
Entrepreneurial Traits: Passion	-0.050	0.156*	0.160
	(0.115)	(0.057)	(0.111)
Entrepreneurial Traits: Need to Achieve	0.141	0.033	0.113
	(0.115)	(0.059)	(0.130)
Entrepreneurial Skills: Future Focus	0.160	-0.016	-0.064
	(0.105)	(0.053)	(0.109)
Entrepreneurial Skills: Idea Generation	0.097	0.012	-0.091
	(0.109)	(0.052)	(0.102)
Entrepreneurial Skills: Execution	-0.293*	-0.094	0.405*
	(0.150)	(0.066)	(0.155)
Entrepreneurial Skills: Self Confidence	0.096	-0.040	-0.182
	(0.124)	(0.060)	(0.112)
Entrepreneurial Skills: Optimism	-0.047	0.024	0.155
	(0.113)	(0.059)	(0.146)
Entrepreneurial Skills: Persistence	0.098	0.005	-0.170
	(0.160)	(0.076)	(0.177)
Entrepreneurial Skills: Interpersonal Sensitivity	0.045	-0.064	0.067
	(0.108)	(0.057)	(0.099)
Constant	0.347	-2.000	-49.368
	(3.787)	(2.566)	(26647.397)
χ2	93.13	.116	91.73

Standard errors are given in parenthesis. * signifies $p < .05$

Discussion

The findings of this study reveal that specific entrepreneurial traits—particularly **action orientation** and **risk acceptance**—significantly influence the likelihood of purchasing self-development courses. This supports prior research linking entrepreneurial mindset traits with proactive behaviors in uncertain environmments, such as the decision to invest in personal growth through online education (Guerrero et al., 2015).

1. Interpretation of Key Findings

Action Orientation: The positive correlation between action orientation and purchasing behavior underscores the role of immediate decision-making in personal investments. Individuals with a high action orientation may feel more inclined to pursue self-development opportunities swiftly, seeing these courses as actionable steps toward achieving personal or professional goals. This aligns with findings from Ireland et al. (2003), who highlighted that an entrepreneurial mindset encourages swift responses to opportunities.

Risk Acceptance: Although risk acceptance showed a weaker significance, its correlation with purchasing behavior supports the notion that entrepreneurial-minded individuals may view self-development as a calculated risk with potential rewards. This mirrors the concept that entrepreneurs are generally more comfortable with uncertainty, making them more likely to invest in self-improvement despite financial or time-related risks (Alvarez, 2003).

2. Practical Implications for E-Learning and Marketing

These insights offer practical applications for marketers in the e-learning and online education sectors. By tailoring marketing messages to highlight actionable benefits and career advancements, providers can more effectively appeal to action-oriented individuals. For example, messaging that emphasizes immediate application of skills or visible, short-term achievements could resonate strongly with this audience segment.

Additionally, course providers might consider introducing "tiered" course structures with low-risk entry points (e.g., introductory or affordable courses), allowing risk-tolerant individuals to try courses without substantial initial commitment. This approach may lower the perceived risk of entry, encouraging entrepreneurial-minded individuals to begin their self-development journey with less hesitation.

3. Other Key Observations

The analysis reveals several notable correlations between entrepreneurial traits and demographic factors, offering insights into how these variables interact within the context of purchasing behavior for self-development courses.

1. **Education Level and Action Orientation**: A moderate positive correlation ($r = 0.28$) was observed between education level and action orientation. This suggests that higher educational attainment may encourage a more proactive mindset, potentially enhancing decision-making confidence. This relationship aligns with previous findings that education can foster an entrepreneurial mindset.

2. **Execution and Persistence**: A positive correlation ($r = 0.25$) between execution and persistence highlights the complementary nature of these traits within an entrepreneurial mindset. Individuals who score high on execution also tend to exhibit strong persistence, a combination likely conducive to achieving long-term goals and commitments.

3. **Income Level and Risk Acceptance**: The correlation between income level and risk acceptance ($r = 0.11$) indicates that individuals with higher income may be more inclined toward risk-taking, potentially due to the financial buffer that higher income provides. This trend aligns with the understanding that financial security can facilitate comfort with calculated risks.

4. **Age and Action Orientation**: A mild positive correlation (r = 0.19) between age and action orientation suggests that as individuals grow older, they may develop a greater tendency for proactive decision-making. This could reflect the impact of accumulated experience on confidence and readiness to act.
5. **Unexpected Findings**: Contrary to initial expectations, no significant negative correlation was found between income level and passion, suggesting that passion alone may not drive low-income individuals to invest in self-development courses. This finding could indicate that while passion is important, income level remains a critical factor in self-investment decisions.

4. Theoretical Contributions

This study extends the literature on entrepreneurial traits by confirming that aspects of the entrepreneurial mindset, such as action orientation and risk acceptance, have direct applications beyond business ventures, influencing consumer behavior in digital learning environments. The connection between entrepreneurial characteristics and self-directed learning decisions suggests that entrepreneurial mindset theories can enrich consumer behavior models, particularly within digital and self-improvement markets.

5. Limitations and Future Research Directions

While this study sheds light on the purchasing behavior of entrepreneurial-minded consumers, there are limitations. The reliance on self-reported data may introduce biases related to self-perception and social desirability, potentially affecting the accuracy of reported traits. Future research could benefit from longitudinal designs, examining how entrepreneurial traits evolve over time and impact long-term learning investments.

CONCLUSIONS

This study provides valuable insights into the relationship between entrepreneurial traits and purchasing behavior within the self-development course market. The results reveal that specific traits, notably **action orientation** and **risk acceptance**, significantly predict the likelihood of engaging in self-development investments. This finding supports the notion that an entrepreneurial mindset extends beyond business contexts, influencing personal growth and self-directed learning behaviors.

The analysis also highlights interesting correlations between demographic factors and entrepreneurial traits. For instance, higher education levels correlate with a stronger action orientation, suggesting that formal education may reinforce proactive tendencies. Additionally, a positive relationship between income level and risk acceptance indicates that financial security can facilitate greater comfort with risk, a finding that underscores income's role in self-investment decisions. Contrary to expectations, passion alone did not predict course purchases for lower-income individuals, emphasizing the importance of economic resources in self-development investments.

These findings have practical implications for e-learning providers and marketers. By emphasizing quick, actionable outcomes in course offerings and designing accessible, low-risk entry points, providers can better engage entrepreneurial-minded individuals across income

levels. Moreover, this study contributes to the broader understanding of consumer behavior, illustrating how entrepreneurial characteristics influence decisions in the digital learning space.

In conclusion, this research underscores the importance of entrepreneurial traits in shaping purchasing behaviors in self-development contexts. Future studies could expand upon these findings by examining additional traits and demographic variables longitudinally, offering a more comprehensive view of how entrepreneurial mindsets evolve and impact learning investments over time.

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THE IMPACT OF SUSTAINABLE FASHION
ON THE CONSUMER BEHAVIOUR OF PEOPLE UNDER 45

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Abstract: Sustainable fashion is a trend that is bound to become a key pillar of the future of industry and society. The current situation of fashion represents a complex and ever-growing problem with significantly negative impacts on the environment, as well as society. The presented paper is focused on a sustainable fashion in Slovakia and its influence on consumer behavior. The aim of the paper is to identify consumer attitudes towards fashion sustainability based on the results of a questionnaire survey (197 questionnaires are analyzed). The subject of the research was a sample of people under 45 years old. Based on the obtained results, recommendations were proposed that could help to develop a sustainable trend and reduce negative environmental consequences.

Keywords: customer behavior, fashion industry, people under 45 years old, Slovak sustainable fashion, sustainable fashion.

INTRODUCTION

The fashion industry is a complex system, with the fast fashion phenomenon currently dominating. In recent years, alternative approaches such as slow fashion, ethical fashion, and sustainable fashion have emerged in response to this trend, grounded in values of sustainability, ethics, fair working conditions, and environmental respect. This paper focuses specifically on sustainable fashion and its impact on consumer behavior. The aim is to identify the attitudes of consumers under 45 toward sustainability in fashion, based on the results of a questionnaire survey. The paper is structured into three main sections. The first chapter provides a brief theoretical overview of the topic, focusing on key concepts related to sustainable fashion. The second chapter outlines the aim of the paper and presents two assumptions to be verified through the survey results. The third chapter presents the findings from the questionnaire. Finally, the paper concludes with recommendations for promoting sustainable fashion among consumers.

1. THEORETICAL BACKGROUND IN FIELDS OF SUSTAINABLE FASHION AND CONSUMER BEHAVIOUR

In the fashion industry, the term "fast fashion" has become increasingly prevalent in recent years. Fast fashion refers to the mass production of clothing in short cycles, aimed at

delivering the latest designs to the market as quickly and cheaply as possible to meet consumer demand for trends. This is often accompanied by increased consumption and waste (Sahimaa et al., 2023; Musova & Poliačiková, 2021; Minárová & Gundová, 2021). The fast fashion model results in the production of large quantities of low-quality, low-cost clothing. Between 1994 and 2014, clothing production increased by up to 400% due to a boom in consumerism, with around 80 billion items of clothing produced and purchased annually (Ting & Stagner, 2023). The high demand for cheap, new products leads to overproduction and unsustainable practices. This model is characterized by vast quantities of clothing that often end up in landfills, are discarded by incineration, or are sold in second-hand shops. Unsold clothing thus contributes to waste that pollutes the environment, particularly in low- and middle-income countries (Bick, Halsey, & Ekenga, 2018). If the fast fashion trend continues, the climate impact of the fashion industry is projected to more than double by 2030. As with many other industries, clothing production has become a global endeavor, with manufacturing largely outsourced to countries with cheap labor, primarily China and Bangladesh (Smith, 2021). For this reason, fast fashion is not only an environmental issue but also a social one, calling for a shift toward alternative, more sustainable approaches to fashion.

The term "slow fashion" was coined as a reaction to fast fashion. It was first introduced by Professor Kate Fletcher of the Centre for Sustainable Fashion at the London College of Fashion in 2007, in an article for the British environmental magazine The Ecologist (Ertekin & Atik, 2015). This approach reflects the interests of both enterprises and consumers. For enterprises, slow fashion represents a way to express corporate principles, values, and vision. For consumers, it serves as a guide for more informed and responsible purchasing decisions (Meyer & Höbermann, 2021). From a supply-side (producer) perspective, slow fashion emphasizes the fair and eco-friendly production of timeless, multifunctional, high-quality clothing that is tailored to the needs of consumers (Buzzo & Abreu, 2019). It focuses on slowing down the production process, based on responsibility and respect for people, the environment, and the products themselves. This approach often results in a higher price that reflects the true value of the product. From a demand-side (consumer) perspective, slow fashion encourages purchasing fewer, higher-quality garments that support environmentally and socially responsible production practices (Meyer & Höbermann, 2021). The goal is to slow down both production and consumption, with the expectation that products will last for many years due to their superior quality. For example, slow fashion brands typically release only two collections per year, whereas fast fashion retailers may introduce new collections weekly (Joy & Peña, 2017).

Other alternative approaches that have emerged in response to fast fashion include ethical and sustainable fashion. These two terms are often misunderstood as identical concepts, but they represent distinct yet complementary ideas. Ethical fashion focuses on garment design, production and distribution with the primary goal of reducing negative impacts on people (Stanton, 2024; Nizzoli, 2022). It addresses issues such as labor exploitation, environmental harm, the use of harmful chemicals, pesticides, and dyes, wasteful resource consumption, and animal cruelty related to the use of skin, fur and other animal products (Dhir, 2022). Adopting an ethical approach from the early stages of production plays a crucial role in mitigating negative social and environmental impacts throughout the design, procurement, production,

and distribution phases. Failure to follow ethical practices can lead to consequences such as low or irregular wages, forced overtime, child labor, gender discrimination, exploitation, unsafe working conditions, inadequate safety measures, and various forms of violence, including verbal, sexual, and physical abuse (Arengo, 2019). While ethical fashion primarily focuses on social responsibility - particularly protecting the workforce at all stages of production - sustainable fashion emphasizes the environmental aspects of production processes (Nizzoli, 2022). Environmental sustainability is not only about the production process itself but also about considering the product's entire life cycle, including its carbon footprint (Shen, Richards, & Liu, 2013). Although working conditions are not the central theme of sustainable fashion, the approach still takes into account the environment of workers, but with an emphasis on environmental impacts. Manufacturers committed to sustainable fashion aim to reintroduce eco-friendly production methods, often by using environmentally conscious materials and implementing socially responsible processes (Kaikobad et al., 2015). For a garment to be considered sustainable, every element of the supply chain—from raw material sourcing to production, packaging, and shipping - must prioritize environmental friendliness (Benett, 2021). The overarching goal of sustainable fashion is to combat global warming, maintain ecological balance, preserve vegetation, protect wildlife, and eliminate natural disasters (Dhir, 2022). Although sustainable and ethical fashion are not synonymous, they are closely related, intertwined, and together form a comprehensive framework for a responsible approach to fashion. Clothes should be designed and produced in a way that is respectful and beneficial not only to the environment but also to workers and society at all.

The evolution of the fashion industry significantly impacts consumer purchasing decisions and preferences. Consumers are influenced by current trends when purchasing clothing, footwear, accessories and other products. Their buying behavior is shaped not only by their experiences and values, but also by their perception of their own identity. Consumer behavior is a dynamic concept that is defined in various ways today. Consumption is an integral part of daily life, and as such, consumer behavior is constantly exposed to multiple stimuli and evolves over time. It can be seen as the observable actions of consumers during the process of purchasing and consuming goods (Poliačiková, 2017). In this context, consumer behavior is the exchange of resources—such as money, time or effort—for products or services of perceived value. This broad concept includes all activities involved, not only during the purchase itself but also before and after, with the aim of satisfying the consumer's needs (Petrovičová, Ďaďo, Kostková, 2006). Exploring consumer behavior is a complex effort, as each individual takes a unique approach to purchasing and consumption. However, understanding these patterns is crucial for businesses seeking a competitive advantage in the marketplace. Enterprises need to grasp the decision-making mechanisms that drive consumers to make purchases. It is important to note that not all consumers go through every stage of the decision-making process, as this depends on the complexity of their decisions. However, the decision-making process generally follows a series of stages when a consumer plans or needs to acquire a product or service. These stages are: problem identification, information gathering, evaluation of alternatives, purchase decision-making, and post-purchase behavior (Bartošová & Musová, 2022).

2. THE AIM AND METHODOLOGY OD THE RESEARCH

The aim of this paper is to identify the attitudes of consumers under 45 towards sustainability in fashion, based on the results of a questionnaire survey. We focus on this age group because we wanted to explore the consumer behavior related to sustainable products across three generations: Generation Y, Generation Z, and Generation Alpha. Consumers under the age of 45 represent a significant and dynamic group in the market, influenced by factors such as the digital age, social trends and sustainability. To address the main objective, we have defined two sub-objectives:

C1: *To identify the most important criterion for consumers when purchasing clothing.*

C2: *To compare whether consumers prefer Slovak or foreign fashion stores.*

In line with these objectives, we formulated two research assumptions, which were tested through the results of the questionnaire survey:

Research assumption 1: *We assume that respondents prioritize price over sustainability when buying clothes.*

Currently, secondary data present contradictory findings regarding the most important criterion for consumers during purchase decisions, but many studies suggest that price is the dominant factor (Levrini & Santos, 2021; Zhao et al., 2021). For example, a survey by the non-profit organization Fashion Revolution on fashion consumers' habits in the Visegrad Four countries found that Slovak shoppers prioritize lower prices and sales over other factors (Gawrjolek et al., 2023). Therefore, we expect that price will be more important than environmental sustainability for Slovak consumers as well.

Research assumption 2: *We assume that less than 15% of respondents prefer and support local stores and designers over foreign brands.*

It is important to examine consumers' preferences regarding the origin of fashion products. Vilčeková (2014, p. 307) notes that while Slovaks tend to view domestic products more favorably, they still predominantly buy foreign products. Similarly, a survey by the fashion platform GLAMI revealed that only about 13% of respondents actively support local brands (HNonline, 2020). Our survey will explore the factors that influence consumers' purchasing decisions in this area and identify what might increase the likelihood of buying Slovak brands.

Given the focus of this paper, a questionnaire survey was chosen as the most appropriate data collection method, as it allows for rapid data collection and processing from a relatively large group of respondents. However, one of the main disadvantages of this method is the potential for low response rates due to an uncooperative attitude from some respondents. The questionnaire was created using Google Forms and distributed electronically via social media between February and March 2024, primarily on Facebook and Instagram. That was realised to target respondents under 45, who are more likely to engage with social media and technology. The questionnaire contained 35 mostly closed-ended, multiple-choice questions, divided into five sections: (1) demographic data, (2) consumer clothing purchasing behavior, (3) sustainable fashion, (4) government and legal support for sustainable fashion, and (5) origin of clothing. A total of 197 correctly completed questionnaires were collected. As the survey was distributed online, it is impossible to determine its exact return rate, as we cannot assess how many people actually received the questionnaire. A significant limitation of this survey is

that we could not ensure the representativeness of the sample, meaning the results cannot be generalized to the entire population. This paper presents only the results directly related to the main objective and sub-objectives, while the comprehensive findings of the survey are available in Volovska (2024).

3. RESULTS OF THE QUESTIONNAIRE SURVEY

At the beginning of the questionnaire, we focused on collecting identification data from the respondents, including basic demographic information and selected economic and social data. As is in Table 1 presented, a higher percentage of women (61.9%) participated in the survey compared to men (38.1%). In terms of age distribution, more than half of the respondents were in the 18 to 30-year-old category, followed by the under-18 category, which accounted for 33% of the total respondents. The largest proportion of respondents (42.6%) reported having higher education as their highest level of attainment. Regarding employment status, 75.2% of the respondents were students, with nearly 20% reporting an employment status. In terms of net monthly income, 66.5% of respondents indicated an income of less than 500 euros. This figure is likely influenced by the high proportion of students in the sample, who typically have lower or no income from employment. Only 15.2% of respondents reported a monthly income between 501 and 1,000 euros, 11.7 % had an income between 1,001 and 1,500 euros. Just 6.6% reported earning more than 1,500 euros.

Table 1: *Identification of respondents*

Characteristics	*Number of respondents*	*Relative expression*
Gender		
Female	122	61.9%
Male	75	38.1%
Age		
under 18	65	33.0%
18-30 years	102	51.8%
31-45 years	30	15.2%
Highest education attained		
Elementary	52	26.4%
Secondary	61	31.0%
Higher education	84	42.6%
Economic-social status		
Student	148	75.2%
Employed	39	19.8 %
Unemployed	4	2.0 %
Self-employed/entrepreneur	4	2.0 %
Other	2	1.0 %

Net monthly income		
Less than €500	131	66.5%
Between €501 and €1000	30	15.2%
From €1001 to €1500	23	11.7%
More than 1500 €	13	6.6 %

Source: Own elaboration based on the results of the questionnaire survey.

In the second section of the questionnaire, we focused on consumer behavior related to clothing purchases in general, not just sustainable fashion. First, we aimed to determine how frequently respondents buy clothes, shoes, or accessories. The majority of respondents (39.6%) made fashion-related purchases on a monthly basis. 11.7% of respondents shopped more frequently, on a weekly basis, while 22.3% said they only buy clothing, shoes or accessories when necessary. The most common reasons for making purchases were to replace worn or outdated clothing (36.5%), to adapt to weather and seasonal changes (24.3%) and to shop for pleasure (19.8%). Regarding sustainable fashion, we were also interested in whether respondents try to minimize the amount of clothing they buy. The majority (52.8%) said they try to buy less, but are not always successful in doing so. 38.6% of respondents reported that they only shop when necessary and 8.6% admitted that they do not limit their clothing purchases.

An interesting discrepancy emerged in the responses to the questions about how often consumers buy clothes, shoes, and accessories. While 22.3% of respondents said they only buy when necessary, a higher percentage (39.2%) reported that they try to minimize their clothing purchases. These differences may be due to various factors, such as differing interpretations of the questions. For example, the question on the frequency of clothing purchases may have been interpreted by consumers as relating to immediate, short-term needs, while the question about minimizing purchases may have reflected their broader intentions or ideals. This could explain the higher percentage of respondents who expressed an intention to buy less, even though their actual buying behavior did not fully align with this goal. This discrepancy may have influenced the overall results of the survey.

Financial constraints were the most significant factor cited by survey participants as a motivator for buying fewer clothes, with 63.45% of respondents selecting this option. Other notable reasons for purchasing less included environmental concerns (9.13%), space limitations (4.6%), building a capsule wardrobe (4.6%) and ethical considerations (3.3%). In addition to the net monthly income data collected at the start of the survey, we also examined how much consumers spend on clothing each month. The majority of respondents (75.2%) reported spending less than €100 per month on clothing, while 19.5% spent between €101 and €200. One respondent, however, reported spending more than €400 a month on clothing. We also explored the most important criteria and barriers to clothing purchases. As shown in Figure 1, the top five factors when buying clothes were quality (81%), price (79%), comfort (46.7%), brand (33.3 %), and fashion trends (12. 9%). Respondents were much less concerned with factors such as environmental sustainability (5.2%), ethical production (2.4%), or brand transparency (1.9%). These results highlight a concerning trend: people prioritize affordability, current fashion trends and brand over environmental and ethical considerations.

Figure 1: *The most important criteria when buying clothes*
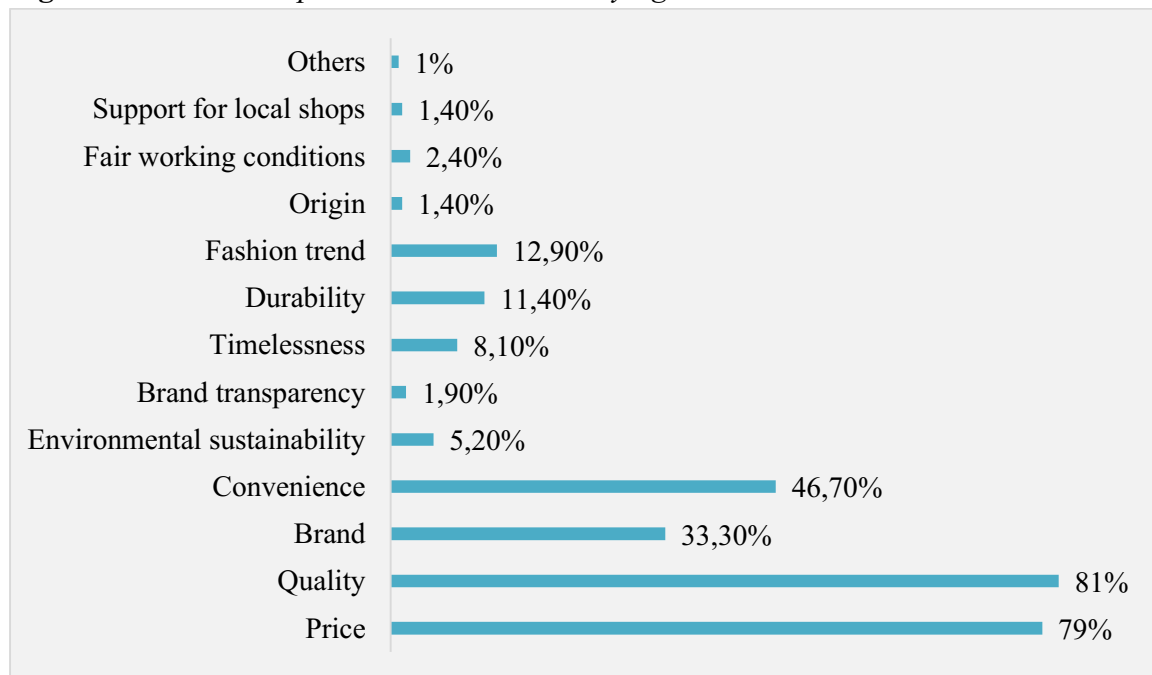
Source: Own elaboration based on the results of the questionnaire survey.

Similar results were found by Musová, Musa, and Ludhová (2018) in their research on environmentally responsible purchasing in Slovakia. Their data indicated that, despite negative environmental developments, environmental factors were not highly prioritized by Slovak consumers. In addition, a survey by Fashion Revolution revealed that 69% of consumers preferred shopping during sales or when prices were lower (Gawrjolek et al., 2023). Despite quality being the most important criterion for respondents in our study, we accept the first assumption, which suggests that consumers prioritize price over sustainability when buying clothes.

In the following question, we asked respondents about their biggest concerns when buying clothes. The most common concern, cited by 63.1% of respondents, was price. This was followed by quality (54.9%), inaccurate and/or limited sizing (43.2%), discrepancies between advertising and reality (31.9%), and return issues (11.9%). As we anticipated, price was a key consideration for consumers. When asked about its influence on purchasing decisions, the vast majority of respondents (62.9%) indicated that while price is important, it is not the particular deciding factor. For 31% of respondents, price was the decisive factor and only 6.1% stated that price was not important to them, instead making their decision based on other criteria. Therefore, we can conclude that for the majority of consumers, price plays a significant role in the final purchasing decision.

In the third section of the questionnaire, we focused on sustainable fashion, where consumers expressed a variety of views and attitudes. Almost a quarter of respondents are actively engaged in promoting and purchasing sustainable fashion, while more than half are aware of sustainable fashion but do not yet buy it. On a positive note, data from the World Wildlife Fund (WWF) shows that online searches for sustainable products increased by 71%

between 2016 and 2020. This survey, conducted in 54 countries, covered 80% of the global population (Hirsheimer, 2021). Similarly, an analysis by Pawaskar et al. (2018) of consumer behavior toward environmental responsibility found that people are willing to participate in environmental initiatives, provided the necessary platforms are available. However, our survey also revealed that a significant number of respondents were unfamiliar with sustainable fashion or expressed skepticism due to a lack of awareness. To better understand their attitudes, we presented respondents with seven statements, asking them to rate their level of agreement on a Likert scale (1 = strongly disagree to 5 = strongly agree).

The results are summarized in Table 2.

Table 2: *Percentage of agreement with the statements*

Statement	Agreement rate expressed as a percentage				
	Strongly disagree (1)	Partially disagree (2)	Neither agree nor disagree (3)	Rather agree (4)	Strongly agree (5)
I prefer buying sustainable fashion over fast fashion.	12.3 %	27.2 %	32.4 %	17.1 %	11.0 %
I am well informed about the environmental impact of the fashion industry.	9.5 %	24.9 %	18.1 %	31.8 %	15.7 %
I know about the origins of my clothes and the way they were made.	21.0 %	35.7 %	18.1 %	17.1 %	8.1 %
I know shops that sell sustainable clothing.	20.0 %	24.6 %	21.6 %	20.5 %	13.3 %
I consider sustainable clothing readily available nowadays.	12.1 %	28.9 %	28.6 %	21.0 %	9.5 %
Consumers have the opportunity to influence the sustainability of the fashion industry.	8.1 %	17.1 %	24.5 %	28.4 %	21.9 %
Raising awareness of sustainable practices in fashion is also important for the future.	9.5 %	11.4 %	13.8 %	25.7 %	39.5 %

Source: Own elaboration based on the results of the questionnaire survey.

The first statement investigated whether consumers preferred buying sustainable fashion over fast fashion. The responses were generally inclined to disagree, with an average score of 2.9. Most respondents (32.4%) selected "neither agree nor disagree". When combining the options for total and partial disagreement, 39.5% of respondents expressed a preference for fast fashion over sustainable fashion, indicating that sustainable fashion was not their primary

choice. In the second statement, we examined whether consumers considered themselves sufficiently informed about the environmental impacts of the fashion industry. The mean score was 3.2, slightly indicating agreement. When combining "somewhat agree" and "strongly agree", 47.5% of respondents felt adequately informed. Conversely, 34.4% disagreed or strongly disagreed, indicating a gap in knowledge, and suggesting that there is a continued need to raise awareness on this issue.

Consumer views on the need for greater awareness of sustainable practices in the fashion industry are further explored in the seventh statement. The next statement in Table 2 examined respondents' knowledge of the origin and production methods of their clothing. The majority of respondents indicated they did not have this information, reflected in the mean score of 2.6. When combining "strongly disagree" and "disagree", 56.7% of respondents reported they were unaware of the origin or production process of their clothes. Similarly, the next question asked whether respondents knew of shops that sell sustainable clothing, and it his case, disagreement was more common as well, with an average score of 2.8. For the fifth statement, which asked if respondents considered sustainable clothing to be readily available, the mean score was again 2.9, slightly leaning toward disagreement. Only about one-third of respondents considered sustainable clothing to be easily accessible, marking "somewhat agree" or "strongly agree".

Respondents were also asked whether they believe consumers can influence sustainability in the fashion industry. In this case, they were generally more inclined to agree with the statement, as reflected by a mean score of 3.4. Additionally, with an average score of 3.7, respondents expressed agreement with the statement regarding the importance of raising awareness about sustainable practices in the fashion industry. Over 65.2% of respondents (after combining the "agree" and "strongly agree" responses) emphasized the importance of education on sustainability, indicating significant support for initiatives aimed at raising awareness of sustainable practices in fashion and clothing. Our findings align with the 2018 survey by Pawaskar et al., which highlighted consumers' willingness to engage in sustainable initiatives. More than half of the respondents (50.3%) stated they would be willing to pay a premium for sustainable clothing, driven by environmental concerns, ethical considerations, positive experiences or recommendations from friends and family. However, 33.8% of respondents indicated that their willingness to pay extra would depend on the specific product, while 11% would not be willing to pay more, regardless of the sustainability features or benefits. Regarding the types of sustainable clothing most frequently purchased, respondents reported buying t-shirts and tops (29%), trousers (27.1%), sweaters and sweatshirts (26.7%), shoes (24.3%), and jackets and coats (21%). Sleepwear, by contrast, was the least purchased category.

Respondents who purchase sustainable fashion were asked to identify the main motivators for their choice. More than half cited high quality and longevity as the primary reasons. For these consumers, the benefits go beyond reducing waste, sustainable fashion also saves money, as high-quality items do not need to be replaced as often. Other common motivators included the use of environmentally friendly materials and production methods, brand transparency, support for local shops, ethical production and fair working conditions. In

contrast, respondents who do not buy sustainable fashion were asked to explain the barriers preventing them from doing so. Price emerged as the main concern for 59% of these respondents. This finding aligns with responses from the second part of the questionnaire, where financial constraints were identified as a primary factor influencing the decision to buy fewer clothes. Additional significant barriers included lower availability (43.6%), lack of product information (23%), preference for other brands (21.2%), and limited sizes (19.4%).

The data also show the fact that more than half of the respondents did not place much importance on the origin of their clothing. Reflecting diverse consumer preferences, 34.8% of respondents preferred foreign brands, while only 14.9% preferred Slovak or local brands. Thus, we accept the second hypothesis that less than 15% of respondents actively support local stores and designers over foreign brands. To gain a deeper understanding of clothing purchase habits, we asked respondents what proportion of their wardrobe consists of clothing from Slovak brands. More than half of the respondents (over 50 %) reported that Slovak brands made up less than half of their wardrobe, while 22.9% declare no clothing from domestic brands. Only 11.4% of respondents confirmed that more than half - or all - of their wardrobe consisted of Slovak brands. When choosing between domestic and foreign brands, respondents were influenced by a variety of factors. Price (66.2%), quality (57.6%), design and style (39%), and product variety (27.1%) were the most significant considerations. Respondents also noted that lower prices, higher quality, a greater variety of products, as well as guarantees such as money-back options, could increase their likelihood of purchasing from domestic brands.

The results of the questionnaire survey indicate that price is a significant factor for consumers under the age of 45. However, it is worth noting that while many respondents cited high prices as a reason for avoiding sustainable fashion, they were also shopping regularly - often spending a relatively large amount of money each month. This raises an interesting point: cheap fast fashion, while initially more affordable, can end up costing consumers more in the long run due to the need for more frequent replacements. Additionally, a lack of awareness or concerns about greenwashing may contribute to reluctance in choosing sustainable options.

CONCLUSIONS

The aim of this paper was to explore the attitudes of Slovak consumers under the age of 45 toward sustainable fashion. The results of the questionnaire survey confirmed two key assumptions: first, that respondents prioritize price over sustainability when buying clothes, and second, that less than 15% prefer and support local shops and designers over foreign brands. Based on these findings, we offer recommendations to help foster the development of sustainable fashion. The survey revealed that while consumers frequently shop often preferring fast fashion products, they also expressed a willingness to pay more for sustainable clothing. Addressing the issue of frequent, environmentally unsustainable, and costly clothing purchases may be central to shifting consumer attitudes. In the long run, investing in sustainable fashion could be a cost-saving strategy, given the superior quality and durability of these products.

Currently, consumers are often characterized by a consumerist lifestyle, and their behavior in the fashion sector reflects this fact. A societal norm has emerged where quantity often outweighs quality. Sustainability, however, brings attention to the negative environmental and social impacts of this mindset. Consumers can help drive the development

of sustainable fashion by reducing consumption, resisting short-lived trends, and curating capsule wardrobes that are versatile and long-lasting. An interesting alternative for consumers is the use of clothing rental services. According to a survey by the Fashion Revolution association, only about 24% of Slovak consumers use rental services for special occasion clothing and just 6% for everyday wear (Gawrjolek et al., 2023). Additionally, 45% of respondents felt that companies should offer take-back services for recycling or reusing unworn clothing (Gawrjolek et al., 2023).

In the context of advancing sustainability in fashion, consumers should prioritize buying from companies that are transparent about their practices. Non-transparent entities often provide incomplete or even misleading information regarding their production processes, supply chains, and working conditions. In contrast, transparent companies offer open communication and make such information publicly available. Promoting transparency enables consumers to make informed choices and encourages businesses to adopt more responsible practices. Third-party certifications can further help consumers verify the accuracy of the information provided. Additionally, purchasing from local companies benefits the environment by reducing the negative impacts of transportation and emissions.

Each of us is making a reality we are living in. By making everyday decisions everyone should think about the fact, that once we all will take a look back in our lives and see the time, that will never come back. That is why is so significant think and act responsibly, change the value orientation and know the fact, everything can be done in a different way and everyone can make a right thing.

A limitation of this survey is its non-representative sample, which means that the results cannot be generalized to all Slovak consumers under the age of 45. However, this limitation opens up opportunities for future research, where more in-depth statistical analyses can be conducted. A future study could involve a representative survey of consumers aged 16-75 across the four Central European countries of the Visegrad Group, drawing inspiration from the research by Gawrjolek et al. (2023) on consumers' sustainability in purchasing clothing, footwear and accessories.

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THE IMPACT OF THE IMPLEMENTATION OF GUARANTEED AND INTERVENTION PRICES ON FOOD SECURITY

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Abstract: Improving food security in contemporary conditions directly depends on solving numerous issues. It is crucial to consider that the processes of globalization significantly impact food security. In countries where the influence of import channels on the food market is high, this often leads to a deterioration in food security. Therefore, there is an urgent need for state regulation measures. The regulatory measures implemented by the government to improve food security, especially in the context of globalization and market economies, involve the application of guaranteed and intervention prices. The implementation of both guaranteed and intervention prices is considered one of the indirect tools for regulating the food market and does not contradict the fundamental principles of market economies. The application of these price controls particularly involves the government's procurement processes, which stabilize market prices and the incomes of agricultural producers. Such interventions create favorable conditions for stabilizing food prices and improving food security. In this environment, it becomes possible to improve food security by ensuring equal access to the food market for producers. Imbalances in the food market, particularly among low-income populations, can lead to food security issues.

Keywords: food security, food market, guaranteed prices, intervention prices, state food reserves, private funds, agriculture, processing industry.

1. INTRODUCTION

Improving food security is a multifaceted challenge that requires a comprehensive approach encompassing economic, social, and political dimensions. According to experts in the field, food security is defined not only by the availability of food but also by its accessibility, utilization, and stability over time (FAO, 2009). In today's globalized economy, food security is increasingly influenced by various global factors, such as climate change, international trade policies, and market fluctuations. These elements often cause disruptions in food supply chains, leading to shortages and price volatility, which directly impact the availability of food in local markets. As highlighted by scholars, global markets play a crucial role in determining food prices, and international trade often results in countries becoming more dependent on imports, making them vulnerable to price changes in global markets.

A key strategy for addressing these vulnerabilities involves the application of government policies such as guaranteed and intervention prices. According to economists like Stiglitz (1997), price stabilization mechanisms are essential in ensuring that both producers and consumers are protected from excessive market fluctuations. These mechanisms include

interventions that help regulate supply and demand in the food market, especially during times of scarcity or seasonal changes. In particular, intervention prices, which involve the government purchasing surplus food during periods of excess or providing food to the market during shortages, play a significant role in maintaining market stability and preventing extreme price increases.

Globalization has intensified the interconnectedness of food markets, often exacerbating the vulnerability of countries that rely on imports for their food security. In this context, government intervention becomes a critical tool to mitigate the risks posed by global market fluctuations. Scholars argue that government interventions are particularly vital in countries with low agricultural productivity or limited access to global food markets. These interventions help stabilize food prices, ensuring that food remains affordable for all population segments, especially marginalized and low-income groups. Moreover, interventions such as the establishment of strategic food reserves, are essential in ensuring that food can be distributed effectively during times of crisis or seasonal shortages.

By creating a regulatory framework that includes guaranteed prices and commodity interventions, governments can promote a more stable and resilient food system. These measures not only benefit agricultural producers by securing their incomes but also ensure that consumers have reliable access to affordable food. As noted, the concept of "food sovereignty" emphasizes the importance of local agricultural production and the role of state-led interventions in maintaining food security. Such interventions can reduce reliance on international markets and enhance self-sufficiency, which is crucial for long-term food security.

2. MATERIALS AND METHODS

This study investigates global food security interventions, focusing on strategic food reserves, commodity intervention funds, and government involvement in stabilizing food prices. A qualitative research approach was used, relying on secondary data from international organizations, government reports, and academic literature. The data was collected from various sources, including the Food and Agriculture Organization (FAO), World Bank, and national agricultural ministries, to analyze the practices of food reserves and intervention policies in countries like the USA, China, Russia, Brazil, and the EU. The research includes both historical and contemporary perspectives on food security measures, with a particular emphasis on the impact of the Russia-Ukraine war on global food markets and the role of state intervention in stabilizing commodity prices. A comparative analysis was conducted to evaluate the effectiveness of different intervention strategies across countries, using statistical data on grain reserves, price fluctuations, and food market performance.

The Role of Guaranteed Prices in Agricultural Development and Food Security

Ensuring the sustainable development of the agricultural sector in the economy is largely dependent on the successful completion of the extensive reproduction process in agriculture and the enhancement of the competitiveness of agricultural commodity producers. As is well known, agriculture is a sector that directly depends on natural climatic conditions and the fertility of land resources. Changes in these climatic conditions ultimately affect productivity levels and the volume of products produced (Tsakhaev, 2013). Therefore,

measures aimed at increasing the volume of agricultural production are not only dependent on the capabilities of agricultural commodity producers but also directly related to the effectiveness of the agricultural policies implemented by the state. It should also be noted that since a market economy reflects the fundamental laws of free competition, demand and supply, as well as economic freedom and liberalization processes, the development of agriculture and the food market, in general, based on market conditions, results in market fluctuations and price increases (Dolan & Simon, 2005). However, fluctuations in market conditions do not always lead to price increases. In some cases, there are instances of price reductions, which, although beneficial for consumers, have a negative impact on producers' ability to continue their activities profitably in the future (Stiglitz, 1997). These rapid price fluctuations in the market characterize market cycles and create harmful tendencies that affect both producers and consumers negatively (Galbraith, 1976). The price formation process is quite complex and multi-dimensional, and the increase in the influence of price-forming factors leads to various fluctuations. The enhancement of these factors in market conditions often leads to harmful tendencies, and thus, it is essential for the state to implement effective price policies to eliminate these harmful tendencies (Kosyakin, 2009). The state can play a role as the most important purchaser and buyer of agricultural products. The provision of national defense and security needs and food requirements in other sectors are directly dependent on the supply processes implemented by the state (Pakhomov, 2019).

Figure 1. Impact of Guaranteed and Intervention Prices on Food Security in 2023
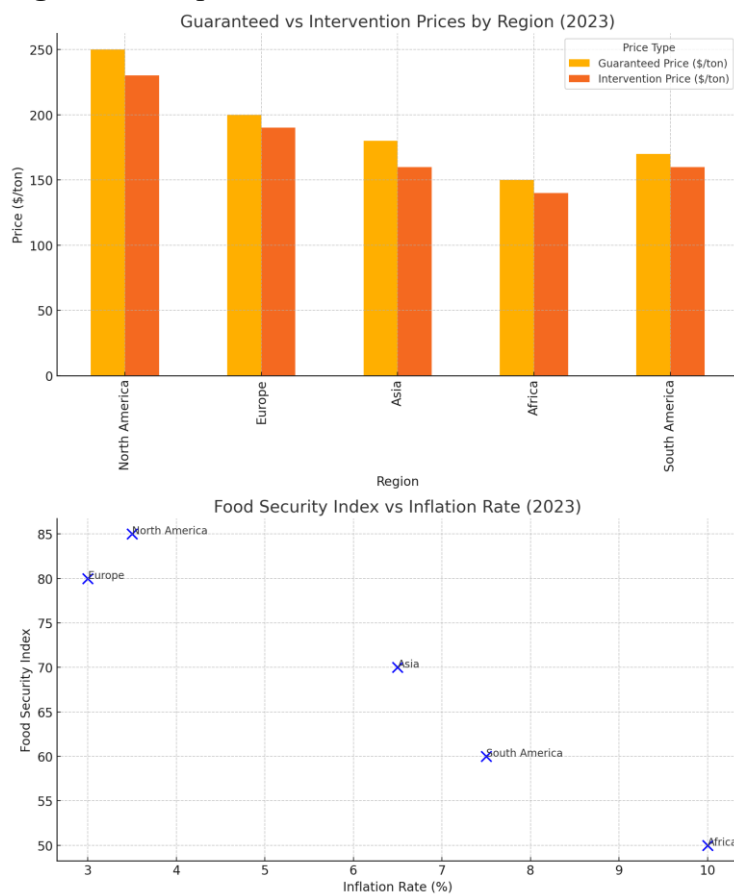
Source: Data synthesized from global trends and FAO reports

THE IMPACT OF THE IMPLEMENTATION OF GUARANTEED AND INTERVENTION PRICES ON FOOD SECURITY

This analysis explores how guaranteed and intervention pricing strategies affect food security across various regions in 2023. The bar chart highlights price disparities, with developed regions offering higher guaranteed and intervention prices, ensuring better market stability. Conversely, the scatter plot shows a negative correlation between inflation rates and food security indices. Regions with higher inflation, particularly in Africa and South America, experience lower food security. These visuals underscore the crucial role of price controls and economic stability in mitigating food insecurity amid global challenges such as inflation and geopolitical tensions.

It is true that in a market economy, prices are usually determined freely, based on demand and supply. However, it should be noted that in countries where state intervention in economic activities is implemented, the state's influence on the price formation process is quite high (Charikova & Chernysheva, 2019). For instance, American economist G. Simon argues that in most markets, the prices are not determined by competition, but by managed prices (Dolan & Simon, 2005). In developed countries, the level of prices in various sectors accounts for 10-30% of the total production volume and is regulated by the government (Galbraith, 1976). It is possible to agree with these economists' views, as in many cases in developed and even developing countries, the level of prices for agricultural products is often determined through necessary and indirect compensation and subsidies by the state. This process has a unique effect on both consumer and producer interests. In our view, the state's intervention through price policies can help achieve balance in various sectors of the economy, including agriculture, and create favorable conditions for equal access for consumers to the food market (Stiglitz, 1997). Another American economist, D.K. Galbraith, argues that state regulation often involves intervention in the level of aggregate demand, with the government's regulatory tools performing fiscal functions on prices and incomes (Galbraith, 1976).

The experience of developed countries shows that price regulation measures are primarily implemented in the agricultural sector and food markets. This is due to the unstable nature of agricultural product prices (Kosyakin, 2009). The high elasticity of supply in agricultural products makes their prices more susceptible to fluctuations. Additionally, the inadequate or sometimes non-adequate demand for agricultural products also causes price changes. Therefore, in such situations, it is necessary to stabilize food prices and ensure that agricultural producers' prices are set at levels that improve their financial position (Pakhomov, 2019). This can be achieved by limiting price fluctuations and protecting both consumers and producers from harmful price changes. In this regard, price regulation by the state plays a key strategic role in eliminating the harmful effects of the market mechanism and ensuring the balanced development of the agricultural sector (Charikova & Chernysheva, 2019).

In our opinion, the measures aimed at regulating price levels should serve to maintain the principles of a free market mechanism. In this sense, agricultural producers should be able to sell their products at market prices determined by demand and supply. However, when the market prices do not align with the financial situation of agricultural producers, the state should intervene and establish necessary price regulations. The fundamental principle of price regulation should be a price priority system, which ensures that the government creates an acceptable and sufficient price level for agricultural producers' interests and adjusts it when necessary (Galbraith, 1976).

Studies show that agricultural producers can face different situations regarding price fluctuations. In some cases, their incomes may increase, but in most cases, price reductions lead to a decrease in their revenues (Kosyakin, 2009). In the past, under the centralized socialist economy, price levels were regulated by the state. At that time, uniform sales prices and differentiated supplements were applied across the entire union, enabling compensation for commodity producers when necessary. The costs and profits in these price mechanisms were reflected in the production costs per unit of agricultural products (Tsakhaev, 2013). With the transition to a market economy, the economic system is largely based on liberal free market laws, and in this process, free market prices are proposed, which leads to the formation of prices based on demand and supply, and often monopolistic price levels. As a result, agricultural producers cannot gain enough profit from these market prices (Dolan & Simon, 2005).

Therefore, the use of guaranteed prices in agriculture is crucial to protect agricultural producers and ensure stability in the food market, improving food security. Guaranteed prices can be defined as a system where the government sets a minimum procurement price for agricultural products (Stiglitz, 1997). When the free market prices align with the agricultural producers' interests, they can sell their products at those prices. However, when market prices do not favor agricultural producers, they can rely on guaranteed prices to sell their products. The methodology for forming guaranteed prices is widely used, where economists argue that guaranteed prices should cover the material costs of commodity producers and provide necessary income for subsequent years to carry out large-scale agricultural reproduction processes (Pakhomov, 2019). Economists believe that guaranteed prices should not only compensate for the costs incurred in agriculture but also ensure a minimum profitability level in the worst-case scenario (Galbraith, 1976).

In the European Union, price policies play an important role in the structure of the common agricultural policy, with a greater emphasis on guaranteed prices (Charikova & Chernysheva, 2019). Guaranteed prices are usually determined through a minimum price system, which is applied when market prices are low. These price levels play a vital role in protecting the economic interests of agricultural producers. In the European Union, various programs are implemented to enhance the sustainability and efficiency of national agriculture, including measures to eliminate food product imports and ensure food security under conditions of inter-country integration. In conclusion, the protection of the guaranteed price system, particularly in times of economic crises, stabilizes the financial position of agricultural commodity producers and prevents bankruptcy. The implementation of guaranteed prices also contributes to improving food security by enabling producers to sell their products at these prices when market prices are unfavorable. Thus, in the current context of deepening globalization, the use of guaranteed prices in developing countries can significantly improve national food security (Daoud et al., 2019).

3. DISCUSSION AND RESULTS

Intervention prices play an essential role in government price policy aimed at supporting agricultural commodity producers. Through intervention prices, the government acquires products from agricultural commodity producers at supply prices and intervenes in the food market when prices fall (Tsakhaev, 2013). In this context, intervention prices are applied during supply interventions and commodity market interventions. These price types

are crucial in defending agricultural commodity producers and contributing to the stabilization of the food market (Dolan & Simon, 2005).

It should be noted that intervention prices are implemented during market interventions, that is, when the government intervenes in the food market. Historical analysis of the formation of intervention prices suggests that active efforts to regulate the food market through commodity interventions began in the 1930s. During the Great Depression of the 1930s, specifically between 1929 and 1933, the United States introduced federal agricultural price support programs to achieve several social and economic goals. Commodity interventions applied in the food market during this period helped stabilize the food market (Galbraith, 1976). After the Agricultural Adjustment Act of 1933, agricultural productivity levels in the U.S. experienced significant increases (Kosyakin, 2009).

Government interventions in the food market occur under market conditions and within the global competitive environment, in the form of purchased interventions and commodity interventions (Pakhomov, 2019). The government's purchase and commodity interventions aim to stabilize the prices of agricultural products, raw materials, and food, while ensuring balanced income levels for agricultural commodity producers (Charikova & Chernysheva, 2019). The government's purchase interventions are carried out when the prices of agricultural products fall below the minimum settlement prices in market transactions, including at auction (Tsakhaev, 2013). Commodity interventions, on the other hand, occur when the prices of agricultural products rise. The government intervenes by selling purchased agricultural products at auction and applying maximum settlement prices (Dolan & Simon, 2005). Government food market purchase interventions are characterized as supply interventions. These supply interventions involve organizing the acquisition of agricultural products, raw materials, and food through collateral transactions (Pakhomov, 2019). The commodity intervention stabilizes the price levels in the agricultural market, ensuring that agricultural commodity producers maintain a necessary income level to sustain widespread reproduction. This process involves sales of agricultural products from state and regional food reserves (Charikova & Chernysheva, 2019).

From the author's perspective, government intervention in the food market occurs in the following scenarios: When agricultural products are abundant in the food market, meaning the supply level is high, and prices fall, the government acquires food products to eliminate surplus supply in the market (Stiglitz, 1997). In the second case, when agricultural product prices rise, the government intervenes by selling products from food reserves, thus reducing the prices in the market (Kosyakin, 2009). Supply interventions are implemented when agricultural products, raw materials, or food prices fall below the minimum levels or when commodity producers in the production sector are unable to sell products due to a drop in prices. Examples of this include government purchases and commodity interventions involving grains, oilseeds, wool, beef, pork, poultry, vegetable oils, sugar, and powdered milk, which are widely practiced in global markets (Pakhomov, 2019).

Global experience shows that market interventions are most commonly applied in the grain segment of the food market (Daoud et al., 2019). This process has been more successful in the U.S., Canada, and EU member countries. However, post-Soviet countries have not implemented these processes as successfully, primarily due to underdeveloped infrastructure

systems in those regions (Charikova & Chernysheva, 2019). For instance, in Azerbaijan, although infrastructure systems for storing grains and other products, including storage facilities, have been established, the underdevelopment of certain technologies has led to the rapid spoilage of perishable products or higher storage costs (Voronin, Chupina, & Voronina, 2019). Similar tendencies have been observed in other post-Soviet countries. Russian economists O.G. Charikova and I.I. Chernysheva state that the effectiveness of interventions in the grain market is low due to the insufficient allocation of state budget funds (Charikova & Chernysheva, 2019). These inefficiencies result from untimely interventions, unrealistic auction prices, violated storage deadlines, and organizational and economic issues during the interventions (Daoud et al., 2019).

Figure 2. Percentage of Grain Reserves for Intervention Prices in Various Countries.

Percentage of Grain Reserves for Intervention Prices in Various Countries
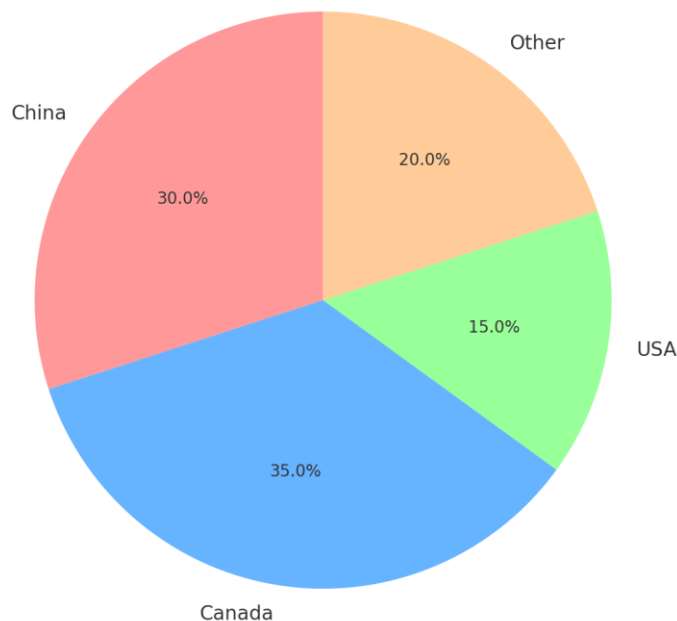
Source: Food and Agriculture Organization (FAO) Statistical Yearbook (2021).

In developed countries, intervention prices play a crucial role in stabilizing the agricultural market. For example, in 1933, the United States introduced federal agricultural price support programs during the Great Depression, significantly increasing agricultural productivity. In countries like China, Canada, and the U.S., intervention reserves are substantial, with China holding over 30% of total grain reserves, Canada 35%, and the U.S. about 15% (as of recent years). These intervention measures, primarily in the grain market, are vital for stabilizing prices, supporting producers, and ensuring food security, especially in the face of market fluctuations and global competition (Charikova & Chernysheva, 2019).

A. I. Doroshuk also defends the view that the underdevelopment of infrastructure systems and inefficiencies in intervention processes contribute to these problems. He argues that especially in grain market interventions, unreasonable prolonged storage of grain products without an effective system to manage storage costs leads to significant financial burdens for the state (Doroshchuk, 2016). Observations suggest that, in some cases, the mispricing of

intervention prices creates problems in the post-Soviet space. The government may set the purchasing prices for grain products below market prices, resulting in lost potential profits for commodity producers (Charikova & Chernysheva, 2019). From these authors' viewpoints, it can be concluded that improper price determination leads to inefficient interventions in the post-Soviet space. Moreover, intervention prices are not scientifically justified and often fail to meet the market's realities. These issues, such as the purchase of low-quality products for intervention reserves, are common problems in post-Soviet countries (Pakhomov, 2019).

In terms of the realities of Azerbaijan, it can be argued that discrepancies in global grain prices are directly related to the quality and price of grains (Voronin, Chupina, & Voronina, 2019). In post-Soviet countries, the volume of grain reserves is often not determined based on scientifically grounded norms. In developed countries, Western nations, China, and other major grain-producing countries, the creation of intervention reserves for grain is of significant importance. For example, in China, the reserve fund accounts for more than 30% of the total grain reserves, while in Canada, it is about 35%, and in the U.S., it is approximately 15% (Daoud et al., 2019).

In developed countries, supply and commodity interventions are widely used to stabilize food market prices and maintain stable income levels for agricultural commodity producers (Kosyakin, 2009). In particular, commodity interventions are of significant importance in the export of food products, contributing to the formation of export potential for agricultural commodity producers (Pakhomov, 2019). The historical aspects of agricultural market interventions show that this process spans a long period. In other words, commodity interventions play an essential role in the creation of food interventions and the establishment of government reserve funds (Charikova & Chernysheva, 2019). Initially, interventions begin with supply (purchase) interventions, leading to the establishment of reserve funds from which interventions can be made when necessary. The primary goal of strategic food reserves is to stabilize the national market (Galbraith, 1976). Even in ancient times, civilizations such as Rome, China, and Egypt created grain reserves, which were used to maintain stable food prices. The creation of such reserves continues today in countries like Russia, China, India, Brazil, Indonesia, Canada, and Malawi (Food and Agriculture Organization [FAO], 2021).Global experience shows that the creation of food reserves is mainly carried out in three directions:

1. Creation of strategic state reserves;
2. Creation of private reserves;
3. Formation of intervention funds.

The creation of strategic state reserves is more widespread in world countries and is primarily implemented to address unforeseen food shortages, regularly build food reserves, and improve food security for vulnerable groups while stabilizing prices. In the process of creating private reserves, government bodies are generally not involved. Private sector entities, including agricultural commodity producers, processing enterprises, and wholesale organizations, are responsible for creating private reserves. The creation of private reserves serves the following functions:

1. Meeting business needs;
2. Managing risks associated with future price increases;
3. Ensuring the continuous supply of food;

4. Stabilizing prices during adverse conditions, such as transportation issues, in order to compensate for potential losses.

Analysis shows that compared to state strategic reserves, private reserves are generally not as large in scale. In some countries, private reserves created by private sector entities can serve as an alternative to state reserves (Voronin, Chupina, & Voronina, 2019). Along with state strategic reserve funds, the creation of intervention funds, or commodity intervention funds, aims to restore balance between supply and demand in commodity markets (Pakhomov, 2019). In EU countries, intervention processes are typically applied during significant price fluctuations in global markets (Charikova & Chernysheva, 2019). The formation of intervention funds occurs when the intervention price of a product in foreign markets falls below the set level for a certain period (Daoud et al., 2019).

As previously mentioned, grain and food reserves are created in developed countries such as the U.S., EU, China, and others (Food and Agriculture Organization [FAO], 2021). The norms for the placement of products in food reserves differ depending on the country's population size, economic development level, and the potential and actual capacity of the food market (Ulanov & Kovaleva, 2017). In countries like the U.S. and Sweden, the created food reserves can ensure the standard distribution of products for up to 5 years. The volume of grain reserves determines the stable level of food security in the world economy, corresponding to 17% of annual consumption or 60 days of grain consumption (FAO, 2022). It is important to note that the process of creating intervention funds and the scope of interventions are significantly influenced by global market changes. Recently, not only economic factors but also political and military factors, such as the Russia-Ukraine war, have had a profound impact on food reserves and global food market fluctuations (Food and Agriculture Organization [FAO], 2014). In particular, the role of Russia and Ukraine as major grain exporters has further complicated the situation. As a result, there has been a decline in global grain reserves (Daoud et al., 2019). The depletion of government intervention reserves is directly related to the reduction in the volume of food reserves. This process is affected by wars, escalating political tensions, global climate change, and other factors (Ulanov & Kovaleva, 2017). The unfavorable agricultural climate and crises such as the COVID-19 pandemic and the Russia-Ukraine war have led to a decrease in the reserves of many developed countries, resulting in price increases. According to the Food and Agriculture Organization (FAO), the global food price index was 159.17% in 2022, up from 125.17% in 2021 and 98.11% in 2020 (FAO, 2022). The preservation of global food reserves is crucial for handling emergency situations. In this regard, increasing agricultural productivity, modernizing the sector, and other such measures in developing countries can play a vital role in stabilizing the situation and securing global support (Daoud et al., 2019).

4. CONCLUSIONS

Supply and intervention prices play a crucial role in improving food security, particularly in countries facing significant challenges in this area. Developing nations are more prone to food insecurity due to factors such as limited resources, unstable markets, and vulnerability to global price fluctuations. The establishment of supply and intervention funds serves as a vital strategy for mitigating these risks. By stabilizing market prices, supply and intervention prices protect agricultural producers from volatility, ensuring consistent income

levels and promoting the sustainable production of food. These interventions also help in controlling inflationary price increases, which can make food unaffordable for low-income populations. Furthermore, ensuring consumers' access to affordable and nutritious food contributes directly to enhancing food security, which is essential for social stability and economic growth. The implementation of these measures also strengthens the resilience of the agricultural sector, enabling it to better cope with environmental and economic shocks, such as climate change and geopolitical tensions. In conclusion, supply and intervention prices not only stabilize the market but also ensure that food security policies are effective in meeting the needs of both producers and consumers, thereby contributing to a more resilient and equitable global food system.

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PROCESS RENOVATION: CASE STUDY OF A LIQUIDITY PLANNING PROCESS OF THE NATIONAL BUDGET IN SLOVENIA

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Abstract: The constant development of new technologies and tools is forcing organizations to recast their processes. The paper examines the reengineering of the key processes in a public finance organization that cause bottlenecks and consequent ineffectiveness. The aim is to eliminate and reduce obstacles, as simulations and cash flow forecasts (reports) are prepared too slowly and are consequently reported late, certain operations are carried out manually and duplicated. This increases the chance of errors. Theoretical findings are presented for the case study of the liquidity planning process of the national budget. They present the renovation process and the effects of the improvements achieved using the Object-Oriented Method (TAD) approach, which is based on a tabular representation, and the Aris method for the graphic depiction of the model of the business process flow based on the BPMN standard for business process modelling. The renovated liquidity planning process of the national budget was found to be necessary. It proved to be 50% quicker, saving 466 hours a year through the elimination of the hard work tasks. It provides added value in the further forecasting of cash flows that effect the liquidity of the national budget.

Keywords: process renovation, TAD, ARIS method, BPMN, public finance organization, model, BPM

INTRODUCTION

We live in the age of globalisation, which is constantly introducing modern technologies and forcing us to recast business processes and adapt them to changes in order to keep up with the competition. Organizations are constantly looking for cost-effective improvements for their business processes (Wynn et al., 2013). Business Renovation (BR) is a useful method to help organizations cut operational costs and improve the quality of their processes. It provides organizations sustainable competitive advantage in the market (Bhaskar, & Singh, 2014). In order to be successful in business renovation, organizations utilize specific methodology for analysing and modelling the current state of the business process (AS-IS) and the effectiveness of the renovated process (TO-BE). This provides information regarding the executability of the process renovation, the weak points in the processes and resource bottlenecks, as well as suggests possible improvements.

Approaches that focus on analysing the current state of the business process (AS-IS) and the effectiveness of the renovated process (TO-BE) are combined in the TAD method. As stated by Damij (2009), the TAD method is based on a tabular representation of the state of the analysing processes. According to Damij, N., Damij, T., Grad, & Jelenc, (2008), it provides a lot of new ideas for process modelling (development of a design model) and process improvements.

The suggested method for business process modelling is the Aris method based on the BPMN standard for business process modelling (Ivandic Vidovic, & Bosilj Vuksic, 2003). This is a unique and internationally established method for the graphic modelling of a business process renovation (Scheer, 2000). Business process modelling has a number of positive effects, as it increases the model quality of the business processes (Hilt, 2007; Fettke &Loos, 2007; Kirchmer, 2009 in, Indihar Štemberger & Kovačič, 2011), facilitates improvements, and provides the opportunity to increase competition on the market (Dantis, 2019).

This paper presents a case study of the liquidity planning process of the Slovenian national budget. It details the procedure of the process renovation and the effects of the improvements achieved. Obstacles, i.e., bottlenecks (e.g., simulations and cash flow forecasts (reports) are prepared too slowly and are consequently reported late, certain operations are carried out manually and duplicated, leading to errors in the forecasts) are being encountered in the execution of the process, which in turn leads to the inefficiency of the liquidity planning process of the national budget.

Business Renovation Approach

Using the TAD method, the current state (AS-IS) and the renovated process state (TO-BE) were analysed for the liquidity planning process of the Slovenian national budget. The process involved preparing the work processes for the proposed liquidity plan (PLP) and the confirmed liquidity plan (CLP), the adjusted liquidity plan (ALP), and reporting adjustments to the LP and cash flow (CF) management. The effect of the renovated process was also measured.

The main goal of the renovation was to eliminate or reduce so-called bottlenecks. The data was acquired through interviews with 27 process users. The measurements of the current state of the process (AS-IS) and the renovated process (TO-BE) as recorded in the information system after the implemented improvements were both analysed. The process activities were evaluated according to the duration in minutes and the costs in EUR.

Table 1 presents the analysis of the properties of the activities in the current process (AS-IS) and the renovated process (TO-BE) of preparing the PLP and confirming the LP along with the measured effect of the renovated process.

Table 1: Properties of the current and renovated process of the PLP preparation and LP confirmation and measurements of the effect of the process renovation

Properties of the current PROCESS of PLP preparation and LP confirmation (AS-IS)			Properties of the renovated PROCESS of PLP preparation and LP confirmation (TO-BE)		Measuring the effect of the process renovation		
Activity	Time in minutes	Cost in EUR	Time in minutes	Cost in EUR	Reduced time in minutes	Reduced time in minutes	Reduced costs in % (TO-BE)
Initialising PLP documents	5	0.61	0	0.00	-5	-0.61	-100
Data review and preparation for PLP entry	85	10.33	82	9.96	-3	-0.36	-4
Entering and arranging a PLP document	37	4.50	35	4.25	-2	-0.24	-5
PLP rejection	10	1.22	5	0.61	-5	-0.61	-50
Data import/export	10	1.22	0	0.00	-10	-1.22	-100
PLP approval	5	0.61	5	0.61	0	0.00	0
Storage of data in a BLMS (budget liquidity management system] database	5	0.61	0	0.00	-5	-0.61	-100
Transfer of data from PLP to LP and ALP	10	1.22	0	0.00	-10	-1.22	-100
Total	167	20.29	127	15.43	-40	-4.86	-24

The analysis of the results from Table 1 indicates that the renovation process (TO-BE) eliminated 4 manual activities (initializing the process, importing and exporting data, data saving process, and the data transfer process). The TO-BE process execution was shorter by 24% relative to the existing current state (AS-IS).

We determined that the process of preparing the PLP and confirming the LP was also shortened by 40 minutes, constituting a lowered cost of EUR 4.86. It was also concluded that the process is carried out once a month, amounting to 12 times a year, which represents 8 fewer hours of unnecessary labour a year and EUR 58.12 lower costs a year as depicted in Table 4.

Compared to the current AS-IS process, the information and data flow of information in the renovated process (TO-BE) runs between the process participants through the unified MFERAC information system (with new and expanded functionalities) and eliminating manual entries (as illustrated by Figure 1 – graphically depicted process model). The manual activities (starting the processes of initialization, importing, exporting, entry of data) have been replaced by automated service procedures that are simultaneously implemented with each change in the system, which consequently means that the number of activities for the participants in the process has decreased. These improvements in the renovated process have influenced their effectiveness as presented in Figure 1.

The visualisation, i.e., the graphic process model, was created using the BPMN (business process management notation), which is standard for business process modelling in Aris. The main benefit of using BPMN is that it is allows for the flexible development of business processes (Rosing, White, Cummins, & Man, 2015).

Figure 1
Model of the renovated PLP process (TO-BE)
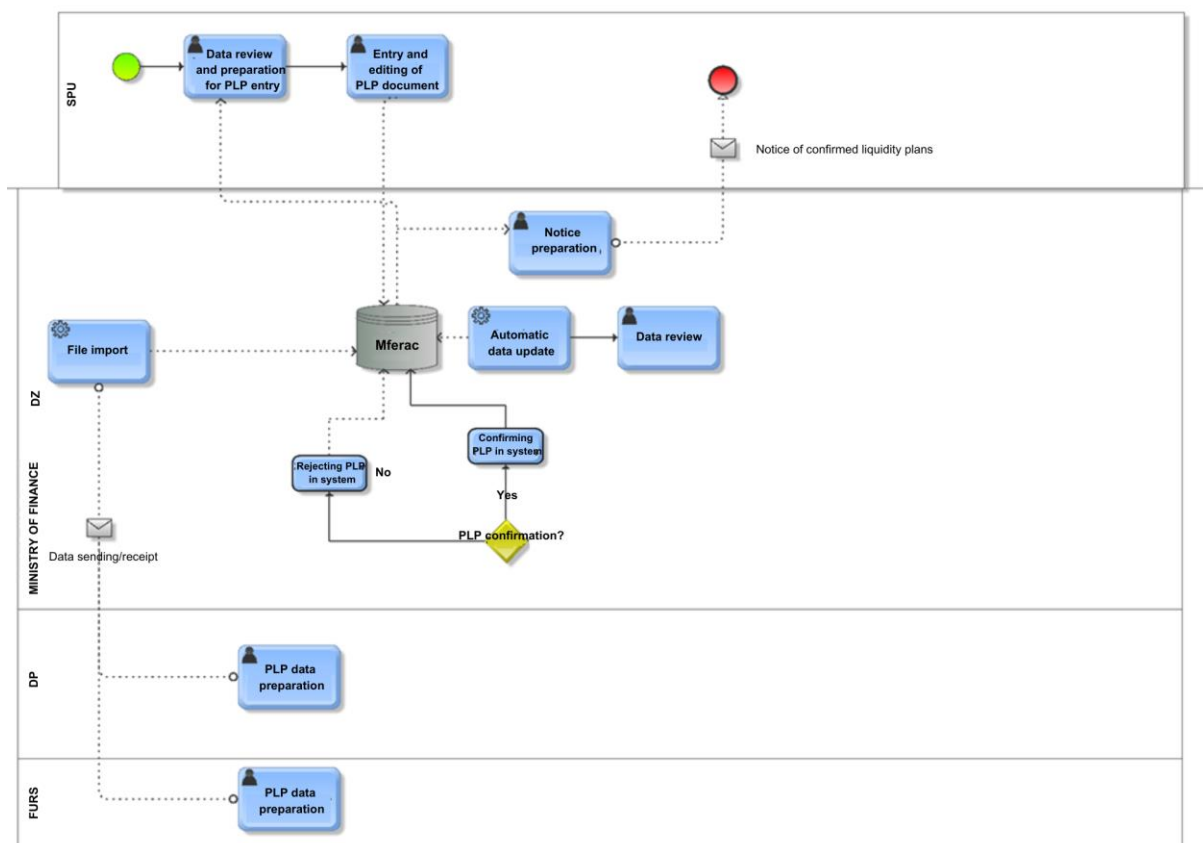
Table 2 presents the analysis of the properties of the implemented activities in the current process (AS-IS) versus the renovated process (TO-BE) or communicating adjustments to the liquidity plan and measuring the effects of the process renovation.

Table 2: The properties of the current and renovated process of communicating adjustments to the liquidity plan and measuring the effects of the process renovation

Properties for the existing LP adjustments reporting process (AS-IS)			Properties of the renovated LP adjustment reporting process (TO-BE)		Measuring the effect of the process renovation		
Activity	**Time in minutes**	**Cost in EUR**	**Time in minutes**	**Cost in EUR**	**Reduced time in minutes**	**Reduced time in minutes**	**Reduced costs in % (TO-BE)**
Verifying data for preparing the ALP	19	2.31	17	2.07	-2	-0.24	-11
Oversight and arrangement of the ALP document for the PU	20	2.43	10	1.22	-10	-1.22	-50
Preparing the increase application	5	0.61	3	0.36	-2	-0.24	-40
Confirming the increase application	5	0.61	5	0.61	0	0.00	0
Review and documentation of the submitted corrections	30	3.65	10	1.22	-20	-2.43	-67
Data entry in the auxiliary BLMS database	25	304	0	0.00	-25	-3.04	-100
Data entry into the BLMS database	10	1.22	0	0.00	-10	-1.22	-100
Total	**114**	**13.85**	**45**	**5.47**	**-69**	**-8.38**	**-61**

The analysis of the gathered results from Table 2 indicates that on average, the renovated process (TO-BE) is 61% shorter, which is an improvement of 15% from the analysis of the current process analysis (AS-IS). The shorter implementation time of the renovated process constitutes EUR 8.38 fewer costs. It was revealed that this process is executed daily, which sums up to EUR 175.98 EUR fewer costs a month and means EUR 2,111.76 EUR in cost savings a year (Table 4).

The main change of the renovated process of communicating corrections to the liquidity plan (TO-BE) that can be discerned from the graphically presented model on Figure 2 is that

in comparison to the AS-IS process, the communication flow of data between the process participants runs exclusively through the MFERAC information system. The manual activities (manual entries, data import and export) have been replaced by automatized service procedures concurrently with each change in the system, which has consequently decreased the number of activities for the process participants. The renovated process (TO-BE) has also introduced smaller organizational changes, for example, that in contrast to the AS-IS process, users in the TO-BE process can communicate a change for the 1st of the month, no longer on the 10th of the month. This change was implemented in order to acquire the most precise possible data for the national budget manager who plans, monitors, and coordinates the executed cash flow of the national budget and the users have smaller disparities between the realized and the forecast payments at the end of the month.

Figure 2
Model of the renovated ALP process
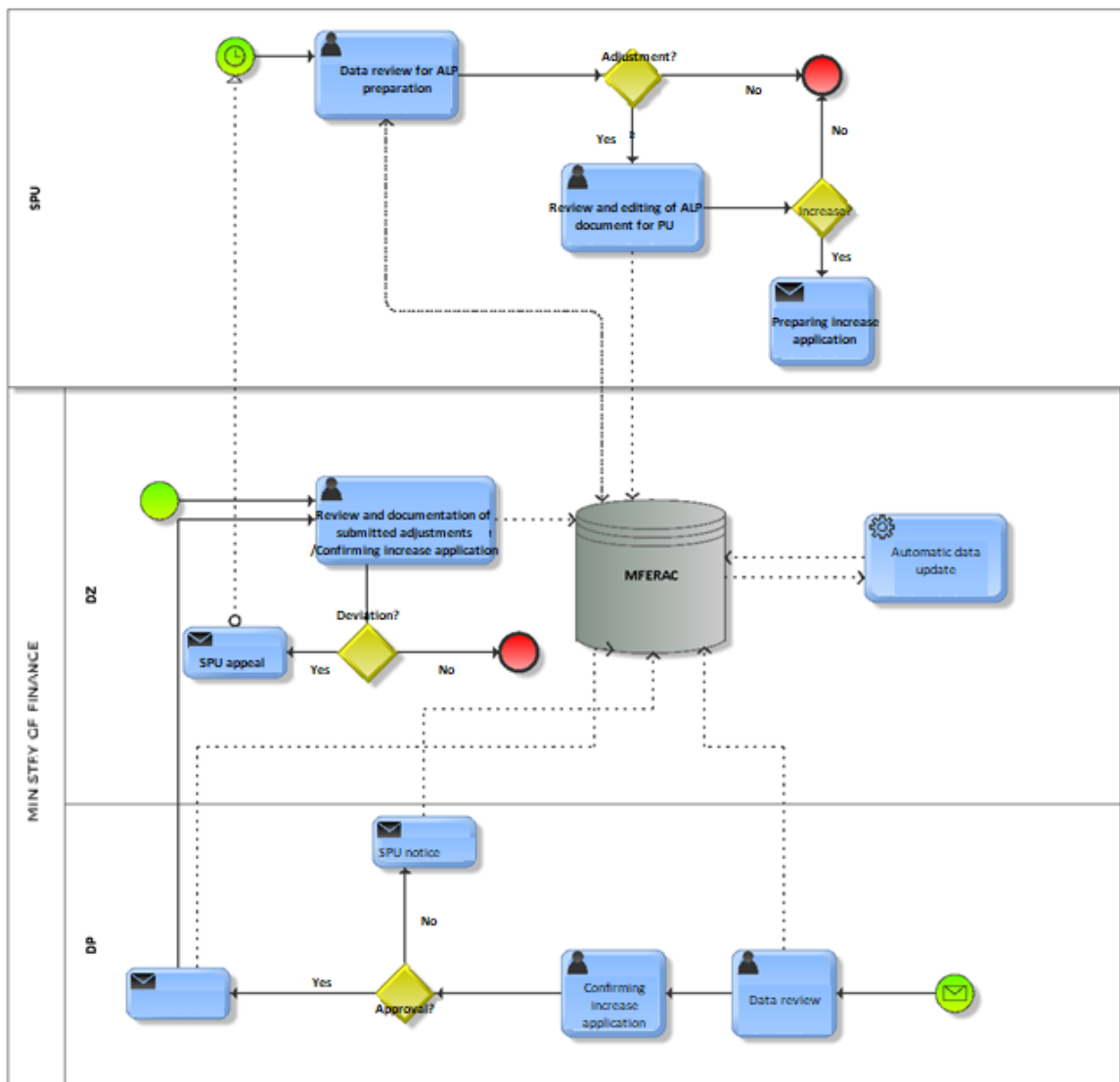
Table 3 contains the analysis of the properties of implementing activities in the existing process (AS-IS) and the renovated process (TO-BE) of cash flow management as well as measurements of the effect of renovated process (TO-BE).

Table 3: Properties of the existing and renovated process and the effects of the improvements to the renovated process of cash flow management

Properties of the existing PROCESS of cash flow management (AS-IS)			Properties of the renovated PROCESS of cash flow management (TO-BE)		Measuring the effect of the process renovation		
Activity	Time in minutes	Cost in EUR	Time in minutes	Cost in EUR	Reduced time in minutes	Reduced time in minutes	Reduced costs in % (TO-BE)
Data collection and overview	30	3.65	15	1.82	-15	-1.82	50
Data entry	20	2.43	5	0.61	-15	-1.82	-75
Data import/export	10	1.22	0	0.00	-10	-1.22	-100
Total	60	7.29	20	2.43	-40	-4.86	-67

The analysis of the acquired results as displayed in Table 3 indicate that the renovated process (TO-BE) has shortened the process execution by 67% relative to the current state process (AS-IS).

It was determined that the process is executed on a daily basis, which constitutes EUR 102.06 fewer costs a month, i.e., EUR 1,224.72 fewer costs a year (Table 4).

The key substantive change in the renovated process (TO-BE) is the database that has been established at the economic classification level. It is no longer organized at the level of liquidity items as it used to be in the AS-IS process. Additionally, the TO-BE process is implemented in the new online environment of the MFERAC information system, which provides the required and necessary functionalities and an adjusted manner of executing individual activities (as depicted by Figure 3 – graphically presented model of the process). These improvements in the renovated process have also impacted their effectiveness as presented in Table 4.

Figure 3
Model of the renovated cash flow (CF) process (TO-BE)
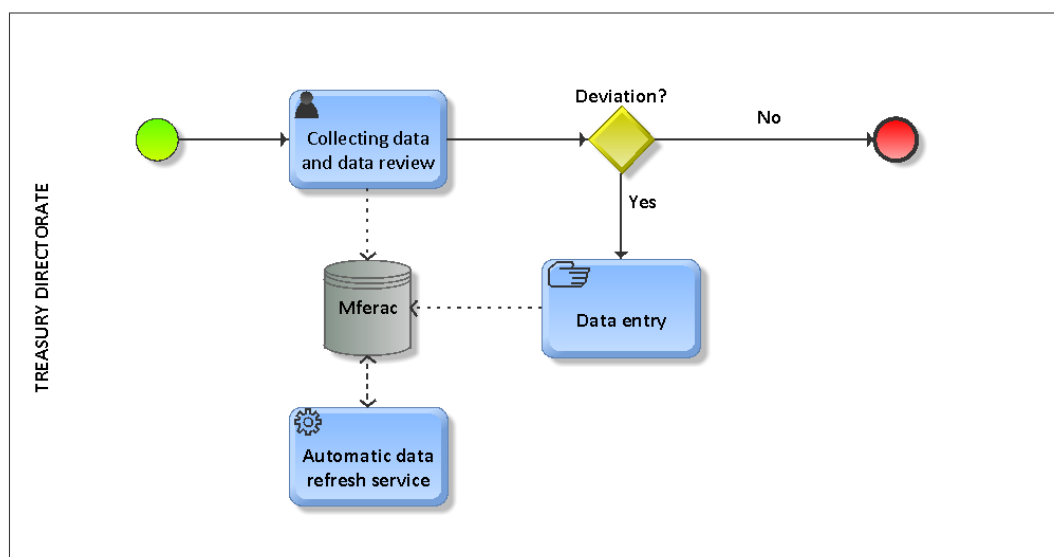
Discussion: Measuring the effect of the process renovation

Table 4 presents the effects of the renovated liquidity planning process of the national budget. Presented are the average values of executing individual work processes and the achieved impact – annual saving in hours and costs in EUR.

Table 4: Annual impact of the renovated liquidity planning process of the national budget (TO-BE)

Annual impact of the renovated Liquidity Planning Process of the National Budget TO-BE						
Process	**No. of executions**	**Time change in min**	**Cost change in EUR**	**Cost change in %**	**Annual savings in hours**	**Annual savings in EUR**
Process of preparing the PLP and confirming the LP	12	-40	-4.86	-24	-8	-58.32
Process of communicating adjustments to the LP	252	-69	-8.38	-61	-290	-2,111.76
Cash flow management process	252	-40	-4.86	-67	-168	-1,224.72
Total	516	-149	-18.11	-51	-466	-3,394.80

Source: Own (Gartner, 2020)

We have determined that the renovated process is executed 50% faster, consequently resulting in EUR 3,394.80 lower cost a year. It has been indicated that the renovated liquidity planning process of the national budget (including the new and expanded functionalities of MFERAC and in eliminating manual entries) saves 466 hours of time that had previously been dedicated to compiling the necessary analyses and preparing reports. The renovated process is executed 50% faster. The additional daily measurements of entry errors and discrepancies between the forecast liquidity plan and realized liquidity plan has also determined that the gathered data and information in the renovated process are 18% more accurate (which means 18% fewer discrepancies between the planned cash flow and actual realization) and as much as 72% fewer errors.

The renovation of the liquidity planning process of the national budget also provides added value for future cash flow forecasts and executing cash flow simulations by taking into account certain scenarios that can impact the liquidity of the national budget (Table 9).

The analysis of the answers of the interviewed users of the renovated liquidity planning process of the national budget (TO-BE) confirmed the advantages of the TO-BE process: 22% of the users share the opinion that user support is well established, 19% of the users recognize the advantage of implementing the economic classification that has replaced the liquidity items, which also shortens the time users need to spend on the review, collection, and preparation of the data. 9% of the users think the automatic nature of coordinating the dynamics on the last day of the month is an advantage that shortens the processing time, 9% of the users think the renovated system in more transparent. Furthermore, 9% of the users also believe that the renovation has shortened the time needed for the process execution, 6% are pleased with the enabled function of reporting corrections to be set for the 1st of the month, no longer on the 10th of the month as was customary in the AS-IS process.

CONCLUSIONS

This paper analysed the liquidity planning process of the Slovenian national budget. The core notion is that the process renovation has a significant impact in its efficiency. In practice, this means that the renovated process aims to eliminate and reduce the obstacles or so-called bottlenecks (i.e., simulations and forecasts (reports) of cash flows are prepared too slowly and are consequently reported too late, certain operations need to be carried out manually and are duplicated). This increases the chance for errors.

The proposed business renovation approach using the TAD and Aris method on Press and hold BPMN standard for modelling has proven to be valuable for understanding the current process (AS-IS), the renovated process, and the effects of the improvements.

The case study confirms that the renovated process is executed 50% faster. In addition, the data and information acquired through the renovated process are 18% more accurate (meaning 18% fewer discrepancies between the forecast cash flow and the actual realization) and present 72% fewer errors.

Tables 1, 2, and 3 reveal that the activities of duplicated data entry, import, and export that were executed several times a day upon each change of data or upon errors in the manual

data entry. In the TO-BE process, these activities have been automated or can only be executed only once when needed.

Furthermore, the renovation process has proven to be useful since it enables a faster and more precise preparation of future cash flow forecasts. The reached conclusion was that the shortened duration of the process execution and the eliminated manual activities saves 466 hours of labour a year that can be utilized in a more productive way for preparing different analyses and reports enabled by the renovated MFERAC information system. This constitutes added value for future cash flow estimates and preparing simulations by taking into account certain event scenarios that affect the liquidity of the state budget.

The limitation of the study is that the renovated liquidity planning process of the national budget including the new and expanded functionalities of the MFERAC information system is still in the implementation phase. In the future, the effects of the renovated process are expected to increase further (decreased hours spent and costs). For this reason, further research of the process remains necessary and advisable.

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AGRO-ECONOMIC SYNERGY: ENHANCING FOOD SECURITY THROUGH INNOVATIVE AGRICULTURAL PRACTICES IN AZERBAIJAN

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Abstract: *This paper examines the critical role of agro-economic synergy in enhancing food security in Azerbaijan. Amid global challenges such as climate change, population growth, and economic uncertainty, Azerbaijan has significant potential to modernize its agricultural sector through innovative practices like precision agriculture, biotechnology, and sustainable farming techniques. The research highlights the country's strategic initiatives, including the "State Program for Ensuring Food Safety in the Republic of Azerbaijan for 2019-2025," which emphasizes the integration of technological advancements and economic strategies to boost agricultural output while reducing environmental impact. By employing a qualitative methodology based on secondary data from governmental and global organizations, the study explores how advanced agricultural practices can improve both food availability and export potential. Case studies such as the development of agroparks and partnerships with international institutions further demonstrate Azerbaijan's efforts to modernize its food systems and achieve long-term sustainability. Despite facing infrastructural and policy challenges, the paper underscores the importance of continued innovation and investment to secure food sovereignty and strengthen Azerbaijan's position in global markets. The findings contribute to a broader understanding of how agricultural modernization can drive economic growth while ensuring food security.*

Keywords: Azerbaijan, agriculture, food security, economic development, agricultural practices

INTRODUCTION

In recent years, food security has become a critical global concern, driven by challenges such as climate change, population growth, and economic uncertainty, all of which have raised questions about the sustainability and effectiveness of agricultural systems. Amid these global challenges, Azerbaijan finds itself at a pivotal point, with the opportunity to harness its distinctive geographic, climatic, and economic attributes to build a resilient agricultural sector. The concept of agro-economic synergy—integrating modern farming techniques with economic sustainability—is increasingly seen as essential for enhancing food security, particularly in Azerbaijan, where agriculture plays a significant role in both GDP and employment. Food security, encompassing the availability, accessibility, and effective use of food, has emerged as a strategic priority for the Azerbaijani government. Agriculture, vital for

meeting domestic needs and generating export revenues, is central to achieving this objective. As Azerbaijan continues its commitment to sustainable development, exploring how agro-economic synergies can enhance agricultural output while reducing environmental impact is crucial. Tackling these challenges will not only safeguard the nation's food sovereignty but also bolster its standing in global agricultural markets. The key lies in modernizing the sector in a way that ensures sustainability and inclusivity. Contemporary research in agricultural economics has highlighted the importance of integrating technological innovations with robust economic policies. Studies indicate that the adoption of innovations like precision agriculture, climate-resilient farming, and biotechnology can substantially improve both productivity and resource efficiency. In Azerbaijan, such practices are gaining ground, particularly in areas like digital agriculture, water resource management, and the cultivation of high-value crops. However, the potential of these innovations is not yet fully realized, as the country continues to face challenges in policy development, infrastructure enhancement, and capacity building. The Republic of Azerbaijan has consistently prioritized food security as a critical component of its national policy, ensuring that the population has access to sufficient, safe, and nutritious food. To this end, the "State Program for Ensuring Food Safety in the Republic of Azerbaijan for 2019-2025," approved by Presidential Order No. 1143 on April 29, 2019, serves as a strategic framework to bolster the country's agricultural sector and safeguard its food systems against potential vulnerabilities. The 2020 Impact Assessment Report published by the Center for Analysis of Economic Reforms and Communication offers a detailed review of the progress achieved in implementing the program's objectives and highlights both successes and areas for further improvement. (State Program, 2020)

The 2020 Impact Assessment Report highlights several milestones achieved under the State Program. One of the major successes has been the significant improvement in the country's agricultural output. Enhanced irrigation systems, coupled with the promotion of precision agriculture technologies, have contributed to higher yields in key crops such as wheat, cotton, and fruits. The use of digital agriculture platforms, allowing farmers to monitor soil health, crop growth, and weather patterns, has further optimized farming practices. Additionally, the establishment of several food safety agencies and laboratories has improved the capacity to monitor and regulate food quality standards across Azerbaijan. The increased focus on training and certifying food producers to meet international standards has also facilitated the expansion of Azerbaijani agricultural products into foreign markets, boosting the country's export revenues.

Methodology

This research employs a qualitative methodology to explore agro-economic synergies that enhance food security in Azerbaijan. Utilizing secondary data from reputable sources, including the State Statistical Committee and World Bank reports, the study aims to analyze the interplay of agricultural practices, economic strategies, and environmental factors. Key data sources include the "State Program for Ensuring Food Safety in Azerbaijan" and relevant scholarly articles. The methodology incorporates content analysis to identify themes related to innovation and policy strategies, alongside comparative analysis to benchmark Azerbaijan's agricultural performance.

Literature review

Several scholars have underscored the significant role that agriculture plays in fostering economic development and ensuring food security, particularly in developing nations such as Azerbaijan. Schultz (1964) posits that agriculture in traditional societies must undergo modernization to become more productive and contribute effectively to economic progress. (Schultz, 1964) He emphasizes that with proper investments in areas like education, infrastructure, and technology, even subsistence farming can be transformed into a dynamic sector. This argument holds particular relevance for Azerbaijan, where agricultural productivity has yet to reach its full potential due to outdated farming methods and fragmented landholdings. Schultz's ideas on modernizing traditional agriculture resonate strongly with Azerbaijan's current needs. Lipton (2009) builds upon this by stressing the essential role agriculture plays in reducing poverty, particularly in rural areas. (Lipton, 2009)He argues that improvements in agricultural productivity can drive economic growth by creating demand for non-agricultural products and services, thus contributing to rural industrialization. Given that a large portion of Azerbaijan's population resides in rural areas, policies aimed at increasing agricultural output—especially in important agricultural regions like Ganja-Dashkasan and Shaki-Zagatala—could yield significant economic benefits. Lipton's theory supports the idea that well-targeted agricultural investments can create positive ripple effects throughout the economy, promoting sustainable development and enhancing food security.

Mellor (1995) also highlights agriculture's critical role in boosting overall economic development. He asserts that increased productivity in the agricultural sector can lead to higher incomes while simultaneously lowering food prices, thereby improving food security. Mellor's insights are particularly pertinent to Azerbaijan, where rising food costs have the potential to disproportionately impact the most vulnerable segments of society. By boosting agricultural efficiency and productivity, Azerbaijan can make food more affordable—a key factor in improving nutrition and alleviating poverty, according to Mellor's framework. (Mellor, 1995)

The value chain development approach, as discussed by Kaplinsky and Morris (2001), further supports the notion that integrating farmers into larger regional and global markets is vital for agro-economic growth. In Azerbaijan, developing value chains could significantly boost the production and export of high-value agricultural products like fruits, vegetables, and hazelnuts. According to Kaplinsky and Morris, improving farmers' market access and product quality can raise incomes and strengthen the broader agricultural economy. This is particularly relevant for regions such as Absheron-Khizi and Lankaran-Astara, where horticulture and export-oriented agriculture are emerging as key growth areas.

Chayanov's (1966) theory of the peasant economy offers additional insights into the challenges faced by Azerbaijan's rural farmers. Chayanov notes that smallholders tend to be risk-averse, often prioritizing subsistence over market-based production. (Chavanov, 1966) This is particularly applicable in Azerbaijan, where fragmented landholdings and limited access to credit and technology frequently hinder smallholders from scaling up production. However, the adoption of cooperative farming models—successfully employed in countries like Switzerland—could help Azerbaijani farmers pool resources, share risks, and gain better access to markets.

In the realm of innovative agricultural practices, Pretty et al. (2018) advocate for sustainable agricultural intensification, which focuses on boosting productivity while minimizing environmental impact. They argue that practices such as organic farming, conservation agriculture, and integrated pest management are crucial for achieving long-term food security. Azerbaijan, where challenges like climate change and land degradation are significant, can benefit greatly from this approach. For instance, the introduction of water-efficient irrigation technologies, successfully implemented in Germany, aligns with Pretty's recommendations for sustainable farming. Germany's experience in adopting eco-friendly practices while maintaining high levels of productivity offers valuable lessons for Azerbaijan as it seeks to transition toward sustainable agriculture.

Furthering the discussion, Ellis and Biggs (2001) emphasize the importance of agricultural innovation systems in promoting technological advancements and improving farm productivity. They argue that successful agricultural transformation requires not only technological innovation but also robust institutional support, including policies that facilitate access to credit, markets, and agricultural services. Azerbaijan's ongoing modernization efforts, which include partnerships with international organizations and government initiatives, align with the principles outlined by Ellis and Biggs. The development of modern greenhouse technologies in regions like Mil-Mughan and Shirvan-Salyan exemplifies how technological advancements, combined with supportive policy frameworks, can bolster food security and economic resilience. (Ellis & Biggs, 2001).

Finally, Pingali (2012) underscores the importance of diversifying agricultural production systems to ensure food security and economic stability. He warns that monoculture farming systems are highly vulnerable to environmental and market fluctuations and advocates for diversification into high-value crops, livestock, and agroforestry as a means of building resilience. In Azerbaijan, particularly in regions like Guba-Khachmaz and Karabakh, diversifying crop production aligns with Pingali's recommendations. Encouraging the cultivation of fruits, vegetables, and nuts not only reduces the country's dependence on staple crops but also increases its export potential, contributing both to food security and overall economic development. (Pingali, 2012)

Discussion

The establishment of agro parks, like those in Baku and Khachmaz, plays a pivotal role in these reforms, facilitating large-scale, high-tech agricultural production across the country. These parks are equipped with advanced irrigation systems, modern greenhouse technologies, and support services for local farmers, enabling them to increase productivity while maintaining environmentally sustainable practices. (Agroparks,2024) Agroparks not only increase food production but also contribute to economic development by creating jobs, fostering local entrepreneurship, and enabling rural communities to engage in profitable agricultural activities. They serve as vital nodes in the country's food supply chain, ensuring year-round production and improving Azerbaijan's food security. Agro Dairy operates in various regions of Azerbaijan, including key agricultural zones in the country's western and southern districts. With access to vast tracts of fertile land, the company primarily focuses on crop production, livestock farming, and dairy production. The company's large-scale

operations are aligned with Azerbaijan's broader agricultural strategy, which aims to develop export-oriented, high-yielding agricultural enterprises that contribute significantly to national food security. (Agro Diary, 2024)

One of the primary innovations brought in by Agro Dairy is the use of precision agriculture, which involves applying data-driven technology to optimize farming practices. This includes soil analysis, the use of advanced irrigation systems, and GPS-guided machinery, all of which help to maximize crop yields while minimizing environmental impact. The company has been instrumental in introducing smart farming technologies in Azerbaijan, which include automated systems for planting, irrigation, and harvesting. With access to vast agricultural land, Agro Dairy has introduced precision farming technologies, which optimize farming processes through data-driven decision-making. This includes the use of satellite imagery, GPS-guided machinery, and soil sensors to monitor crop health, manage water usage, and improve yields. These technologies are crucial for maximizing productivity while reducing environmental impact. One of Agro Dairy's primary focuses is sustainable agriculture, ensuring that the farming methods employed preserve soil health and promote long-term land productivity. The company's use of automated drip irrigation systems conserves water in Azerbaijan's arid regions, while crop rotation practices help maintain soil fertility. By integrating these modern farming techniques, Agro Dairy plays a crucial role in boosting the country's agricultural output, particularly in grain, dairy, and livestock production. (Agro Diary, 2024)

Figure 1. Economic Indicators of Agricultural Enterprises in Azerbaijan (2018-2023)
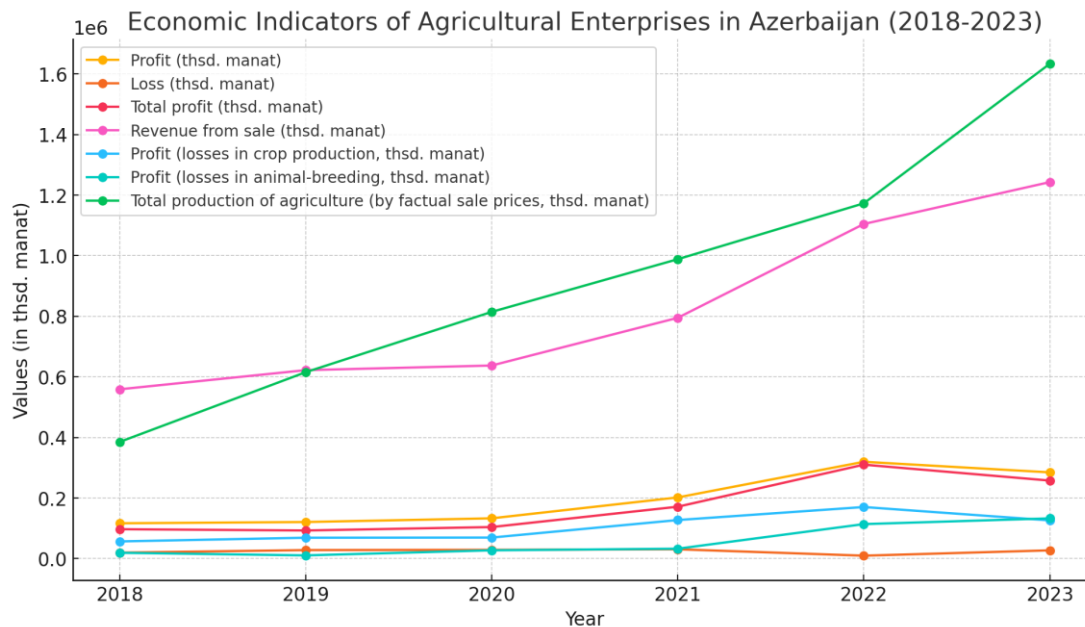
Source: State Statistical Committee of the Republic of Azerbaijan

The Figure 1 provides a comprehensive overview of key financial metrics related to the agricultural sector in Azerbaijan over six years. The indicators represented in the chart include profit (thsd. manat), loss (thsd. manat), total profit (thsd. manat), revenue from sales (thsd.

manat), profit (losses in crop production and animal breeding, thsd. manat), and total production of agriculture (by factual sale prices, thsd. manat). The most prominent upward trends can be observed in total production of agriculture and revenue from sales, which show continuous growth throughout the years. The total production of agriculture by factual sale prices rises steeply, almost doubling from 2018 to 2023. Similarly, revenue from sales follows a steady increase, reflecting a growing demand for agricultural products or improved market conditions. In contrast, the values for profit and loss remain much lower in comparison but display a subtle, consistent rise until 2022, after which they slightly dip in 2023. Despite fluctuations, profits in crop production and profits in animal breeding stay relatively stable, with no significant changes throughout the years, though a slight growth is visible towards the end of the period. This chart underscores the overall positive financial trajectory of the agricultural sector in Azerbaijan between 2018 and 2023, driven primarily by increased production and sales revenue, despite more moderate changes in profit and loss figures.

Figure 2. Total Agricultural Harvest by Region of Azerbaijan

Total Agricultural Harvest by Region (2005-2021)
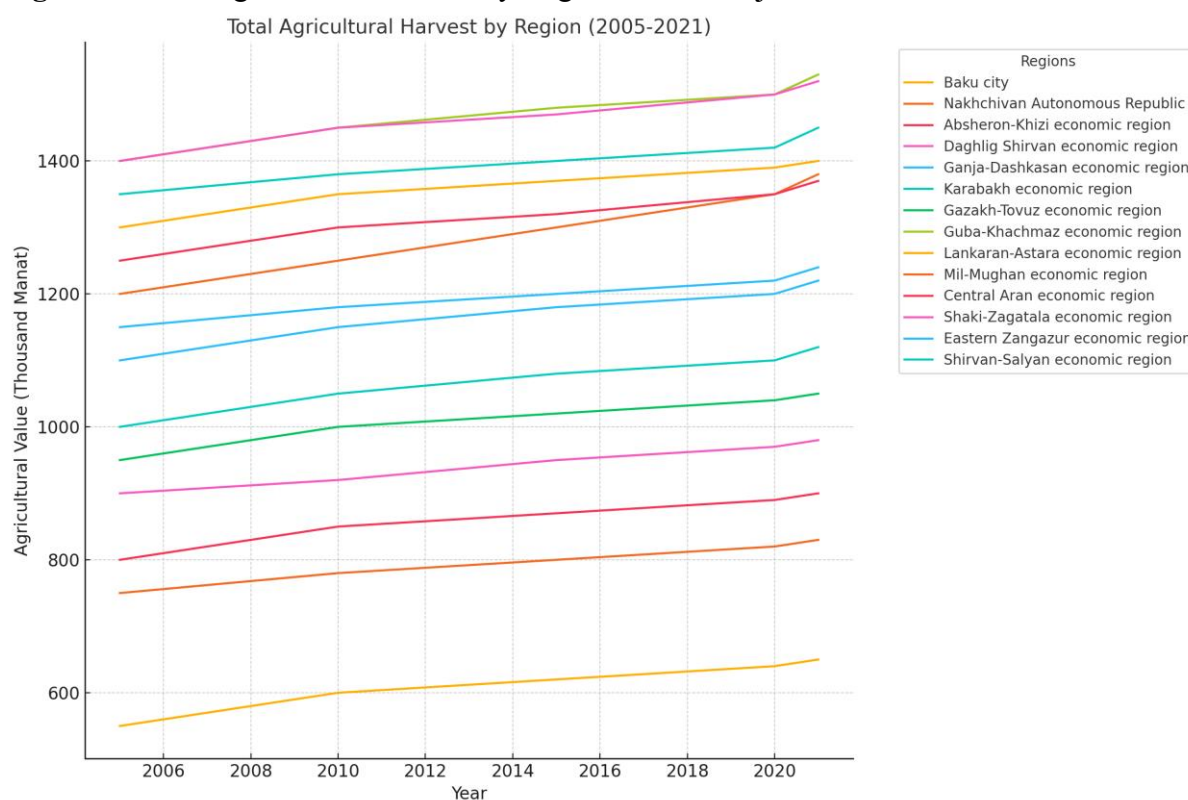
Source: State Statistical Committee of the Republic of Azerbaijan

Figure 2 illustrates the agricultural harvest performance in thousand manats across various economic regions of Azerbaijan from 2005 to 2021. Key regions, including Baku City, Nakhchivan Autonomous Republic, Absheron-Khizi, Daghlig Shirvan, Ganja-Dashkasan, Karabakh, Gazakh-Tovuz, Guba-Khachmaz, Lankaran-Astara, Mil-Mughan, Central Aran, Shaki-Zagatala, Eastern Zangazur, and Shirvan-Salyan, are represented, offering insights into agricultural productivity over time. During this period, some regions showed steady growth in agricultural output, reflecting regional development and investment in the agricultural sector.

For example, the Central Aran and Ganja-Dashkasan regions demonstrated notable increases, likely due to improved infrastructure and government policies promoting agricultural advancement. Lankaran-Astara, a traditionally fertile region, maintained relatively high productivity throughout the years, benefiting from its favorable climate for subtropical crops. Eastern Zangazur and Karabakh regions saw fluctuations due to historical conflicts, but the data post-2020 reflects a revitalization of agricultural activities following Azerbaijan's control over these territories. Regions like Baku City had relatively lower agricultural contributions due to urbanization.

Figure 3. Agricultural Production (2015-2023) in Central Asia and Azerbaijan
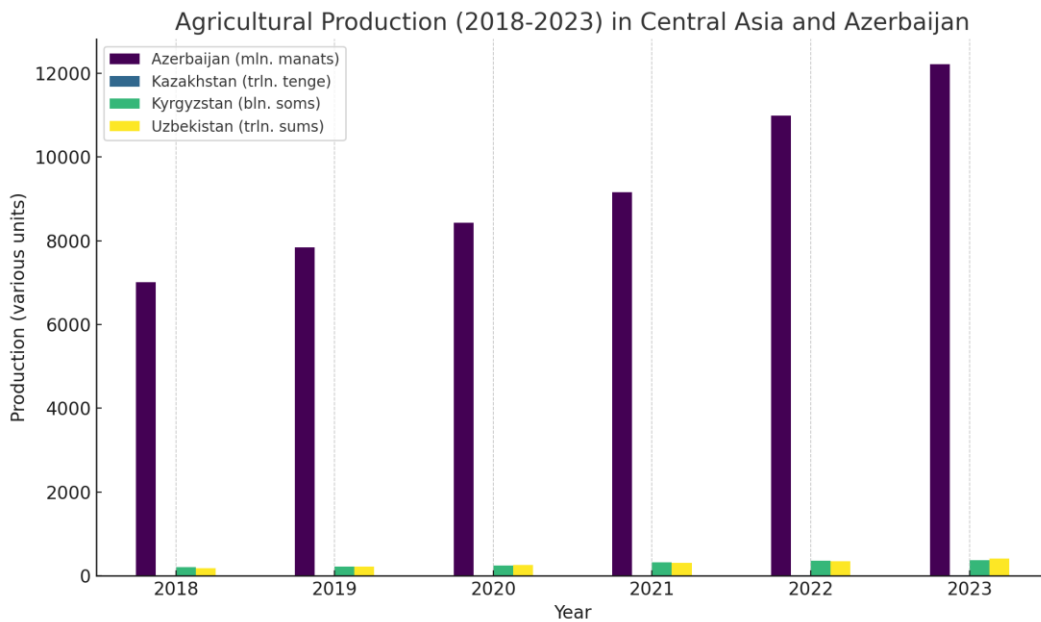
Source: State Statistical Committee of the Republic of Azerbaijan

Figure 3 represents the agricultural production from 2018 to 2023 in Central Asia countries (Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan) and Azerbaijan, based on the economic indicators you provided. The chart visualizes the economic growth trends in these countries, reflecting their agricultural outputs.

The government of Azerbaijan has actively supported agricultural development through reforms and the establishment of agro parks—large-scale agricultural zones that integrate advanced technology with modern farming practices. Agro parks serve as hubs for innovation, allowing both domestic and foreign companies to invest in high-tech farming solutions. One of the most prominent agroparks is the Baku Agropark, located in the Zira settlement, known for its high-quality tomato production. The park covers more than 10 hectares and includes state-of-the-art greenhouses that employ 4th-generation technology to grow several hundred tons of tomatoes monthly. The facility's greenhouses are equipped with modern climate control systems, ensuring optimal growing conditions year-round. Baku Agropark also operates a quality control laboratory that ensures all crops meet stringent hygienic standards, making its produce fully ecological. Agroparks like the Baku Agropark and others in Khachmaz are

crucial for enhancing Azerbaijan's agricultural output. These parks not only contribute to local food production but also play a significant role in exporting agricultural products to CIS and European markets. (Agro Parks, 2024)

1.1. Revitalized Karabakh and agriculture sector

The revitalization of Karabakh following the Second Karabakh War in 2020 is a key priority for the Azerbaijani government, especially in terms of developing the agricultural sector. Before the conflict, Karabakh was known for its high agricultural productivity, contributing significantly to the country's grain, cotton, grape, meat, and silk production. Now, the Azerbaijani government is focusing on reclaiming and restoring these areas to their former agricultural prominence, while also aiming for export-oriented farming. The government has started leasing agricultural land in Karabakh to several companies, many of which have connections to top officials. According to an investigation by Abzas Media, in 2021, 8,376.5 hectares of land were leased to five companies, including Agroinkishaf-2017, Agro Fresh, Agro Dairy, Azersun, and Kraun Ko. Notably, these companies are either directly linked to or are close to high-ranking officials, with some being owned by individuals related to the President's family. Large agricultural enterprises such as Azersun and Agro Dairy have been given prime land for agro-business development in districts like Gubadli, Zangilan, and Fuzuli. Azersun, for example, received a 9,000 square meter plot for a project worth 40 million manats. These lands are being developed for agricultural production, especially in strategic sectors such as grain cultivation, vineyards, and livestock farming. (SACCI, 2024)

The Azerbaijani government has committed to prioritizing food security and is pushing forward with various agricultural initiatives in Karabakh. According to President Ilham Aliyev, a 2021 plan aimed to cultivate around 40,000 to 50,000 hectares of land to ensure national food security. The Ministry of Agriculture has been temporarily tasked with managing the leasing of agricultural lands and ensuring that the new projects are aligned with Azerbaijan's broader agricultural goals. The revitalization efforts extend beyond agriculture, with major investments being made into infrastructure like roads, airports, and "smart villages" in regions such as Zangilan. These efforts are also designed to support the eventual return of displaced Azerbaijanis to their homelands, a process that will go hand-in-hand with agricultural and economic recovery.

The establishment of agro-businesses in Karabakh also aligns with Azerbaijan's post-conflict development strategy, where large-scale reconstruction is underway, and foreign and domestic investments are encouraged. Agricultural initiatives are seen as a key driver in boosting the region's economy and creating jobs for future residents. (Republic of Azerbaijan, 2024, State Program, 2021) Local farmers, many of whom were displaced during the conflict, are eager to return to their land. With plans to revive grape production, wheat farming, and animal husbandry, these former residents represent the broader agricultural revival in the region. The Azerbaijani government's efforts to rebuild the agricultural sector in Karabakh are underpinned by the creation of the Karabakh Revival Fund, aimed at supporting socio-economic development, infrastructure reconstruction, and sustainable resettlement.

This holistic approach to redevelopment reflects a commitment to long-term agricultural productivity and economic stability in Karabakh, ensuring that the region plays a

vital role in the national economy once more. In conclusion, the revitalization of Karabakh's agriculture after the 2020 war is an ambitious but achievable goal. With government support, strategic investments, and local farmer involvement, Karabakh is set to reclaim its place as a key agricultural hub in Azerbaijan, contributing to national food security and export potential. Overall, the liberated territories will significantly boost Azerbaijan's agricultural capacity in the coming years. By President Aliyev's directives, work has already begun to develop agriculture in these areas. In collaboration with Azercosmos, the Ministry of Agriculture has used satellite imagery to map arable land in the region. In Azerbaijan, the agricultural sector saw a 2% increase in 2020, and to support farmers, over 7,260 pieces of agricultural equipment were distributed to more than 3,000 farmers, and 8,758 breeding animals were sold. Additionally, over 3,400 farmers received microloans that year. (Republic of Azerbaijan, 2024)

1.2. Educational and International Collaborations in Azerbaijan's Agricultural Sector

Azerbaijan is actively expanding its educational and international collaborations in the fields of food security, food engineering, and agricultural technologies to address the growing global challenges in agriculture and food production. By partnering with leading international institutions, the country aims to develop a new generation of experts equipped with the knowledge and skills required to advance its agricultural sector. These collaborations not only foster academic exchange but also promote research and innovation, helping Azerbaijan to enhance its agricultural productivity, ensure food security, and meet international standards.

1.2.1. ADA University and University of Bologna PhD Program in Food Engineering and Technology

One of the key educational partnerships is the PhD program in Food Engineering and Food Technology offered by ADA University in collaboration with the University of Bologna in Italy. This program is designed to cultivate expertise in sustainable food production, food engineering, and cutting-edge agricultural technologies. Through this partnership, students from Azerbaijan gain access to world-class research facilities and expertise from both institutions, allowing them to develop innovative solutions to pressing issues in the global food system. The collaboration between ADA University and the University of Bologna emphasizes research that promotes sustainable practices in agriculture, such as reducing waste in food production, improving energy efficiency in food processing, and ensuring the long-term viability of agricultural resources. For example, one of the research projects focuses on biotechnological innovations that could enhance the efficiency of food preservation techniques, significantly reducing food waste and increasing shelf life. Such research is critical for Azerbaijan, which is working towards reducing food imports and boosting domestic production. By engaging in joint research projects, students in this program gain a broader understanding of global trends in food engineering while being equipped to address local challenges in Azerbaijan. Graduates from this program are expected to take on leading roles in Azerbaijan's agricultural sector, contributing to food security and the modernization of food production systems. (ADA University, 2023; University of Bologna, 2024)

1.2.2. UNEC and Ege University Double Degree Program in Food Engineering

Another notable collaboration is the double degree program in Food Engineering between the Azerbaijan State University of Economics (UNEC) and Ege University in Turkey. This program prepares students for dynamic careers in modern agriculture and food production, focusing on the development of advanced food engineering techniques and the application of innovative technologies to meet industry demands. Students enrolled in the UNEC-Ege University program benefit from a curriculum that combines the strengths of both universities. Ege University, known for its cutting-edge research in agro-food technologies, provides students with exposure to innovative approaches in food production, processing, and safety standards. This experience is crucial for Azerbaijan, which is working to modernize its food industry by improving efficiency, increasing production quality, and meeting international export standards. An example of this collaboration's impact can be seen in the training students receive in food quality control and food safety regulations. By learning how to implement these standards, Azerbaijan's future food engineers will be better prepared to develop safe, sustainable, and high-quality food products for both domestic consumption and international markets. Graduates of this program are poised to play critical roles in Azerbaijan's food industry, helping to improve the country's competitiveness and ensure that its food products meet global standards. (UNEC, 2023)

1.2.3. Azerbaijan State Agrarian University and German Universities Partnerships

The Azerbaijan State Agrarian University (ASAU) has established a range of collaborations with several German universities, focusing on advancing agricultural education and introducing modern agricultural techniques in Azerbaijan. These partnerships emphasize the importance of agricultural sustainability, environmental conservation, and technological innovation in farming practices. Germany is renowned for its advancements in sustainable agricultural practices, and its universities offer Azerbaijani students valuable opportunities to learn and apply these techniques. Through joint programs, students at ASAU gain practical knowledge in areas such as precision agriculture, crop management, and livestock breeding technologies. This exposure enables them to implement the latest technologies in Azerbaijan's agricultural sector, improving productivity and sustainability. One of the success stories from this collaboration is a project focusing on organic farming and sustainable land use. In partnership with German universities, ASAU has introduced a pilot project in which students apply organic farming techniques on experimental plots. These techniques include using biological pest control instead of chemical pesticides, rotating crops to preserve soil health, and applying natural fertilizers. The results from this project are promising, showing an increase in crop yields and a reduction in the environmental impact of farming. (ADAU, 2022)

Challenges and recommendations

Oil is the main driver of the Azerbaijani economy. However, in recent decades, the country and its development partners have worked to reduce this dependence by enhancing other sectors to create a more diversified economy. Agriculture has been recognized as a key area with significant potential for poverty alleviation; in 2008, more than half of the country's poor lived in rural areas, with most engaged in agricultural activities. When the Agricultural

Competitiveness Improvement Project (ACIP) was evaluated in 2013 by the World Bank, agriculture employed 40% of the Azerbaijani workforce—more than any other sector—but only accounted for 5% of GDP. (World Bank, 2023) This disparity was attributed to several challenges, including a lack of improved seeds and productive livestock breeds, outdated processing technologies, a market structure that discouraged long-term investment and planning, and limited access to financing. (Trade Gov, 2023) Agricultural land is encountering significant issues, including the depletion of soil fertility, erosion, salinity, and pollution. Despite these challenges, the quality and yield of wheat produced in the country are still low. However, private farmers are starting to see improvements in yields due to their efforts. As seen from Chart 1, industry dominates the GDP with approximately 55.94%, followed by services at 32.2%, and agriculture contributing 4.76%.

Figure 4. Azerbaijan's GDP Composition by Sector in 2022.
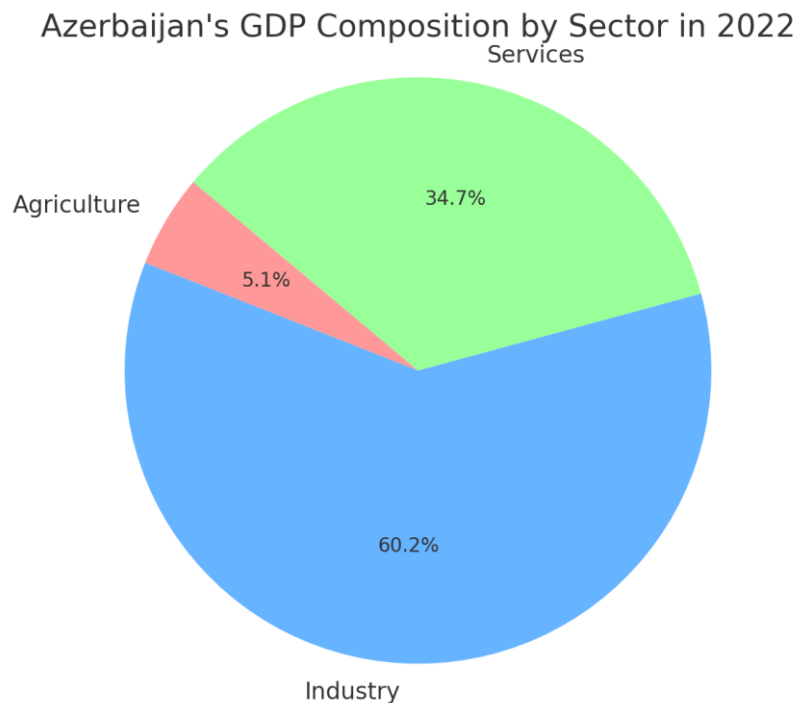
Source: State Statistical Committee of the Republic of Azerbaijan

Urbanization and inadequate agricultural practices have led to significant soil degradation in Azerbaijan. Reports indicate that approximately 60% of arable land is affected by degradation, impacting both productivity and sustainability. A study by Abbasov (2019) indicates that soil degradation is linked to poor land management practices and urban expansion, resulting in diminished agricultural output. To combat these challenges, Azerbaijan should adopt sustainable land management practices that promote soil health. Encouraging practices such as crop rotation, organic farming, and agroforestry can enhance soil quality and increase agricultural productivity. The agricultural sector in Azerbaijan suffers from inadequate infrastructure, including poor transportation and storage facilities. According to World Bank (2020) reports, about 25% of agricultural products are lost due to inadequate

logistics and infrastructure, leading to substantial post-harvest losses. Farmers often find it challenging to access markets, which hampers their income potential. Significant investment in rural infrastructure is vital to address these issues. Improving rural roads and enhancing storage facilities will facilitate the efficient distribution of agricultural products. Furthermore, fostering public-private partnerships can leverage additional resources for infrastructure development, creating a more robust agricultural supply chain that connects producers with consumers effectively.

The Azerbaijani agricultural sector has historically focused on a limited number of crops, particularly cotton and grains. This narrow focus renders the sector vulnerable to price fluctuations and limits its capacity to meet the diverse dietary needs of the population. As highlighted in a FAO report (2023), the reliance on a few key crops, such as cotton, exposes farmers to economic risks, particularly during periods of declining global prices. Many smallholder farmers in Azerbaijan live in poverty, with limited access to financial resources, technology, and education. The National Statistical Committee reports that around 25% of the rural population lives below the poverty line, which severely affects their capacity to invest in agricultural improvements. The lack of access to credit and modern farming technologies contributes to low productivity levels among smallholders. (FAO, 2023)

Creating microfinance programs tailored for rural communities can alleviate some of these challenges. Additionally, strengthening agricultural extension services will provide farmers with the knowledge and resources needed to improve their practices. These services can offer training in modern farming techniques, business management, and financial literacy, empowering farmers to enhance their productivity and livelihoods. Farmers in Azerbaijan often struggle with accessing markets due to high transportation costs and insufficient market information. The COVID-19 pandemic in 2020 highlighted this vulnerability, causing significant price volatility for key agricultural products and negatively impacting farmers' incomes. The lack of reliable market access often leads to financial instability for producers. To improve market access, fostering the formation of cooperatives and farmer associations can be highly beneficial. These cooperatives enhance farmers' bargaining power, facilitate resource sharing, and provide access to larger markets, ultimately leading to better prices for their products. Additionally, developing market information systems that provide farmers with real-time data on market trends and prices will enable them to make informed decisions about production and sales.

CONCLUSIONS

Azerbaijan stands at a critical juncture where the integration of innovative agricultural practices with economic strategies offers immense potential for enhancing food security and economic development. Through initiatives like the "State Program for Ensuring Food Safety in the Republic of Azerbaijan" and the establishment of agroparks, the country is making strides toward modernizing its agricultural sector. Precision agriculture, sustainable farming, and biotechnology have emerged as key drivers in improving productivity, resource efficiency, and environmental sustainability. While Azerbaijan has seen success in areas such as irrigation improvements and the promotion of digital agriculture, challenges related to infrastructure, policy development, and smallholder participation remain.

To fully realize the potential of agro-economic synergies, continued investment in technological advancements, education, and international collaboration is essential. Additionally, policies that support market access, capacity building, and financial resources for farmers will further enhance food security and economic resilience. The revitalization of regions like Karabakh and the ongoing international partnerships in agricultural education demonstrate Azerbaijan's commitment to sustainable agricultural development. As the country continues to modernize, the balance between economic growth and environmental sustainability will be key to securing long-term food security and bolstering its position in the global agricultural market.

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"THE ECONOMIC MAGAZINE" FROM SIBIU, AN IMPERATIVE OF THAT TIME BETWEEN 1898-1918

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Abstract: "The Economic Magazine", particularly meant on the service of the Romanian financial institutions, to which was given a common publicity organ ,of which they would use of, in all their practical needs and which to contribute for the spreading over of futuristic experiments of the ruling circles in the economic life of the Transylvanian Romanians, it put its service for the national economic interests by publishing wide lists of economic themes useful to all national economic fields .It had a much wider horizon than the one strictly connected to the financial-banking relations and interests. In this case, also, the Romanians national interests came first comparing to the strictly economic ones.

Keywords: banking system, banking strategy, financial banking interests, reforms banking, expert reviewers, pension found

1.INTRODUCTION

Understanding the major role and the complexity of economic progress, the Transylvanian Romanians promoted in the second half of the 19th century next to vast political program also a rich economic program, well contoured multilateral and deepen in.

In their exertion of economic prosperity and national freedom, the Romanians from Transylvania needed functional institutions and organizations through which to be absorbed all the energies that the Romanians disposed of potential targeted and directed then towards the achievement of centennial ideals and aspirations of national unity.

On this purpose it was improved and enlarged the activities horizon of the economic institutions of which the Romanians from Transylvania disposed of, new institutions were created, meant for the economic and financial prosperity of keeping the dignity and increasing the national prestige.

After many attempts and ineffective tries in the economic media field the Romanian Transylvanians finally succeeded at the end of 1899 to establish a publication in this field, which to be suitable with that time's exigency. It is about "The Economic Magazine" breakthrough.

The issue of "The Economic Magazine" as an organ dedicated particularly to the financial and commercial companies was possible due to high level of development that the Transylvanian Romanian banking network had reached.

Through the complex activity that it displayed and through the collective grouped around it, "The Economic Magazine" played the role of a true economic school in Transylvania.

Just as the Romanian banks, "The Economic Magazine", the outface in the period between1899-1918 the hostile attitude of the Hungarian officiates and of a large part of the Hungarian officiates and of a large part of the nationalist Hungarian press. A major role in those 20 years from the appearance of "The Economic Magazine" was the one of its managers, great personalities of the Romanian culture and science in the first three decades of the twentieth century.

Because of the decisive initiative and help of Cornel Diaconovici, in his quality as a manager, appeared in Sibiu, beginning with the year 1899, the first publication in this field of the Romanian Transylvanians.

Militant leader in the cultural purview, Cornel Diaconovici brought himself a major contribution for editing "The Economic Magazine ", but also for publishing a large number of studies referring to the Romanian Banks Reform in Transylvania (Diaconovici,1899)

The second great personality in the financial, banking, economic and political domain, which had a manager's and collaborator position of "The Economic Magazine ", was Ioan I Lapedatu.

At the scientific and publicist level, the Transylvanian economist published books, studies, articles, consignments and informations with varied themes. In the most prolific years of his activity, he practiced all the possible publicist genders. There is also to be remarked his particular contribution as a politician, in solving the problems Romania was facing at that time, and for elaborating a proper legislation.

Beginning with 1st January 1908 "editor in charge" of "The Economic Magazine" was nominated Constantin Popp, constant and truthful contributor of it. His activity as a highly bank officer matched in a perfect way with his publicist activity, together with the leading of "The Economic Magazine" (Popp, 1923).

2.The Program and the Themes of "The Economic Magazine"

The diversity of the programmers and themes of "The Economic Magazine" is presented in the next chapter of the doctorate thesis.

The new stage of the economic development imposed new requirements in the Romanian economic thinking and practice, imposed by the new management manners.

"The Economic Magazine" was from the very beginning an authorized councilor of the financial and commercial circles, through its pages being spread the specialized experiences and knowledge of those who dedicated their entire activity exclusively to the economic studies.

Initially, without leaving out agriculture's problems, the program of spreading economic knowledge was primary targeted to financial and accountant matters.

Tracing the themes' evolution and the initial program's appliance of "The Economic Magazine", we may notice that it was initially created with the purpose of serving the interests of the Romanian Bank from Transylvania and exclusively sustained by these. But it didn't confine only to dealing bank business, strictly meaning, but also appreciating the interaction status between the financial institutions and the Romanians' economic condition and their importance and influence on banks.

"The Economic Magazine" widened its field of actions and the themes, handling topics referring to all aspects of the Romanians' lives and activities (Lapedatu, 1903: 430).

Besides being a publicist means of spreading the progressive ideas and experiences, it was also an organ of publicity, which to be directly used by the Romanian banks.

Appreciating the interaction status between the financial institutions and the Romanians 'economic condition, "The Economic Magazine" widened its field of action and the themes, handling topics referring to all aspect of the Romanians' lives and activities (industry, exchange, agriculture).

"The Economic Magazine" for achieving the Romanian banks 'reunion into a common junction, publishing send offs, pointing out books and manuals' advent conferred a particular place. "The Economic Magazine" militated for the institutionalism's development in the economic, cultural and socio-historic fields.

The idea of a cultural found of the Romanian banks bestowed by "The Economic Magazine" became an integrated part of the programs. The Romanian Banks' Conference. Preoccupied with the perfecting of the Romanian cultural and economic organisations from Transylvania, "The Economic Magazine" publishing house considered that this process would facilitate the assuming of an as perfect common language as possible for all the Romanians and a homogeneous terminology (Diaconovici,1899)

As an institution, "The Economic Magazine's" publishing house was forced to develop a varied theoretical, practical and utilitarian theme.

Studying and knowing the economic laws and phenomena, called "The Economic Magazine's" publishing house did not contribute a pure theoretical purpose of its own. It was made in the purpose of substantiating ways and trends in which was supposed to be headed a certain economy. From the Romanian economists' point of view, opinion also shared by the editors from "The Economic Magazine", the most important link in the economic organisations of the Transylvanian Romanians was the banks. Of their financial strength and ability would depend the development's acceleration of both, Romanian agriculture and industry (Diaconovici, 1903).

The pages of "The Economic Magazine" hosted, next to problems referring, to economic processes, also their theoretical interpretation and studies concerning the society's future: socialism or capitalism.

The crises, its effects and solutions were analyzed by the collaborators of "The Economic Magazine", in close relationship with the economic realities in which they displaying the Romanian banks' activity, meaning during the periods of economic crises, general or partial (Diaconovici,1904: 305).

The reflections concerning the crises arisen in "The Economic Magazine" are of a preventing nature, not post- factum.

The representatives of "The Economic Magazine" made quite some reflections concerning the competition and its effects on the Romanian banks with the purpose of tracing the ways and means of strengthening their resistance in both, the struggle against the competition from inside the Romanian banking system, and in the struggle for survival against foreign financial organisations.

"The Economic Magazine" pondered not only the general concerns respecting the ways of development and of the economic progress of the Romanians (Lapedatu, 1906), it was also

preoccupied in elaborating some plans for improving and making efficient activity sectors of the Transylvanian Romanians.

Such an activity plan in a long time framed was the on referring to the Romanian banking sector strengthening.

3.“The Economic Magazine” Promoter of the Strengthening and Developing Reforms of the Transylvanian Romanian Banking Network. The Support Given for Creating, Developing and Perfectioning the Promotor Institutions of the Romanian Banking System Reform

Although the Romanian banks had reached quite high level, still their simple extension no longer constituted a rational process. It was imposed the consolidation of the existing ones, concomitant with a process of founds' increase of which it disposed, and of centralization, in the possible cases of several banks. This imperative demand of the moment was picked up deeply realized by the Transylvanian economists.

As a result of the analyses and searches a new Institution was created through which to be achieved radical reform of the functioning mechanism of the Romanian banks.

The institution was given the name of The Romanian Banks' Conferences.

The five conferences of the Romanian Banks and the meetings of the Romanian Banks' delegation had as a purpose the fundamental reorganization of the Romanian banks guiding themselves according to "solidarity and association", principle according to which the reform of the Romanian banks were displayed.

Initiator of the Transylvanian Romanian banks' reforms of consolidation and development, "The Economic Magazine" replied to these needs of the Romanian banks, which in that period had to face many forms of competition. From the many lacks the Romanian banks were suffering of, "The Economic Magazine" publishing house draws the attention on two major categories:

a) lack of external control;

b) lack of movable assets.

The Romanian banks had liabilities (deposits, reaccounts), mostly on short-term, which in shortage, were about to be paid off in a relatively short time, while the assets, even those less strict, most of them, couldn't be achieved but on long-term.

The two categories of defects that the Romanian banks were suffering of, could be removed according to "The Economic Magazine's" publishing house or through:

a) the interested circles' self-action;

b) or through the state's power. This second way was rejected mainly by the reform's promoter

The great virtue of Cornel Diaconovici consists in the fact that while the state's pressure on the Romanian banks was exerted, he succeeded to hold forth such reform measures in order to avoid the governmental intercession on these. From the Hungarian State, he draws everyone's attention; the Romanian banks couldn't wait for any help (Diaconovici, 1899).

Cornel Diaconovici showed the Romanians that they needed such financial-banking organisation in order to prevent the action of the state legislation through a self-contained social action, to consolidate themselves through self-initiative, through their own forces, to use that human asset they disposed of, changing over its knowledge and experience into a real factor, of national heritage.

The Romanian banks had reached-according to Cornel Diaconovici - to such a level of development, that for surviving for their own interest, they needed to do everything that was in their power for their own self-sufficiency .This goal could be achieved only if they themselves were willing to elude the inconveniences and the subsidence that were in their lives and couldn't be denied .The stricter and the more rigorous self-imposed the Romanian banks' measurements for the reform would be ,the more they would impose the respect of their self-sufficiency from the Hungarian authorities.(Diaconovici, 1901: 101)

There were indicated measures of unconditioned and uninterrupted insurance of the Romanian banks' solvency of avoiding deposits; jeopardize through exaggerated extending of the reaccounts, of confirming the public's trust in the banks administration, of of attracting available Romanian funds, of ensuring a deeper control from the stockholders and their deponents. The whole reform was meant as a social, self- eaction of the interested institutions, meaning a spontaneous work, began and achieved at free will.

Just as his forerunner, loan I. Lapedatu draw his attention on consolidating the reforms' themes, he underlined t the necessity of the reasonable use of the reaccount credit, on improving the deposits' structure.

Marking out, once again, the shortcomings of the Romanian banking system, Ioan I. Lapedatu outlined in the pages of "The Economic Magazine" a new program of the banking political strategies, through which it had to stand out to the competitive environment imposed by the banks belonging other ethnic groups, meantime consolidating their positions within the Transylvanian economy. (Lapedatu, 1906: 261)

The idea of passing to a new organisation in an institution with its own functioning status, provided with executive organs and with their own control organs, was taken over and supported. It is about "The Solidarity", an association of the financial institutes, of which, "The Economic Magazine" from Sibiu published a large number of pages.]

4.Control Perfecting, Major Component of the Banking System Reform: the Experts Inspectors Institution

Launched and sustained, the idea of controlling in the Romanian banking system, it would arouse many discussions for and against predicting, mental changes, the recurrence on certain points of view, initially supported. discussions regarding the authorities that should be registered with surveillance attributions.

But "The Economic Magazine" was the press mechanism that widely and truthfully reflected the whole problems of control displayed for two decades.

It supported within its pages any initiative of establishing Romanian institutions that had the vocation to fill the Romanian economic institutionalized landscape, and also to contribute to the efficiency of the existent ones by taking over or by decongestion them of some duties (Lapedatu, 1906: 237).

An institution like this was the institution of the expert revisers, strongly supported by the magazine's editors, to who belongs the greatest part of the initiative and the practical support of establishing, developing and consolidating it.

Giving a high appreciation for the activity of the reviser experts, the editor's office of "The Economic Magazine" was writing about this institution: " it has had throughout its activity

of nearly two decades many difficulties to defeat, but it also had wrathful and beautiful years of activity that will never be forgotten, whatever the future will be. The inspectors-experts' conferences represent a new stage in the development of the inspectors-experts' institutions.

5.Social Problems and the Insuring Problem of a Retirement Fund for the Romanian Banking Clerk

The problems of the clerk's retirement were, next to the one of controlling, one of the most important ones.

Disciples of the social solidarity, the editors of "The Economic Magazine " often debated the problems connected to the bank officers' level of qualification, but also the of insuring a decent living and insuring the future in case of retirement, or of other unhappy circumstances that might happen to them. They considered that the banks were interested in creating elite officers, whose interests were identified with the bank's interest.

The forming of a fund for allowance for the clerks is not an act charity, but an economic need imposed by the well-understood interests of the bank managers.

"The Economic Magazine" took care of the retirement issue for their private officers, illustrating with many examples and digits many times, a whole series of ways through which the pensions of the bank officers could be created and assured.

6. The Banking Institutional Profile's Enlargement through Establishing Insurance Units

As a component of the interests of the Transylvanian Romanian banking financial circles, the "The Economic Magazine" published an important number of materials, through which it fundamental the opportunity and the importance of an insurance bank, exclusive property of the Romanian nation. (Lapedatu, 1912: 185)

After establishing The Bank of Insurance, the "The Economic Magazine" continued publishing materials in order to support the development and the consolidation of the insurance spirit among the Romanians. In the editors' office vision, the Insurance Bank, in Transylvania's condition at the beginning of the XX" century, also received an important educational role. It needed to promote not only the idea of saving, but also the one of predicting.

The insurance Bank constituted a new link that completed the Romanian financial institutional system, having the vocation of contributing to the enhancement of the economic and financial capacity of the Romanians.

7. The National Unity Idea Reflected in "The Economic Magazine". Pages Between 1899-1918

The establishing of "The Economic Magazine" marked a superior stage in marking out the intense economic connections between the two sister countries, but also revealing the unity in principle and action concerning the economic area of the Romanians from both sides of the Carpathians. It developed a vast program of informing the Transylvanian public regarding the dynamics of the Romanian economy between 1898-1918.

The attention of the Transylvanian Romanian banking circles, the versatile economic relationships the businesspersons from both sides of the Carpathians were sustaining reflected in the particular care given to the Romanian banking movement.

The editors of "The Economic Magazine" were the exponents of the most interesting part of the population in completing and unifying the terms in general, but of the financial-banking, in special.

8.CONCLUSIONS

Established as a means of communication in the service of the Transylvanian Romanian banking system, "The Economic Magazine" was forced by unfavorable historical circumstances to suspend and reject numerous attacks pointed against the Romanian banks and against banks of other non-Hungarian cohabiting nationalities (The Romanian banks were blamed of baffling the colonizing plan with the Hungarian population from Transylvania).

"The Economic Magazine" published not only materials that testified the discriminatory attitude of the Hungarian banks towards the Romanian population, but also materials in which were admitted, in an honest way, the activity of the Romanian banks.

By reading the pages of "The Economic Magazine", we realize that its editors were forced to take great efforts, especially in editing a modern magazine in the hostile Romanian business environment, a graphically appropriate one, but also at the highest level, that the economic science had already reached from the first half of the twentieth century.

Conclusion, we may declare that "The Economic Magazine" from Sibiu may be considered a cultural institution, with multiple services in the economic, cultural, historical and cultural areas. It was an organizational institution meant in the service of the institutional development of the Romanian people.

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EUROSYSTEM CENTRAL BANKS' CLIMATE-RELATED FINANCIAL DISCLOSURES OF NON-MONETARY POLICY PORTFOLIOS

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Abstract: This article explores the climate-related financial disclosures of Eurosystem central banks' non-monetary policy portfolios, focusing on adherence to the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). Through an analysis of disclosures from 20 central banks in the euro area, it investigates governance structures, reporting practices, and metrics used to assess climate risks and opportunities. Findings reveal significant variability in transparency levels, particularly regarding governance and the frequency of climate issue reporting to boards. The mandatory metrics, including Weighted Average Carbon Intensity, Total Carbon Emissions, and Carbon Footprint, were commonly disclosed, while voluntary metrics remained underutilized. The study highlights gaps in standardized reporting and emphasizes the need for enhanced disclosure practices to support effective climate risk management within central banks. Recommendations include more comprehensive reporting aligned with TCFD guidelines, improved transparency in governance disclosures, and adopting additional metrics for a clearer understanding of climate-related risks. These findings contribute to the growing literature on sustainable finance, offering insights that may guide future policy development in central banks' climate risk management practices.

Keywords: central banks; climate risk; disclosure; non-monetary portfolios.

INTRODUCTION

The Paris Agreement and the 2030 Agenda for Sustainable Development have catalyzed a global shift towards sustainability, greatly impacting initiatives worldwide. Institutions are increasingly aligning with these goals, such as the objective to limit global warming to below 2°C (Eliza, 2024). Sustainable investments, which incorporate Environmental, Social, and Governance (ESG) factors, demand a sophisticated risk assessment approach. Research shows that integrating ESG factors enhances risk management and stabilizes financial performance, with companies emphasizing ESG often achieving better long-term returns and higher investor confidence (Eliza, 2024). However, challenges in ESG data quality, measurement, and comparability create obstacles to informed investment decisions (Yunus & Nanda, 2024). Additionally, the lack of standardized ESG reporting

frameworks and regulatory inconsistencies intensifies these challenges, underscoring the need for improved data quality and regulatory alignment (Yunus & Nanda, 2024).

Environmental risks pose distinct challenges, frequently complicating the risk-return balance in investment strategies. Institutional investors play a vital role in mitigating these risks by influencing ESG performance in their portfolio companies, thus optimizing risk-adjusted returns (O'Sullivan, 2024). Infrastructure projects, for example, apply risk assessment tools to manage uncertainties while balancing economic, environmental, and social goals (Canesi & Gallo, 2024; Coskun et al. (2023)).

Although sustainable investments offer financial and social benefits, they require a thorough understanding of associated risks. Enhancing ESG data quality and fostering cross-disciplinary collaboration between finance, sustainability, and regulatory policy is essential for navigating the complexities of sustainable finance (Yunus & Nanda, 2024). In the financial sector, climate change presents both risks and opportunities. Habib et al. (2024) highlighted sustainable investment practices as a means for effective capital management, while financial regulators increasingly incorporate climate risks into risk management systems.

Globally, institutions are increasingly exploring how they can contribute to sustainability. Climate change remains one of the most pressing risks for organizations, as the warming of our planet is recognized as having and continuing to have, profound economic and social impacts. The primary goal of the Paris Agreement is to maintain the global average temperature rise below 2°C above pre-industrial levels.

In finance, climate change introduces both opportunities and challenges. Financial institutions increasingly prioritize climate risk in their assessments, often identifying it as one of the most critical risks to manage. New regulatory requirements for banks bring further challenges in climate risk management. This presents a significant research gap, as few tools are available to assess and manage the impacts of climate change. Banks also face difficulties quantifying climate risks, which are complex to incorporate into existing risk management frameworks while adhering to each institution's risk appetite.

The interest in sustainable investments continues to grow. Many financial institutions actively manage sustainable assets and aim to support the green economy. Recently, central banks, as major financial players, have begun considering sustainable investments in their foreign reserves management. Other financial market participants also seek to integrate sustainable investments into their portfolios. Although sustainable financial products may seem like an easy way to promote sustainability, a short history, limited liquidity, and complex risk management requirements challenge the market for sustainable investments. The lack of sustainable investment risk management research makes this an important and novel topic for science and practice.

Uncertainty regarding the extent, scope, and timing of climate change's economic impacts translates into financial risks, affecting markets, asset classes, institutions, businesses, households, and governments. Therefore, research in this area is critical for developing new tools for climate risk assessment and credit risk management within the banking sector.

As sustainable considerations gain importance, there is an increasing need to invest in and support companies that contribute to sustainable economies. Various financial instruments,

including mutual funds and exchange-traded funds, are emerging that adhere to strict sustainability criteria.

Climate risk plays an increasingly central role in today's economy, attracting attention from academics, the banking sector (central and commercial banks), other financial institutions, businesses, and investors (Campiglio et al. (2018), Chenet et al. (2021), Engle et al. (2020), Stroebel & Wurgler (2021), Ma et al. (2022). This type of risk and its management is becoming a crucial challenge across sectors. Studies have found that climate risk affects financial stability (Campiglio et al., 2018b), energy price volatility (Liang et al., 2022), stock price fluctuations (Khalfaoui et al., 2022), exchange market volatility (Bonato et al., 2023), and influences decision-making in companies and among investors (Chenet et al., 2021b). Research also indicates that climate risk impacts various economic factors, with some authors exploring how it affects inflation across countries, revealing that some nations are more sensitive to climate risks than others (Zhang, 2023). This variance may also be seen in the banking sector, where climate-related risks have been found to affect audit fees (Yang et al., 2023), credit risk, and sovereign ratings (Sun et al., 2023). Practical findings suggest that climate vulnerability and preparedness are now emerging factors in sovereign rating assessments, alongside traditional economic, political, and external factors, with climate readiness positively impacting sovereign ratings.

Curcio et al. (2023) examined the relationship between climate change and systemic financial risk, focusing on the banking and insurance sectors. They emphasized the need for appropriate policies to address climate-related disasters' increasing frequency and severity. Their findings have implications for banks and insurers, reinforcing the importance of risk management frameworks tailored to climate-related risks.

This research supports the creation of a robust climate risk management framework within the banking sector, highlighting that effective risk management relies on a well-defined framework. The main goal of this research is to investigate the level of climate-related information disclosure on non-monetary portfolios among Eurosystem central banks based on TCFD recommendations governance and metrics areas. Climate-related disclosures aim to improve stakeholder understanding of the distribution of carbon-intensive assets and the financial industry's vulnerability to climate change risks.

Theoretical challenges in this area stem from varying interpretations and classifications of climate risk and sustainable investments. A key theoretical issue is the diverse understanding of financial risks and the concept of "green" finance. Climate-related metrics disclosure also remains an area of concern.

Empirical challenges involve the availability of sustainable investment data and limited historical information. However, as this field evolves rapidly, improvements in climate risk disclosure and data quality are anticipated, enabling future studies to incorporate more extensive time series and data reflecting periods of growing demand.

This paper is organized as follows: Section 2 gives insights into our research methodology, focusing on 3 level approach. Section 3 focuses on research results and discussion, and finally, we present our conclusions and recommendations.

METHODOLOGY

This chapter focuses on the methodology of disclosing climate-related information on non-monetary policy portfolios based on TCFD recommendations for governance and metrics. The Task Force's guidelines are organized into four key themes representing fundamental aspects of organizational operations—governance, strategy, risk management, metrics, and targets. In the first stage of the research, we will focus on two main aspects – governance and metrics. This study analyzed 20 central banks in the euro area to determine how they disclose climate-related information on non-monetary policy portfolios following TCFD recommendations for governance and metrics.

The initiation of the Task Force on Climate-related Financial Disclosures (TCFD) by the Financial Stability Board (FSB) in December 2015 (Task Force on Climate-related Financial Disclosures, 2017) represented a significant industry-led move to foster climate-related disclosures that would inform decisions in investments, lending, and insurance underwriting processes. The objective was to provide stakeholders with a more transparent view of carbon asset concentrations and the financial sector's vulnerability to climate change risks. Access to reliable data is the starting point for addressing climate change. Accurate data is critical for assessing the influence of central banks on the climate and understanding the associated risks. This essential information paves the way for central banks to implement meaningful and practical actions.

The reporting by central banks offers detailed insights into the carbon footprint and climate-related risks tied to the assets managed by the European Central Bank (ECB) and the national central banks of the euro area, collectively referred to as the Eurosystem. This improved transparency facilitates a more nuanced understanding of their portfolios' impact on the climate, thereby enhancing the decision-making process concerning the climate goals of central banks and aiding others in comprehending climate-related risks and impacts.

Beginning in 2023, the European Central Bank (ECB) and the Eurosystem central banks have pledged to release climate-related financial disclosures annually. These disclosures demonstrate their initiatives to reduce carbon emissions from their portfolios following the objectives set by the Paris Agreement. Additionally, these disclosures act as instruments to track their advancement and guide any required modifications to their strategies.

Eurosystem central banks' initiatives significantly enhance openness and responsibility in how financial institutions manage and disclose climate risks. Given their significant potential environmental impact, concentrating on non-monetary policy portfolios is crucial. The yearly frequency of these disclosures enables continuous oversight and adaptation, addressing the dynamic nature of climate-related challenges and policy goals. This movement is part of a broader global shift towards incorporating environmental factors into the financial industry, aligning with international frameworks such as the Paris Agreement.

Currently, the Eurosystem framework mandates members to publish metrics based on three emission allocation methods: emissions within a country's physical borders ("production emissions"), emissions related to domestic consumption ("consumption emissions"), and emissions associated with government institutions and expenditures ("government emissions").

Mandatory reporting of production and consumption emissions is advantageous for the Eurosystem. Production emissions form the foundation of countries' decarbonization efforts as

defined in their nationally determined contributions (NDCs), while consumption emissions address the effects of carbon leakage. These two types of emissions are the most relevant and widely reported sovereign emission categories. The mandatory reporting of government emissions has both benefits and drawbacks, influenced mainly by specific factors and preferences of central banks.

The calculations for mandatory metrics are placed below:

Weighted Average Carbon Intensity

$$WACI = \sum_{n}^{i} \left(\frac{\text{current value of investment}_i}{\text{current portfolio value}} \right) x \left(\frac{\text{issuer's GHG emissions}_i}{\text{issuer's €M revenue or GDP, population, total consumption expenditure}} \right)_i \tag{1}$$

Total Carbon Emissions

$$TAE = \sum_{n}^{i} \left(\frac{\text{current value of investment}_i}{\text{EVIC or GDP}_i} x \text{ issuer's GHG emissions}_i \right) \tag{2}$$

Carbon Footprint

$$CF = \frac{\sum_{n}^{i} \left(\frac{\text{current value of investment}_i}{\text{EVIC or GDP}_i} \right) x \text{ issuer's GHG emissions}_i}{\text{current portfolio value (€M)}} \tag{3}$$

The Weighted Average Carbon Intensity (WACI) (formula 1) measures a portfolio's exposure to carbon-intensive issuers and acts as a proxy for climate transition risks. WACI is a normalized metric, making it comparable across different portfolio sizes and over time, as it adjusts issuers' emissions relative to their economic activity. (ECB, 2023)

In contrast, the total carbon emissions metric (formula 2) measures the absolute emissions associated with a portfolio, serving as a proxy for its contribution to global warming and environmental impact. Unlike the other metrics, it is not normalized and is influenced by changes in portfolio values, limiting its usefulness for comparisons over time or between portfolios of different sizes. The carbon footprint metric (formula 3) addresses this by normalizing total carbon emissions by the portfolio's value, enabling better comparability. (ECB, 2023)

Our research design is placed in Figure 1.

Figure 1

Methodological framework
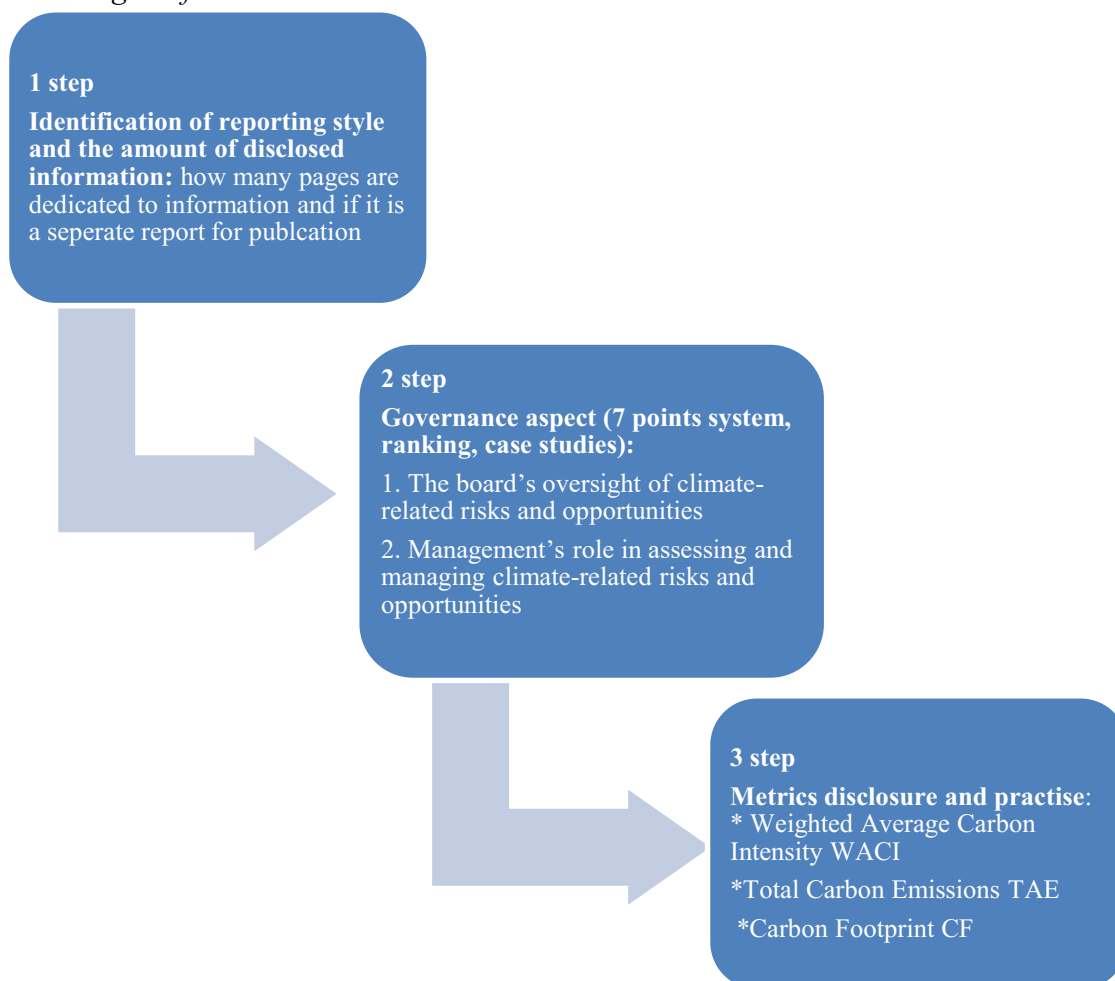
Source: Done by authors

RESULTS AND DISCUSSION:

In this research, 20 central banks of the euro area were analyzed to identify how these central banks disclose climate-related information based on TCFD recommendations for governance and metrics.

The disclosures adhere to the recommendations of the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD) across four categories: "Governance," "Strategy," "Risk Management," and "Metrics and Targets," including the TCFD's supplemental guidance for asset owners. The Eurosystem has developed a common disclosure framework for the "Metrics and Targets" category, establishing minimum standards for each member. In creating this framework, the Eurosystem also incorporated recommendations from the Partnership for Carbon Accounting Financials and the Network of Central Banks and Supervisors for Greening the Financial System (NGFS).

Table 1

Results of Eurosystem central banks climate-related financial disclosures of non-monetary policy portfolios reporting style.

It has a separate report	Name of the report	The length of the report in pages	Announce in yearly report together with other information.
Austria	„Climate-related financial disclosures by the Oesterreichische Nationalbank 2022 ". Sustainability issues are also analyzed in the yearly report too.	13	
Belgium	„Climate-related Disclosures for non-monetary policy portfolios 2022". Also has a Sustainable and Responsible Investment Charter, Annual report also covers climate issues, and Climate Dashboard.	25	
	„Climate report" as a chapter in a yearly report.	6	Croatia
Cyprus	„Climate-related financial disclosures of the Central Bank of Cyprus EUR non-monetary policy portfolios".	12	
	Has a chapter in Annual report „Climate-related sustainable investment at Eesti Pank.	5	Estonia
Finland	„Bank of Finland's Annual Report on Responsible Investment".	27	
France	„Responsible investment report".	45	
Germany	„Climate related disclosures by the Deutsche Bundesbank 2023".	43	
Lithuania	„Climate-related disclosures of the Bank of Lithuania's non-monetary policy portfolios".	13	
Greece	„Climate footprint of the euro-denominated non-monetary policy portfolios of the Bank of Greece".	10	
Ireland	„Central Bank of Ireland's climate-related financial disclosures 2023".	27	
Spain	"Climate-related aspects of the Bando de Espana's non-monetary policy portfolios".	22	
Italy	„Annual report on sustainable investments and climate-related risks".	52	
Latvia	„Climate-related disclosures of Latvijas Banka's non-monetary policy portfolios".	13	
Luxembourg	„Climate-related disclosures of the BCL's non-monetary policy portfolios".	15	
Malta	„Climate-related financial disclosures of the central bank of Malta's non-monetary policy portfolios".	40	
	In Annual report. „De Nederlandsche Bank N.V. 2022 Annual Report. Information is very unstructed., other climate related information is mixed with other topics.	5	The Netherlands
Portugal	„Climate-related financial disclosures of the Banco de Portugal's own financial assets".	14	
Slovakia	„Climate-related disclosures of Národná banka Slovenska's non-monetary policy portfolio".	16	
Slovenia	"Climate-related disclosure of Banka Slovenije's own financial assets".	23	

Source: Done by authors using central banks' reports published online.

Table 2

The results of governance disclosure in euro area central banks based on TCFD recommendations.

Describe the board's oversight of climate-related risks and opportunities	LT	IE	AT	BE	EE	EL	ES	IT	CY	HR	LV	LU	MT	NL	PT	FR	SK	SI	FI	DE
– processes and frequency by which the board and/or board committees (e.g., audit, risk, or other committees) are informed about climate-related issues	no	no	no	yes[1]	no	no	yes[3]	no	yes	no	yes	yes	yes	yes	yes[3]	yes	no	yes	yes[3]	yes
– whether the board and/or board committees consider climate-related issues when reviewing and guiding strategy, major plans of action, risk management policies, annual budgets, and business plans as well as setting the organization's performance objectives, monitoring implementation and performance, and overseeing major capital expenditures, acquisitions, and divestitures	yes	yes	yes	yes	no	no	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	no	yes	yes	yes
– how the board monitors and oversees progress against goals and targets for addressing climate-related issues	no	no	no	yes	no	no	yes	no	yes	no	no	yes	yes	yes	no	yes	no		no	yes
Describe management's role in assessing and managing climate-related risks and opportunities																				
whether the organization has assigned climate-related responsibilities to management-level positions or committees; and, if so, whether such management positions or committees report to the board or a committee of the board and whether those responsibilities include assessing and/or managing climate-related issues	yes	no	yes	yes	no	no	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	no	yes	yes	yes
– a description of the associated organizational structure(s)	no	no	no	yes[2]	no	no	yes[2]	yes[4]	yes[2]	no	no	yes	yes	yes[2]	no	yes	no	yes[2]	yes[2]	yes
– processes by which management is informed about climate-related issues	no	no	no	yes	no	no	yes	no	yes	no	no	yes	yes	yes	yes	yes	no	yes	yes	yes
– how management (through specific positions and/or management committees) monitors climate-related issues	no	no	no	yes	no	no	yes	no	yes	no	no	yes	yes	yes	no	yes	no		no	yes

*Notes: [1]on regular basis; [2]there is no organizational chart, but explained functions quite well; [3]lack of frequency, process clear; [4] good and clear organizational structure; *the best practice in disclosing*

Source: Done by authors using central banks' reports published online.

Governance

Table 1 and Table 2 present the analysis of 20 Euro Area Central Banks' reports on sustainable investments and climate-related risks. The results show that reports are not very transparent, as we see a lot of information that central banks do not disclose.

Figure 2

Countries ranked by pages of climate-related information disclosure
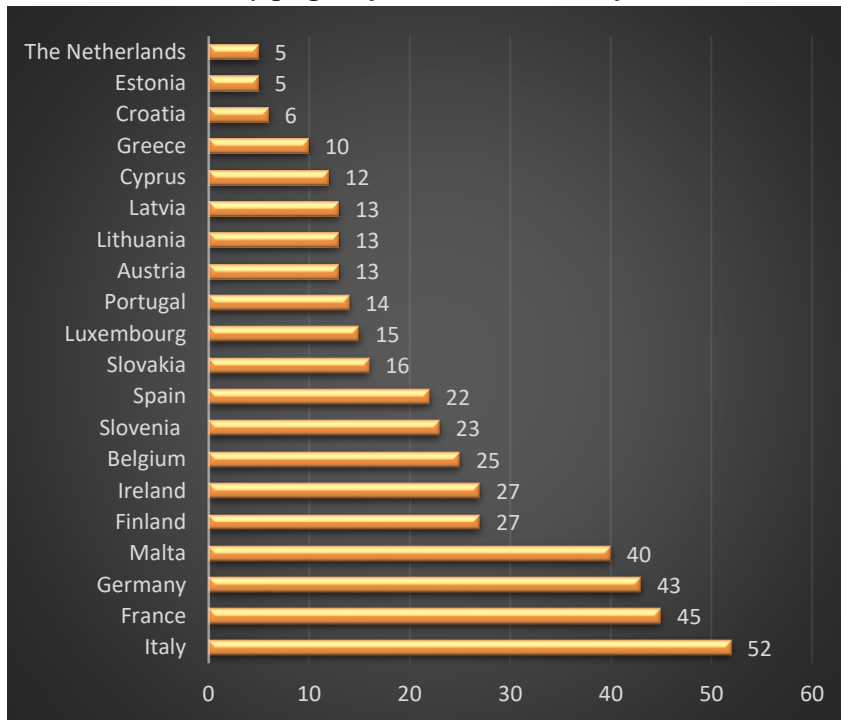
Source: Done by authors using central banks' reports published online.

Based on our research presented in Figure 2, we can group all countries into four groups based on information about climate change impact disclosure in their reports. In the first group, we can add Italy, France, Germany, and Malta as countries presenting the most information. We can also consider that central banks in these countries are the most transparent regarding climate-related information disclosure of non-monetary portfolios. For the second group of transparency, we can appoint Finland, Ireland, Belgium, Slovenia, and Spain, so the central banks of these countries are a bit less transparent in disclosing climate-related information about non-monetary portfolios. The third group comprises Slovakia, Luxembourg, Portugal, Austria, Lithuania, Latvia and Cyprus central banks. And the fourth group (Netherlands, Estonia, Croatia, Greece) of central banks are with very short reports and a poor amount of climate related information in their non-monetary portfolios.

After analyzing all the reports, we tried to evaluate the quality of governance disclosure based on TCFD recommendations. We decided to rank all the central banks from 0 to 7 based on the disclosure aspects which are presented in Table 2. The ranking results are placed in Figure 3.

From the results in Figure 3, we can see that some countries disclosure all recommended information (Belgium, Spain, Cyprus, Luxembourg, Malta, Netherlands, France, and Germany) about the governance while others do not disclosure all main aspects (Estonia, Greece, Croatia, Slovakia).

Looking at the length of reports and the level of the disclosure of information about climate risk governance, we can see that countries with concise reports do not focus on the disclosure of governance aspects. The only exception was the Netherlands, where all recommended aspects were disclosed, and the report of climate-related information about nonmonetary portfolios was very short and concentrated (Figure 4).

Figure 3

Countries ranked by the level of governance disclosure.
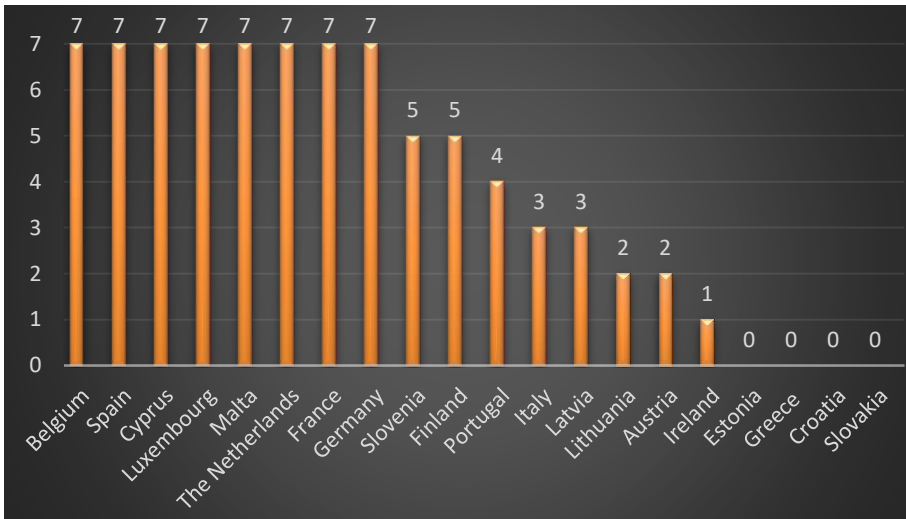
Note: 7 points – the highest level of governance information disclosure, 0 – the lowest level of governance information disclosure

Source: Done by authors using central banks' reports published online.

Figure 4

Relationship between the length of climate-related information disclosure report and the level of governance information disclosure
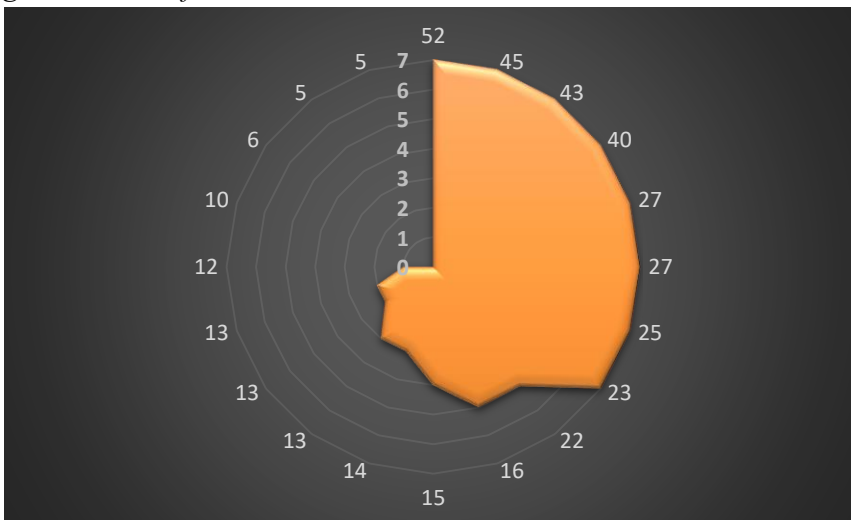
Source: Done by authors using central banks' reports published online.

After a deep analysis of the reports, we can conclude that the governance part in disclosure about climate risk is fragile, with no precise frequency for reporting to the Board. The best governance disclosure practices are identified in Malta, France, and Germany.

Metrics

After analyzing all the reports of central banks, we have summarized the results in Figure 5. Based on the ECB rules, WACI, Total carbon emissions, and Carbon footprint are mandatory metrics, so all central banks disclose them. All other metrics are disclosed voluntarily.

Table 3 shows the results of metrics disclosed by euro area central banks. The required metrics are only three: weighted average carbon intensity (WACI), total carbon emissions, and carbon footprint. Two extra metrics are disclosed in half of all central banks: green and thematic bond share and carbon intensity. Other measures are disclosed only in some banks. From the reports, it was clear that central banks tend to disclose more metrics next year, so the results for 2023 can be better with more efforts for disclosing information.

Figure 5

Metrics used to assess and manage relevant climate-related risks and opportunities in euro area central banks
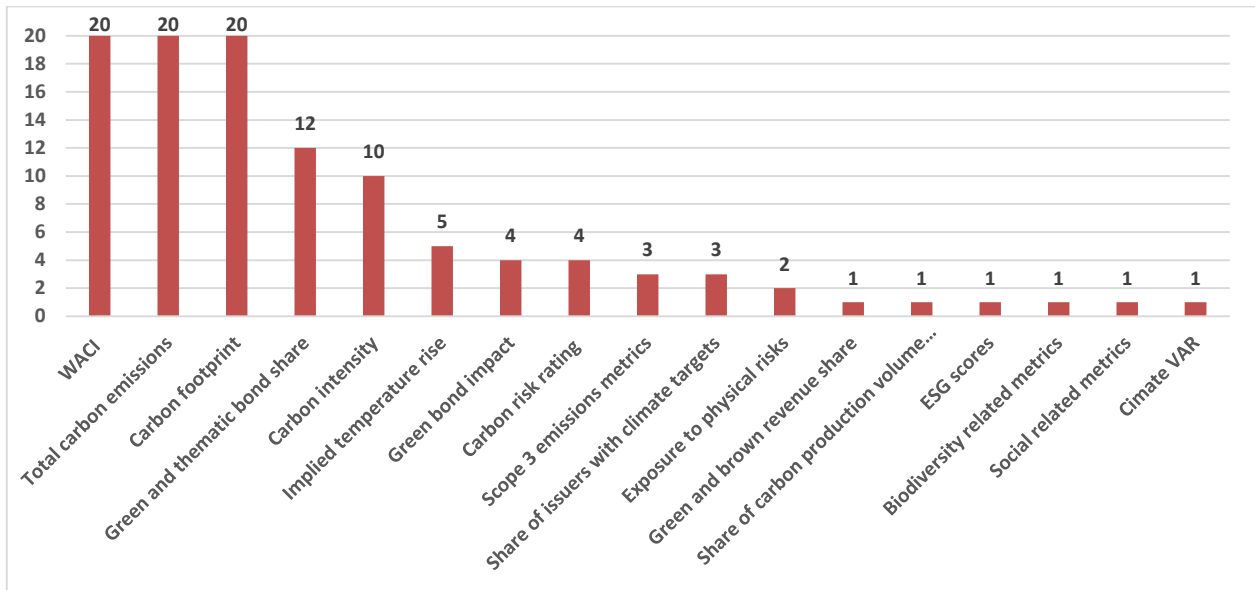
Source: Done by authors using central banks' reports published online.

Table 3

Calculated metrics at the bank level

Metric		Banks
WACI	20	All euro area central banks
Total carbon emissions	20	All euro area central banks
Carbon footprint	20	All euro area central banks
Green and thematic bond share	12	Ireland (thematic and green), Italy (green), Belgium, Slovenia, Slovakia, Portugal, Malta, Luxembourg, Spain, Germany, Netherlands, Finland
Carbon intensity	10	Finland, Croatia, Cyprus, France, Greece, Italy, Ireland, Portugal, Malta, Spain
Implied temperature rise	5	France, Belgium, Finland, Germany, Malta
Green bond impact	4	Malta, Germany, France, Belgium
Carbon risk rating	4	Belgium, Germany, Slovenia, Malta
Scope 3 emissions metrics	3	Belgium, Finland, Germany
Share of issuers with climate targets	3	Finland, Slovenia, Malta
Exposure to physical risks	2	France, Germany
Green and brown revenue share	1	Germany
Share of carbon production volume to GDP	1	Germany

ESG scores	1	France
Biodiversity related metrics	1	France
Social related metrics	1	France
Climate VAR	1	Italy

Source: Done by authors using central banks' reports published online.

Central banks tend to report minimum metrics to assess climate-related risks and opportunities. Most metrics of climate issues are explained in the central banks of France and Germany reports. Eurosystem members were encouraged to enhance their disclosures with voluntary metrics, and in their 2023 reports, they included 14 different categories of such metrics. These voluntary metrics were both backward-looking and forward-looking. The most commonly reported backward-looking metrics included the shares of green and thematic bonds and carbon intensity. Among the forward-looking metrics, the most popular were the implied temperature rise, carbon risk rating, and the share of issuers with climate targets.

Introducing mandatory carbon intensity metrics could enhance reporting for certain central banks. These metrics provide additional insights into the emissions associated with holdings by normalizing emissions relative to the level of financed economic activity (i.e., revenue). Carbon intensity metrics are widely used in the financial sector and preferred by some investors for tracking portfolio decarbonization. Most NMPP portfolios should have sufficient data availability, and the calculation process is operationally straightforward. But at the moment, for the 2022 reporting year, only half of all central banks disclosed and calculated this metric.

However, the added value of carbon intensity depends on specific investment strategies, raising questions about its usefulness as a mandatory metric. The TCFD recommends disclosing precise, comparable, and consistent information about climate-related risks and opportunities. Portfolio managers select climate metrics based on their investment strategies and the applied scope. Adequate climate-related metric disclosure aids understanding; thus, adding the complex carbon intensity metric to the already mandatory WACI, Total Carbon Emissions, and Carbon Footprint metrics might complicate reporting without significantly increasing informative value. PCAF (Partnership for Carbon Accounting Financials) does not explicitly recommend the carbon intensity metric.

Integrating forward-looking metrics into the reporting framework is desirable, but the lack of methodological standardization currently weakens the case for inclusion. While these metrics enrich reporting and are conceptually appealing, ongoing debates about methodological aspects and the lack of standardization argue against their mandatory inclusion at this stage. The availability and standardization of data should improve with the implementation of the CSRD (Corporate Sustainability Reporting Directive). Central banks are encouraged to share their experiences to define best practices for voluntary reporting of forward-looking metrics.

Reporting on green bond-avoided emissions remains challenging. Three distinct approaches for reporting avoided emissions—relying on data provider estimates, collecting issuer impact reports, and collecting third-party impact reports—each has pros and cons. Current guidance and data are insufficient to ensure accurate estimates for green bonds' avoided emissions. Among the three approaches, relying on data provider estimates appears superior in terms of practicality and feasibility, but data coverage must improve before collective disclosure by the Eurosystem. Harmonizing methodologies used by data providers would also enhance metric quality.

Reporting portfolios' green bond share could enhance transparency about portfolios' contribution to the low-carbon transition, stimulating the supply of crucial transition financing. Green bonds are a popular tool for fixed-income investors to support low-carbon projects. Several central banks already report the share of green bond holdings in their portfolios. Identifying green bonds is straightforward, as Bloomberg provides a classification flag based on the Green Bond Principles (GBP) of the International Capital Market Association (ICMA), reducing greenwashing risks.

Addressing the impact of inflation on financial data remains unresolved. Financial measures such as revenue and EVIC are affected by inflation, which can lead to "artificial" greening over time. While correcting for inflation in metrics is theoretically desirable, it is complex in practice. PCAF (Partnership for Carbon Accounting Financials) does not recommend adjusting for inflation to maintain comparability across institutions. The EU climate benchmark regulation prescribes an "enterprise value inflation adjustment factor," which does not distinguish between causes of enterprise value fluctuations. This metric is complicated to correct for inflation's impact, but it should be reviewed in the future due to its relevance for setting interim targets.

Biodiversity aspects are likely to gain prominence in climate reporting. The Taskforce on Nature-related Financial Disclosure (TNFD), announced in July 2020, released its complete framework for market adoption on 18 September 2023. EU environmental standards being developed by EFRAG (E4 – Biodiversity) build on TNFD recommendations. If deemed material, the CSRD will require major EU companies to report on certain nature-related KPIs starting in 2025. While biodiversity disclosures should remain voluntary for now, it should be considered to include them in the standard reporting framework later.

Metrics should be updated retroactively as new climate data becomes available. Emissions and financial data for issuers typically have a delay of one to two years, causing reference year mismatches in recent portfolio reporting. We recommend making these limitations transparent and updating metrics in the next reporting round when new data with matching reference years becomes available. Most recent metrics would likely need only one update.

Because of calculation challenges, most central banks at the moment do not want to make other metrics to disclosure mandatory and tend to remain voluntary.

CONCLUSIONS

After analyzing 20 central banks' climate-related financial disclosure reports, it can be concluded that euro area central banks do not disclose transparent processes by which the bank boards are informed about climate-related issues. The other important point is that most central banks do not identify the reporting frequency.

Monitoring climate-related issues for central banks is essential, and if the central banks have no transparent processes, they can face difficulties in managing climate risk and adding value to sustainable development.

In climate-related financial disclosure reports, central banks explain how the board supervises and manages risks and opportunities related to climate change. At the same time, it outlines how management evaluates and handles risks and opportunities associated with climate change. Small central banks based on foreign reserves portfolios tend to make concise reports about governance without profound explanation.

Central banks, from 2023, have to disclose metrics by which they assess climate-related risks and opportunities. The research has shown that most central banks tend to disclose only metrics based on minimum requirements (WACI, Total carbon emissions, Carbon footprint), especially small central banks. By disclosing other metrics, there is no transparent system of providing information.

The main recommendation for central banks would be to report more transparent disclosures in governance, focusing on TCFD recommendations. Processes and frequency by which the board and/or board committees (e.g., audit, risk, or other committees) are informed about climate-related issues are essential to ensure proper climate risk management in the organization. The other aspect for central banks is to have a transparent monitoring of climate-related issues system.

The other recommendation is to include more measures than the minimum in disclosing climate-related risks and opportunities and present it clearly by explaining the calculation and targets for the future.

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BREAD, POWER, AND NEOLIBERAL MUNICIPALISM: THE HALK EKMEK A.Ş. AS A CASE OF BREAD AND CIRCUSES POLITICS

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Abstract: This article explains the historical process and political importance of Halk Ekmek A.Ş., a public bread production company, since its establishment. In this context, Halk Ekmek A.Ş. was considered an example of a Socialist Municipality in the past, but today, it is used as a political tool in neoliberal municipalism. Although municipal enterprises such as Halk Ekmek, which are taken as an example in this study, are generally presented as social enterprises, they have also become enterprises of profitability and political gain, especially as a result of neoliberal municipal practices. Bread is both a fundamental part of culture and nutrition for the Turkish people and a unique part of the control system in which the government is also involved. For this reason, public bread enterprises, such as Halk Ekmek A.Ş., are seen as valuable by those in power to control society and create a political argument. As a result of this examination, it will be investigated that this order established through public means is essentially a part of a "bread and circus" politics that appeases the public and strengthens the political power of the governments. As a result of the findings obtained, it will be seen how Municipality Participation can create a system that serves political purposes and kills competition. This study contributes to the public administration literature, where there are very few studies on this subject, by critically analysing how the socialist municipality period implemented in the historical process has essentially transformed into neoliberal municipal practices. As a result, the sustainability of this system will be questioned.

"Life, misfortune, isolation, abandonment, poverty, are the fields of battle which have their heroes; obscure heroes, who are, sometimes, grander than the heroes who win renown…. Firm and rare natures are thus created; misery, almost always a step-mother, is sometimes a mother; destitution gives birth to might of soul and spirit; distress is the nurse of pride; unhappiness is a good milk for the magnanimous." (Hugo, 2017: 433).

Keywords: Bread and Circus, Socialist Municapilism, Halk Ekmek, Neoliberal Governance, Public Bread

1. INTRODUCTİON

Bread, which contains only flour, water, salt and yeast, has been the most fundamental source of nutrition in the whole world. Especially in Anatolia, bread, which has many varieties, has a significant and even sacred place in terms of society. In fact, the famous traveller Evliya Çelebi also states in his *Seyahatnâme* that the angel Gabriel brought wheat to Adam for the first time. He also states that Adam was the first person to make bread in the world (Yerasimos, 2019: 71-73). Bread, which finds its place in novels, poems, social texts, and religious teachings, and its relationship with poverty makes bread a social phenomenon. In fact, during

the French Revolution - although its accuracy is debatable - it is claimed that Marie Antoinette said, "*Qu'ils mangent de la brioche*" [Then let them eat bricohe] when the French Queen was told that the peasants had no bread to eat. This situation is still used today to describe the deep gap between the misery of the people and the aristocracy (Thompson, 2003). For this reason, bread has become a field of control and power both socially and publicly. In the Ottoman Empire, therefore, the laws stated what kind of a product bread was, how it was to be produced, and what the bread production should be. After the establishment of the Republic of Türkiye after the Ottoman Empire, policies based on the economic, social and political aspects of bread continued.

Halk Ekmek Discussions in Social Sciences

The literature on social sciences does not broadly discuss bread or Halk Ekmek A.Ş. (People's Bread). Outside the field of social sciences, bread is seen as food, which is why food engineers, agricultural experts, and gastronomy experts have examined bread as a "product." However, due to its unique status, bread is the most political item in Türkiye, and even Türkiye's economic situation is understood by how much bread can be consumed per household. In the literature in the field of Public Administration, authors such as Malbeleği (2018) and Özdemir (2008) examined Halk Ekmek within the scope of Municipal Economic Enterprises. These researchers saw these companies as an element of a neoliberal municipality, in which municipalities switched to a business model. In this model, municipalities establish many companies to provide public services instead of using money from the central budget. These local government companies create more space for their budgets, and municipal economic enterprises implement public policies in areas such as transportation, infrastructure, energy, food, etc. In addition to profitability, this situation is also politically beneficial for municipalities. These companies provide additional income to their budgets and votes from the poor classes, which is like a win-win deal. Municipalities that present the policies of these companies as social services create a control system behind populist rhetoric.

However, although they have the social phenomenon of bread behind them, it is also a reality that bread calls for a political reality. What makes this study different is that it addresses the Halk Ekmek A.Ş. issue as a form of control outside of this rhetoric, that is, as a part of the "bread and circus" policy, which is what makes this study more original. The problem statement of the study is that Municipal Economic Enterprises such as Halk Ekmek A.Ş. are a reflection of populist discourses. In order to prove the hypothesis in the article, Court of Accounts Reports, policy documents, and different research will be used. Halk Ekmek A.Ş. is affiliated with local governments in Türkiye as a public bread production centre, and local governments carry out these economic enterprises as an element of Socialist Municipality. Therefore, before starting the discussion, it is necessary to examine the historical roots of the relationship between bread and the municipality in Türkiye.

2. Roots of Socialist Municipalism

In Europe, since the thirteenth century, when city governments first emerged, the social character of municipalities emerged when they began to collect taxes from the public for public services, which is the basis for the emergence of modern municipalities. Naturally, in the past, there were city-states in Ancient Greece, or the "Municipal" management model in Rome, and

various commune managements. However, while the modern municipality model emerged in the nineteenth century, this situation was based on the collection of taxes in European cities from the thirteenth century onwards. In the past, cities were the places of epidemics, military conflicts, food shortages, and urban death crises. This situation caused many people to be in need of assistance. For example, in Hamburg in 1787, while 10 per cent of the population was in need of assistance, 20 years later, 32 per cent of the population was in need of assistance, which also led to an increase in chaos and crime rates in cities. This chaotic society led to the emergence of voluntary aid organisations, especially those based on religion, throughout Europe. These religious-based organisations emerged as organisations that helped people experiencing poverty, widows, the elderly, and blind people (Clark, 2009; Oktay, 2008: 12).

The first example of the idea of social municipality was experienced in the Paris commune, which emerged in 1871 - also as the first administrative experience of the working class. The Paris commune constitutes the politicisation process of local governments in a historical sense, in other words, the first core of the modern understanding of municipality. In this short-term self-government experience, public services were implemented through direct initiative, and it was demonstrated that direct democracy could be applied in a metropolitan city (Güler, 2009: 127-128). However, this experience was relatively short-lived, and later on, modern examples of social municipality emerged in the nineteenth century with the experience of "Municipal Socialism". The shocking effects of the Industrial Revolution were very evident in these cities, and as a result, the demographic structure changed, especially in Europe with the Industrial Revolution, and it increased late from rural to urban areas. In England, which was considered one of the centres of industrialisation in the nineteenth century, the country's population more than doubled between 1750 and 1850. Many people migrated from rural areas to industrial cities because of their proximity to factories. At the same time, improvements in health and increased food production reduced the mortality rate. This extreme situation created a public policy problem for the poor working classes in crowded industrial cities (Wilde, 2020).

The problems experienced by the working masses in the cities - infectious diseases, water, sewage, garbage, housing, etc. - made it very difficult to manage daily life. In the face of these problems that occurred in industrial cities such as London, Liverpool and Manchester, the British Parliament made a series of regulations under the name of the "Public Health Act" in 1848. The British Government saw these problems only as a matter of poverty and tried to overcome them only with legal regulations. Later, in 1858, with the Local Government Act, local administrators were elected to office more radically, and thus, practical consequences arose for the working class (Prest, 2011). During this period, policies aimed at improving living conditions and public health were implemented in various cities in England with the resources of local governments. In this direction, social reforms were attempted to be carried out by local governments, and all these practices were seen as "Municipal Socialism", and Municipal Socialism was widespread, especially in cities such as Glasgow and Birmingham (Gehrke, 2016).

According to Ruşen Keleş, municipal socialism aims to provide a public service approach instead of an individualistic profit motive. This approach, which argues that it is more appropriate for public services to be carried out by local factions, was developed by the Webbler and Fabian socialists and was eventually based on various principles. According to

these principles, an order based on the will of the plural, not landowners, should prevail in cities. As a result of this approach, municipalities should undertake most of the local services. Ultimately, municipal socialism sees small communities (local governments, cooperatives and unions) as the basic unit of human life. Developments in the nineteenth century increased the needs of local communities. This approach against the nationalisation of these needs, and they see the nationalisation of services as a movement against municipal socialism. Finally, it assumes that local governments should benefit from a particular area of freedom (Keleş, 2014: 41-43).

The main arguments of the administrations where municipal socialism is implemented are to maintain order in cities, to prevent the spread of diseases, to improve public health and to reduce crime. In working-class cities such as Glasgow and Birmingham, municipal socialism is implemented, and it aims to improve living standards in the neighbourhoods where workers live intensively. In other words, the driving force of municipal socialism, which expresses socialism applied in matters related to local governments, has been the working class (Bayramoğlu, 2015: 36-37). This understanding has been developed further over time, and municipalities have been given entrepreneurial, distributive and productive duties; it has taken on an understanding that defends the welfare of the people and distributes social aid in a social sense. Socialist municipal practices continued until the 1980s, especially in England in the 19th century; these services (electricity, water, housing, etc.) that were implemented with continuity were at a level that could compete even with the socialist states of that period. However, these practices seen through municipalities manifested themselves with central government policies after 1945. These practices, which are described as the welfare state approach, have enabled the socialist municipality approach to spread to the state (Bayramoğlu, 2015: 52-53).

3. Socialist Municipality Practices in Türkiye

With the establishment of the Republic, the aim was to restructure cities with practices carried out with the principles of etatism. This all-out revival and the adoption of statism policies in production would also show itself at the town level, and the production of many public services would be "municipalised". Here, municipalities aimed to create "healthy" and "civilised" cities (Tekelioğlu, 2012). The Municipalities Bank was established in 1933 to provide financial support for the development of these cities and to realise the drinking water investments of the municipalities. However, all these practices were practices aimed at improving public services that were intertwined with the state. Socialist municipality practices, which had been seen in England since the nineteenth century, would only be possible in Türkiye in the 1970s (Bayramoğlu, 2015:149).

The reason for the Socialist Municipality movement that emerged in Türkiye in the 1970s was political and economic crises. Some social democratic mayors who emerged during this period pursued policies that aimed to end the understanding of municipalities under the control of party leaders. The profound social and service problems that emerged in the cities during that period brought such a situation to the forefront. As a result, the 1973 elections were elections in which urban problems directed the political conjuncture (Güler, 2009: 134). In the 1973 elections, the fact that the central government and the local government were from different parties created a contradiction between them. At the centre of this contradiction, for the first time, social democratic mayors won the elections with the votes they received from

the shantytowns of the city and shaped their policies through shantytown policies (Tekelioğlu, 2012: 245). Because most of the urban problems were undertaken by the shantytowns.

The period, called the Socialist Municipality in Türkiye, was remembered with the names of social democratic mayors who were elected to solve the problems in the big cities. Mayors such as "Vedat Dalokay (1973-1977) in Ankara, Ahmet İsvan (1973-1977) and Aytekin Kotil (1977-1980) in Istanbul, İhsan Alyanak (1973-1980) in Izmir" shaped this period. Socialist municipality studies in Türkiye are generally explicitly addressed in these periods. Apart from these examples, the period when Fikret Sönmez was the mayor of Fatsa, the period when Osman Özgüven was the mayor of Dikili, and various projects carried out by various municipalities (such as the Milk Lamb Campaign and Neighborhood Committees) are also seen as reflections of the socialist municipality (Bayramoğlu, 2015: 150-151). What is really important in the social municipality is that some actions are visible, and the first of these visible actions is to open the door to a socially just structure. The reason for the application that will especially please the shantytowns is to show that this socially just structure is being served. This situation is also expected to be reflected in the voting rates. In addition to the socially just structure of social municipalities, the aim is to establish a municipality that is productive rather than a supervisory one, where all layers of the public participate in the participation process, where the municipality does not allow monopolistic rent (Tekelioğlu, 2012: 251-255).

4. Neoliberal Municipalism and "Bread and Circus" Politics

The Latin phrase "*Panem et Circenses*", literally "bread and circuses", was a political term in Roman times symbolising the well-being of the population. As the Roman satirist Juvenal put it:

> "*iam pridem, ex quo suffragia nulli vendimus, effudit curas; nam qui dabat olim imperium fasces legiones omnia, nunc se continet atque duas tantum res anxius optat, panem et circenses*". (Juvenal & Persius, 2004: 372).
>
> *"Now that no one buys our votes, the public has long since cast off its cares; for the people that once bestowed commands, consulships, legions, and all else, now meddles no more and longs eagerly for just two things – Bread and Games."*

The concept of "bread and circus politics" proposes that the vast masses in society can voluntarily exchange their democratic freedoms for a stable but controlling government. To this end, in the Roman period, the Roman emperors used tools such as food distribution, baths, exotic animals, and theatre to prevent the people from rebelling, eliminate their discontent, and prevent anarchy from emerging. In this context, the concept is used as the general definition of compassion for government policies that ensure the continuation of dominant ideologies and offer short-term solutions to social unrest (Esdaw, 2022; Dove, 2024). Local governments, as the closest administrative unit to the people and their problems, do not hesitate to pursue palliative "bread and circus" politics under the name of "social municipality" in order to turn the destructive effect of mass power into an advantage. These policies will likely increase, especially in periods when economic crises are experienced, and deep poverty spreads to the whole society. In Türkiye, organisations such as the "Deep Poverty Network" have focused on the impact of poverty that has deepened in society since 2018 (DeepPovertyNetwork, 2024).

As anticipated, the minimum services expected from local governments are providing the city's infrastructure services, preparing urban planning, providing garden and garden services, allocating drinking water to citizens, and finally, collecting and disposing of the city's waste. All of these duties are public services that the public demands from local governments at a minimum level. However, in addition to these needs, local governments can also implement social municipality practices that will ensure the unity of the society, develop social and cultural relations, and reduce poverty. In Türkiye, municipalities with a population exceeding 50 thousand have been authorised to offer all kinds of social and cultural activities. The social and cultural duties of these municipalities include "opening women's shelters, producing houses and plots for low-income people, allocating plots for disaster victims, cooperating with the disabled and their associations, and carrying out various social projects through the city council" (Kurt, 2009: 287).

The Social Municipality practices that we have mentioned so far have been minimised due to the neoliberal municipality approach that came into effect in the 1980s. The neoliberal municipality sees such social practices as unnecessary burdens on municipal budgets, and public policies that were previously offered as "services" are now transformed into "sectors", and various services (education, health, water, etc.) are commodified. In parallel with general economic doctrines, the main goal of a neoliberal municipality is to privatise public services as much as possible. Social services have now been replaced by "social services" surrounded by populist discourses aimed at gaining votes. The aim here is to consider social services as a political element and to receive more votes from the poor community. We can understand this situation from the budgets that municipalities allocate to social responsibility and social municipality practices. For example, in the 2014 general budget of Çanakkale Municipality, social services only covered 1 per cent of the budget (İpek & Çıplak, 2016: 209). According to the "*Local Government Social Budget Monitoring Report",* Denizli Metropolitan Municipality spent 2.49% of its budget on social expenditures in 2009, Bursa Municipality 4.69%, Diyarbakır Metropolitan Municipality 15.66%, Kocaeli Metropolitan Municipality 2.62%, and Kadıköy Municipality 9.7% (Şeker, 2011). In a more recent study, the total average of social expenditure rates of Adana, Mersin, İzmir and Ankara Metropolitan Municipalities between 2010-2017 corresponds to 3.1% (Karadağ & Şahin İpek, 2020: 189). The reason behind the increase in social expenditures is local elections. Local governments increase social expenditures, which constitute a tiny portion of their budgets, in order to gain votes before the elections. Within this framework, social expenditures now take the form of "Social Politics", and municipalities pursue social politics through the companies they establish. For example, the Istanbul Metropolitan Municipality has exactly 28 joint stock companies affiliated with the fields of Transportation, Construction, Environment Energy, Services and IT (Information Technologies). These enterprises, which are called Municipal Economic Enterprises (MEEs), are defined as "*private law legal entities established by municipalities or in partnership with them for the purpose of carrying out many local services, with independent budgets, and subject to private law provisions as a rule*" (Malbeleği, 2018: 34). Although these institutions are seen as public organisations, they are essentially private law legal entities subject to private law rules. These private companies were established with the aim of providing most of the public services and social-cultural services with a "profit margin".

The reasons for the establishment of Municipal Economic Organizations (MEOs) were, firstly, the desire to establish a company outside of public control and in the field of private law. Thus, bureaucracy and its legal limitations were reduced to a minimum level, and a new source of income was created for the municipality through companies. In addition, populist politics was also implemented in the elections due to uncontrolled personnel recruitment. They can also employ those who are close to their political parties in the areas they create in different areas. These personnel also have the opportunity to receive higher salaries than central government officials. Since these Municipal Economic Organizations are not subject to the "State Personnel Regime", people can be employed freely. In Türkiye, there is an increase in personnel employment in both general and local elections. There is always a decrease in personnel employment in the year following the election. Based on this study, there has been an increase in personnel recruitment in the local election years 1999, 2004, 2009, and 2019 in Türkiye in the last 20 years. There was a decrease in civil servant recruitment in the year following the election. This situation alone shows that ICTs are actually part of a "social employment policy" that goes far beyond their social purposes (Oğuz, Taşbaşı, & Soykut Sarıca, 2020). Although it seems to be established for the purpose of reducing poverty in society, the aim is to provide more income to municipal resources. Municipalities implement neoliberal municipal practices by becoming companies and transferring resources from companies (Malbeleği, 2018: 38-40).

Municipal Economic Enterprises (MEEs) are established as partnerships by the municipality, which has more than half of its capital in the municipality. The reason for this partnership is the idea that social service maximisation will be provided through companies. Through this relative autonomy, BITs are freed from regulatory provisions such as the "State Tender Law, General Accounting Law, Court of Accounts Law" and are able to position themselves in an area outside the tutelary control of the Ministry of Internal Affairs (Özdemir, 2008: 43-44). In short, MEEs are private, municipal joint ventures that provide non-audited public services but are not public institutions. According to Karanfiloğlu, these enterprises are groundless in terms of the Municipalities Law:

> "*There are only two provisions in our legislation that allow municipalities to establish companies and participate in established companies. The first of these is the provision of Article 19, paragraph 5 of the Municipality Law, and the second is the provision added to the Municipality Law by Law No. 5656. According to these provisions, companies, which are one of the institutional principles outside the municipal organisation, can only be used in public transportation, meat transportation and housing construction listed in the law. This situation leaves many municipal companies established today without a legal basis*" (Karanfiloğlu, 2020: 58).

Among the companies established by municipalities, companies have been established in many unrelated sectors such as textile, apparel, forest products, vegetable oil, cement, construction, plastic paint production, weapons, tourism, television, etc. (Karanfiloğlu, 2020: 60). Municipalities can create monopolies in local areas far from the control of the central government through these companies. In this study, Halk Ekmek A.Ş., a Municipal Economic Enterprise, will be taken as an example.

5. Istanbul Halk Ekmek A.Ş. as a Case Study

Halk Ekmek is one of the most important and most profitable companies among the MEEs mentioned in the previous section, which makes it possible to describe this company as a public bread initiative. Although it was one of the subsidiary organisations with a more social aspect when it was founded, Halk Ekmek later became a tool -especially in shantytowns- to gain votes in big cities. The poor classes in Türkiye mainly apply bread-based diets, which is also proven by statistics. Türkiye ranks first among the countries that consume the most bread, with an annual bread consumption of 199.6 kg (440 pounds) per capita. Of course, this statistic also includes other pastries such as simit, pide, and lahmacun, but the most consumed pastry is "somun" bread (Martinez, 2023). This makes bread the most consumed food in Türkiye. For this reason, bread attracts the attention of politicians and becomes both a social and political phenomenon. For this reason, it is helpful to examine the bread issue from different aspects. According to official figures, İstanbul Halk Ekmek A.Ş. produces 1.8 million bread daily in Istanbul, which has a population of 15.4 million and is at the heart of the bread market, with more than 3,000 buffets located almost everywhere. According to the data shared by İstanbul Halk Ekmek A.Ş., it meets the bread needs of 12% of the people of Istanbul (İHE, 2024). In this way, İstanbul Halk Ekmek emerges as the city's largest bread producer.

Halk Ekmek A.Ş. was established as a private subsidiary affiliated with the municipality based on the provision in Article 71 of the Municipality Law, "*The municipality may provide its services with special income and expenses by establishing a business within the budget with the permission of the Ministry of Environment and Urbanization*" (Mevzuat, 2005). Municipalities in Türkiye use their social background to establish such subsidiaries, thus opening the door to a social policy and generating additional income for their budgets. This is true even for water. Although mains water is a public service, packaged water is dependent on private subsidiaries. Hamidiye A.Ş. -which is affiliated with the Istanbul Metropolitan Municipality- produces water and exports the produced water to forty-two countries, acting as if it were operating as a business rather than a social enterprise (Malbeleği, 2018: 47).

The state has both regulatory, supervisory and controlling powers for bread. The first regulation is realised by intervening in bread prices, which is called the "Price Ceiling Implementation", so the aim is to sell bread at the maximum selling price. The price ceiling is the maximum selling price that official institutions set for the sale of goods. Although the private sector seems to be in the hands of bread, the state has a dominant role in pricing, and the municipality intervenes in the bread market through price intervention, that is, by setting a price. According to Aydın, this is a manifestation of oligopoly behaviour (Aydın, 2021: 2158).

Price control on bread first emerged in the Ottoman Empire and was implemented in the Republic of Türkiye. The "Law on the Obligation of Non-Haggling Sale" numbered 3489, enacted in 1928, was aimed at the seller to label their goods and not to sell goods below the label price. The control of these prices was also given to the municipalities with the Law numbered 1580 enacted in 1930. Today, pricing is prepared by the chambers to which the tradesmen are affiliated according to the "Law on Tradesmen and Craftsmen Professional Organizations" numbered 5362. However, in case of objection to these prices, a commission is convened within 15 days upon the application of the highest civil administrator, governor and mayor of that place. However, this pricing changed in 2017, and more institutions became

involved in the pricing of bread (Yaman, 2022: 262-263). The price change process on the Ministry's website is defined as follows with the latest update:

> *"First of all, the chambers of tradesmen and craftsmen, whose members are registered in the profession of bakery and flour products manufacturing and trade, prepare the bread/simit price tariff and apply it to the union they are affiliated with. The union that receives the application will carry out the procedures for establishing a commission consisting of the representatives of the relevant municipality, provincial directorate of trade, provincial directorate of agriculture and forestry, chamber of trade and industry or chamber of commerce and the relevant chamber in order to ensure that the bread/simit price tariff presented by the chamber is discussed by holding a meeting with the participants stipulated in the said Regulation. The representatives above should be informed that participation in the commission is mandatory, and the invitation should be made in writing. Suppose anyone does not accept this written invitation. In that case, this should be clearly stated when sending it to our Ministry for approval, and the invitation letter sent to the representatives should be made an annexe. The commission decision received should first be sent to the Turkish Bakers Federation by the relevant union for its opinion. Then, the commission decision should be submitted to our Ministry by the relevant union together with the opinion of the Federation for its opinion. Suppose the opinion of our Ministry is positive. In that case, the bread price tariff will enter into force after the relevant union approves the tariff after the opinion of our Ministry is received. However, suppose the tariff requested by our Ministry is given a negative opinion. In that case, the union will re-submit the new tariff request with its justifications to our Ministry without convening a commission and will approve it after the opinion is received."*. (Ministry of Trade, 2024)

As it appears, many state institutions in the pricing system show that bread price tariffs are now centralised. Bread and simit bakers are faced with a strict pricing policy by the central government, and they are also forced to compete with municipalities since municipalities are direct producers. For Tekelioğlu, the notion of the municipality has changed; the notion of "*Producer Municipality, Not Controller*" has come into play. Because municipalities produce public goods, including bread (Tekelioğlu, 2012: 254). Municipalities feeling responsible for the pricing, production and distribution of bread in this way is not a phenomenon we encounter frequently in other countries except Türkiye (Akalın, 2003: 42-43). There are Public Bread factories and thousands of sales buffets in 12 metropolitan municipalities throughout Türkiye. In these cities, where over 37 million citizens live, a total of 534 million somun bread is produced in a year (Yaman, 2022: 269). In big cities, the class differences between the rich and the poor are visible, and the poor masses live densely in big cities. It is possible to normalise this situation by helping the poor living in big cities. However, even in cities with small populations, such as Afyonkarahisar, Düzce, and Kastamonu, there are Public Bread factories, and they produce thousands of bread per day. For the first time, in 1978, the bread production process of municipalities was based on the notion of cheap, healthy, high-quality production in order to provide better service to the people of Istanbul. Nevertheless, this notion changed, and producing bread was used as a political argument. However, before focusing on the problem of municipalities producing bread, we need to address what bread means economically and

socially and what kind of sound it is. In other words, the problem is whether bread is a public good or a private good.

Bread is considered a private good due to its characteristics and its marketability, and due to these economic features, the private sector must produce bread. If bread is to be considered a social good or a virtuous good, it must be subsidised by municipalities from their main budgets. However, in Türkiye, on the contrary, bread production is carried out by municipal companies in a way that competes with the other bakeries in the market. In fact, the Istanbul Metropolitan Municipality is considering selling the Halk Ekmek company because of its high profitability (KARAR, 2024). In a place where there is a liberal market economy like Türkiye, it would be logical for the Halk Ekmek companies not to enter the market at all, assuming that a market with so many producers will find its equilibrium price. Municipalities may be willing to produce bread for two reasons. The first reasons that will allow municipalities to enter the market are stated as "preventing bakers from forming cartels among themselves, that is, ensuring competitiveness", or the second reason is "eliminating income inequality in cities, preventing poor people from being able to eat or even facing hunger" (Akalın, 2003: 43-44). In both cases, municipalities should not be in a position to eliminate competition. The Competition Board reports show that municipalities do not assist competition in the market for social purposes. On the other hand, municipalities could not eliminate monopolisation; on the contrary, municipalities themselves show the potential for monopolisation, and these reports also reveal how large the Halk Ekmek companies are.

For example, in a case filed in 2010, an application was made by a local bakery owner to the Competition Board with the claim that "*the general managers of Ankara Halk Ekmek ve Flour Factory A.Ş., İstanbul Halk Ekmek Factories A.Ş. and BESAŞ Bursa Bread ve Nutrient Ind. came together and decided not to increase the prices of public bread*". It was stated that, according to the rapporteurs, there was no need to open an investigation. However, Istanbul Halk Ekmek General Manager Salih Bekaroğlu stated at that time that "*they were selling 300 grams of white bread for 40 kuruş, that when the recent price increases in raw materials were added to the cost, this increase did not necessitate a price hike for the price of the bread, and that as an enterprise, they were not bound by the decisions of any other bread company, that while a worker working in a normal bakery produces 200 loaves of bread per day, a worker in their own factory can produce 2,500 somun bread per day, and therefore a great cost advantage was achieved, and that Istanbul Halk Ekmek was currently one of the most profitable companies of the Istanbul Municipality*" (Competition Board, 2010). As can be understood from this, Halk Ekmek is essentially a large enterprise. Other local bakery actors in the market do not have a chance to compete with Halk Ekmek A.Ş. -especially in cities such as Istanbul, Bursa and Ankara, where the majority of the population in Türkiye lives, agreements to be made due to political conjuncture can lead to a "cartelisation".

One of the advantages that Halk Ekmeks have -as a public institution- is that they can obtain the raw material they need for production much more cheaply. They also have a very high storage capacity. The bread production and storage areas of the relatively minor private capital are not large enough to allow them to produce bread cheaply. In addition, small businesses have to buy more expensive agricultural products like flour, wheat, and nuts than municipalities, and there have been many complaints about this unfair competition to the Competition Board in Türkiye. For instance, in 2010, a bakery owner stated that he wanted to

produce and sell the Golden Bread and Golden Cake. However, the Turkish Grain Board sold roasted hazelnuts to İstanbul Halk Ekmek at a 60% discount, and according to him, İstanbul Halk Ekmek caused unfair competition by allowing these hazelnut products to be sold both at its own sales points and private sales points and by benefiting from state support. Then he applied to the Competition Board with the request that the necessary be done. However, the Competition Board similarly stated that Halk Ekmek was not dominant in the market, that its activities should not be considered predatory pricing or discrimination for abuse, and that "*As a result, there are reasonable economic and political reasons for Turkish Grain Board to sell roasted and chopped hazelnuts to İstanbul Halk Ekmek at a low price by using the authority granted to it by the Council of Ministers, without exceeding its founding purpose*" (Competition Board, 2010b). At this point, it was decided that competition was not distorted. However, it was not stated for which public benefit a public-looking Main Company produced Golden Bread and Golden Cake. Apart from these two examples, there have been many claims that Halk Ekmek prevented competition in the market. These examples were the subject of complaints not only in İstanbul but also in Malatya and Sakarya, which are relatively more minor settlements. No positive result was obtained from any of the 8 applications made between 1999 and 2010. In addition to the Competition Board reports, the Court of Accounts Reports also reflect the irregularities committed and show the areas in which Halk Ekmek spent its income.

In the 2015 Court of Accounts Audit Report of Istanbul Metropolitan Municipality Halk Ekmek A.Ş., the commercial profit of the company was declared as 6,047,157.00 TL. According to this report, Halk Ekmek A.Ş. is ranked 623rd among the 1000 most prominent companies in Türkiye and 94th among all public companies. Despite this profitability, the company also includes problematic practices such as:

- Some personnel working in the company taking annual paid leave in violation of the legislation to fulfil their military service
- Provision of supplementary health insurance for board members, general manager and assistants, personnel working as consultants, managers, chiefs and their family members
- Faulty practices and payments regarding price differences
- The partnership structure of the company consists of 5 founders, a habit dating back to the period of Law No. 6762
- Failure to use marketing and advertising expenses in a way that would increase the company's profitability
- Although the company employs two lawyers, only one of them follows up on lawsuits filed in favour of and against the company
- The personal expenses of personnel who go abroad are paid from the company budget.

These findings essentially show that the company is poorly managed and that there are many irregularities.

The most interesting of the problems identified in the Court of Accounts reports is that Halk Ekmek A.Ş. pursues policies that are entirely incompatible with Halk Ekmek's social vision, such as advertising, sponsorship, and organising congresses. According to the Court of Accounts Report, Halk Ekmek advertised in TV and radio programs, newspapers and

magazines for 1,182,402.00 TL (391,262 Euro) in 2015 and signed various sponsorships with different companies. The situation becomes more apparent when the Euro exchange rate is added in parentheses. While the Euro exchange rate was around 3.50 TL against TL in 2015, 1 Euro is around 35 TL in 2024. Similarly, Halk Ekmek revealed they paid 318,253.00 TL (105,386 Euro) for the rental fee of the Wyndham Grand Istanbul Hotel, where the 15th International Cereals and Bread Congress also held 11,800.00 TL (3,907 Euro) for the stand rental fee at the World Technology Innovation and Entrepreneurship Conference, and 20,672.00 TL (6,844 Euro) for the food served to the guests. As if to confirm the Ekmek Circus politics concretely, Halk Ekmek paid 295,000.00 TL (97,682 Euro) to the Istanbul Municipality Sports Club Association, which is a football team. It has also been revealed in the Court of Accounts reports that 122,720.00 TL (40,625 Euro) was paid to web TV advertisements shown in the municipal social facilities (Sayıştay, 2016). According to the report, it is clear that these organisations are subsidiaries of the Istanbul Metropolitan Municipality and various press and publication organs. The Court of Accounts Report states that the IHE company should follow various paths to increase its profitability and that it is necessary to follow a path that is in line with the requirements of commercial life without forgetting that it is a structure that uses public resources to a large extent (Sayıştay, 2016: 22).

In this context, Halk Ekmek transfers its source of income by advertising to its other municipality budget's subsidiaries; the organisation that Halk Ekmek advertises for is another municipal company. In short, Halk Ekmek is a company that aims to increase the municipality budget rather than its social aspect. We can understand this situation from the statements of Halk Ekmek company that the somun bread - called typical bread - has very little commercial return. Therefore, they have turned to other products and from the Court of Accounts reports. While Halk Ekmek uses the loaf of bread for social purposes, it also uses other luxury derivative bread and bakery products to maximise profitability. Therefore, it reveals that Halk Ekmek's social aspect is only apparent. Practices that will support this argument also emerge in Ankara Metropolitan Municipality Halk Ekmek A.Ş. outside of Istanbul Halk Ekmek. In the 2020 Court of Accounts report, it was reported that Ankara Halk Ekmek had 15 defective practices. In addition to the defective practices committed commercially, practices that prevent competition in the bread market were also revealed (Court of Accounts, 2020).

These findings are "Not Accruing Late Payment Interest at the End of the Year for Receivables That Could Not Be Collected on the Due Date; Not Using the Severance Pay Account; Incomplete Recording of Monthly Commission Fees That Were Not Paid by the Contractor; Not Tracking Program and License Purchases in the Rights Account; Not Applying Late Payment Interest to Commission Fees That Were Not Collected within the Payment Period; Not Entering Any Record in the Inventory Book at the End of the Activity Period; Exceeding the Upper Limit in Purchases Made Based on Exception Provision 3-g of the Public Procurement Law; Making New Contracts in a Short Period of Time with Two Companies Whose Contracts Were Terminated by Mutual Agreement on the Grounds That They Could Not Procure Flour from the Market; Carrying Out Work That Should Be Done Through Open Tender by Dividing It Into Parts Using the Direct Procurement Method; Signing of Contracts Exceeding the Representation Authority Amount by the General Manager Without a Decision of the Board of Directors 9. Delaying the Application of Delay Penalty Until After the Termination of the Contract; Applying a Delay Penalty Based on the Missing Day to the

Contractor Company That Does Not Fulfill Its Commitments on Time; Signing a Contract with a Company in Composition; Exceeding the Limit Regarding the Annual Overtime Working Period Determined in the Labor Law" (Court of Accounts, 2020).

6. CONCLUSIONS

Many metropolitan municipalities changed hands for the first time in the 2019 local elections in favour of the opposition parties. After 25 years, the CHP won in Istanbul and Ankara, where more conservative voters were elected in 2019. Although this election success did not affect the 2023 general elections, the opposition parties managed to hold more metropolitan municipalities in their hands in the 2024 local elections. Local governments, especially big municipalities, are places where deep poverty is most felt, which has affected the attitude of the voters. Because deep poverty and economic crises also create such opportunities for politics, the social municipality discourses of municipalities showed their effect in the 2024 local government election. Although it is not the primary duty of municipalities, Metropolitan Mayor candidates used some election promises for voters in 2024, such as "neighbourhood nurseries, market shopping assistance, assistance to retirees, student scholarships".Social municipal policies -targeting such poor classes- have become the determinant of Turkish politics, and Halk Ekmek A.Ş., as a municipality subsidiary, is seen as an element of this social policy.

Halk Ekmek affiliates, which had social purposes since their establishment, emerged with the aim of reducing the social inequalities of the poor in society and became institutions expected to provide a kind of social justice. However, the neoliberal municipality understanding that emerged as a manifestation of today's neoliberal system has taken on a different meaning. In the neoliberal municipality understanding, municipalities have become profit-oriented formations like companies, as in many public institutions. In this plane, municipalities have both maximised profits through their companies and, as a populist reflection of these policies, they have seen companies as "vote-gathering" tools. At this point, the "Bread and Circus" politics mentioned in the article also offers a conceptual set that makes it easier to understand these populist political forms of municipalities because it has been known since the past that the most accessible forms of controlling society have been sports and food. Because although human beings are social creatures with complex structures, some of our primitive instincts make us more easily controllable. As we understand from public policy documents, municipalities have also used these extremely archaic techniques. They are using Halk Ekmek A.Ş. both as a current policy tool and competing in a way that could harm local merchants. In this context, future academic studies can also focus on another Municipal Economic Enterprise. Because the framework of this study is limited to Halk Ekmek A.Ş., municipalities have subsidiaries in different areas. If we give a current example, the "Kent Lokantaları" (City Restaurants) that Ekrem İmamoğlu opened in 2022 after becoming the mayor of Istanbul Metropolitan Municipality can also be one of the different tools of municipalities in the face of deep poverty because it seems easier to create control mechanisms over the poor people, especially in periods of deep poverty.

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EFFECTIVENESS OF HEALTH COACHING AI APPLICATIONS FOR NON-COMMUNICABLE DISEASES' MANAGEMENT: IMPACT ON BEHAVIOR CHANGE

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Abstract: The rising prevalence of noncommunicable diseases (NCDs) such as diabetes, cardiovascular disease, and chronic respiratory illnesses underscores the urgent need for effective management strategies. This study investigates the effectiveness of health coaching applications enabled by artificial intelligence (AI) in promoting behavior change among individuals having NCDs. Utilizing a mixed-methods approach, the research evaluates user engagement, adherence to treatment regimens, and the impact of application features including personalized interventions, real-time feedback, and community support. Data was collected through surveys distributed among NCD patients using various health coaching applications. Preliminary findings indicate that personalized health coaching significantly enhances user adherence and engagement, with specific features being instrumental in driving positive health outcomes. Additionally, barriers to effective use, such as data privacy concerns and technology access, were identified. This research contributes to the understanding of how AI applications can optimize NCD management and offers insights for developers and healthcare providers to enhance the usability and effectiveness of these technologies. Ultimately, findings aim to inform the design of future health coaching applications, ensuring they better meet the needs of patients managing chronic health conditions.
Keywords: AI health coaching, Noncommunicable disease (NCD) management, behavior change in NCDs, health coaching for behavior change, AI health applications for NCDs.

INTRODUCTION

Non-communicable diseases (NCDs) such as diabetes, cardiovascular diseases, chronic respiratory diseases, and cancer are leading contributors to global morbidity and mortality. According to the World Health Organization (WHO), NCDs account for over 70% of deaths worldwide, resulting in significant healthcare burdens, economic loss and diminished quality of life for affected individuals (WHO, 2022). Of these, 15 million are premature deaths occurring in 30-70 years' age range, disproportionately affecting low- and middle-income countries (LMICs).

Moreover, to review economic impact of NCDs on healthcare systems, NCDs impose significant economic burden on healthcare systems, accounting for up to 16.5% of healthcare expenditure in some countries. The financial impact is particularly severe in LMICs, where resources are limited. Household impoverishment due to out-of-pocket payments for NCD management ranges from 6% to 84% of families affected, especially in LMICs (Jaspers et al.,

2015). The global economic burden of NCDs is expected to reach $47 trillion between 2011 and 2030, resulting from lost productivity and increased healthcare spending, according to a report from the World Economic Forum (WEF) and the Harvard School of Public Health (Muka et al., 2015). A study published in the American Journal of Preventive Medicine reported that NCDs accounted for 75% of total healthcare expenditure in the United States, translating to approximately $2.7 trillion annually (CDC, 2020). NCDs represent a significant and growing challenge, responsible for the majority of global deaths and substantial economic costs, particularly in LMICs. Prevention and equitable healthcare policies are essential in mitigating this problem globally.

The rising prevalence of NCDs is largely attributed to factors such as unhealthy diets, physical inactivity, tobacco use, and harmful use of alcohol. As the global population ages and the incidence of NCDs continues to escalate, innovative and efficient management strategies are urgently needed. Nevertheless, 80% of premature heart disease, strokes, and type 2 diabetes cases, and 40% of cancers, could be prevented through lifestyle changes such as improved diet, reduced tobacco and alcohol use, and increased physical activity. Moreover, cardiovascular diseases, diabetes and chronic pulmonary disease, can be prevented at a population level by promoting healthy behaviors such as reducing tobacco use, increasing physical activity, and improving diets (Ye, Q., Khan et al., 2018). Policies that create supportive environments are critical for fostering such changes.

Amid these pressing challenges, technology is playing an increasingly crucial role in health management. To review market valuation and growth, the global digital health market was valued at approximately $140 billion in 2022 and is expected to reach around $430 billion by 2028. This data is reported by various industry research firms and market analysis reports (Grand View Research. (2023). Digital Health Market Size, Share & Trends Analysis Report By Technology, By Application, By Region, And Segment Forecasts, 2023 – 2030). It is estimated, that globally, around 50 million people actively use health and wellness apps, including health coaching (Statista. (2023). Number of mobile health app users worldwide from 2017 to 2025). About 20-25% of U.S. smartphone users have downloaded health coaching apps (Pew Research Center. (2021). Mobile Technology and Home Broadband 2021).

The Transtheoretical Model identifies stages of readiness for change (precontemplation, contemplation, preparation, action, and maintenance). Interventions tailored to an individual's stage of readiness improve compliance with lifestyle changes and long-term disease management (Ng, N., Eriksson et al., 2021). Introduction of digital health solutions, particularly health coaching applications powered by artificial intelligence (AI), has opened new opportunities for individuals to manage their health conditions proactively. AI technologies can analyze vast amounts of health data, enabling personalized health interventions, real-time monitoring, and sustained engagement with users. Digital health tools incorporating behavior change techniques such as social support, goal setting, feedback, and monitoring are effective for managing NCDs. These techniques have demonstrated improved physical activity, diet quality, and medication adherence by offering tailored recommendations and support, which can empower individuals to adopt healthier behaviors and improve adherence to treatment regimens (Jakob et al., 2022).

AI health coaching applications, such as Noom, Omada Health, and mySugr, are specifically tailored to address the needs of patients with NCDs. By leveraging machine learning algorithms, these applications facilitate personalized feedback, goal-setting, and behavioral nudges, which are intended to promote long-term behavior change (Chokshi & Farley, 2014). Preliminary evidence suggests that such technology-driven interventions can enhance user engagement and substantially improve health outcomes.

Despite the emerging literature on this topic, there is a lack of comprehensive understanding regarding the specific features that drive user engagement and adherence in these applications. Thus, presented study seeks to address this gap by analyzing user experiences and expectations.

The objective of this research is to assess the effectiveness of health coaching AI applications in promoting behavior change among individuals with NCDs and to explore barriers to effective use of health coaching applications from the perspective of patients. In alignment with the main objective, the following research questions were identified: How effective are AI-powered applications in managing specific non-communicable diseases, such as diabetes, hypertension, and cardiovascular diseases, compared to traditional interventions? What measurable health outcomes (e.g., HbA1c reduction, blood pressure control, weight loss) have been achieved through AI-driven coaching? What is customer experience with regard to AI-powered health coaching applications in scope of user engagement, satisfaction and adherence to health interventions over time?

By addressing these research questions, this study aims to provide valuable insights for developers, clinicians, and policymakers to enhance the design and implementation of AI health coaching applications, ultimately improving patient management of noncommunicable diseases.

Methodology

Presented study employs a mixed-methods approach, with combination of narrative literature review and quantitative survey, to evaluate the effectiveness of health coaching AI applications in promoting behavior change among individuals having noncommunicable diseases (NCDs).

At the first stage, a comprehensive narrative literature review was conducted to identify existing research on the effectiveness of AI health coaching applications in the management of NCDs. For this purpose, peer-reviewed articles, clinical studies, and relevant grey literature published between 2000 and 2023 were sourced from databases including PubMed, Scopus, Web of Science, and Google Scholar. Search keywords included "AI health coaching," "behavior change," "noncommunicable diseases," and "management applications." Studies included in the review focused primarily on AI applications that provide health coaching for NCDs and assessed their impact on patient engagement, adherence to treatment, and health outcomes. Overall, 120 scientific articles were found and 80 were counted to be relevant for research purpose. Key findings, including application features, user engagement strategies, challenges, and healthcare outcomes, were extracted and synthesized. This synthesis laid the groundwork for understanding effectiveness of health coaching applications and guided the survey design for quantitative aspect of the research.

At the second stage, a structured survey was developed based on major findings from the literature review. The survey aimed to capture patient demographics, awareness and usage of health coaching applications, perceived challenges, and expectations from these applications. The questionnaire consisted of five sections: Demographics and Health Information: Including age, gender, type of NCD diagnosis, duration of managing NCDs, and use of mobile devices; Awareness and Use of Health Coaching Applications: Assessing awareness, familiarity with specific applications, and usage patterns; Challenges and Barriers: identifying obstacles faced when using health coaching applications; Needs and Expectations: exploring features desired in health coaching applications; Feedback and Future Improvements: collecting open-ended responses on gaps and desired enhancements.

Table 1. Structure of the questionnaire

Section	Survey Focus	Number of Questions	Examples
1: Demographics and Health Information	Basic demographics and NCD management information.	5	Age, gender, type of NCD, duration of management, smartphone usage.
2: Awareness and Use of Applications	Awareness, usage patterns, and barriers to adopting health coaching apps.	5	Awareness of apps, app usage frequency, reasons for not using apps.
3: Challenges and Barriers	Challenges in using apps and barriers to regular usage.	2	Difficulties in app usage (e.g., cost, motivation, personalization), reasons for irregular use.
4: Needs and Expectations	Desired features and engagement strategies for health coaching applications.	3	Preferred features (e.g., goal tracking, reminders, peer support), engagement suggestions.
5: Feedback and Future Improvements	Gaps in existing apps and suggestions for improvements.	2	Biggest gaps (e.g., cost, lack of personalization), recommendations for app enhancements.

Prior to launching, the survey was pilot-tested with a small group of NCD patients to ensure clarity and relevance of questions. Feedback was incorporated to refine the questionnaire. The survey was distributed via online platforms including social media groups, patient forums, and healthcare community websites, targeting individuals diagnosed with NCDs. Participation was voluntary, and respondents provided informed consent prior to completing the survey. Responses were collected over eight-week period, utilizing an online survey tool (Google forms) to facilitate data entry and management. Overall, 289 individuals filled out survey questionnaire.

Descriptive statistics were calculated to summarize the demographics, awareness, utilization patterns, and responses to closed-ended survey questions. Responses to open-ended questions were analyzed thematically with content analysis, to identify common themes, barriers, and suggestions for improving health coaching applications. This qualitative analysis provided insights into user experiences and expectations, complementing the quantitative data. All participants provided informed consent, ensuring anonymity and confidentiality of the responses.

Limitations of the study include self-selection bias, as participants who are more engaged with technology may have been more likely to respond. Additionally, the cross-sectional nature of the survey limits the ability to draw conclusions about causality in behavior change resulting from the use of health coaching applications.

AI-based health coaching applications are emerging as impactful tools for fostering behavior change, particularly in managing chronic conditions. However, they also present barriers that may hinder their utilization. Below is a narrative literature review synthesizing evidence on their effectiveness and challenges.

Narrative literature

Review targeted on the main research questions of the study demonstrates effectiveness of AI-based health coaching applications in behavior modification, chronic disease management and weight loss. These solutions are increasingly recognized for their scalability and potential to bridge gaps in preventive healthcare.

Digital health tools incorporating behavior change techniques such as social support, goal setting, feedback, and monitoring are effective for managing NCDs. These techniques have demonstrated improved physical activity, diet quality, and medication adherence (Mair et al., 2023). The effectiveness of AI applications in managing NCDs can be attributed to several key features. First one to review is predictive analytics: AI systems leverage predictive analytics to forecast health risks and recommend timely interventions. For instance, Livongo employs AI to analyze user data and predict potential health issues before they escalate, effectively improving management strategies for chronic conditions (Bennet et al., 2018).

Another aspect is - behavioral nudges: applications such as Woebot deliver personalized behavioral nudges through engaging chat interfaces, helping users build healthier habits through evidence-based cognitive behavioral strategies. These nudges enhance motivation and adherence (Fitzpatrick et al., 2017). Still another feature is community support: AI-enhanced applications facilitate community building, allowing users to connect with peers facing similar health challenges. Research indicates that support features within apps can lead to lower dropout rates and higher commitment to health goals (Smith et al., 2022).

When assessing effectiveness of AI health coaching regarding NCDs management, impact of personalization on user engagement and adherence should be noted. Personalized health interventions powered by AI technologies are shown to significantly boost user engagement and adherence rates among patients with NCDs. To illustrate, health coaching applications like Omada Health provide customized content that aligns closely with individual user needs, enhancing relevance and satisfaction. Studies indicate that personalized interventions yield a 2-3 times higher adherence rate compared to standardized approaches (Topol, 2019). Furthermore, real-time feedback and dynamic adjustments is another important

aspect- AI can continuously analyze user data, allowing health interventions to adapt in real time. For example, a weight management program can adjust dietary recommendations based on user responses, maintaining engagement throughout the program duration (Garcia et al., 2023). Moreover, applications such as Omada Health provide continuous monitoring to deliver immediate feedback, which is crucial for reinforcing positive behavior change. Users receive real-time insights based on their daily activities and health metrics, resulting in improved engagement and adherence (Morawski et al., 2018; Nguyen et al., 2023).

Many AI health apps, such as Fitbit, incorporate gamification techniques that motivate users through rewards and challenges. Research demonstrates that gamified strategies can significantly enhance user engagement and lead to sustained behavior change (Lunde et al., 2018).

AI health coaching has shown success in empowering patients with chronic diseases to adopt healthier behaviors and improve adherence to care plans. To illustrate impact on diabetes management, AI health coaching applications have effectively improved glycemic control in individuals with type 2 diabetes(Okoye V.N. 2022). In this case, personalized interventions should be underlined: AI algorithms in applications like Noom utilize user data to create tailored weight management programs, resulting in increased user adherence and significant weight loss outcomes in clinical trials (Han et al., 2021). Similarly, diabetes management applications like mySugr provide personalized dietary recommendations, leading to notable reductions in HbA1c levels (Chomutare et al., 2018; Smith et al., 2022). Likewise, applications incorporating self-management tools and coaching reduce cardiovascular risk factors, such as cholesterol levels and blood pressure, through targeted interventions and patient education (Vale et al., 2003).

Furthermore, a meta-analysis revealed significant reductions in HbA1c levels (mean difference of -0.17%) when health coaching was combined with structured interventions (Radwan et al., 2019). In another study, digital health coaching interventions have shown significant reductions in HbA1c levels. More specifically, in a 12-week program, high-risk participants (HbA1c >9%) experienced a 2.28-point reduction in HbA1c, demonstrating the impact of patient-centered coaching on diabetes management (Martin et al., 2020). With regard to patient engagement and long-term benefits, a tailored mobile coaching system in a randomized controlled trial demonstrated significant HbA1c reductions over 12 months in engaged participants, with a mean decrease of 0.92% compared to 0.33% in less engaged users (Lee et al., 2021). Similarly, virtual health coaching through AI tailored to individual needs has been effective in Type 2 diabetes patients in improving physical activity and oral health behavior (Cinar, 2015). Digital tools integrating behavioral coaching reduce diabetes-related stress. Studies indicate improved physical and mental health scores, particularly for participants with elevated baseline distress (Martin et al., 2020). Moreover, My Diabetes Coach program, which uses an AI conversational agent named Laura, was effective in improving health-related quality of life over 12 months. While HbA1c reductions were modest, the program demonstrated potential for scaling personalized interventions (Gong et al., 2020).

Moreover, AI health coaching demonstrated effectiveness in hypertension and cardiovascular diseases management. Applications incorporating AI-driven behavior change models have significantly improved blood pressure and cardiovascular health metrics by

encouraging medication adherence and lifestyle changes such as dietary improvements and increased physical activity (Baglivo et al., 2023). Furthermore, health coaching that integrates AI-enabled tracking systems has been shown to effectively manage cardiovascular risk factors by leveraging patient behavior change models (Ng et al., 2021).

Behavior change is integral to managing NCDs, from individual-level interventions based on readiness and self-efficacy to population-level strategies facilitated by policy and technology. Evidence supports the use of tailored, theory-based interventions for effective prevention and management of these diseases. According to reviewed literature sources, AI-supported health coaching models help patients manage chronic diseases by empowering them to adhere to care management programs and adopt healthier behaviors (Sqalli & Al-Thani, 2019). A pilot randomized controlled trial demonstrated improved engagement and lifestyle changes with AI-based sleep coaching systems using domain-specific question-answering algorithms (Bojić et al., 2023). Moreover, BCC- Behavior Change Communication leveraging theories like Social Cognitive Theory and Health Belief Model, effectively motivate individuals to adopt healthier behaviors and reduce NCD risk. It also facilitates community-level awareness and peer influence to reinforce positive habits (Nancy & Dongre, 2021). The Transtheoretical Model identifies stages of readiness for change (precontemplation, contemplation, preparation, action, and maintenance). Interventions tailored to an individual's stage of readiness improve compliance with lifestyle changes and long-term disease management (Zimmerman et al., 2000).

Furthermore, mobile applications paired with human coaching demonstrate long-term effectiveness in weight loss and sleep quality improvements among patients with chronic diseases (Baglivo et al., 2023). Another impact that AI-coaching applications show is with regard to promoting physical Activity and healthy lifestyles. To illustrate, these applications have significantly increased physical activity levels in participants over short and long durations, particularly in low socioeconomic groups (Spelt et al., 2019). To review impact of health coaching AI applications on weight loss and lifestyle management - a study on conversational AI coaching for weight loss found a 2.38% reduction in body weight among participants, along with increased healthy meal choices and user satisfaction (Stein & Brooks, 2017). The combination of AI and health coaching led to significant improvements in self-management strategies, including exercise adherence and balanced diets, in patients with chronic conditions (Kang et al., 2021). AI algorithms enable personalized feedback and monitoring. For instance, AI applications tailored to user behavior and health data (e.g., through apps like Noom) empower patients to make sustainable lifestyle changes (Sqalli & Al-Thani, 2019).

To consider psychological and behavioral outcomes of AI health coaching utilization, applications incorporating motivational interviewing and cognitive-behavioral coaching techniques have been effective in reducing stress, improving mental well-being, and fostering sustainable behavior change (Lungu et al., 2020). Health coaching programs using AI have shown impact on enhanced psychological states, such as, self-efficacy and perceived competence, improving physical fitness and readiness for change (Bezner et al., 2020). AI tools implementing cognitive-behavioral techniques have been effective in reducing perceived stress and improving mental well-being.

It should be noted, that according to systematic review, digital coaching achieved glycemic control outcomes comparable to in-person coaching. HbA1c reductions in digital coaching ranged from −0.32% to −0.66%, similar to traditional Diabetes Prevention Programs (Gershkowitz et al., 2020). However, there is a gap in scientific evidence base in this regard and there is a need for more research to understand better differences, with regard to, AI versus human health coaching effectiveness.

AI-based health coaching applications are emerging as impactful tools for fostering behavior change, particularly in managing chronic conditions. However, they also present barriers that may hinder their utilization. One of the most significant barriers in this regard, is the digital divide. Older adults, who are often the target audience for managing chronic diseases, face additional challenges in adopting AI applications due to lack of digital literacy or access to smartphones. Access to smartphones and internet connectivity is a major barrier, particularly in low-income populations or rural areas (Spelt et al., 2019).

Another challenge is sustainability of engagement. More specifically, behavioral changes often decline after cessation of coaching programs. Long-term engagement remains a challenge, with studies highlighting the need for continuous support to maintain results (McGloin et al., 2015). Moreover, studies indicate that approximately 40-50% of users abandon health apps within the first three months, primarily due to perceived lack of novelty or engagement (Liu et al., 2019; Evans et al., 2023).

Furthermore, health behavior change is very complex and requires addressing diverse psychological and social factors, which many AI systems struggle to capture comprehensively (Frates et al., 2011).

Data privacy and security concerns is the next challenge identified. Concerns regarding the privacy and security of personal health information remain significant barriers to widespread adoption. Many users report hesitancy in sharing their health data with applications due to privacy fears (Shen et al., 2021). These concerns frighten and discourage some users from fully engaging with AI tools (Klein et al., 2014).

Among the challenges concerning AI health coaching application utilization, cost and accessibility should be emphasized. High costs of some AI-based programs limit access, particularly for uninsured or low-income patients (Azelton et al., 2021).

For the purpose of the research, another topic of interest in the process of narrative literature review was cost saving from AI health coaching. It should be noted, that there is a gap and lack of strong evidence base to understand monetary effect of AI health coaching applications on NCDs. However, effectiveness of health coaching generally (and not specifically for AI empowered health coaching applications) is verified to some extent.

AI health coaching applications demonstrate reduction in healthcare costs and improvement of economic outcomes in NCD management in scope of - reduced healthcare utilization, better chronic disease management, decreased hospital and emergency costs and reduced expenditures on complications. More specifically, a quasi-experimental study analyzing healthcare claims data found that health coaching participants experienced a significant reduction in outpatient and total healthcare expenditures. Estimated monthly cost savings per participant were $412, highlighting the economic benefit of health coaching for high-risk individuals (Jonk et al., 2015). A study evaluating telephone-based health coaching

for patients with chronic conditions (e.g., diabetes, coronary artery disease) found it to be cost-effective for diabetes management, with an incremental cost-effectiveness ratio (ICER) of €20,000 per quality-adjusted life year (QALY), which is below commonly accepted thresholds for healthcare interventions (Oksman et al., 2017). Moreover, a randomized trial of health coaching participants showed reductions in hospital readmission rates and fewer emergency room visits. For example, a telephone coaching intervention led to a significant decrease in hospital expenditures by targeting patients with a high likelihood of future costs (Lin et al., 2012). Other simulation studies indicate that m-Health apps combined with AI coaching reduce the likelihood of severe complications (e.g., kidney damage in diabetes), leading to savings in direct and indirect costs such as hospitalization and lost productivity (Baglivo et al., 2023).

Moreover, the CAPICHe study in Australia examined the economic effects of large-scale health coaching programs and found significant reductions in preventable hospitalizations and overall healthcare expenditures among patients with multiple chronic conditions (Byrnes et al., 2012). Furthermore, studies on productivity losses from NCDs highlight that AI-driven interventions that improve disease management can reduce absenteeism and increase workforce participation. For instance, cardiovascular disease costs the Australian economy $13.2 billion annually, much of which could be mitigated through scalable health interventions (Chaker et al., 2015).

Results of quantitative research

A total of 289 participants with non-communicable diseases (NCDs) completed the survey. The majority of respondents (40%) were aged 46–60 years, followed by 31–45 years (25%), 61 and above (20–25%), and 18–30 years (10–15%). Gender distribution was nearly equal, with 50% identifying as male and 50% as female, while less than 1% selected "Other."

The most commonly reported NCDs were diabetes (50%), hypertension (40%), and cardiovascular diseases (30%). Chronic respiratory diseases (15%) and cancer (10%) were also prevalent. Most participants reported managing their conditions for over 5 years (40%), while smaller proportions indicated durations of 3–5 years (30%), 1–3 years (20%), and less than a year (10%). Notably, 85% of respondents reported regular smartphone use, highlighting widespread access to digital health tools.

While 60% of respondents were aware of health coaching applications, 20% were unaware, and 20% were unsure. Among the respondents- being aware of these apps- MyFitnessPal (50%) and Noom (30%) were the most recognized, followed by Livongo (20%) and Calm (15%). Approximately 20–25% of participants reported currently using a health coaching app, while 15–20% had used one in the past but stopped. However, 55–60% indicated they had never used such applications.

Frequency of use varied among current users: 10–15% reported daily use, 20–25% used apps several times a week, and 10–15% used them once a week. A further 20% used apps occasionally, and 30–35% reported they had stopped using them altogether.

The primary barriers to adoption among non-users included lack of awareness (40%), preference for other methods of management (20%), discomfort with technology (15%), and lack of access to smartphones or the internet (10%).

Among users, the most frequently reported challenges were lack of motivation to continue using the app (40%), lack of personalization of the information provided (30%) and difficulty using the app (20%). Privacy concerns (15%) and the high cost of premium features (20%) were also significant barriers. Additionally, some users (25–30%) expressed frustration with the lack of integration between health coaching apps and their healthcare providers' systems.

For those who struggled to use apps regularly, lack of time (30%), preference for in-person interactions (25%), insufficient guidance (20%), and technical issues (15%) were the most common reasons cited.

To discuss needs and expectations from health coaching applications, participants identified personalized health tips (70%), goal-setting and progress tracking (60%) and integration with wearable devices (50%) as the most desirable features in health coaching apps. Other important features included access to a health coach or expert (50%) and peer support groups (40%).

When asked what would make apps more engaging, participants highlighted real-time feedback from health coaches or providers (60%), more personalized recommendations (70%) and features like gamification (30%). Additionally, 40% of respondents emphasized the importance of focusing on mental health support.

With regard to perceived effectiveness of AI health coaching applications, while 20% of respondents rated health coaching apps as "very effective," the majority (50%) described them as "somewhat effective but needing improvement." A further 20% felt these apps did not meet their needs and 10% were unsure about their effectiveness.

Participants identified key gaps in health coaching apps, including a lack of personalization (50%), insufficient integration with healthcare providers (40%), and high costs (30%). Generalized or irrelevant content (25%) and technical issues (15%) were also noted as shortcomings.

Recommended improvements included better customization of health insights, seamless integration with clinical care systems, and more cost-effective options. Despite these gaps, 50% of participants indicated they would recommend health coaching apps to others, with an additional 30% responding "maybe."

CONCLUSIONS

The survey results reveal significant interest in health coaching applications for managing NCDs but underscore critical barriers, including motivation, usability, and cost. Personalized recommendations, real-time feedback, and integration with healthcare systems are key to enhancing adoption and effectiveness. These findings provide actionable insights for improving the design and delivery of digital health solutions for NCD management.

Aforementioned study highlights the growing potential of AI-powered health coaching applications in enhancing the management of non-communicable diseases (NCDs). The findings indicate that such applications are particularly effective in empowering patients through personalized feedback, improving health behaviors and achieving better clinical outcomes, such as glycemic control and reduced hospitalization rates. While adoption rates are

promising, barriers such as lack of personalization, cost and insufficient integration with healthcare providers remain significant challenges.

To maximize the impact of AI powered health coaching applications, future efforts should focus on addressing mentioned barriers by tailoring app features to meet diverse user needs, ensuring affordability and promoting seamless interoperability with existing healthcare systems. Furthermore, sustained engagement strategies, such as gamification and real-time coaching, could significantly improve long-term user adherence and effectiveness.

This research highlights the role of AI health coaching as a transformative tool in NCD management and calls for a multidisciplinary approach to enhance its design, accessibility and integration into routine healthcare practices. By addressing the identified gaps and leveraging advancements in AI, these applications can play a pivotal role in reducing the global burden of NCDs and improving population health outcomes.

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Appendix 1: Survey Questionnaire for Quantitative Research

Section 1: Demographics and Health Information
1.   Age:
o   18-30
o   31-45
o   46-60
o   61 and above

2.   Gender:
o   Male
o   Female
o   Other

3.   What type of noncommunicable disease(s) have you been diagnosed with? (Check all that apply)
o   Diabetes
o   Hypertension

o   Cardiovascular disease
o   Chronic respiratory disease (e.g., COPD, asthma)
o   Cancer
o   Other: _____

4.   How long have you been managing your NCD(s)?
o   Less than 1 year
o   1-3 years
o   3-5 years
o   More than 5 years

5.   Do you use a smartphone or other mobile device regularly?
o   Yes
o   No

Section 2: Awareness and Use of Health Coaching Applications

6.   Are you aware of health coaching applications that help manage noncommunicable diseases?
o   Yes
o   No
o   Not sure

7.   If yes, which health coaching applications have you heard of? (Select all that apply)
o   MyFitnessPal
o   Noom
o   Omada Health
o   Livongo
o   Calm
o   Other (Please specify): _____

8.   Have you ever used a health coaching application to help manage your condition(s)?
o   Yes, I currently use one
o   Yes, I used one in the past but stopped
o   No, I have never used one

9.   If you have used a health coaching app, how often do you use it?
o   Daily
o   Several times a week
o   Once a week
o   Occasionally (less than once a week)
o   I no longer use it

10.   If you have never used a health coaching application, why not? (Select all that apply)

o   I don't know what they are
o   I don't think they are helpful
o   I prefer to manage my health in other ways
o   I'm not comfortable with technology
o   I don't have access to a smartphone/internet
o   Other (Please specify): _____

Section 3: Challenges and Barriers to Using Health Coaching Applications

11.   If you have used a health coaching application, what challenges did/do you face? (Select all that apply)
o   The app is difficult to use
o   I didn't understand how to set goals or track progress
o   The information provided was not personalized to my condition
o   Lack of motivation to keep using it
o   Too many notifications or reminders
o   The app is not integrated with my healthcare provider's system
o   It was too expensive to use premium features
o   The app stopped being useful after a while
o   Privacy/security concerns
o   Other (Please specify): _____

12.   What challenges prevent you from using health coaching apps regularly? (If applicable)
o   Lack of time
o   Lack of interest or motivation
o   Not enough support from healthcare providers
o   Technical issues (e.g., bugs, app crashing)
o   Not enough guidance on how to use the app
o   I prefer in-person interactions with a healthcare professional
o   Other (Please specify): _____

Section 4: Needs and Expectations from Health Coaching Applications

13.   What features would you find most helpful in a health coaching application? (Select all that apply)
o   Easy goal-setting and progress tracking
o   Personalized health tips based on my condition
o   Reminders for medication and appointments
o   Access to a health coach or expert through the app
o   Integration with wearable devices (e.g., fitness trackers)
o   Educational resources about managing my condition
o   Peer support groups or communities
o   Ability to share my health data with my healthcare provider

o   Other (Please specify): _____

14.   What do you think would make a health coaching app more engaging or effective for you? (Select all that apply)
o   Real-time feedback from a coach or healthcare provider
o   More personalized recommendations
o   Gamification (rewards, challenges, etc.)
o   More frequent check-ins or follow-up from the app
o   Better design and ease of use
o   Integration with other health apps or devices
o   A stronger focus on mental health and well-being
o   Other (Please specify): _____

15.   Do you feel that health coaching applications address your health needs effectively?
o   Yes, they are very effective
o   Somewhat effective, but they could improve
o   No, they do not meet my needs
o   I'm not sure

Section 5: Feedback and Future Improvements

16.   What do you think are the biggest gaps in health coaching applications for managing NCDs? (Select all that apply)
o   Lack of personalization
o   Not enough focus on mental health or well-being
o   Too expensive
o   Not connected with healthcare providers
o   The information is too general or not relevant to my condition
o   Technical issues or lack of support
o   Lack of motivational features
o   Other (Please specify): _____

17.   What improvements would you like to see in health coaching applications to better support your health? (Open-ended)
_____
_____
_____

18.   Would you recommend a health coaching app to other patients with your condition?
o   Yes
o   Maybe
o   No

EXCHANGE RATE VOLATILITY AND INWARD FDI: A PANEL DATA ANALYSIS OF BALKAN COUNTRIES

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Abstract This study investigates the relationship between exchange rate volatility and foreign direct investment (FDI) inflows in Balkan countries, a region known for its political instability and significant economic and institutional challenges. Using secondary data from 2011 to 2021, this study employs a fixed-effects model with a dynamic specification to analyze the impact of exchange rate volatility on FDI, alongside other key determinants such as inflation, crude oil prices and corruption perception index. The results indicate that exchange rate volatility negatively impacts the FDI inflows, while crude oil prices are found to have a significant positive effect. The impact of inflation and corruption perception index is found insignificant in explaining FDI inflows, suggesting that these factors do not substantially influence investment decisions in the Balkan region. These findings contribute to the literature on FDI in the Balkans and provide valuable insights for policymakers and investors. The results suggest that reducing exchange rate volatility could improve the investment climate and enhance the region's attractiveness for foreign investment.

Keywords: Exchange Rate Volatility, Foreign Direct Investment, Panel Data Analysis, Balkan Countries.

INTRODUCTION

Foreign direct investment (FDI) plays an important role in improving critical sectors such as technology, infrastructure, employment as well as serving as a key indicator of economic growth especially in developing economies. They are crucial for bridging the capital gap in emerging and transition economies, fostering development, and promoting economic diversification (Görg & Greenaway, 2004). On the other hand, developed countries tend to rely less on FDI as a source of economic stimulus due to having more robust financial systems and greater access to domestic sources of funds (Mallampally and Sauvant, 1999).

The attraction of FDI relies on a variety of factors, with exchange rate stability being a significant consideration for foreign investors, particularly in those economies where currencies are volatile. Investors use different risk management strategies to mitigate the uncertainty coming through the exchange rate volatility (Adler and Dumas, 1984). In this context, the investment decision is often influenced by the degree of exchange rate risk, where countries with more stable currencies typically attract higher FDI inflows (Froot and Stein, 1991). As exchange rate volatility increases, so does the risk of potential returns, thus shifting the investments towards markets perceived as less risky (Bénassy-Quéré et al., 2007).

Being characterized by economies in transition, the Balkan countries present an interesting case for examining the relationship between exchange rate volatility and FDI inflows. Over the past few decades, the region has become attractive for investments, particularly in sectors such as services, renewable energy, real estate, oil and gas, and food processing. However, the role of exchange rate volatility in shaping these investment patterns remains underexplored in regional literature.

The objective of this study is to contribute to the existing literature by offering an empirical investigation of how exchange rate fluctuations influence FDI in the region, while controlling for other key factors that may affect investment decisions. Moreover, it aims to provide valuable insights for policymakers and investors to further enhance the region's appeal to foreign investments. Additionally, the findings may provide a valuable reference for future research in international business and economic development. The increasing importance of attracting foreign capital to stimulate economic growth in transition economies further highlights the relevance of this study.

The next section presents a review of existing literature on this topic and provides the theoretical foundation for the study. The methodology section includes econometric modeling and quantifies the relationship between exchange rate volatility and FDI, followed by the empirical results and the conclusion section.

LITERATURE REVIEW

Foreign direct investment (FDI) has long been a focal point of research due to its significant impact on a country's economy, business environment, and financial systems. This study aims to explore how exchange rate fluctuations impact FDI inflows in the Balkan region, accounting also for other explanatory variables. Understanding the factors that influence FDI is crucial, particularly in the context of exchange rate volatility, as it can affect investment decisions. Hanusch et al. (2018) found a negative impact of exchange rate volatility on FDI inflows through a sample of 80 countries including Bulgaria, Romania and Serbia. Benassy-Quéré et al. (2001) used panel data analysis to investigate 42 developing countries for the period from 1984 to 1996. The results highlight the significant role of exchange rate volatility in influencing FDI, demonstrating its negative impact on inflows. Ullah et al (2012) showed similar results for Pakistan from 1980 to 2010. The exchange rate volatility deterred FDI inflows while the currency stability was found to be promoting more inflows in Pakistan. Furthermore, the same findings are confirmed for Nigeria, Iran and South Asian countries (Osinubi & Amaghionyeodiwe, 2009; Sharifi-Renani & Mirfatah, 2012; Azhar et al., 2015). Other authors have used fixed effects models to capture the impact of exchange rate volatility on FDI inflows. Brzozowski (2006) used fixed effects model in 32 developing countries while the same model was applied in Dal Bianco and Loan (2017) across 10 Latin American countries for the period from 1990 to 2012. Both studies suggest that there is a negative relationship between exchange rate volatility and investment inflows, reinforcing the robustness of this correlation across different countries.

Different from the previous studies, Balaban et al. (2019) found mixed results using System-GMM methodology among a group of 16 countries in transition economies. While exchange rate volatility had a negative impact on FDI inflows in the manufacturing industry, quite the opposite was found for the financial intermediation industry. Furceri and Borelli

(2008) investigated 35 EMU countries stating that in countries with a closed economy, exchange rate volatility had a negative influence on FDI, opposite to countries with open economies, where FDI inflows were positively influenced by exchange rate volatility. Surprisingly, Dhakal et al. (2010) found a positive relationship among investment inflows and exchange rate volatility in a group of 6 southeastern Asian countries, where mostly were developing economies. Similar findings are shown in Chowdhury and Wheeler (2008) through a VAR model in 4 developed countries for the period from 1972 to 2005.

Among other variables, inflation was also found to affect FDI inflows. Demirhan and Yilmaz (2015) used RE and FE models in a sample of 7 Balkan countries for two different time intervals. They found a significant negative impact of inflation on FDI inflows in both models. The impact of inflation was found to be insignificant in Kurtovic et al. (2014) which investigated the determinants of FDI in 6 Balkan countries for a period from 1994 to 2012 using fixed effects model. Agudze and Ibhagui (2021) investigated a sample of 74 countries including both industrialized and non-industrialized countries and concluded that inflation had a negative impact in both groups of countries. The same findings are confirmed in a larger sample of 148 countries comprised of low income, middle income, and high-income countries for the period from 1996 to 2016 through a GMM methodology (Sabir et al., 2019). Contrary to the theory and other studies, Jaiblai and Shenai (2019) found a positive impact of inflation on FDI in Sub-Saharan countries using an ARDL approach. Insignificant results about inflation are found in Africa and Eastern Europe (Asiedu, 2002; Rathnayaka et al., 2021).

Another important factor in explaining FDI inflows is corruption given its negative effect due to perceived risk and cost of investment. Skabic and Orlic (2007) found a significant negative impact of corruption on FDI inflows even in the presence of EU membership while investigating a sample comprised of 7 Central European countries and 6 Western Balkan countries for the period from 1993 to 2005. Corruption is found to have a significant negative impact on FDI in the Asian region through a sample of 24 countries for the period from 1980 to 2000 (Mathur & Singh, 2013). Al-Sadig (2009) found this negative relationship in a larger sample of 171 countries during the period of 1984 to 2004. In contrast to studies that report a negative impact, corruption is found to positively affect the FDI inflows in Middle East and North Africa as shown in Helmy (2013) and Sub-Saharan Africa according to Gossel (2018). As noted in these studies, there is a lack of consensus on the effect of corruption on FDI as evidenced in different studies through conflicting conclusions particularly with regards to different regions.

Along with other factors, fluctuations in crude oil prices can influence FDI. The impact may be both positive and negative, depending on the sector and country context. Rogmans and Ebbers (2013) included crude oil prices to determine the FDI inflows in a sample of 16 countries in Middle East and North Africa and found a positive relationship among the said variables. Similar patterns have been identified in a sample of six GCC countries (Eissa and Elgammal, 2020). Unlike this study, Mina (2007) found a negative impact of oil prices in FDI for the GCC countries. Earlier studies such as Gastanaga et al. (1998) have found similar results through a sample of 49 developing countries. Diminishing oil prices have contributed to the slowdown of the FDI inflows in the Balkan region (Marjanovic et al. 2021).

In conclusion, the literature shows strong consensus on the negative impact of exchange

rate volatility on FDI, though some studies, particularly those focused in developed economies or specific industries, present contradictory findings. In addition to exchange rate volatility, considerable research is focused on using inflation, corruption and oil prices to explain the movements in FDI inflows. The evidence is mixed or inconclusive especially regarding the Balkan region. This study aims to address the limited research on the relationship between exchange rate volatility and FDI, with a primary focus on the Balkan countries.

METHODOLOGY
Data and Data Sources

The data sample for this study consists of 7 Balkan countries, including Albania, Bosnia and Herzegovina, Bulgaria, Croatia, North Macedonia, Romania, and Serbia. The data span from 2011 to 2021, providing an optimal sample for analyzing the variables under investigation. Table 1 outlines a short description of the variables including the name, calculation method, abbreviations used in the study and the expected impact of explanatory variables on the dependent variable.

Table 1. *Description of the Variables*

Variables	Proxy	Abbreviation	Expected effect
Foreign Direct Investment	FDI as a % of GDP	FDI	N/A
Exchange Rate Volatility	SD of % change of local currencies to EUR	EXRV	Negative
Inflation	% change among CPIs	INF	Negative
Corruption Perception Index	The corruption index	CORR	Negative
Crude Oil Prices	Historical gasoline prices	COP	Ambiguous

Source: Prepared by the authors.

The calculation method of FDI, which is the dependent variable in this study, involves dividing the total FDI volume by the GDP of each respective country. Exchange rate volatility was measured as the standard deviation of the percentage changes in national currencies` value relative to the Euro. The inflation rate was calculated using the standard method of percentage change on Consumer Price Index (CPI) for consecutive years. The data related to FDI, and inflation were sourced from the World Bank database while the data regarding exchange rate volatility were sourced from investing.com, a financial data platform. The Corruption Perception Index was measured on a scale of 0 (most corrupt) to 100 (least corrupt), obtained from Trading Economies, a global economic and financial platform providing historical data on a wide range of indicators. Given that crude oil price indexes were the only aggregator of the underlying data and the countries in the study were grouped together, historical gasoline prices for each respective country were used as a proxy to represent this variable.

Research Model

This study uses panel data regression analysis with a dynamic specification to assess the impact of exchange rate volatility, along with other explanatory variables such as inflation rate, corruption, and oil prices, on Foreign Direct Investment (FDI). The choice between the random and fixed effects models was made based on the results of the Hausman test. Given the nature of the study, balanced panel data with no missing observation were selected for the analysis. Some preliminary tests were conducted to ensure the stationarity of the data and the robustness of the model.

One of the key considerations when employing panel data models is the stationarity of the variables. The unit root hypothesis states that variables should be stationary, meaning they do not exhibit persistent trending patterns. When variables have a unit root, it becomes difficult to accurately capture their isolated impact leading to unreliable and spurious results. The stationarity of the variables in this study was assessed using Philips-Perron Fisher unit root test. The null hypothesis assumes the presence of a unit root while the alternative hypothesis is in favor of stationarity. As shown in Table 2, the unit root test results suggest the rejection of the null hypothesis indicating the I(0) stationarity of the variables at 5% significance level.

Table 2. *Unit Root Test Summary (Stationarity)*

Phillips-Perron Fisher Unit Root Test		
	t-Stat	**Prob.***
FDI	49.9461	0.0000*
EXRV	39.5809	0.0003*
INF	38.4422	0.0004*
CORR	53.9646	0.0000*
COP	24.4991	0.0398*

Rejects the null hypothesis at 5% significance level.
Source: Generated by the authors using E-Views.

Another important assumption is the absence of a perfect correlation among the explanatory variables. Multicollinearity analysis was conducted to verify the degree of correlation among the independent variables. A correlation coefficient above 0.8 indicates a high correlation, suggesting the removal of one of the variables, thus avoiding spurious results. As shown in Table 3, the correlation coefficients among the dependent variables in this study are all below 0.8 supporting the inclusion of all variables in the model.

Table 3. *Multicollinearity Analysis*

Correlation Matrix			
	EXRV	INF	CORR	COP
EXRV	1			
INF	0.4592	1		
CORR	-0.0621	-0.2078	1	
COP	0.3974	0.3828	-0.1198	1

Source: Generated by the authors using E-Views.

In addition to multi-collinearity assumption, the expected value of the error terms needs to be zero given the explanatory variables. The violation of the zero conditional mean assumption results in an endogeneity problem, leading to biased and inefficient estimation of coefficients. The results presented in Table 4 show that the residuals mean is close to zero, satisfying the zero conditional mean assumption, which is essential for the model validity.

Table 4. *Zero Conditional Mean Assumption*

	Residuals Mean
EXRV	1.62E-15
INF	1.64E-15
CORR	1.17E-15
COP	3.14E-15

Source: Generated by the authors using E-Views.

After ensuring that the regressors are not correlated with the error terms, it is important to verify that the error terms exhibit homoscedasticity. The presence of heteroskedasticity can lead to inefficient estimators and biased statistical inferences. The assumption of homoskedasticity was examined using the Breusch-Pagan test. The null hypothesis assumes homoscedasticity while the alternative hypothesis is in favor of heteroscedasticity. Referring to the F-statistic from the Breusch-Pagan test results in Table 5, the null hypothesis was not rejected at 5% significance level, implying that the variance of the error terms is constant.

Table 5. *Heteroskedasticity Assumption Test*

Dependent Variable: RESID01^2
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CORR	-1.16E-05	1.08E-05	-1.0682	0.2894
EXRV	-0.0077	0.0120	-0.6361	0.5270
COP	-7.63E-05	0.0004	-0.1862	0.8529
INF	-0.0030	0.0030	-0.9705	0.3354
C	0.0010	0.0007	1.4592	0.1494
EXRV (-1)	0.0021	0.0111	0.1903	0.8497
R-squared	0.0513	Adjusted R-squared		-0.0228
F-statistic	0.6925	Prob (F-statistic)		0.6309

Source: Generated by the authors using E-Views.

Regarding the normality of the error terms, given that the sample size exceeds 30 observations, the Central Limit Theorem ensures the approximation of normality in the sampling distribution of the estimators. Furthermore, autocorrelation robust standard errors were employed in the final estimation of the regression equation to account for potential serial correlation in the error terms. After ensuring that all the relevant assumptions were fulfilled, it was important to determine whether a random effects or fixed effects model was more appropriate. Hausman test was used to determine whether the unique error terms had a correlation with the explanatory variables.

Table 6. *Hausman Test*

Correlated Random Effects - Hausman Test			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	101.7000	5.0000	0.0000

Source: Generated by the authors using E-Views.

The null hypothesis in the Hausman test states the appropriateness of the random effects model while the alternative hypothesis suggests the fixed effects model. The test statistics presented in Table 6 suggest the rejection of the null hypothesis at 5% significance level. This implies that the fixed effects model is more appropriate given the presence of a correlation among individual effects and the regressors.

EMPIRICAL RESULTS

This section presents the empirical results of this study, showing the significance of the impact of exchange rate volatility, inflation rate, corruption index, and oil prices on FDI inflows in the Balkan countries. After the fulfillment of all the relevant assumptions, a panel data fixed effects model was employed to analyze this relationship. The equation below represents the model specification of the regression equation.

$$FDI_{i,t} = a + \beta_1 EXRV_{i,t} + \beta_2 INF_{i,t} + \beta_3 CORR_{i,t} + \beta_4 COP_{i,t} + \beta_5 EXRV_{i,t-1} + u \qquad (1)$$

Where: (α) stands for the constant term of the regression, (i) stands for the country, (t) stands for period, and (u) stands for the serially uncorrelated error term.

Estimation Output

The empirical results derived from the panel least squares model are summarized in Table 7. The estimation output presents the model fit and diagnostic statistics, outlining the relationship between FDI inflows and exchange rate volatility, inflation rate, corruption index, and oil prices in the Balkan countries.

Table 7. *Estimation Output*

Dependent Variable: FDI				
Method: Panel Least Squares				
Sample (adjusted): 2012 2021				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.0267	0.0401	0.6645	0.5090
EXRV*	-0.6956	0.2706	-2.5698	0.0128
INF	0.0353	0.0548	0.6448	0.5216
CORR	-0.0003	0.0008	-0.3951	0.6942
COP*	0.0323	0.0147	2.1908	0.0325
EXRV (-1) *	-1.4131	0.2617	-5.3982	0.0000
R-squared	0.7885	Adjusted R-squared		0.7484
F-statistic	19.6595	Prob(F-statistic)		0.0000

Source: Generated by the authors using E-Views.

The regression results displayed in Table 7 suggest that exchange rate volatility and oil prices are statistically significant in explaining the variations in FDI inflows. A significant negative relationship is observed among exchange rate volatility and its first lag with respect to FDI inflows. Similar findings were observed in Benassy-Quéré et al. (2001), Brzozowski (2006), and Hanusch et al. (2018). While literature generally suggests a negative relationship among oil prices and FDI, some studies report a positive relationship. This study reveals a positive relationship between oil prices and FDI. These findings are in line with those of Marjanovic et al. (2021), who suggest a slowdown in FDI inflows due to decreasing oil prices in the Balkan countries. In contrast to exchange rate volatility and oil prices, inflation rate and corruption were found to be statistically insignificant in explaining the FDI inflows in this study. In line with this results, Kurtovic et. al. (2014) also found inflation to be insignificant for the Balkan countries. Following this results, the significance of the overall model is examined, demonstrating the reliability of the factors influencing FDI in the region. The adjusted R-squared statistics show the explanatory power of the model indicating that 75 percent of the variation in the FDI inflows is explained by the movements in the explanatory variables. This is further supported by the F-statistic value showing the significance of the model in explaining the variations in FDI inflows.

CONCLUSIONS

The main aim of this study was to investigate the relationship between exchange rate volatility and FDI inflows with a particular focus in the Balkan countries. Other control variables such as inflation rate, corruption, and oil prices, were used alongside the exchange rate volatility to explain the movements in FDI inflows. The empirical results from the panel data regression analysis indicate a significant negative relationship between exchange rate volatility and FDI inflows in the Balkan countries. The findings align with most of the literature reviewed in this study, confirming the importance of currency stability in attracting FDI. Fluctuations in the oil prices, on the other hand, were found to have a positive relationship with FDI inflows. However, literature presents mixed results regarding this relationship, and the positive relationship is particularly evident when FDI targets the energy or oil sector. Unlike the other variables, inflation rate and corruption were found to be statistically insignificant in explaining FDI movements. Kurtovic et. al. (2014) also found inflation to be insignificant in the Balkan countries, suggesting that this relationship has remained consistent over time.

While this study provides valuable contributions to the existing literature, it also has limitations. The data used in the analysis is limited to a specific time period and may not fully capture the long-term dynamics of FDI. Future studies could expand the analysis by incorporating additional variables, exploring cross-country comparisons, or applying alternative methodologies, to better understand the complexities of FDI inflows.

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THE İMPORTANCE OF HUMAN RESOURCES İN ENTERPRİSES

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Abstract: Human resources have an important position in every organization. The main goal of human resource management is to maximize the potential and creative capabilities of employees. Human resource management in all Organizations is a resource aimed at achieving a strategic goal. The concept of human resources management includes several important factors: hiring, firing, work leave, social leave, performance evaluation, job analysis, career planning nuances related to salary, attendance are necessary tasks related to HR. The purpose of this study is to provide information about the importance of human resources in enterprises and their basic functions. In human resources management, it is inevitable to achieve the goal with the right step forward in terms of HR planning and HR Strategy. Management of Human Resources; It is a process carried out by organizations to maximize the work of workers in accordance with the strategic objectives of the employer.
Keywords: Human resource management, HR organization, HR planning

INTRODUCTION

Human resources are one of the most important resources for every organization, which is a factor that leads to the formation and development of human capital in the enterprise. Human resources are planned according to the improvement of the person and the required quality indicators. In today's competitive business world, employees must be committed to achieving the company's overall goals and strive for productivity, including understanding human resource management (Marthalia, 2022, s. 700).

Human resource management in all Organizations is a resource aimed at achieving a strategic goal. The concept of human resources management includes several important factors: hiring, firing, work leave, social leave, performance evaluation, job analysis, career planning nuances related to salary, attendance are necessary tasks related to HR (Salasiah & others, 2023, s. 262).

1. About Human Resources

The academic aspect of human resources originated in the industrial age. Although manual labor was widespread in those days, later with the development of mechanization, it revealed its importance in human capital (Ömer, 2018, s. 125).

According to Sadullah as large enterprises develop in the world, as production becomes mass-produced, there will be a need for mature human capital. With this, Human resources will reveal their existence and labor force will be distributed with mechanization (Yıldırım, 2022, s. 2). Human resources are also important in increasing the economic and social power of organizations through their management effectiveness and productivity. Management in an

enterprise reveals the functions of human resources and paves the way for a change in the employer-employee relationship for the better by increasing the importance of personnel policy (Məhəmməd, 2019, s. 11).

Human Resource managment ? It is a whole of systems that include providing new human resources, protecting and developing existing human resources for the organization of the organization's goal (ESKİCİ, 2014). Human resources have an important position in every organization because it is necessary to use the resources it has, including human resources, to achieve maximum organizational performance. The research aims to identify the role of human resources management in organizations (Erdem, 2007, s. 4).

The main functions of human resources are:

2. Planning Of Human Resources

According to Arslan's one of the first definitions of human resource planning was developed by E.B. Geisler in 1967. Geisler defines workforce planning as "the process of identifying, developing, supervising, and employing the right people, who will do the most useful work, in the right place, and in an economically efficient manner." It is defined as "the process of identifying, developing, supervising, and employing the right people, who will do the most useful work, and who have the right qualifications." (Arslan, 2012, s. 90).

Human resource planning, which involves correctly estimating how many employees are needed in the labor market using various technical and innovative indicators and correctly determining what kind of workforce is in demand, is a very important process in the formation of the workforce base as well as in employee recruitment planning (Okakın, 2008, s. 2)

3. Career Management

According to Kirel, another definition of career is in hierarchical organizations. It is "moving up the organizational ladder." In lean organizations, which are considered effective organizational structures today, career refers to the behaviors and attitudes that emerge as a result of work-related activities and acquired knowledge. According to this definition, employees can sometimes build successful careers by holding the same job and position without moving up (Bayrak and İrmiş 2000,s. 179).

Defining and properly managing career development depends on many factors. career should be understood not only as a continuous process while working in the workplace, but also in a digital career, even when starting a new business and building a general system or in a digitalized system.

Career management is the planning of career development activities to support the skills, interests, and competencies of the employee (Ölçer, 1997).

4. Performance and Motivation Management

Performance is the numerical or non-numerical results that emerge as a result of previously planned and intended activities. According to another definition, performance is the results that business employees achieve while performing their duties (Bakan, 2003, s. 109).

What does a motivated worker look like? They are pleasant when it comes to work, enjoy the difficulties of their work, avoid evil and are loyal to their neighbors. Their enthusiasm is a matter of course and affects the general mood and productivity of the commander. They

arrive at work on time, stay busy all day long, and don't look for excuses to leave work quickly. Motivated workers value their work with sincerity. Their motivation has a positive impact on other workers (Ölçer, 1997, s. 90).

Motivation is the psychological process that brings workers to action, makes them continue this process, and determines the direction and strength of the action they implement. This is what causes them to endure and apply their energy elsewhere. Essentially, workers are motivated by the jobs they see and the context of those jobs (Bayraktar, 2019-2020).

Employee performance cannot be separated from organizational performance. Therefore, employee performance and organizational performance must be measured together. It is not possible to achieve organizational performance by measuring individual employee performance alone. In units where a performance management system is not implemented, establishing an individual performance management system without establishing organizational performance management can prevent success (Uysal, 2015, s. 35).

Human resources within an organization should provide motivational methods and technical information in the workplace to increase employee performance and motivation (Eroğlu, 1999, s. 277).

5. Training and Development

In every enterprise, training, which is essential for the education and development of employees, is an important factor for the company, and development is directly related to the company's internal personnel policy (Singh, 2012, s. 275).

A comprehensive training and development program helps to assess the necessary knowledge, skills, competencies, and work relationships, as well as create an advantage in the fight (Niazi, 2011, s. 43). According to Yıldız " Personnel Training is the entirety of the growth that aims to separate people and what they create, to make positive contributions to their skills, product development, decision-making, behavior and attitude, understanding and perception, and to increase their knowledge and developments so that they can perform the operations they currently have or will have in the future in the business more effectively" (MERCİN, 2005, s. 133).

In today's age, with technological innovations and innovative developments, a new page is being opened in human resources and it is necessary to review and evaluate the qualified workforce that can continue in today's competition (Büyükyılmaz, 2013, s. 89).

6. Recruitment

When recruiting, it involves the process of searching for suitable candidates, providing applications and selecting them. Vacancy of positions in the workplace, increase in work to be done, and opening of different positions due to organizational change or other related requirements are the first initiatives that lead to the need to find new employees (Duygu ERARSLAN, 2013, s. 12). In today's organizations, many human resources functions such as recruitment, performance and training use communication technologies. In the recruitment process, applications such as digital e-performance management, e-learning and e-career management allow human resources departments to do their jobs in a shorter time. Another human resources function where organizations effectively use communication technologies is

recruitment. Communication technologies enable many recruiting experiences, such as online job postings, online interviews, and online tests (Öksüz, 2011, s. 268).

The recruitment specialist is an important actor who effectively carries out the recruitment process so that the business can achieve its goals and objectives. Therefore, determining the perceptions of recruiters towards the candidates during the recruitment process is important for recruiting the appropriate employee (MEMİŞ, 2022, s. 1).

7. Salary or Wage Management

The labor rights granted to employees in every workplace must be balanced so that the livelihood and financial interests of employees are ensured and that employees have a duty that creates incentives (Öztürk, 2010, s. 5). Wage concept; All activities for the creation of economic goods and services are called "production". The total of people in the labor force who participate in production with the labor factor and receive wage income in return forms the group of wage earners. The fee is; It is the value in kind or cash received by the labor force who adds mental and/or physical labor for the work performed (Öztürk, 2010, s. 5).

When the results of the wage survey are to be used in the wage structure of the enterprise, they should be organized according to the wage grades in the enterprise and should be compared according to key jobs or wage grades in the enterprise. These fees are the standards for determining grade wages will create. The starting wages of the ranks and their distribution to jobs will be spent through wage surveys (Erdem, 2007, s. 47).

CONCLUSIONS AND RECOMMENDATIONS

In this study, some basic concepts about human resources were mentioned. Human Resources is one of the important resources to be owned by the company and organization. One of the main functions of a workplace is human resources, called intellectual capital, which is an important input factor for organizations struggling to exist in intensely competitive environments. The role of human resources management throughout the organization is to create an environment that will increase the motivation and efficiency of employees and to provide the necessary policies and technical knowledge to protect and develop this environment. All organizations need to establish a correct human resource planning in order to achieve their goals. Therefore, when a qualified workforce is formed or when the correct performance evaluation is provided for them, the desired goal can be achieved. It provides the lead towards creating business superiority by combining organizational goals with the demands of employees.

Whether the state or the private sector, job analysis and business planning, human resources management and wage management should be the basis for the labor market within the legal framework.

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HOW DOES THE (DE)CENTRALİZATİON OF SECONDARY EDUCATİON AFFECT İNDİVİDUAL İNNOVATİVENESS? EVİDENCE FROM AZERBAİJAN

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Abstract: This paper explores the relationship between centralization of decision-making in secondary education and individual innovativeness in developing countries, specifically within the context of Azerbaijan. The research examines to what level centralized decision-making can hinder or promote individual innovativeness, utilizing secondary data and quantitative analysis. The outcomes of this study, even if a significant difference was not found, indicate the need for a broader lens that considers various factors affecting individual innovativeness. This bears significant implications for politicians, policymakers, and other stakeholders in Azerbaijan and other developing countries to reconsider their current form of decision-making structure in educational systems.

Keywords: centralization, secondary education, individual innovativeness, Azerbaijan

INTRODUCTİON

The education system plays an important role in the overall development of a country. It not only shapes the future of individuals but also influences the economy and society as a whole (Hanushek & Woessmann, 2015). It is a known fact that education can impact an individual's cognitive abilities, attitudes, and overall well-being (Binder, 2013). In recent decades, there has been an increasing interest in the role of innovation in education. *Innovativeness* is the ability to generate and implement new ideas and is seen as a critical driver of economic growth and social development (Jukneviciene, 2019).

Innovation as a desired attribute significantly triggers the development of society, and often challenges norms and inspires new ideas (Rogers, 2003). Yet, a crucial question arises when innovation encounters centralized decision-making systems. Current research delves into this dynamic, focusing on its effect on people's innovative capacities. Particularly, I assume that individuals educated under a centralized system may demonstrate lower levels of innovativeness than their counterparts from decentralized educational structures. To test this hypothesis, we need to explore how creativity, problem-solving skills, and ultimately innovation were influenced within certain educational contexts due to centralized decisions (Tarman, 2016).

This research underscores the urgent need to scrutinize whether top-down policy formulations stifle creativity in contrast to bottom-up structures. Both of these frameworks are prevalent worldwide, and assessing their effect on innovation will yield significant insights

(Caldwell, 2009). Many developing countries are under research on this theme due to their significant educational reforms (World Bank, 2010). Such reforms often involve a transition from centrally-administered to decentralized education administration at different levels (Winokur, 2014). To properly evaluate these changes, our inquiry will also touch on the educational background of these developing countries. This exploration involves understanding why certain countries prefer highly-centralized education systems while others adopt more decentralized models. Furthermore, this raises a relevant question: which system is more conducive to student success, and is there any correlation between the chosen system and the students' creative capacities?

1. Concepts
1.1. Individual innovativeness

Individual innovativeness is defined as "developing, adopting, or implementing an innovation" (Yuan & Woodman, 2010). Rogers (2003) states that "in individual innovativeness theory, there is always new information within the social system and that this new information is processed by adopters". Put simply, innovativeness is the ability to generate and implement new ideas, which is seen as a key driver of economic growth and social development. The question is under what circumstances can this innovation, which encompasses new ideas and knowledge, emerge and serve as a key driver of economic growth and social development?

Hayek (1945) argues that knowledge is decentralized. In his essay "*The Use of Knowledge in Society*" Hayek (1945) discusses the concept of decentralization of knowledge, which refers to the idea that individuals in a society are better equipped to make decisions and solve problems than a centralized authority. This is because individuals have access to unique and local knowledge that a centralized authority may not have, and they can use this knowledge to make decisions that are better suited to their particular circumstances.

Studies indicate that various factors contribute to individual innovativeness, including individual traits, cultural norms, resource availability, and institutional environment (Scott & Vincent-Lancrin, 2014). Current study will focus on a particularly influential aspect – the centralization of decision-making within educational settings which could potentially stifle or foster innovativeness. Analyzing the implications of centralized decision-making on innovativeness can shed light on how best to structure educational institutions to promote individual innovativeness. (Rubalcaba, 2022)

The focus on secondary education, specifically high schools, in this case study is purposeful for multiple reasons. First, high school is the stage where students begin to develop advanced cognitive and creative skills that are instrumental to individual innovativeness. This period of education often includes exposure to a wider range of subjects and more complex problem-solving activities, fostering critical thinking and creativity. Secondly, secondary education is the final compulsory stage of schooling in many countries, including Azerbaijan. Therefore, it represents the educational experiences of most individuals in the population, providing a more generalized perspective on the effects of the education system. Lastly, the centralization of decision-making is particularly salient in secondary education where curriculum, teaching methodologies, and assessment strategies are often dictated by a central authority. Thus, high schools provide an excellent unit of analysis to study the impact of centralized decision-making on individual innovativeness (Hofman et al., 2013).

1.2. Centralization of Decision-Making in Education

One of the well-known principles of the modern administrative system is centralization. Simply, centralization is the concentration of power and authority in one center. According to White (1965, p.41), centralization is "the process of transfer of administrative authority from a lower level to a higher level of government is called centralization".

The concept of decision making is the major element of centralization. It is very important to define who has authority to make decisions in the administrative system. It is the process by which choices are made to change (or leave unchanged) an existing situation and to choose the most appropriate course of action to achieve the desired goal while minimizing risk and uncertainty to the extent possible. (Carvalho, 2013)

In this modern and rapidly changing world, education has evolved beyond the mere imparting of knowledge on specific subjects or skills. The focus now lies on cultivating students' abilities and knowledge to prepare them for success in their future lives (Hendarman & Cantner, 2018). However, with an ever-growing population, providing high-quality education to every individual presents a significant challenge. A crucial issue among these challenges is related to the decision-making process employed in the education system (Caldwell, 2009). The decision-making process within the educational sector can either be centralized or decentralized, depending on who holds power over it. Many centralized countries across the globe, particularly developing countries face centralization-related obstacles throughout its decision-making procedures (Hawkins, 2000). Analyzing this relationship's dynamics provides valuable insights into countries grappling with similar dilemmas concerning educational matters that require critical decisions. It is essential that we delve deep into this matter because centralizing control over pivotal aspects of education may streamline processes but also stifle innovation and creativity emanating from both individual learners as well as educators (Caldwell, 2009).

The standard method for making decisions in education has long been the top-down approach (Moe, 2003). Nevertheless, this style of decision-making has elicited criticism due to its negative impact on creativity and critical thinking within the educational system. Relying exclusively on a top-down approach can limit the progression of a well-rounded education system (Mok, 2004). One crucial component that is often disregarded in top-down decision-making is student involvement. When teachers and administrators neglect the voices and opinions of students, they forfeit important insights into what works best for individual learners (Yilmaz et al., 2014). Ultimately this lack of consideration toward students stifles their creative expression while hindering their capacity to think critically. Moreover, when decisions are made from just one perspective without considering diverse viewpoints or alternative ideas, there remains little space for innovation or experimentation with new methods or techniques. As a result, this restrains not only student creativity but also teacher ingenuity as they may feel restricted by strict guidelines imposed by the administration. To create an effective education system that stimulates growth across all areas - including creativity and critical thinking - educators must embrace more comprehensive approaches to decision-making that value diversity of thought inside classrooms as well as outside them (Amalia et al., 2020).

1.3. (De)centralization and individual innovativeness

The form of decision-making in education has its upsides like better efficiency, consistency, equity of outcomes, streamlined processes and more opportunities for collaboration among stakeholders. However, it also carries potential drawbacks such as reduced flexibility to respond to local needs, loss of local autonomy, increased bureaucracy and an augmented chance for the misuse of power. (Nurakhir, 2021) This research scrutinizes the impact that centralizing decisions can have on two primary areas – improved equity of outcomes and streamlined procedures. However, before delving into these topics we need to grasp how centralization influences internal functioning; whether positively or negatively depending on multiple factors mentioned above. This study contends that while certain aspects may improve through centralization initiatives in the right decision-making structure - such as streamlining procedures or boosting equity - proper planning must take place beforehand if these improvements are going to outweigh any negative externalities caused by them over time such as lost local autonomy (Welsh & McGinn, 1999).

Centralization offers significant benefits, one of them is amplified efficiency that results from having a distinct chain of command. (Bray, 1999) This ensures everyone knows who is in charge of making decisions, which simplifies communication across departments and mitigates the possibility of errors or misunderstandings. Another key advantage to centralization is consistency. All choices are made using the same set of criteria leading to an approach that's more standardized. Notably, collaboration becomes more productive when decision-making power resides in one place since it promotes teamwork among employees with shared objectives. Caldwell argues that centralizing decision-making may enhance efficiency, consistency, and collaboration" (2009). Providing clarity on roles and responsibilities within an organization's hierarchy through centralized-decision-making policies can help people see how their contributions fit into overall objectives while also promoting synergy between teams working towards shared goals. In sum, centralizing decision-making not only leads to better communication but also promotes trust among team stakeholders by ensuring transparency in organizational operations - ultimately resulting in higher-quality work output and greater satisfaction levels among stakeholders.

Organizations may suffer significant drawbacks when decision-making is centralized. One downside is the loss of local autonomy which can lead to decreased creativity and innovation at lower levels. Central decision-making leaves lower-level employees feeling disconnected from their work, resulting in reduced morale and productivity (Nurakhir, 2021). Moreover, centralization restricts flexibility as it neglects regional differences or changes in circumstances that require unique solutions. This rigidity causes suboptimal outcomes when enforcing universal policies across varying geographical regions or situations. Ultimately, there's a risk of power misuse by those who possess decision-making authority; centralizing power offers little oversight on how decisions are executed at lower levels where actual implementation takes place. Given these negative consequences for organizational performance and dynamics, leaders must explore alternatives that balance centralized directives with devolved responsibilities concerning planning, budgeting, and staffing among others depending on specific organizational needs (Bray, 1999).

The centralization of decision-making could lead to streamlined procedures while improving the equity of outcomes. This is because when decisions are made by a centralized

body, they're consistent across the organization, creating uniformity in rules and regulations for everyone. However, on the other hand, such an unvarying organizational structure could stifle innovation at lower levels of management. To support this assertion further, Caldwell (2009) defended that centralized decision-making can be essential for some functions that require tight control or coordination, but it also may restrict employees' discretion. Thus while there may be advantages to centralizing decision-making in specific situations, weighing them against likely downsides becomes mandatory. Let us consider an illustration where a retail chain decides to hoard its purchasing decisions for all stores nationwide. While this would result in more consistent pricing and inventory levels across locations - thereby improving equity of results - it could as well hinder each store's ability to cater quickly enough to local customer needs or preferences, which ultimately reduces overall efficiency. Therefore, organizations must critically evaluate potential benefits before implementing any centralized decision-making structure. In conclusion, evaluating the impact of centralizing decision-making requires carefully weighing out pros against cons since rushing into such structures without giving due consideration might end up curtailing employee discretion even though doing such might be essential for achieving strict controls over corporate operations, as highlighted by Caldwell (2009).

To draw to a close, the form of structure in education may offer numerous advantages and disadvantages. It's crucial to weigh both sides before deciding whether or not your organization should adopt centralization policies. Evaluate how much autonomy you're willing to sacrifice when considering the impact on streamlining processes and improving equity of outcomes. Ultimately institutions need to make sure any decisions made relating to centralization align with their mission and values because there are bound to be tradeoffs involved during this process. Careful consideration will allow institutions more effective methods that result in better overall effectiveness levels within their organizations.

Literature review indicates that centralization in decision-making processes plays a crucial role in shaping individual innovativeness within the educational sphere, with both direct and indirect factors contributing to its impact. Direct factors (Table 1), such as curriculum development, teacher training, assessment and evaluation, may have a more immediate influence on the design and delivery of educational content, thereby directly affecting the innovative capabilities of students (Stevenson & Baker, 1991).

Table 1. Centralization vs individual innovativeness

Form of centralization	Description	Effect on individual innovativeness
Direct effects		
Centralization of Curriculum Development	A centralized curriculum means that decisions about what is taught are made by a single authority, usually the government or a national organization.	This may limit teachers' and students' ability to adapt and innovate based on local needs or unique situations, as they are required to follow a standardized curriculum.
Centralization of teacher training	Teacher training is directed by a central authority, with uniform standards and methods applied to all teachers in the system.	With standardized training methods, teachers may have limited exposure to diverse teaching styles or innovative practices,

		reducing their potential for innovation in the classroom.
Centralization of Assessment and Evaluation	A centralized authority designs and implements standardized assessments and evaluations for teachers and students, which may include testing, grading, and performance reviews.	This may discourage individual innovativeness, as teachers and students might focus on meeting standardized criteria rather than exploring new and creative ways of learning and teaching.
Indirect effects		
Centralization of resource allocation	A centralized authority determines how resources, such as funding, materials, and personnel, are allocated to schools and districts.	Centralized resource allocation may limit the flexibility for individual schools and teachers to pursue innovative projects or ideas, as they must rely on the centralized authority for resources.
Centralization of policy and regulation	Centralized policies and regulations are established by a single authority that all schools and districts must adhere to.	Strict adherence to centralized policies and regulations may hinder innovation by discouraging experimentation and the development of localized solutions to unique challenges.
Centralization of parents and community involvement	A central authority oversees and directs the extent and nature of parents' and community members' involvement in schools.	By limiting the autonomy of local communities and parents, this centralization can hinder the exchange of diverse ideas and grassroots innovation that could otherwise benefit schools and students.

Source: Author's own completion.

In contrast, indirect factors (Table 1), including resource allocation, policy and regulation, as well as parents and community involvement, may not have an immediate bearing on individual innovativeness but still hold a significant effect on the overall educational environment, indirectly on individual innovativeness (Ragmoun & Alfalih, 2021). A full understanding of this process is essential to fostering a more innovative and adaptable educational landscape, which can, in turn, enable dynamic teaching and learning experiences for all involved (Model 1).

Figure 1. (De)centralization and individual innovativeness
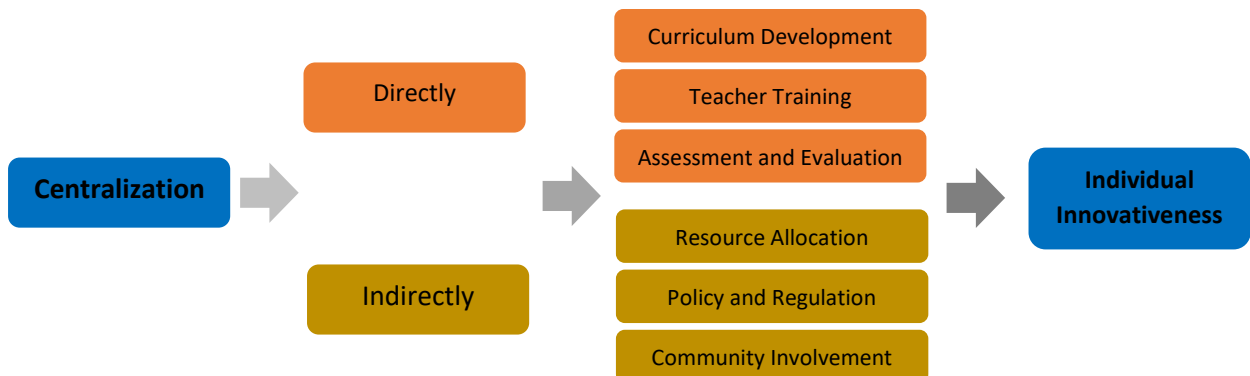
Source: Author's own creation

2. Literature Review

How (de)centralization in education affects individual innovativeness

Innovation in education systems cannot always be achieved through centralized decision-making. Instead, as Amalia et al. (2020) point out, this style of leadership structure may pose a significant obstacle to those who seek to innovate and expand their horizons within their respective fields. The rigidity inherent in centralized decision-making limits opportunities for experimentation or exploration by creative thinkers seeking fresh solutions to complex problems. Decentralized approaches offer a more effective framework for fostering innovation among educators. By empowering teachers with autonomy and agency over curriculum development and implementation, administrators encourage them to experiment with new methodologies that can enhance student outcomes while remaining true to their areas of expertise. In essence, educational leaders must recognize the crucial importance of cultivating an environment where creativity flourishes without fear of retribution from central authority figures. Only then will teachers and students alike have greater opportunities for learning while pushing our education system forward toward greater effectiveness and success as a whole.

In today's world, education systems are trending toward decentralization. The reason for this shift is rooted in the belief that it can lead to better educational outcomes and promote innovation at an individual level. That's why many developed countries have joined this trend by implementing various policies aimed at granting schools more autonomy in their decision-making processes (Payne, 2008). Research indicates that such decentralization can indeed have a positive impact on innovativeness levels among individuals. A study conducted by Pollock (2008) found that decentralized school management positively influences teachers' innovative behavior. This discovery should not come as a surprise since people tend to take ownership of their responsibilities when given more authority over their work environment, making them more likely to experiment with new ideas.

However, some experts caution against embracing this change too quickly without weighing its consequences fully. Critics argue that there may be downsides to education system decentralization, too - such as disparities between regions or schools within countries- which could harm students' learning outcomes overall (Fiske, 1996). Therefore, policymakers must be careful not to tip the scale too far in either direction when considering these changes. They need to balance centralized power enough so all students receive a quality education while still providing decentralized autonomy for schools where experimentation might be beneficial. The research concludes that educational decentralization promotes innovativeness amongst teachers and individuals alike; however, policymakers must consider all implications before implementing any significant changes because they can have both positive and negative effects on society as a whole if not done correctly (Brown & McIntyre, 1981).

Additionally, studies such as Winokur (2014) indicate that centralization of decision-making in education can have a positive impact on individual innovativeness if they consider innovativeness as an important element in the curriculum, but it is not the sole determinant. Other factors, such as adequate resources and support for teachers, also play a crucial role in fostering innovation in the education sector. If the necessary conditions are met, centralization of decision-making in the education system may enhance individual innovativeness among

students (Winokur, 2014). However, more research is needed to understand the underlying mechanisms and the potential limitations of this approach.

3. Data and research methodology
3.1. Research question and hypothesis

The main aim of this study is to investigate the relationship between the centralization of decision-making in the education system and the level of individual innovativeness, with a specific focus on Azerbaijan. This research has the potential to contribute to our understanding of how educational systems can foster or hinder individual innovativeness. By examining the case of Azerbaijan, this research can provide insights into how centralized decision-making in education affects individual innovativeness in a specific context (Guliyev, 2016). The findings of this research have implications for educational policy and practice, as well as for our understanding of the relationship between educational systems and individual innovativeness more broadly.

The main research question of the study is as follows:

How does the centralization of decision-making in secondary education affect the level of individual innovativeness?

In the study, I hypothesize that:

H: Individuals who have received education in a system with centralized decision-making will have lower levels of innovativeness compared to those who have received education in a system with more decentralized decision-making.

Through this study, I hope to contribute to the ongoing debate on the role of education in fostering individual innovativeness. By providing empirical evidence on the relationship between the centralization of decision-making in education and individual innovativeness, this research can inform discussions on how educational systems can best support the development of innovative individuals (Goldsmith & Foxall, 2003). Ultimately, this research aims to provide insights that can help improve educational systems and support the development of innovative individuals. Briefly, this study has two main ambitions. The first is to test the proposed hypothesis, while the second is to generate new hypotheses that can guide subsequent exploration of this topic.

3.2. Case selection

The unit of analysis in the case is high schools (public and private) in terms of individual innovativeness. The population of the case mainly covers Azerbaijan, but also this case can be applied as an example for former SOVIET member countries and other developing countries in which similar situation are experienced. The case to explain the effectiveness of centralization of decision-making in education system is Azerbaijan as a developing country. If we consider that it has gained its independence since 1991 and had a transition period from the SOVIET management system to the education system, it will be useful to investigate the centralization of decision-making in the education system and its effectiveness in terms of individual innovativeness in Azerbaijan during its independence (1991-2022).

The other factor which makes this case unique is Baku, the capital city of Azerbaijan remains the only capital city in the Council of Europe area with no directly elected governance (''Council of Europe'', 2021). Baku is not the only city in Azerbaijan that experiences this, but

also other big cities of Azerbaijan remain the same. In Azerbaijan, only small areas like villages and settlements have municipalities and directly elected officials but they have no competences to intervene any issue of local education. This also demonstrates that there is no possibility for decision-making in education at local government level. There is a centralized education system in this case which makes it specific enough to be investigated.

In terms of innovation, Azerbaijan holds the 93rd position among the 132 economies featured in the Global Innovation Index (GII) 2022, reflecting a need for improvement in fostering a culture of innovation within the nation. Interestingly, the country performs better in innovation inputs (79th) than innovation outputs (110th), although both rankings have seen a decline since 2021 and 2020. This disparity suggests that while resources and infrastructures for innovation are present, the country is facing challenges in translating these inputs into tangible results. As Azerbaijan seeks to strengthen its position in the GII, it becomes essential to harness individual innovativeness and inspire a national mindset that encourages creativity and risk-taking to boost the translation of innovation inputs into successful outputs (Table 2).

Table 2. World Intellectual Property Organization, 2022

Rankings for Azerbaijan (2020–2022)

GIIYR	GII	Innovation inputs	Innovation outputs
2020	82	76	86
2021	80	74	91
2022	93	79	110

The focus on secondary education, specifically high schools, in this case study is purposeful for multiple reasons. First, high school is the stage where students begin to develop advanced cognitive and creative skills that are instrumental to individual innovativeness. This period of education often includes exposure to a wider range of subjects and more complex problem-solving activities, fostering critical thinking and creativity. Secondly, secondary education is the final compulsory stage of schooling in many countries, including Azerbaijan. Therefore, it represents the educational experiences of most individuals in the population, providing a more generalized perspective on the effects of the education system. Lastly, the centralization of decision-making is particularly salient in secondary education where curriculum, teaching methodologies, and assessment strategies are often dictated by a central authority. Thus, high schools provide an excellent unit of analysis to study the impact of centralized decision-making on individual innovativeness.

Regardless of the result, whether centralization of decision-making in the education system negatively affects individual innovativeness or not, it is worth investigating the case of high schools in Azerbaijan. Briefly, the case will help us to observe a proper example of a highly centralized system looking to improve its contribution to innovativeness.

3.3. Data collection and variables

This data is the result of a survey on innovativeness and entrepreneurship potential among high school students in Azerbaijan (Gasimov et al., 2021). It is an unpublished dataset that is being used as secondary data. Dataset includes high school students selected from private and public schools. Gasimov et al. (2021) have been cautious while choosing public schools to

maintain public-private balance in quality of staff and target audience. Such homogeneity is required to reveal actual difference due to (de)centralization.

Individual Innovativeness Index (***III***) is a scale developed by Hurt, Joseph and Cook (1977) to evaluate how innovative people generally are.The original model of the scale contains 20 statements (Annex 1) that describe the features of people in five different classes, from highly innovative to very traditional. Each statement related to individual innovativeness was initially scored using a 7-point Likert scale, from "Strongly Disagree" to "Strongly Agree". The final version of the scale uses a 5-point Likert scale. There are 12 positive (1, 2, 3, 5, 8, 9, 11, 12, 14, 16, 18, 19) statements and 8 negative (4, 6, 7, 10, 13, 15, 17, 20) statements in the scale. The innovativeness score is determined by adding 42 points to the difference between the total positive and negative scores. The lowest possible score is 14, and the highest is 94. It is calculated as follows:

1. Calculate sum of numbers for positions 4, 6, 7, 10, 13, 15, 17, and 20.

2. Calculate sum of numbers for positions 1, 2, 3, 5, 8, 9, 11, 12, 14, 16, 18, and 19.

3. Use the following formula to find II:

II = 42 + total sum from stage 2 - total sum from stage 1

Individuals can be classified according to their innovativeness on the basis of their scores. They can be considered as "Innovators" if their II score is above 80, "Early Adopters" if the II score is between 69 and 80, "Early Majority" if the II score is between 57 and 68, "Late Majority" if the II score is between 46 and 56, and "Laggards/Traditionalists" if the II score is below 46. These scores can also be used to provide an overall evaluation of a person's level of innovativeness. In general, individuals who score above 68 are considered as highly innovative, whereas those who score below 64 are considered as low in innovativeness. (Hurt, Joseph & Cook, 1977)

Table 3. Summary of data

Variable name	Abbreviation	Meaning	Measure	Source
Individual Innovativeness (II) Index	Score_All	It is a scale to evaluate how innovative people (students) generally are.	Continuous	Own calculation
II Index of public school students	ScoreC	It represents the II index of students from centralized public schools.	Continuous	Own calculation
II Index of private school students	ScoreD	It represents the II index of students from decentralized private schools.	Continuous	Own calculation
Type of schools (public or private)	School_Type	It represents the type of schools either it is public or private.	Nominal	Survey
All schools (public and private)	School_ALL	It represents both centralized public schools and decentralized private schools.	Nominal	Survey
Public schools	SchoolC	It represents centralized public schools.	Nominal	Survey
Private schools	SchoolD	It represents decentralized private schools.	Nominal	Survey
Gender	Gender_All	It represents the gender of students from both public and private schools.	Nominal	Survey
Family income	Income_All	It represents the family income of students from both public and private schools.	Ordinal	Survey
Family business	Business_All	It represents whether families of students have a business or not.	Nominal	Survey

3.4. Data analysis

In the process of data analysis, quantitative methods were employed to assess the research outcomes.

a)   One-way Analysis of Variance (ANOVA)

ANOVA was utilized to assess the variations between and within different school groups. The dependent variables "ScoreC" and "ScoreD" denoting centralized public schools and decentralized private schools respectively were investigated. The results of the ANOVA test displayed key statistics such as the sum of squares, degrees of freedom (df), mean square, F-value, and significance (Sig.). The F-value, a statistic used to interpret the significance of the group differences, and the significance value, which shows the statistical validity of these differences, were particularly instrumental in the analysis.

There are the mean differences between different pairs of schools using a Tukey HSD post-hoc test. This test is useful in comparing all possible pairs of means to understand significant differences between group means after conducting an ANOVA. These tables present statistics such as mean differences, standard error, significance, and 95% confidence intervals for each pair of schools, which were analyzed to understand the relative performance of the schools.

By observing these quantitative measures, the significance level of the results, and comparing this with the conventional threshold of 0.05, an understanding of the statistical significance of the differences between the school groups was derived. This led to the conclusion that while most schools performed at similar levels, certain significant outliers existed that require more focused examination.

b)   Multiple regression

Multiple regression is a statistical method used to analyze the connection between one dependent variable and several independent variables. In this case, this method was used to predict an outcome (innovativeness score of students) based on various predictor variables (such as family business, gender, type of school, and family income). It creates a model to estimate how these variables collectively influence the dependent variable. The method includes assessing the strength of the relationship, measuring how much variability in the outcome can be explained by the predictors, adjusting for the number of predictors, checking the model's overall significance, examining the contribution of each predictor individually, evaluating model assumptions, and diagnosing issues such as multicollinearity (high correlation among predictors). It's a comprehensive process aimed at accurately forecasting the outcome variable using the selected predictors.

4. Results

The Republic of Azerbaijan sees education as a strategic priority and the Constitution guarantees the right of all citizens to education. The state plays a significant role in controlling the education system, setting minimum educational standards, and providing free compulsory secondary education. All decision-making processes for secondary education take place at the central level mainly by the Ministry of Education in Azerbaijan. This body is responsible for setting educational standards and curriculum, managing teacher training, and regulating the establishment and operations of schools. This centralized system allows for a unified

educational framework across the country but may also present challenges, such as potential lack of local autonomy and flexibility. An example of central decision-making is the government's strategy to realign the country's education system with global standards by improving the quality of skilled workers and providing equal opportunity in education at all levels. As part of the country's National Development Strategy 2020, the government's strategy is to extend primary and secondary education to 12 years, making attendance obligatory for students up to the age of 16. The central government's decision-making and policy-making in secondary education highlights the centralization of the education system in Azerbaijan (Asian Development Bank, 2015).

4.1. Descriptive statistics of variables

In the year 2021, an online survey was conducted with the participation of 335 respondents who were all high school students from the capital city of Baku (Gasimov et al., 2021). Those students were studying in the 10th and 11th grades from both public and private schools. However, the distribution of students was somewhat skewed from these schools, with 252 students, or 75.2% of the total, attending public schools, while the remaining 83 students, representing 24.8% of the total, came from private schools (See Table 4).

Table 4. School_Type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	public	252	75.2	75.2	75.2
	private	83	24.8	24.8	100.0
	Total	335	100.0	100.0	

Source: Author's own completion

The gender distribution of the respondents is nearly balanced, 183 of the participants, accounting for 54.6% of the total, are males, while females make up the remaining 152 participants, or 45.4% of the total (See Table 5).

Table 5. Gender_All

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	183	54.6	54.6	54.6
	female	152	45.4	45.4	100.0
	Total	335	100.0	100.0	

Source: Author's own completion

Table 6 provides a distribution of income levels of families of 335 students. The largest proportion, 36.1%, earn between 0 to 500, while 15.8% earn from 501 to 1000. The next income bracket, 1001 to 2000, constitutes 20.3% of the population. Those earning between 2001 to 3000 make up 13.7% of the total, followed by 7.2% earning 3001 to 5000. The smallest group

is individuals earning over 5000, representing 6.9% of the population. The cumulative percentage column reflects the growing total proportion as each income group is sequentially added, reaching 100% by the final group.

Table 6. Income_All

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-500	121	36.1	36.1	36.1
	501-1000	53	15.8	15.8	51.9
	1001-2000	68	20.3	20.3	72.2
	2001-3000	46	13.7	13.7	86.0
	3001-5000	24	7.2	7.2	93.1
	5000+	23	6.9	6.9	100.0
	Total	335	100.0	100.0	

Source: Author's own completion

Table 7 shows the distribution of "Business_All" which represents whether students' families possess their own business or not. Out of a total of 335 students, 119, or 35.5% responded with "Yes", while 216, which is 64.5% of the respondents, answered "No".

Table 7. Business_All

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	119	35.5	35.5	35.5
	No	216	64.5	64.5	100.0
	Total	335	100.0	100.0	

Source: Author's own completion

4.2. Comparative statistics of public or private schools

Table 8 provides insights into the key differences between public and private schools. In terms of gender demographics, public schools appear to have a higher proportion of female students compared to private schools. It's also noteworthy that a larger percentage of students attending private schools come from families owning a business and those with higher income brackets. Additionally, both school types exhibit some differences in the II index, but they are relatively close in their mean, median, and standard deviation values.

Table 8. Comparative statistics of public or private schools

	Public	**Private**
No. of observations	252	83
Females (%)	48.8	34.9

Family business (%)	25.4	66.3
Family income (%) (low [0-500 AZN], high [2000+ AZN])	45.6; 16.7	7.2; 61.5
II Index (mean, median, Std. dev, [min-max])	67.57; 68; 9.001 [37-90]	65.06; 65; 8.45 [38-85]

Source: Author's own completion

4.3. ANOVA

The analysis (See Table 9) displays the results of the ANOVA test conducted on the dependent variable, ScoreC, which represents centralized public schools. The test is used to examine the differences between group means and their associated procedures. It is organized into three sections: between groups, within groups, and total. The 'Between Groups' section represents the variance between different groups, while the 'Within Groups' section represents the variance within each group. The 'Total' section represents the sum of these variances.

H0: There is no significant difference between and within public schools.

H1: There is a significant difference between and within public schools.

Based on the table, the variability in the 'ScoreC' variable is not significantly explained by the group variable, as the p-value (.117) is greater than the commonly used significance level of .05. This suggests that the means across the different groups are not significantly different from each other. The F-value is 1.865, but due to the high p-value, the null hypothesis of equal group means is accepted.

Table 9. Public Schools' Group Means (ANOVA)

ScoreC

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	596.089	4	149.022	1.865	.117
Within Groups	19737.625	247	79.909		
Total	20333.714	251			

Source: Author's own completion

Table 10 shows the results of the Tukey HSD post-hoc test for the dependent variable "ScoreC", which represents centralized public schools, across five different schools (SchoolC 1-5). It indicates that none of the mean differences between the schools' scores reached statistical significance, as indicated by the Significance (Sig.) values all exceeding the typical threshold of 0.05. For example, the mean score difference between School 1 and School 2 is -2.295 with a Sig. of .716, showing no significant difference. This pattern is consistent across all school comparisons. Consequently, the conclusion from this data is that there are no statistically significant differences in ScoreC between the five schools based on this analysis.

Table 10. Public Schools' Multiple Comparisons

Dependent Variable: ScoreC
Tukey HSD

(I) SchoolC	(J) SchoolC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
1	2	-2.295	1.822	.716	-7.30	2.71
	3	2.085	1.527	.650	-2.11	6.28
	4	2.089	1.518	.643	-2.08	6.26
	5	2.580	2.412	.822	-4.05	9.21
2	1	2.295	1.822	.716	-2.71	7.30
	3	4.380	2.001	.187	-1.12	9.88
	4	4.384	1.994	.184	-1.10	9.86
	5	4.875	2.737	.387	-2.65	12.40
3	1	-2.085	1.527	.650	-6.28	2.11
	2	-4.380	2.001	.187	-9.88	1.12
	4	.005	1.728	1.000	-4.75	4.75
	5	.495	2.550	1.000	-6.51	7.50
4	1	-2.089	1.518	.643	-6.26	2.08
	2	-4.384	1.994	.184	-9.86	1.10
	3	-.005	1.728	1.000	-4.75	4.75
	5	.491	2.544	1.000	-6.50	7.48
5	1	-2.580	2.412	.822	-9.21	4.05
	2	-4.875	2.737	.387	-12.40	2.65
	3	-.495	2.550	1.000	-7.50	6.51
	4	-.491	2.544	1.000	-7.48	6.50

Source: Author's own completion

Table 11 presents the results of an ANOVA (analysis of variance) test conducted on the dependent variable, ScoreD which represents decentralized private schools.

H0: There is no significant difference between and within private schools.

H1: There is a significant difference between and within private schools.

The test shows the difference between the groups is statistically significant. The sum of squares between groups is 1159.478, resulting in a mean square of 165.640, while the within groups sum of squares is 4695.221, with a mean square of 62.603. The F statistic is 2.646, and the significance level (p-value) is .017. Because the p-value is less than .05, the null hypothesis is rejected, meaning the differences between the groups are not due to chance, and there are significant differences in scores between the groups.

Table 11. Private Schools' Group Means

ScoreD

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1159.478	7	165.640	2.646	.017
Within Groups	4695.221	75	62.603		
Total	5854.699	82			

Source: Author's own completion

The Table 18 shows the results of the Tukey HSD post-hoc test conducted on the dependent variable, ScoreD, to analyze the mean differences between various public schools (SchoolD). The majority of pairwise comparisons showed non-significant differences, with p-values above 0.05. However, one comparison stood out with a statistically significant

difference: School 6 had a higher ScoreD compared to School 3 (mean difference = 14.247, p = .009). This suggests that students at School 6 scored significantly higher than students at School 3. All other comparisons did not reveal significant differences in scores across the schools (See Annex 3).

Table 12 displays the results of the ANOVA test conducted on the dependent variable, ScoreALL which represents both public and private schools.

H0: There is no significant difference between and within schools (both public and private).

H1: There is a significant difference between and within schools (both public and private).

The test shows that the observed F-value is 5.006 with a significance level (p-value) of .026. This means there is a statistically significant difference between the groups being compared, as the p-value is less than the common threshold of 0.05. Thus, the alternative hypothesis (H1) is accepted which means there is a difference between groups. The high between-groups sum of squares relative to the within-groups sum of squares further supports this conclusion. Briefly, we can see a significant difference between schools.

Table 12. All schools' group means

ScoreALL

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	393.724	1	393.724	5.006	.026
Within Groups	26188.413	333	78.644		
Total	26582.137	334			

Source: Author's own completion

4.4. Multiple regression

Table 13 is a summary output of a multiple regression analysis, where the dependent variable 'Score_All' represents the individual innovativeness score of students and independent variables 'Business_All', 'Gender_All', 'School_Type', and 'Income_All' represent accordingly family business, gender, type of the school and family income of students. The model provides a weak fit for the data. The multiple correlation coefficient (R) is low at .146, suggesting a weak correlation between the predicted and observed values of the dependent variable 'Score_All'. The coefficient of determination (R Square) is .021, indicating that a mere 2.1% of the variability in 'Score_All' can be explained by the independent variables 'Business_All', 'Gender_All', 'School_Type', and 'Income_All'. The adjusted R Square further reduces to .009, pointing towards the potential presence of irrelevant predictors in the model. The standard error of the estimate stands at 8.879, which measures the variability of the predictions, and appears high. On a positive note, the Durbin-Watson statistic is 1.888, showing no significant autocorrelation in the model, a desirable attribute. However, the overall model's lack of statistical significance is evidenced by the Sig. F Change value of .129, which exceeds typical significance levels such as .05. Hence, based on these results, the model in its current form seems insufficient to accurately predict 'Score_All' using the chosen independent variables.

Table 13. Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.146[a]	.021	.009	8.879	.021	1.796	4	330	.129	1.888

a. Predictors: (Constant), Business_All, Gender_All, School_Type, Income_All

b. Dependent Variable: Score_All

Source: Author's own completion

Table 14 represents an Analysis of Variance (ANOVA) for a multiple linear regression model which shows that the set of predictors - 'Business_All', 'Gender_All', 'School_Type', and 'Income_All' - may not significantly predict the dependent variable 'Score_All'. The sum of squares for regression, which measures the variation explained by the model, is 566.421, while the residual sum of squares, indicating the variation is quite high at 26015.717. The F statistic, a measure used to determine if the model significantly explains more variance than residuals, is 1.796. However, the p-value, which estimates the likelihood that the observed data could have occurred if there were no relationship between the predictors and dependent variable, is 0.129. This value is greater than the commonly used threshold of 0.05, indicating that we cannot reject the null hypothesis at this significance level. In other words, this set of predictors may not significantly predict the 'Score_All' based on these results.

Table 14. ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	566.421	4	141.605	1.796	.129[b]
	Residual	26015.717	330	78.836		
	Total	26582.137	334			

a. Dependent Variable: Score_All

b. Predictors: (Constant), Business_All, Gender_All, School_Type, Income_All

Source: Author's own completion

Table 15 presents the results from a multiple regression analysis, focusing on the variable Score_All as the outcome. The Unstandardized Coefficients section provides the change in Score_All for each unit increase in the predictor variables. However, none of these predictor variables - School_Type, Gender_All, Income_All, and Business_All - showed a significant association with Score_All, as indicated by p-values greater than 0.05 in the Sig. column. These p-values reflect the probability that the observed relationships could have occurred by chance. The t-values in the table, calculated as the ratio of departure of an estimated parameter from its notional value to its standard deviation, were used to derive these p-values. Comparatively, the Standardized Coefficients (Beta) show the relative importance of each predictor when the variances of dependent and independent variables are standardized to 1. Lastly, the Collinearity Statistics (Tolerance and VIF) suggest that there is no significant issue

of multicollinearity among the predictor variables, meaning they are not highly correlated with each other. This is further confirmed by the fact that all VIF values are below 5, which means there is no serious issue of multicollinearity.

Table 15. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	72.880	3.514		20.743	.000		
	School_Type	-2.172	1.301	-.105	-1.669	.096	.746	1.341
	Gender_All	.266	.988	.015	.269	.788	.973	1.028
	Income_All	-.495	.394	-.088	-1.256	.210	.608	1.644
	Business_All	-1.409	1.215	-.076	-1.159	.247	.695	1.438

a. Dependent Variable: Score_All

Source: Author's own completion

The collinearity diagnostic table (Table 16) presented represents a test of multicollinearity, which is the statistical phenomenon where predictor variables in a model are highly correlated. The table shows that the model contains five predictors: School_Type, Gender_All, Income_All, and Business_All, all used to predict the dependent variable Score_All. The condition index is greater than 5 for dimensions 2, 3, 4, and 5, which may indicate potential issues with multicollinearity. More specifically, the predictor "Business_All" shows high variance proportions on the 5th dimension with a condition index of 17.819, signifying it might be the source of high multicollinearity in the model. This could impact the reliability of the model, as it suggests that Business_All might be linearly predictable from the other predictors, thus potentially inflating the variance of its estimated regression coefficient.

Table 16. Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				(Constant)	School_Type	Gender_All	Income_All	Business_All
1	1	4.522	1.000	.00	.00	.00	.01	.00
	2	.305	3.852	.00	.01	.04	.32	.04
	3	.090	7.091	.00	.12	.72	.04	.11
	4	.069	8.098	.00	.66	.05	.45	.16
	5	.014	17.819	.99	.20	.19	.18	.68

a. Dependent Variable: Score_All

Source: Author's own completion

Table 17 represents residuals and predicted values for a model with a dependent variable "Score_All". With a sample size (N) of 335, the predicted value ranges between 63.01 and 69.34 with a mean of 66.95 and a standard deviation of 1.302. The residual values vary

between -29.928 and 22.072 with a mean of 0 and a standard deviation of 8.826. The standardized predicted values and residuals exhibit similar characteristics; they both center around 0 with standard deviations close to 1. These data suggest a reasonably well-fitted model with some outliers.

Table 17. Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	63.01	69.34	66.95	1.302	335
Residual	-29.928	22.072	.000	8.826	335
Std. Predicted Value	-3.022	1.833	.000	1.000	335
Std. Residual	-3.371	2.486	.000	.994	335

a. Dependent Variable: Score_All

Source: Author's own completion

From the plot for the distribution of the dependent variable "Score_All" which represents the II index (See Graph 1), it seems it is fairly close to normal distribution which can allow to continue with a simple OLS regression.
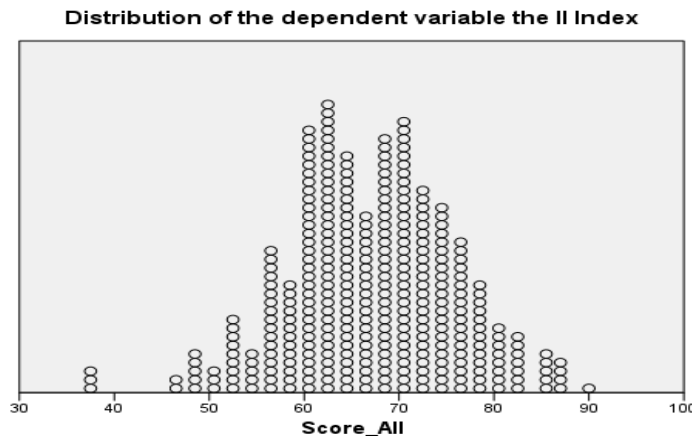
The simple OLS (Ordinary Least Squares regression) model can be as follows in this case:

Score_All = $\beta 0 + \beta 1 Business\_All + \beta 2 Gender\_All + \beta 3 School\_Type + \beta 4 Income\_All + \varepsilon$
Where:
- Score_All is the dependent variable.
- Business_All, Gender_All, School_Type, and Income_All are the independent variables.
- $\beta 0$ is the y-intercept (the value of Score_All when all independent variables are 0).
- $\beta 1$, $\beta 2$, $\beta 3$, and $\beta 4$ are the coefficients of the independent variables, which represent the expected change in the dependent variable for a one-unit change in the corresponding independent variable, holding all other independent variables constant.
- ε represents the error term (residuals), which captures the variation in Score_All not explained by the independent variables.

To summarize, the analysis indicates that the residuals of the regression model are quite normally distributed. This is a positive outcome as it suggests that the model adequately captures the underlying patterns in the data. Additionally, the absence of high VIF scores indicates that multicollinearity is not a significant issue, which strengthens the reliability of the results.

The p-value of 0.129 for the overall model suggests that the model's explanatory power is not considered statistically significant. This means that the model doesn't explain the amount of the variance in the dependent variable, individual innovativeness, but it cannot be considered statistically significant at the conventional significance level (e.g., $p < 0.05$).

One possible explanation for the lack of significant results could be the small sample size of 335. With a small sample, the statistical power to detect significant effects may be limited. Therefore, caution should be exercised when interpreting the overall significance of the model.

Moving on to the independent variable 'School_Type,' its p-value is just below 10%, which indicates that there may be a marginally significant relationship between school type and individual innovativeness. Although it does not meet the conventional threshold for significance, this result suggests that the type of school attended by students might have some influence on their level of innovativeness.

Furthermore, the negative beta parameter associated with the 'School_Type' variable indicates that there is a negative relationship between school type and individual innovativeness, which contradicts the initial hypothesis. This finding suggests that students attending a certain type of school (as represented by the 'School_Type' variable) may exhibit lower levels of innovativeness compared to other types of schools.

In essence, the multiple regression analysis shows that the overall model explains a moderate amount of variance in individual innovativeness but is not statistically significant. This lack of significance may have different reasons; it may occur because more variables would explain more of the dependent's variance or the small sample size of 335 may not be sufficient to predict the dependent variable.

5. Discussion

The development and success of individuals are inextricably linked to education. But, as educational systems become increasingly centralized, questions arise about their impact on creativity and problem-solving skills (Tether et al., 2005). Centralized decision-making is a top-down approach where higher authorities make decisions instead of grassroots-level participation. This type of decision-making can have lasting impacts on how people perceive the challenges they face in their lives. Research conducted by Topsakal et al. (2022) shows that people prefer autonomy when it comes to seeking new information or taking risks for greater creativity. When decision-making processes are centralized, this ability may be limited, leading to rigid thinking patterns which stifle innovation. Moreover, homogenization across different regions or countries could result from centralized decision-making in education settings. This would mean students receive similar educational experiences irrespective of their background or location - hindering diversity and cross-pollination of ideas among learners. Policymakers should seek the balance between centralization and decentralization for consistency while preserving unique learning environments where diverse ideas breed excellence among all levels

of society regardless of jurisdictional differences. (Hanson, 1998) In essence, understanding the effects centralized decision-making has on human development requires an investigation into its influence on individual creativity and problem-solving abilities. Policymakers should create balanced policies that cater towards consistency whilst nurturing unique learning environments for fostering creative expression amongst learners at all levels within varied contexts without impeding upon academic standards.

The literature review demonstrated a correlation linking the centralization of decision-making in education to individual innovativeness. Exploring the effects of centralized decision-making on student creativity and problem-solving skills has considerable consequences for policymakers, educators, parents, and other stakeholders involved in creating educational policies. It indicates that delegating control over decisions is beneficial since it can lead to greater inventiveness and imagination as well as improved problem-solving abilities among pupils (Brown & McIntyre, 1981). Moreover, this highlights the requirement for future studies to understand how different forms of decentralization impact student results across varied cultural contexts. More investigation needs to be conducted so we may better understand how choices are made within schools and their effects on academic achievements. To sum up - whilst there may be some upsides when it comes down to uniformity or standardization practices within regions or areas, some studies indicate its negative influence on children's creative reserves must not be disregarded either. Therefore, it is vital educators find effective ways they can create safe spaces for kids where innovative ideas are encouraged without restraint - something which could potentially stimulate greater levels of innovative thinking with time (Amalia et al., 2020).

Whereas the results of this study did not show a significant difference in individual innovativeness between public (centralized) and private (decentralized) schools, and the outcome of the multiple regression which analyzed the innovative innovativeness by considering several independent variables including the type of school, gender, family income, and family business, cannot be considered statistically significant, the study can be considered useful for further investigation.

One possible explanation for the lack of a significant difference between public and private schools is that despite the differences in governance, there might be different factors such as student selection, family income, etc, leading to similar outcomes in terms of individual innovativeness. (Yilmaz et al., 2014) It is also possible that the measures of innovativeness used in the study were not sufficiently sensitive or comprehensive to capture the other factors affecting individual innovativeness.

Even if the study's findings do not provide definitive evidence for the hypothesis, they do contribute to a broader understanding of the complex interplay between centralization, decentralization, and individual innovativeness in education. Future research might benefit from a more in-depth investigation of the specific factors that influence individual innovativeness in different educational contexts, as well as the potential mediating or moderating variables that could be impacting the relationship between centralization and individual innovativeness. For instance, researchers could explore how the degree of autonomy granted to teachers and school administrators, the flexibility of curricula, and the availability

of resources for experimentation and creativity vary across different systems, and how these factors might interact with centralized or decentralized decision-making structures.

Additionally, longitudinal and cross-national comparative studies could be conducted to examine the long-term effects of centralization or decentralization on individual innovativeness, as well as to explore the generalizability of the findings to other countries and contexts. Such research could provide further insight into the potential benefits and drawbacks of different governance models in education, helping policymakers and practitioners make more informed decisions regarding the design and implementation of education systems that best foster innovation and creativity.

In light of the findings from this study, it is clear that the relationship between centralization of decision-making in education and individual innovativeness is not straightforward, and that further research is needed to fully understand the complex dynamics at play. However, the expert opinions gathered in this research suggest that decentralized systems may hold promise for fostering greater individual innovativeness, by allowing for more flexible, adaptive, and context-specific educational experiences. As the world continues to evolve and the need for innovative, adaptable individuals grows ever more critical, it is essential for education systems to adapt and evolve as well, fostering the skills and mindsets needed to thrive in a rapidly changing global landscape. This research contributes to the ongoing conversation around the best ways to achieve that goal, highlighting the importance of considering the impact of governance structures on the development of individual innovativeness within education systems.

6. Limitations

The present study is subject to a number of limitations that should be considered when interpreting the findings. These limitations pertain to the data sources, sample size, and generalizability of the results. The subsequent paragraphs detail these limitations and their potential impact on the study.

Firstly, this study relies on a secondary dataset collected in 2021 by independent researchers. The use of this data poses several limitations. For one, it covers only students in the 10th and 11th grades, which may not be representative of the broader student population. Additionally, the data is limited to the best schools in Azerbaijan, and was collected exclusively in the capital city, Baku. This geographical constraint may limit the generalizability of the findings to other regions or types of schools within the country.

Secondly, the cross-sectional nature of the data poses another limitation. As the data was collected only once from the students, it is not possible to compare their innovativeness before and after joining the schools in question. This precludes any conclusions about the causal effects of the school environment on individual innovativeness, and may lead to an over- or underestimation of the relationship between centralization of decision-making and innovativeness. Future research would benefit from a longitudinal study design, which could provide insights into the temporal dynamics of this relationship.

Consequently, the limitations of this study should be acknowledged when interpreting the findings. The reliance on a secondary dataset with a restricted scope and the cross-sectional nature of the data may all have implications for the generalizability and validity of the results. Despite these limitations, the study provides a valuable starting point for future research on the

relationship between centralization of decision-making in education and individual innovativeness in Azerbaijan. Further investigation, employing longitudinal data and more diverse samples would contribute to a deeper understanding of this important issue.

CONCLUSİONS

This research paper aimed to explore the impact of the centralization of decision-making in education on individual innovativeness, specifically focusing on the case of Azerbaijan. While my hypothesis suggested a greater level of innovativeness in individuals educated within a decentralized system, our quantitative analysis did not yield a significant distinction between students from centralized and decentralized schools in Azerbaijan. This discrepancy, however, does not detract from the value of the research but rather illuminates the intricacies that underlie the relationship between centralization and individual innovativeness. The difference between the hypothesis and findings demonstrates the need for a broader lens that takes into account the various factors that influence individual innovativeness. It underscores the necessity of more in-depth, longitudinal, and cross-national comparative studies, which might reveal the long-term and far-reaching consequences of centralization versus decentralization in education. This research, although not affirming the initial hypothesis definitively, contributes to a nuanced understanding of the complexities between educational governance and individual innovativeness, which is invaluable for future exploration and decision-making. It sets the stage for ongoing dialogue about how education systems can best foster the innovativeness required in our rapidly changing global society. There are some hypotheses driven by this study that can be investigated in the future:

H2: Decentralization of decision-making in education might have a positive impact on individual innovativeness in rural areas. This study is primarily urban-centric, focusing on schools in the capital, Baku. There might be significant differences in rural areas that were not accounted for in this study.

H3: Decentralization of decision-making on individual innovativeness might have a positive impact in the long term. A longitudinal study might reveal that the impact of centralization or decentralization on individual innovativeness becomes more evident over time. The cross-sectional nature of this study may have limited its ability to detect the long-term effects of the educational system on innovativeness.

H4: The centralization of decision-making might have a more significant effect on the innovativeness of the educators rather than the students. Teachers and administrators who have more autonomy might be more innovative themselves, which could indirectly affect the innovativeness of their students.

H5: The level of resources available to a school could mediate the impact of centralization or decentralization on individual innovativeness. Schools with more resources might be better able to foster innovativeness regardless of the degree of decision-making autonomy.

H6: The effects of centralization or decentralization on individual innovativeness might be less significant than the effects of other factors, such as teaching quality or curriculum relevance. This study did not find a significant difference in innovativeness between centralized and decentralized systems, suggesting other factors might be more important.

H7: Centralized decision-making might lead to less innovation in the short term but provide a solid foundational knowledge base that enables greater innovation in the long term. It's possible that a more structured, centralized approach initially provides a solid base of knowledge upon which students can later innovate.

Additionally, the measures of individual innovativeness might be more sensitive to changes in the education system in different cultural contexts. This study focused more on the individual innovativeness index, but the relationship between centralization and innovativeness might look different in Azerbaijan or countries with different cultural attitudes toward innovation and education. Thus, it can be beneficial studying the interaction between cultural aspects and institutional aspects of the innovation ecosystem.

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Appendix 1. Multiple Comparisons

Dependent Variable: ScoreD
Tukey HSD

(I) SchoolD	(J) SchoolD	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	.228	2.733	1.000	-8.29	8.75
	3	3.713	2.998	.918	-5.63	13.06
	4	-4.272	3.705	.942	-15.83	7.28
	5	-.748	2.787	1.000	-9.44	7.94
	6	-10.534	3.498	.066	-21.44	.37
	7	-6.705	3.977	.696	-19.11	5.70
	8	.395	3.705	1.000	-11.16	11.95
2	1	-.228	2.733	1.000	-8.75	8.29
	3	3.485	3.141	.953	-6.31	13.28
	4	-4.500	3.822	.936	-16.42	7.42
	5	-.976	2.940	1.000	-10.14	8.19
	6	-10.762	3.622	.073	-22.05	.53
	7	-6.933	4.086	.689	-19.67	5.81
	8	.167	3.822	1.000	-11.75	12.08

3	1	-3.713	2.998	.918	-13.06	5.63
	2	-3.485	3.141	.953	-13.28	6.31
	4	-7.985	4.016	.496	-20.51	4.54
	5	-4.461	3.188	.855	-14.40	5.48
	6	-14.247*	3.826	.009	-26.18	-2.32
	7	-10.418	4.268	.237	-23.72	2.89
	8	-3.318	4.016	.991	-15.84	9.20
4	1	4.272	3.705	.942	-7.28	15.83
	2	4.500	3.822	.936	-7.42	16.42
	3	7.985	4.016	.496	-4.54	20.51
	5	3.524	3.861	.984	-8.51	15.56
	6	-6.262	4.402	.844	-19.99	7.46
	7	-2.433	4.791	1.000	-17.37	12.51
	8	4.667	4.568	.970	-9.58	18.91
5	1	.748	2.787	1.000	-7.94	9.44
	2	.976	2.940	1.000	-8.19	10.14
	3	4.461	3.188	.855	-5.48	14.40
	4	-3.524	3.861	.984	-15.56	8.51
	6	-9.786	3.663	.148	-21.21	1.63
	7	-5.957	4.122	.833	-18.81	6.90
	8	1.143	3.861	1.000	-10.90	13.18
6	1	10.534	3.498	.066	-.37	21.44
	2	10.762	3.622	.073	-.53	22.05
	3	14.247*	3.826	.009	2.32	26.18
	4	6.262	4.402	.844	-7.46	19.99
	5	9.786	3.663	.148	-1.63	21.21
	7	3.829	4.633	.991	-10.62	18.27
	8	10.929	4.402	.219	-2.80	24.65
7	1	6.705	3.977	.696	-5.70	19.11
	2	6.933	4.086	.689	-5.81	19.67
	3	10.418	4.268	.237	-2.89	23.72
	4	2.433	4.791	1.000	-12.51	17.37
	5	5.957	4.122	.833	-6.90	18.81
	6	-3.829	4.633	.991	-18.27	10.62
	8	7.100	4.791	.815	-7.84	22.04
8	1	-.395	3.705	1.000	-11.95	11.16
	2	-.167	3.822	1.000	-12.08	11.75
	3	3.318	4.016	.991	-9.20	15.84
	4	-4.667	4.568	.970	-18.91	9.58
	5	-1.143	3.861	1.000	-13.18	10.90
	6	-10.929	4.402	.219	-24.65	2.80
	7	-7.100	4.791	.815	-22.04	7.84

*. The mean difference is significant at the 0.05 level.

Source: Author's own completion

MODERN CHALLENGES IN THE DEVELOPMENT OF PROPERTY RELATIONS

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Abstract: This article analyzes the key factors influencing the transformation of property relations in the current context of globalization and economic democratization. It examines examples of countries actively developing sharing and network-based property forms. The need for updating the methodology of property regulation and implementing adaptive management mechanisms for efficient resource allocation and protection of the interests of all economic process participants is highlighted.

Keywords: property relations, democratization of property, sharing economy, sharing enterprises, innovative business models

INTRODUCTION

Property relations are a fundamental aspect of a society's socio-economic structure. Economic globalization, technological advancement, and geopolitical shifts present new challenges that necessitate transformation in these relations. The new industrial revolution offers unique opportunities to establish new forms of property ownership. The changing nature of work, driven by modern technology, underscores the crucial role of human factors in the emerging "socialized economy." The democratization of property involves an equitable redistribution of rights, engaging a broader population in asset management, which leads to a dispersion of wealth and power and creates a sustainable economy. Democratizing property also fosters favorable conditions for entrepreneurship.

According to Klaus Schwab, the "participatory or shared economy" is a leading factor in the new industrial revolution *(*Schwab, K. 2017:13). The sharing economy has become essential amid digitalization, as highlighted during the 2019–2021 pandemic. Sharing economy services and platforms transform traditional property regulation by shifting from individual ownership of production means and products to shared ownership and usage. These new forms of property not only enhance ownership but profoundly impact market architecture, expanding opportunities for micro-enterprises, which were previously limited to large organizations. Jeremy Rifkin suggests that the Fourth Industrial Revolution encourages self-governance and self-organization. In developed countries, there is a continuous increase in democratically organized, self-governing institutions, covering both production and non-production spheres, such as healthcare, education, creative groups, and consumer cooperatives (Rifkin, 2014:23).

New property forms improve management efficiency by reducing transaction costs and removing unnecessary bureaucratic layers. It should be noted that post-Soviet countries have prior experience in collective resource utilization. The modern sharing economy differs in several respects:

The sharing object is not scarce (no deficits in material, financial resources, etc.). Today's sharing service users make more conscious purchases, considering ethical and ecological values among various options. IT advancements have made renting and leasing faster and simpler (Nesterova, 2023).

The sharing economy's advantages include cost reductions for users, expanded access to goods and services, and the development of new business models. However, it also has drawbacks, such as unstable income for workers, a lack of social guarantees, and underdeveloped legal frameworks. There are conflicting views in society regarding the sharing economy's growth. Some believe that "the spread of non-market exchanges and institutions will reduce competition, thus decreasing production efficiency" (Ginarte et al., 1997:283–301).

We believe that the development of new information technologies in the modern world is forming an alternative system for coordinating economic activities, where non-market mechanisms compete with market mechanisms, creating a multiplier effect for further economic growth. Notably, the sharing property model has become widespread in the most developed countries. In the United States, Canada, and the United Kingdom, for instance, up to 10% of the workforce is employed by sharing enterprises, with 72 cities worldwide connected through the Shareble platform (The Fourth Industrial Revolution: Realities and Modern Challenges. Xth Anniversary St. Petersburg Sociological Readings: Proceedings of the International Scientific Conference, April 13–14, 2018. - 896 p., p.83). The sharing economy is necessary for transforming traditional economies, which are divided between property owners and non-owners. The sharing economy is characterized by a new property regulation methodology involving all participants—direct owners, managers, and work collectives. This requires the establishment of co-participation in property management and profit distribution.

In developed countries, the socialization of property is becoming recognized. For example, Article 14 of the German Constitution states, "Property entails obligations. Its use should also serve the public good" (https://worldconstitutions.ru/?p=155.%202017). This principle was further elaborated in a ruling by the German Constitutional Court, which stated that it implies rejecting a property system where individual interests outweigh societal interests (Maximov, 2018:56–69). Article 42 of the Italian Constitution states, "Private property is recognized and guaranteed by law, which determines its acquisition and usage methods, and its limits - aimed at ensuring its social function and availability to all" (https://legalns.com/download/_books/cons/italy.pdf). This article emphasizes that, in the public interest, the law reserves the right for the state, public institutions, worker or consumer associations to transfer ownership. Additionally, the law supports small and medium-sized property and may impose size limits to ensure rational land use.

MATERIALS AND METHODS

The sharing ownership model applies a heterarchical management system, using horizontal management structures. This model relies on interdependent relationships with broad autonomy of production system elements and a mutual distribution of power. This management style is typical for network economies. In its report, the European Commission defines the network economy as a specific environment where any company or individual, regardless of scale, can connect with minimal costs for business, research, idea exchange, and information (Telework 1997, European Commission Report). H.Kagermann and J.Helbig view

the network economy as a qualitatively new level of organization and management throughout the product lifecycle. This economy is based on a new technical system, ownership relationships, and management (Kagermann, 2013:53). According to R. Drath and A. Horch, Industry 4.0, as the foundation of the network economy, is a triad of physical objects, their virtual representations, and services and applications (Drath, 2014:56–58). They view it as a qualitatively new horizon of business models, services, and customized products.

Table 1. *Methodological Features of Economic Activity Regulation Forms*

Features	Organizational Forms of Economic Activity		
	Command-Administrative	Market-Driven	Network-Based
Property Form	Centralized	Private	Sharing
System Approach Characteristics	Dominance of political objectives	Equality of all economic subjects	Subordination to network structure interests
Productive Forces Allocation	Centralized-command	Based on private economic interests	Based on socio-economic interests
Circulation of Goods and Capital	Based on administrative decisions	Driven by competitive decisions	Oriented toward socio-economic needs
Response to External Environment Changes	Passive, limited response	Active adaptation through pricing	High adaptation and coordination among system participants
Dynamism in Economic Expansion	Unidirectional growth in organizational structure	Market-oriented organizational transformation	High flexibility and modular adaptability within a network structure
Tendency for Global Integration	Capable of only vertical integration	Capable of vertical and limited horizontal integration	Capable of broad horizontal integration in a global context

Source: Compiled by the author based on (Vayber, R. 2020).

Table 1 presents the advantages of network structures in terms of both their technical and technological foundations, the content of transactional processes, and the characteristics of resource allocation. The development of the network economy accelerates the process of global economic integration and fosters the emergence of new forms of ownership.

The advancement of technologies, particularly with the advent of 5G as one of the cornerstones of the network economy, also leads to time savings. This results in the acceleration of operations on stock exchanges and the processes of property distribution. In this context, the improvement of property distribution methodologies, the removal of property from monopolistic ownership, legal formalization, and the development of the stock market gain particular importance.

The concentration of ownership in the hands of oligarchic groups, as is well known, turns a country into a raw material appendage of the developed world. Countries that support the democratization of ownership boldly integrate into the global economy by creating attractive conditions for foreign investments. For example, China, which was considered one of the least developed countries until the end of the 20th century, is now among the leaders of countries with developed economies. Saudi Arabia is transitioning to a new level of post-industrial development, moving from specialization in energy raw material production to the production of high-tech products.

Figure 1. *Dominant Principle of Influence in Classical and Network Economies.*
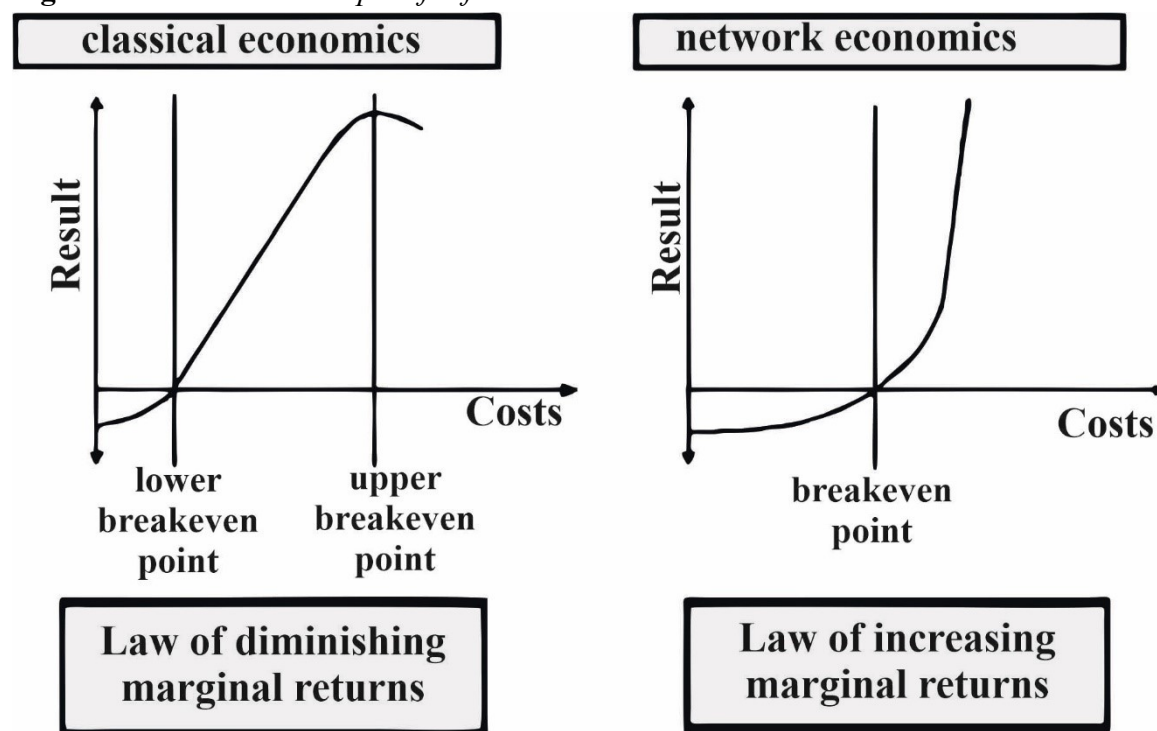
Source: Vayber, 2020

A characteristic feature of sharing enterprises in the network economy is the high initial costs for development and production. For this reason, companies in this sector begin their activities by launching a large volume of products on the market at relatively high prices. An increase in sales volume leads to a reduction in fixed costs and an increase in profits. Figure 1 shows that as production volume grows, marginal revenue increases in the network economy and decreases in the industrial economy. As seen, the network economy is characterized by an increase in fixed costs and a decrease in marginal costs. Therefore, producers in the network economy are interested in the quickest possible realization of the maximum possible volume of products.

Modern challenges to the development of property relations concern both new technologies and global economic processes, as well as social justice and economic sustainability. Adapting property rights to new conditions, developing effective management mechanisms, and protecting the interests of all participants in economic activities have become key tasks for contemporary society. Property relations continue to evolve, including through

the development of the sharing economy, digitalization, and globalization. In order for these changes not to become sources of new inequalities, legal, economic, and social reforms are necessary to ensure a more equitable distribution of resources and opportunities among all members of society.

DISCUSSION AND RESULTS

The findings underscore the significant advantages of the sharing ownership model in enhancing flexibility, efficiency, and responsiveness within network economies. This model aligns with a heterarchical management structure that promotes horizontal integration and interdependent relations, which is essential for the dynamic nature of network-based economic activities. Unlike the command-administrative and market-driven models (Table 1), the network economy relies on a collaborative approach to ownership, enabling companies to adapt quickly to external changes and pursue economic expansion through global integration. For instance, recent studies report that network-based firms grow approximately 30% faster in their initial years compared to traditionally managed firms due to their capacity for rapid information exchange and product scaling (Deloitte, 2021). An essential feature of the network economy is the reliance on advanced digital infrastructures such as 5G, IoT, and cloud computing, which collectively enhance communication, streamline financial transactions, and optimize operational efficiency. According to estimates from the World Economic Forum, digital transformation in network economies is projected to create an additional $100 trillion in global value by 2030. These technologies contribute to lowering transaction costs and increasing responsiveness, providing network-based firms with a significant competitive advantage. Figure 1 illustrates that network economies, characterized by high fixed costs at the outset, achieve notable reductions in marginal costs as production volumes increase. This reduction in marginal costs underpins a profit-maximizing model that incentivizes enterprises to rapidly scale production, allowing for swift cost amortization and increased profitability.

The network economy's success also highlights the importance of democratizing ownership, which plays a key role in achieving socio-economic stability. For example, China's integration into the global economy, bolstered by policies encouraging joint ventures and shared ownership models, has transformed it into a technology and manufacturing leader. Between 2000 and 2020, China's GDP grew from $1.2 trillion to over $14 trillion, a 1,000% increase, largely due to reforms that supported shared ownership and foreign investments (World Bank). Similarly, Saudi Arabia's Vision 2030 agenda includes a transition from a resource-dependent economy to a diversified, network-based economy focused on high-tech production, projecting an annual GDP growth rate of approximately 4.2% over the coming decade. These cases exemplify how network economies can attract foreign investment, stimulate innovation, and reduce economic disparities by broadening access to ownership and production resources.

From a property rights and legal framework perspective, network economies require adaptive regulatory mechanisms that prevent monopolistic practices and promote equitable participation. The European Union's Digital Markets Act and Digital Services Act, for example, aim to regulate large tech firms' behavior, ensuring that the network economy remains inclusive and competitive. These frameworks create safeguards for smaller enterprises within network economies, allowing them to compete on a level playing field by ensuring fair access

to digital platforms. Reports indicate that the implementation of these regulations could lead to a 15% increase in market access for small- and medium-sized enterprises within the EU network economy over the next five years (European Commission, 2023).

The initial cost of adopting a network-based model is substantial, with estimates showing that implementing the necessary technological infrastructure can cost companies between $500,000 to $2 million. Despite these high upfront expenses, companies in the network economy achieve considerable economies of scale, with operating cost reductions of up to 40% as production volume scales. This efficiency is especially crucial for sectors like renewable energy, where decentralized network-based systems reduce dependency on traditional, centralized power sources. A study by McKinsey & Company found that companies in the network economy, particularly in high-tech and green energy sectors, experienced average annual revenue growth of 25% within the first five years of network model adoption.

In summary, the sharing ownership model and network economy principles enable economies to pursue sustainable, equitable growth. By integrating advanced technologies and implementing regulatory safeguards, network economies can offer inclusive access to ownership while achieving high levels of flexibility and adaptability. The cases of China, Saudi Arabia, and the European Union demonstrate the potential of network economies to attract foreign investment, foster innovation, and promote fair competition. With digital transformation projected to add trillions to the global economy, network economies represent a promising foundation for addressing contemporary challenges in property rights, economic sustainability, and social equity.

CONCLUSIONS

The network-based economic model marks a transformative shift from traditional command-administrative and market-driven systems by emphasizing shared ownership, adaptability, and high interconnectivity. This structure enables a dynamic, globally integrated approach that aligns economic activities with socio-economic needs, fostering flexibility and rapid response to external changes. Unlike previous models, the network economy's reliance on digital technologies and decentralized ownership streamlines production and reduces marginal costs as output increases, positioning it as an ideal model for today's fast-paced, innovation-driven environment. Moreover, the capacity for extensive horizontal integration encourages global partnerships, fueling rapid technological advancement and economic diversification. Countries adopting this model often become attractive hubs for foreign investment, underscoring the model's potential to enhance competitiveness on a global scale. However, challenges remain—particularly the risks of ownership concentration among powerful entities, which can lead to social disparities if left unchecked. This reality calls for policies that ensure inclusivity and equitable benefit distribution.

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ADAPTED NEUROMANAGEMENT AND INTEGRAL METHODOLOGY IN DECISION EVALUATION. CUM INTERVENTION

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Abstract: With the advent of Management and Technology, the World is witnessing a plethora of problems; mental issues occupying the prime spot. This provides an opportunity for the discipline of adaptive neuromanagement and integrated methodologies to offer a 'way out'; for those afflicted with mental issues. Based on the protocol evaluations obtained through Adapted Neuromanagement, this paper applies a variety of personalized intervention techniques oriented from the neurointegral methodology. These techniques include; intervention with neurofeedback and biofeedback, personalized training programs to improve neuronal and physiological self-regulation. mindfulness and relaxation techniques, implementation of specific protocols to reduce stress and improve attention, adapted to individual needs virtual reality exposure therapy, development and application of personalized scenarios to treat phobias, anxiety and ptsd, cognitive performance training based on computational interface, implementation of adaptive programs to improve specific executive and cognitive functions, based on the individual neurocognitive profile, qualitative neuropsychological training, implementation of rehabilitation and neuropsychological correction programs aimed at improving the psychological and brain functioning of people, emotional freedom techniques, application of emotional reprocessing protocols to improve self-regulation, adapted to specific emotional needs, guided neuroplasticity interventions, application of cognitive stimulation techniques designed to promote neuroplasticity in specific brain areas, character strengths program, implementation of psychological well-being management programs based on scientific evidence and personalized neuromanagement education.

Keywords: Adapted Neuromanagement, Neuro-Integral Methodology, 3600 Evaluation, Neurofeedback and Intervention

1. Introduction

It is possible that, when translating an extensive document, some minor errors may have been made. However, the first author would like to emphasize that the diagnosis conducted goes far beyond the contours of diagnosis with additional data not yet incorporated (but under consideration for subsequent papers and presentations), which is highly viewed as

relevant. For example, one valuable insight is the ability to identify people with a higher predisposition to danger, such as those who may be more susceptible to workplace accidents.

This information is crucial for risk prevention in the work environment. Additionally, diagnosis offers data that do reveal aspects related to leadership, among other important topics. This approach is truly innovative, and could further enhance its applications and reach.

What makes this diagnosis significant is its ability to go beyond traditional question-answer methods used in tests and assessments. It's literally as if we can interrogate the brain directly, generating real stimuli that allow us to observe how a person makes decisions under pressure, how they get stressed, how they recover from that stress, how they adapt to change, and much more. All of this is analyzed from a solid neurological foundation, which is crucial, as while a person can lie or skew their answers in a traditional assessment, the brain doesn't lie when subjected to pressure or high cognitive demands. Moreover, we use additional sensors that provide us with physiological responses like breathing, heart rate, sweating, or skin resistance, among many others, giving us even more valuable information.

Adaptive Neuromanagement constitute a transdisciplinary approach that integrates advanced knowledge in neuromanagement with personalization and contextualization of specific interventions for individuals and groups in diverse settings. This approach is oriented towards optimizing cognitive performance, emotional regulation and physical activity through evidence-based techniques adapted to the unique characteristics and needs of each context, that is, with a people-centered perspective for flourishing human (2).

Due to its fundamental theoretical orientation in scientific field of greatest extension and validation, Adapted Neuromanagement resumes its surname 'Adapted' in the field of study of life, theory of evolution supported by Charles Darwin since publication of 'The Origin of Neuromanagement'; Species through natural selection. Thus, we understand adaptation as a process by which living organism develops behavioral characteristics that allow it to live well in the different environments and scenarios in which it coexists with other living beings. Conception of adaptation makes two other notions relevant. First, Living-Well, a term that emphasizes commitment of adapted neuromanagement with general framework of studies of well-being and quality of life (Rojas, 2020). Second, to environment, context or scenarios in which human being interacts as a being-in-the-world (Seamon, 2018). Based on these, Adapted Neuromanagement go beyond an instrumental definition; they are embedded in development of Management as a way of adapting its contents and developments to human needs, with a focus on well-being (3).

Adapted neuromanagement aims to go beyond theoretical framework by focusing on practical application of neuroscientific knowledge to improving quality of life. It seeks to bridge the gap between laboratory findings and everyday life, personalising interventions to the unique needs of various individuals and/or communities. Through overlap in Psychology, Biology, and the Environment, adapted neuromanagement aims to optimise human well-being, performance, and resilience across myriad of Ages and circumstances. It does have applications in education to healthcare to social interaction (4).

1. Aim and Objectives

Artificial intelligence plays a key role in interpreting brainwave data, allowing for the real-time identification of patterns of attention, meditation, and stress. A thorough analysis was conducted, correlating this data with the personality test results and key elements of the patient's personal narrative. This multidimensional approach enables an in-depth analysis of how the brain responds to different cognitive and emotional demands, and how these responses affect overall well-being (Alexander et al., 2021).

This paper provides a comprehensive analysis of subject - patient's brain activity, cognitive performance, and personality profile, using innovative approach that combines cutting-edge neurofeedback (brain-wave reading), artificial intelligence tools, and personalized analysis of personal narrative. This methodology, based on electroencephalography (EEG) with devices like MyndBand Being considered in subsequent attempts), allows real-time measurement of [Paulo's] brain activity while experiencing real-life situation simulations, including cognitive tasks, meditation sessions, and auditory distractions. Understanding how brain responds to everyday challenges is key to developing this paper. The paper proposes a Personalized Development Plan, based on test results, outlining clear goals and practical strategies aimed at improving stress management, cognitive flexibility, and decision-making. The ultimate goal is to provide tools that enhance the patient's personal and professional development (Aristóteles, 2009; 2016).

2. Methodology
2. 1. Adaptation in Darwin's Framework

Evolution and genetic or environmental components these days are having a clash directly with component of Trait as a separate determining factor in personality studies of species. It is still a grey zone, so lots of possibilities can be explored. This highlights part of 'Relationship between Adapted Neuromanagement and Charles Darwin's Theory' where it indicates that Adapted Neuromanagement are based on principles of adaptation and evolution that Charles Darwin presented in his theory of evolution by natural selection (5). This theory, first detailed in his work 'On the Origin of Species' in 1859, establishes that species evolve over time through a process of natural selection, where individuals with advantageous characteristics for their environment are more likely to survive and reproduce, passing these characteristics on to their offspring.

Natural Selection: Natural selection is the key mechanism by which traits that improve an organism's ability to survive and reproduce become more common in a population over generations.

Adaptability: Species that can better adapt to changing environmental conditions are more likely to survive. This adaptation process is continuous and dynamic, allowing species to evolve in response to new challenges and opportunities.

Survival of Fittest: 'The fittest' refers to those individuals best equipped to face their specific environment, not necessarily the strongest, but the most adaptable.

Adapted Neuromanagement: Adapted Neuromanagement take these evolutionary principles and apply them to the study and intervention in human cognitive and emotional functioning. This transdisciplinary approach integrates advanced knowledge in neuromanagement with the personalization and contextualization of specific interventions for individuals and groups in various settings.

Adapted Neuromanagement and Darwin's Theory: Parallels

Personalization and Contextualization: Just as in natural selection, where specific adaptations of an organism are closely related to its environment, Adapted Neuromanagement aim to develop personalized interventions that consider the unique needs and characteristics of each individual and their context.

Performance Optimization: Adapted Neuromanagement focus on optimizing cognitive performance and emotional regulation through evidence-based techniques that are tailored to individual characteristics, promoting 'well-being' in the various contexts in which a person develops.

Prevention and Resilience: Similar to how species develop adaptations to survive in their environment, Adapted Neuromanagement focus on prevention and resilience, helping people develop skills and strategies to effectively face and overcome challenges.

2.2. Transdisciplinary Approach

Adapted Neuromanagement aim not only to prevent and correct problems but also to optimize human well-being and performance. This holistic approach considers well-being from an integral perspective, encompassing biological, psychological, and social aspects. Just as in Darwin's theory, where adaptation is a continuous process, Adapted Neuromanagement promote constant and dynamic individual development, adjusting to changes and environmental demands. The relationship between Adapted Neuromanagement and Charles Darwin's theory lies in the application of adaptation and evolution principles to the study of the human brain and mind. By understanding how individuals can better adapt to their environments and optimize their cognitive and emotional functioning, Adapted Neuromanagement aim to improve well-being and resilience, offering practical and personalized solutions that reflect the evolutionary processes described by Darwin.

2.3. Epistemic Foundation

The brain has immense capabilities. We understand that generation and application of knowledge has transdisciplinary methodological future, based on scientific evidence and centered on people. It is considered a 'person-centered approach' because it is recognized that each 'flesh and blood' person presents unique profile of psychosocial configuration and brain activity, requiring personalized interventions. In addition, sustainable development objectives in the 2030 agenda offer governance horizon towards well-being, resilience and sustainability; these three components are central to our institutional work.

2.4. Knowledge Management

All knowledge generation and application procedures are developed with robust methodologies based on scientific advances in Cognitive Management (Rich, et al., 2021), Brain-Computer Interface (Bansal & Mahajan, 2019), Technological Innovation and in the New Humanities. Among the main analysis methods is work with Big Data, Graph Theory and Social Network Analysis, Machine Learning, Bayesian Statistical Analysis, Artificial Neural Networks and Generative Artificial Intelligence, all with the aim of understanding complex relationships, non-linear and dynamics of human behavior (Mitchell, 2009).

Figure1. General Knowledge Management Model with Neurointegral Methodology
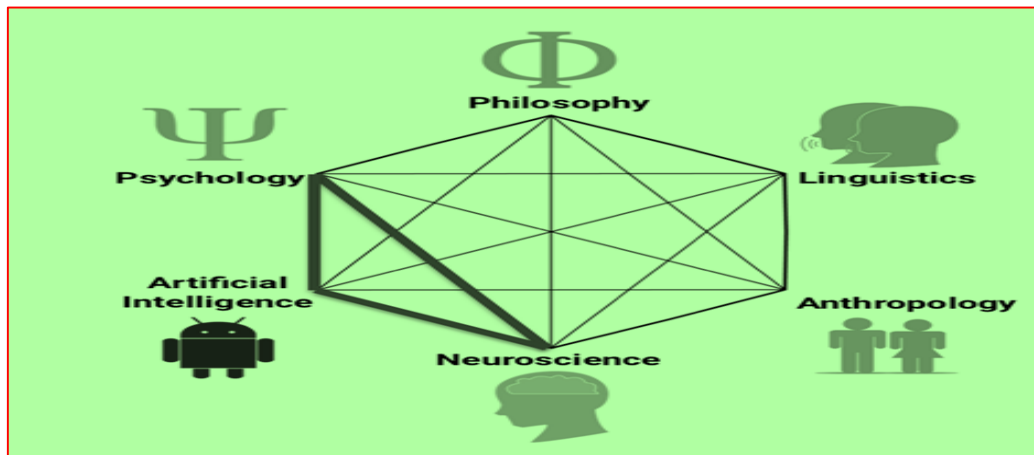
Note. NeuroIntegral Methodology through operationalization of its 360 protocols has adapted assumptions of Cognitive Management approach made up of six disciplinary fields: Philosophy and epistemology of mind, Cognitive linguistics, Anthropology, Neuromanagement, Artificial Intelligence and Cognitive Psychology (Favela, 2020; Rich, et al., 2021). In hexagon, thicker lines highlight transdisciplinary interactions relevant to NeuroIntegral Methodology: Neuromanagement, Artificial Intelligence and Psychology.

Psychology has usually focused on understanding of disorders, dysfunctions and psychopathologies of human beings, that is, on typically negative phenomena. For its part, positive psychology that emerged in mid-20th century was focused on positive psychological phenomena, which in a detailed review paved way for study of flourishing and well-being. Finally, a third wave of positive psychology ("actually the beginning of a new multi-, inter- or transdisciplinary domain of study focusing on well-being as multimodal with a focus on humans, but also beyond the individual and human social systems") studies has expanded epistemological bases of this approach, adopting more holistic, complex dynamic systems perspectives to develop interventions in diverse flourishing contexts (Lomas, et al., 2021). "The third wave reformulates and synthesizes previous generations of behavioral and cognitive therapy and carries them forward into questions, issues, and domains previously addressed primarily by other traditions, in hopes of improving both understanding and outcomes."(Hayes, 2004)." It is under this model that the NeuroIntegral evaluation and intervention protocols return to their foundations.

In this context, optimal levels of psychological well-being are a crucial element for human flourishing and thriving as people. However, the experience of well-being tends to decrease among people who have experiences of mental health diagnoses, such as depression and anxiety. Beyond focusing on positive outcomes, such as optimal levels of psychological well-being, mental health programs prioritize the identification of mental symptoms or disorders (Lomas, et al., 2021). Thus, priority has been given to developing treatments that reduce mental health problems rather than improving aspects of increasing well-being (Rottenberg, et al., 2024).

To achieve neurointegral improvement, mental flexibility is considered an important mechanism for the likelihood of psychotherapeutic success in any diagnosis. In general, increased flexibility is associated with changes in people's symptoms, quality of life, and level of general functioning (14). Therapeutic programs that assume changes in mental flexibility have presented a significant decrease in symptoms, papering higher levels of quality of life

and functioning. Therefore, evidence on flexibility attention programs is crucial as a transdiagnostic process in the success of psychotherapy and psychological interventions (Rutschmann, et al., 2024).

Another fundamental element is self-control. Self-control is an essential life skill. A philosophical reflection on this indicates that, sometimes, the impulse to act in a certain way is at odds with what is known to be best, so self-control must be used in a better way to achieve more valued goals (15). The topic of self-control has recently gained great interest in disciplines such as psychology, neuromanagement, economics and sociology. Broadly speaking, self-control refers to the pursuit of valued long-term goals despite the momentary predominance of lower-value, short-term alternatives that are impulses with momentarily attractive outcomes (Duckworth & Gross, 2024).

Both psychological flexibility and self-control are two higher functions associated with the activity of the prefrontal cortex of the human brain, involving cognitive, emotional and social processes (see Figure 2); These functions are susceptible to shaping through feedback training processes and various comprehensive exercises, procedures that the NeuroIntegral Methodology has collected and systematized for its work of prevention, correction and optimization of the human factor.

Figure 2. Neurointegral Methodology in Model Of Positive Emotions
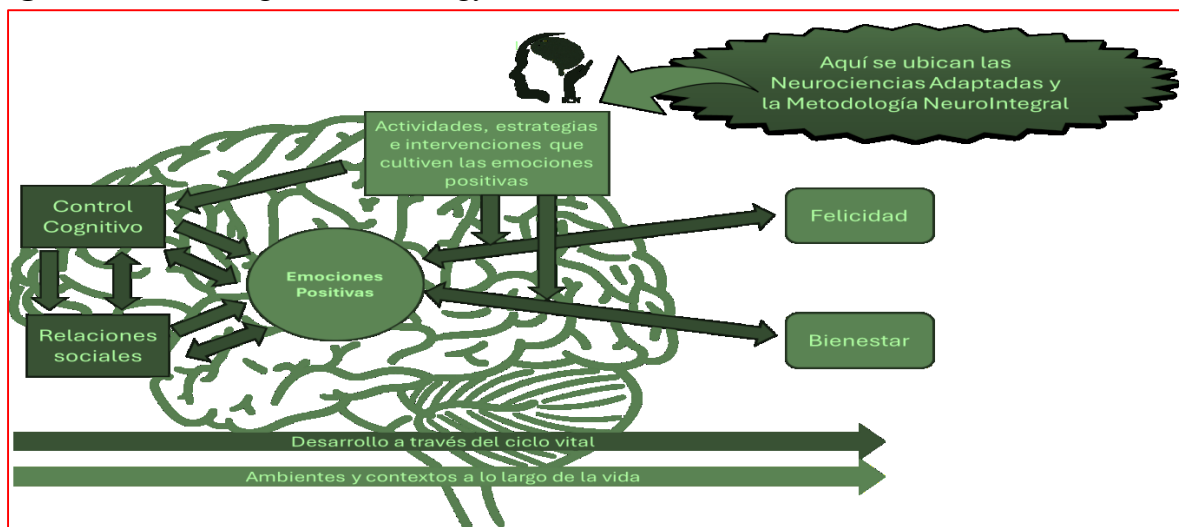
Note. Figure adapted and translated from the Conceptual Model of the psychological correlates of positive emotions and their influence on well-being outcomes. Redrawn from Figure 1 of Alexander, et al. (2021: 222).

Additionally, the term tunnel vision evokes the narrowing of the visual field, where one center of an image can be clearly focused, but blindness is experienced in peripheral vision. This term has a cognitive equivalent about the experience and information that human beings handle in different contexts (Mullainathan & Shafir, 2016). Tunnel vision is usually a metaphor used to express the way in which human beings tend to overestimate certain information and underestimate other information. This vision allows us to focus on the problems, but leaves aside the context of decision-making under uncertainty (Glimcher, 2018). It is commonly associated with solutions focused exclusively on problems, the management of negative emotions, warning signs about threats, generating states of alert and

sustained stress (16). On the other hand, the big picture view provides a broad context for decision-making, typically called 'slack,' and allows people to be more creative in overcoming difficulties. Panoramic vision is commonly accentuated when positive emotions are experienced and generate what has typically been called in the scientific literature as an 'upward spiral of flourishing' (Garland, et al., 2010).

Figure 3. Tunnel Vision versus Big Picture Vision in Affective Response & Decision Making
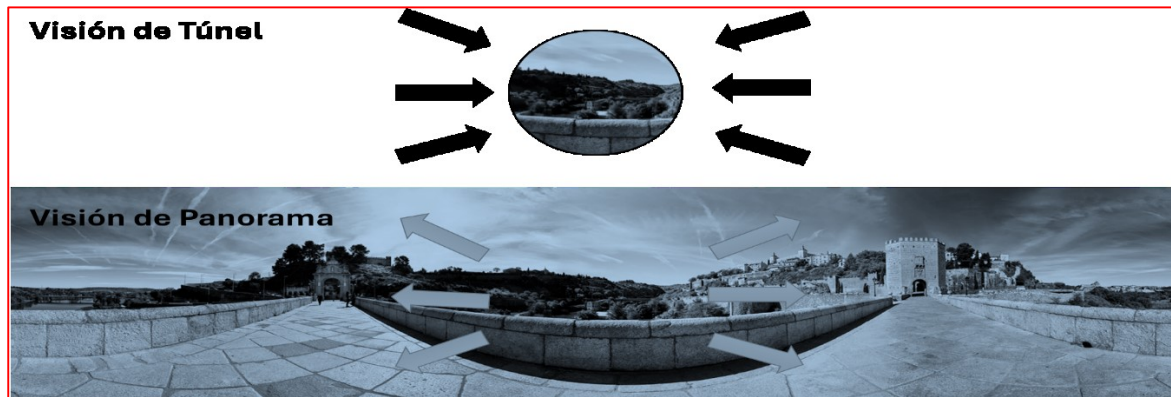
Note. Adapted Neuromanagement and NeuroIntegral Methodology have incorporated advances in neuroeconomics and behavioral economics to provide contextual responses to people we accompany in evaluation and intervention processes, guiding practices to generate a vision of panorama in solving problems.

In summary, integration of these approaches and concepts in the evaluation and intervention protocols of the NeuroIntegral Methodology provides a solid basis for the prevention, correction and optimization of cognitive performance, emotional regulation and social connectivity, as part of a comprehensive intervention in mental health. In addition to these foundations, advances in the analysis of brain activity, neuroplasticity, mind-body interactions and brain-computer interface have been relevant in the evaluation processes and in the generation of quantitative and qualitative indicators that allow us to understand how the methodologies used have allowed the prevention, correction and optimization of the human factor in general.

3. Research, Development and Innovation

The research unit of NeuroIntegral Scientific Institute, Bogota implements plural methodological processes based on paradigms of complexity and cognitive management. Due to this transdisciplinary integration, the Institute is seen as a scientific space oriented to human flourishing with cutting-edge development and innovation.

There are four main fields of application and adaptation:

- Cognitive psychology and social cognition
- Cognitive and affectiveneuromanagement
- Social management (philosophy and economics)
- Artificial Intelligence and Machine Learning

The field of cognitive and social psychology is inspired by research on social perception, attitudes, attributions, priming, and social cognition, where the topics of decision making under uncertainty, rationality, dual systems model and heuristic judgments are raised (Kahneman, et al., 2021; Pinker, 2021). This field implements a wide variety of

methodological approaches, from the development of factorial experiments, psychometric evaluations and Big Data analysis with national and international repositories for the exploration of macrotrends in human behavior. At the NeuroIntegral Scientific Institute, the corresponding field is the analysis of subjective experiences and experiences, since it allows the analysis and approach of a large number of phenomena related to the human psyche (Giorgi, 2015).

For its part, in the field of cognitive neuromanagement, brain activity is analyzed through electroencephalographic recordings and brain mapping with quantitative electroencephalography (qEEG), as well as the application of intervention and training plans with Neurofeedback technology. In this disciplinary field, brain imaging studies are carried out that propose functional correlates with cognitive functioning and decision making for the generation of Neurofeedback intervention protocols adjusted for each participant or person we accompany. Our neuroimaging, brain mapping and brain minimapping equipment are tools to verify the psychological changes related to the NeuroIntegral Methodology interventions (see Figure 2).

Figure 4. Neuroimaging technologies in Adapted Neuromanagement and NeuroIntegral Methodology

Note. The figure shows three images that correspond to the domain of generation and application of knowledge about brain activity through technology in adapted neuromanagement. A) Brain mapping by qEEG is shown with normalized results of brain activity. These 'heat' maps allow a comparative interpretation between a neurotypical group and the activity of the subject under evaluation, making the hyperactivation or hypoactivation of different parts of the brain clearer. The cerebral cortex. B) The basic scheme of how training with Neurofeedback works, technologies based on brain-computer interface research is shown. C) Illustration that shows what the professional services based on the NeuroIntengral Methodology are like for prevention, correction or cognitive optimization. Finally, the field of humanities and social management is an area of knowledge that links developments aimed at understanding social phenomena and interpersonal connection. Social cognition, behavioral economics, social neuromanagement and neuroeconomics are located within this field of work of the Institute (Campos, 2017; Thaler, 2019).

The Institute's data collection efforts use a group of diverse research methodologies, experimental and non-experimental quantitative approaches, biomarkers, psychometric evaluations, in-depth interviews, surveys, purposive and probabilistic sampling, so the tools are available to cover the developments proposed at an interdisciplinary level and attention to diverse fields of application. A summary of main work tools is (20):

- Phenomenological and open interview protocols.
- Adaptive computerizedpsychometricbatteries.

- Go-no go performance tasks and hot/cool cognition.
- Qualitative and quantitativeelectroencephalography.
- Brain mapping and brain minimapping.
- Neurofeedback and Biofeedback training.

4. Results

Our baseline evaluation protocol has been established through a multidimensional examination design that allows the observation of multiple spheres of the biopsychosocial life of our clients, using various types of neuromanagement technologies, cognitive psychology and artificial intelligence, State-of-the-art care models have been developed to propose personalized and person-centered protocols. Our protocols apply the following diagnostic and evaluative activities.

4.1. Self Pattern Examination Interview (EPY)

To begin, a face-to-face interview is carried out with the examiner to inquire about various experiences and personal experiences associated with habits and health in general. In this stage of in-depth qualitative analysis, 10 elements are examined: 1) bodily processes, 2) processes of pre-reflective experience, 3) affective processes, 4) behavioral or action processes, 5) social or intersubjective processes, 6) cognitive or psychological processes, 7) reflective processes, 8) narrative processes, 9) ecological processes and, 10) regulatory processes (Daly, et al., 2024). This pattern analysis assisted by Artificial Intelligence allows the identification of configurations of the Self associated with overwhelm, stress-distress, high demand and cognitive overload, as well as the direction of behaviors directed at goals and environments oriented to biopsychosocial states of stability/destability. These interview processes are based on the most recent studies on the so-called 4E Cognition, understood as embodied, embedded, enactive and extended cognition (Newen, et al., 2018).

Table 1. Elements of Self-Pattern Examination Interview

Patterns	Description
Body processes	It includes the entire basic core of autopoiesis processes (Maturana & Varela, 2003) related to motor, autonomic, endocrine, immune, and interoceptive functions, which allow the general work of the system to maintain the homeostasis necessary for the survival of the organism. people.
Processes of pre-reflective experience	It includes people's pre-reflective self-awareness, that is, the characteristic structure of first-person consciousness delimited by bodily factors, the sense of ownership or 'sameness,' and the sense of agency that may involve various sensory and motor modalities, such as such as proprioception, kinesthesia, touch and vision. These aspects form the core experiences of what is often called the minimal Self.
Affectiveprofessors	The fact that someone manifests certain temperamental or emotional dispositions reflects a particular mix of affective factors that range from basic elements to those more covert or tacit such as hunger, fatigue and libido, which are more typical emotional patterns, a set of feelings. existential, or background mood.
Behavior/actionprocesses	Behaviors and actions make us who we are. Behavioral habits and skills reflect and constitute our character. This is a classic look at Aristotle's lessons in his

	works on Ethics (Aristotle, Trans. 2016; Trans. 2009).
Social/intersubjectiveprocesses	Humans are born with the ability to synchronize with intersubjective existence; from the point of view of social relationships, the self-conscious development and recognition of oneself as a being distinct from others, a sense of being-by/for-others, and a sense of being part of a group or community.
Psychological processes	These processes have been classically emphasized in theories of personal identity that emphasize psychological and memory continuity, including our conceptual understanding of self, beliefs, cognitive dispositions, and personality traits.
reflective processes	The ability to reflect on our own experiences and actions, closely related to the notion of personal autonomy and morality, includes the ability to evaluate and form second-level volitions about personal decisions.
narrative processes	Self-interpretations have a narrative structure and recursive (and often reinforcing) reflections of the Self pattern. In some theories they are inherent or constitutive narrative entities.
Ecologicalprocesses	People tend to identify ourselves with our 'things', physical things we own, clothes, home, and various things we are, the technologies we use, the institutions in which we work, etc. Our embodied and situated actions are engaged with (and also incorporate) different artifacts, instruments and structures of our environment in ways that define our identity.
Regulatoryprocesses	Our extensive commitment to the context, including the social and cultural practices in which we are immersed. They are delimited by social, cultural and institutional factors that shape our habitual behavior and our self-conception of how we are and how we think we should be.

Source: Translation and own adaptation of the works of Daly, et al. (2024) and Gallagher (2024)

The qualitative information deepened in the interview will be used as criteria for the adaptation and personalization of standardized tests, examination protocols that will be carried out during the evaluation. In addition, calibrated and standardized sets of stimuli are used that facilitate in-depth analysis and intrapersonal and interpersonal comparisons.

4.2. Computerized and Adaptive Psychometrics (PIA)

Advances in psychometric technology are used to apply digitalized questionnaires that adapt based on the answers that people have for each item or question. This innovation in psychometry has been the result of research by the NeuroIntegral Scientific Institute based on the working databases it has had for years. The PIA raises questions such as the following: What is the minimum number of questions that can be asked about people's emotional state to identify the prevalence of depressive or anxiety symptoms?

These advances of the institute have been possible thanks to the technological implementation of Big Data, Bayesian Statistical Analysis and Machine Learning that make our cutting-edge psychometric scales possible.

Some of the components of our PIA are:

- HEXACO PersonalityMapping
- Performance in Primary Mental Skills
- WellnessProfile and CharacterStrengths
- Psychosocial risk factors in the workplace

In addition, there is a wide range of psychometric batteries for personalized application. Below, the characteristics of these evaluations and their importance for the development of personalized prevention, correction and optimization interventions are described in general terms.

4.3. HEXACO Personality Mapping

HEXACO model of personality is perhaps one of the most relevant theoretical models currently in the study of personality (Ashton & Lee, 2020). The HEXACO Personality Inventory 60 (IP-HEXACO-60) is a computerized personality profile scale that provides information on six personality factors: Honesty-humility, Emotionality (neuroticism), Extraversion, Agreeableness, Conscientiousness (responsibility), and Openness to experience and in a total of 24 facets corresponding to these factors. This instrument is based on the Big Five Theory, one of the most representative theoretical models in the measurement and analysis of personality (Ahston& Lee, 2014; Zettler, et al., 2020). The translation and adaptation has been carried out by members of the Institute as a systematic process and with sociocultural references for Latin America and Spanish-speaking people, in addition to having the original version in English and more than 20 additional languages (22).

What does the HEXACO profile offer us? A reliable and valid measure for the identification of the most dominant personality traits in behavior, thought patterns and affective-emotional regulation, personality profile and indicators of adaptability of the behavior of those evaluated (see Figure 1). By identifying the strengths, weaknesses, and areas of development based on these personality traits, the HEXACO test model also facilitates personal growth and self reflection. It applies to adults 18 years of age and older.

Figure5. HEXACO PersonalityMapping
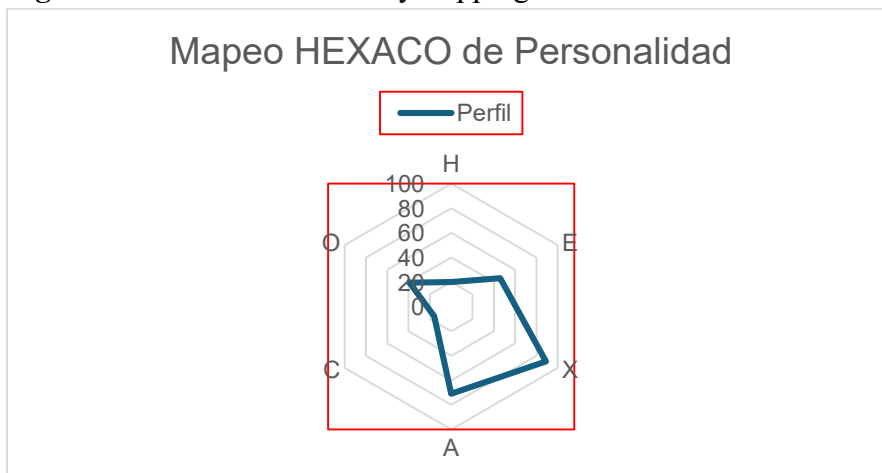
Note. The mapping or visualization of the personality profile through the IP-HEXACO-60 is a valid and reliable measure for the identification of the most salient personality traits in clients, it offers a measure of knowledge or self-knowledge of the adaptive behaviors of clients for personalized adjustment of NeuroIntegral 360 intervention protocols.

4.4. Performance in Primary Mental Skills (HMP)

In general terms, primary mental abilities are understood as the psychic activity in which human cognition can be crystallized, beyond a conception of intellectual quotient, our approach—based on the 4E Cognition paradigm, which refers to the Embedded, Embodied, Enactive, and Extended conception of mind (Newen, et al., 2018)—, defines the cognition evaluated with the HMP as enaction, that is, 'history of bodily and structural coupling that enacts (makes emerge) a world' (Varela, et al., 2011: 240). Thus, our understanding of primary mental abilities is broad; they always involve the personal trajectory of individuals and the way in which they have adapted to their context.

To understand the way in which people make their world emerge, we used a group of activities organized into five factors from Louis Thurstone's Primary Mental Abilities scale (Thurstone & Thurstone, 2012). The factors are the following: Factor V. Verbal Comprehension, an important element for learning through oral or written language, a person with good verbal comprehension has important resources for learning and brain plasticity, establishing relationships of greater empathy, understanding the others, the emotional and social environment that surrounds him (24).

Factor E. Spatial Understanding facilitates the spatial interaction of people with their physical environment, optimizing the spatial relationships in which they live: home, work centers and spatial settings in general where their corporeality is located. The R Factor. Reasoning, raises the skills associated with cognitive inference, induction, deduction and the ability to express logical responses in the identification of patterns and in the prediction of configurations of reality; This factor can be considered as the factor typical of system 2 of thinking, slow, but in which people make an effort to reduce cognitive biases by not taking any mental shortcuts as is typical in system 1 thinking (Kahneman, 2012).

Factor N. Number Management evaluates people's mental calculation capacity, it is an important component for mathematical understanding, however, this task has some of the most interesting configurations from an integrative and enactive approach, in addition to taking of quick decisions that are made during the N Factor test, this can be considered a 'reality test' test, that is, it exposes people's ability to identify the relationship between their feelings, emotions and thoughts. with what happens in reality or in an 'objective' way, evaluating its own behavior as an adaptive response to the context, for this reason, it is strongly associated with mental flexibility and emotional intelligence (see Figure 6). Finally, Factor F. Verbal Fluency allows us to understand how people have the ability to express their thoughts and emotions in the social sphere.

Figure 6. Cognitive Flexibility Model Integrateings Cognitive and Emotional Aspects

Note. Research at the NeuroIntegral Scientific Institute through its Adapted Neuromanagement and NeuroIntegral Methodology approach has discovered important relationships between factors traditionally called 'IQ' and so-called 'emotional intelligence.' In this case, verbal understanding and handling of numbers as 'cold' cognitive skills are closely related to some factors of emotional management such as emotional understanding, empathy and reality testing. The results indicate that 'link' skills between these two apparently separate fields occur through executive functions of prefrontal cortex, especially dorsolateral region of brain, called mental or cognitive flexibility.

4.5. Wellness Profile and Character Strengths

The 20th century was dominated by the idea that a high economic income is enough for people to reach optimal levels of well-being and quality of life. From this idea arises the paradigm of progress as economic growth. At the center of this approach are the GDP (gross domestic product) or GDP (gross domestic product) metrics and other related concepts as indicators of progress in societies. However, in recent years it has been shown that it takes more than a good income to have well-being (27).

A paradigm shift has resulted in the premise of well-being as the progress of societies. From this point of view, economic development is not enough to explain well-being; income is only an instrument that must be considered together with other factors that are sources of well-being (28). To overcome these global paradigm changes, the NeuroIntegral Scientific Institute integrates into its evaluation and intervention protocols the metrics on subjective and psychological well-being, with a view to always having an evaluation of the experiences and experiences of the people we accompany, for this, have assimilated the metrics presented in Table 2.

Table 2. Well-Being Profile and Character Strengths

Indicators	Description
Satisfactionwithlife	Evaluative component of subjective well-being, a single item indicator that synthesizes information about the life trajectory, evaluation of achievements, failures, general aspirations. Itisthemetricwiththehighestemploymentinternationally.
Positive affects	Affective component of subjective well-being, it evaluates the emotions, affections and positive feelings that people experience, such as joy, patience, hope, concentration, vitality, tranquility, among others.
Negative affects	Affective component of subjective well-being. It is not considered a continuum of positive affects, so people can experience both in different magnitude and frequency. This group includes emotions, feelings and affects such as sadness, despair, worry, fear, suffering, anger, among others.
Eudaimonia	A metric associated with psychological well-being, in this you can find components such as self-esteem, optimism, freedom of decision, commitment, locus of control, purpose or meaning in life, resilience and burnout.
Characterstrengths	Character strengths allow the evaluation of the values and virtues that people require to increase their psychological well-being, evaluating a total of 24 strengths divided into six major components: Wisdom and knowledge, Courage, Humanity, Justice, Temperance and Transcendence.

The well-being profile allows the generation of a global image of people's experiences of well-being and discomfort, not as a metric of pathology, but of the mental health experience that people have, thus, this evaluation It is relevant as a general 'x-ray' of how people reach the Institute's intervention protocols. The well-being profile is made up of the evaluation of life satisfaction, affective balance (positive and negative affects), and eudaimonia. These three dimensions form a baseline of the emotional constitution that people have when undergoing surgery under our NeuroIntegral Methodology.

On the other hand, Character Strengths have been shown to be a relevant measure for intervention in positive psychology to increase levels of psychological well-being (Niemiec, 2019; Seligman, 2021). Character strengths aspire to develop human virtues that are oriented towards human flourishing, therefore, the interventions developed in the NeuroIntegral 360 protocols take up these people-centered metrics.

4.6. Psychosocial Risk Factors

Another important aspect in the consideration of the evaluation and intervention protocols of the NeuroIntegral Methodology sample is the review of the Psychosocial Risk Factors in the Workplaces, these are important components for the development of people and organizations as a whole (Uribe, 2016). Amongthefactorsanalyzed are:

1) The conditions in the work environment,
2) Theworkloads,
3) Lack of control over work,
4) Theworkdays,
5) Interference in the work-family-personal life relationship,
6) Positive and negative leadership,
7) Interpersonal relationships at work,
8) Perceptionofworkplaceviolence,
9) Performance recognition,
10) Sense of belonging and job stability.

In addition, there is a measure of Organizational Climate (Méndez, et al., 2024) that evaluates Morale, Direction, Innovation, Motivation, Satisfaction, Leadership and Rewards. These instruments are applied in work centers based on the profile of needs of the clients, people and organizations that we accompany in intervention processes with our methodology.

4.7. Evaluations for Children and Parents

The evaluation tasks for children and parents obtain an important differentiator in the NeuroIntegral Methodology, this because they analyze dynamic and systemic structures of interaction between the members of a family, their functioning and regulation. Neuropsychological work with school-age children (6 to 12 years old) is essential for academic success, high results in living standards, and intergenerational social mobility at a longitudinal level (Campos, 2016). For these reasons, analyzes of infants from the perspective of Adapted Neuromanagement and NeuroIntegral Methodology are important.

Among the main methodological contributions in evaluation are the development of Interviews with parents and guardians, an interview with children and free play, the specialized application of PIA for the Development and evaluation of self-concept in childhood (PAI) Villa &Auzmendi, 1999), assessment of cognitive performance with matrix analysis tasks and the adaptation of neuroimaging protocols to be implemented with school-age children. Table 3 presents the synthesis of the evaluations in this field of care.

Table 3. Elements of Child Evaluation Protocol

Metrics	Description
Interview with parents or guardians	It is a second-person interview that analyzes the parents' or guardians' vision of the children's ego patterns. It includes questions about the 10 dimensions in Table 1 adapted to school-age children.
Interview with children and free play	Approach and empathy interview with children, seeks to 'break the ice' in the relationship between facilitator-client and the three basic repertoires of behavior are observed: Attention, Imitation and Following instructions.
Adaptive behavior Evaluation system	It evaluates adaptive behavior throughout the life cycle, especially for children ages 6 to 12, analyzing adaptive skills in three main domains: conceptual skills, which include communication, academic skills and self-management; social skills, which encompass social interaction, play, and behavioral skills; and practical skills, which relate to daily living, self-help, safety and community skills. These factors allow us

	to evaluate how children manage everyday demands and develop in different contexts (Harrison & Oakland, 2008).
Upbringing and Parenting styles	It assesses parenting practices across four key dimensions: the authoritative style, which involves warmth, support and reasonable expectations, encouraging autonomy; the authoritarian style, characterized by high demands and control, with little warmth and communication; the permissive style, which shows high warmth and low demand, with little discipline and control; and the neglectful style, defined by low warmth and demand, with little involvement in the child's life. These styles are evaluated to understand how parenting practices affect children's emotional, social, and behavioral development.
Perception of child self-concept	Application of a standardized psychometric scale, for the development and evaluation of self-concept in childhood, this scale is carried out with comparative images of individual, family and social contexts that allow the identification of children's coping styles of their different adaptive contexts (Villa&Auzmendi, 1999).
Raven'sProgressive Matrices	A classic component, but of high relevance in the assessment of cognitive performance in conditions of cool-type tasks, allows the identification of rationality and is linked to high-performance tasks with EEG recording equipment.
Child Wellbeing Profile	Adaptation of the standardized well-being profile scales: satisfaction, affects and eudaimonia (see table 2).
Character strengths for children	The character strengths test in its version for children has been reviewed by the original authors, so an application can be made to identify the 24 children's character strengths (Niemiec, 2019).
5 digit test	This qualitative application test analyzes performance on attention and interference processes important in the early detection of attention deficits or psychopathological diagnoses in children. However, in the NeuroIntegral Methodology it is also used for the analysis of mental flexibility in children.
King's complex figure test	Evaluates visuospatial skills, visual memory, and executive functions in children. It consists of copying and reproducing a complex figure, allowing us to measure the capacity for organization, planning, and short and long-term memory, essential for cognitive and academic development.

4.8. Cognitive Demand Tasks Q2 (TDC)

These tasks have two modes of application, one qualitative and the other quantitative. The first is applied in a vis-a-vis interview due to the complexity and qualitative examination of the activities, this is because we recognize that qualitative work requires human support that is difficult to replace and that facilitates our evaluations. While the evaluation of quantitative cognitive demand tasks is oriented towards the development of application protocols with computational interfaces, programming packages such as Python and Psychopy are used for the design of protocols with cognitive tasks of the go/no-go and cool/hot type. that record reaction times, type of response and number of errors. In addition, encephalographic activity (EEG) is also recorded in these activities, so the analysis of Event Evoked Potentials becomes important in the qualitative and quantitative analyzes of the evaluation (see Figure 7).

What are go/no-go activities? This type of tasks proposes the development of an activity where impulse control is required in decision-making, which makes it possible to identify the prefrontal brain activity associated with inhibitory control, attention and cognitive-affective regulation of people. Understanding people's performance in these activities allows them to improve the way they face scenarios of maximum uncertainty for better decision-making in the face of adversity. What are cool/hot activities? Similar to go/no-go, but in this case, hot activities present affective content, while cool activities only present cognitive content, in this way they reveal people's performance when emotional and affective aspects are involved or not in making decisions.

Figure7. Quantitative Cognitive Demand Tasks
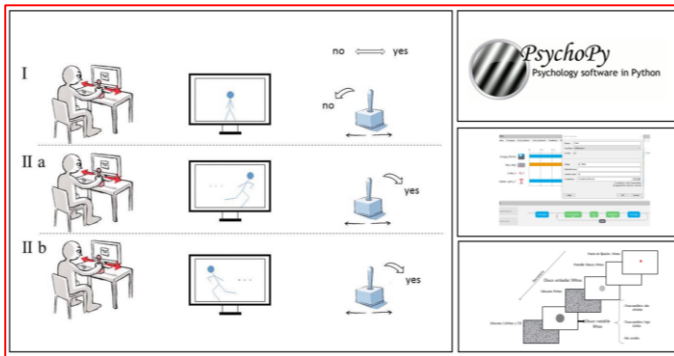
Note. Our advances in programming have allowed the development of tasks with high cognitive demand and decision-making under uncertainty that serve as training activities and evaluation of cognitive and emotional functions in go/no-go and cool/hot tasks. In addition, protocols for recording electroencephalographic activity are adhered to these examination techniques.

4.9. Qualitative Cognitive Demand Tasks

Qualitative cognitive demand tasks are exercises that require strong clinical content and review by professionals. These tests are used to carry out neuropsychological evaluations that allow us to address the three key dimensions of our methodology: Prevention, correction and optimization. Amongthisbatteryof vis-a-vis activities are:

1) **Rey Figure Test**: for memory abilities, visuospatial perception, among others.
2) **Five Digits Test**. It analyzes the Stroop effect of interference between semantic and perceptual tasks, allowing the evaluation of executive functions such as: inhibition, mental flexibility and alternation.

Quantitative Cognitive Demand Tasks

Quantitative cognitive demand tasks are carried out through computerized tests that use computerized interfaces and analysis by EEG and Event Related Potentials (see Figure 7). Among the activities that are usually proposed are: Spatial reasoning, Logical reasoning, Mathematical reasoning, Decision making under uncertainty, Ethical dilemmas, Social cognition and Neuroleadership.

4.10. Neuro-imaging Records

Our evaluations with neuroimaging technology use advanced qualitative Electroencephalographic (EEG) and Quantitative Electroencephalography (qEEG) activity recording systems for the development of brain mapping for personalized and comparative analysis. Our equipment allows the recording of 14 channels of the 10-20 EEG system and monopolar protocols called Brain minimapping used in field work with Neurofeedback equipment. In summary, these records use highly specialized equipment for EEG, qEEG and mapping, Neurofeedback and Biofeedback that allow evaluation and training under the NeuroIntegral Methodology. Among the main EEG analyzes carried out by our laboratory at the NeuroIntegral Scientific Institute, it allows the interpretation of brain activity according to the type of activity, intrapersonal and intersubject comparison mappings, event-evoked potentials, activity coherence and synchronicity, cortical and arousal tone, all of them, oriented towards the assessment of brain health (Figure 8).

Figure 8. EEG analysis processes used in the NeuroIntegral Methodology
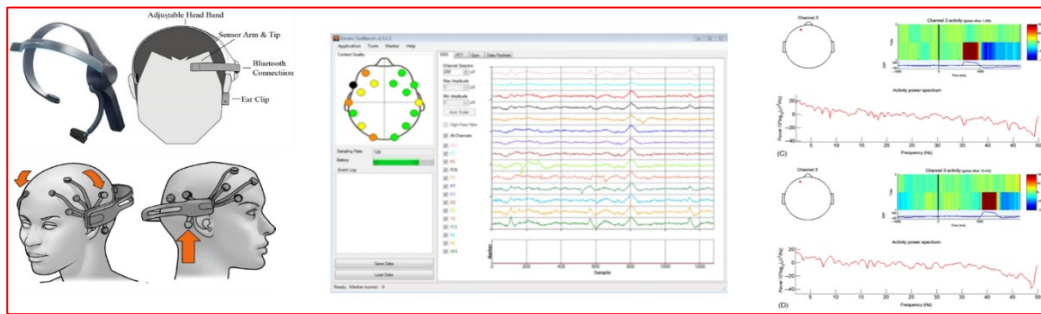
Note. Recording processes, qualitative and quantitative analysis of electroencephalographic activity with various latest generation EEG devices. The analysis and control of applications is proposed from brain-computer interfaces based on EEG (Bansal & Mahajan, 2019).

4.11. Neurointegral Methodology: Practical Implementation
What is the NeuroIntegral Methodology?

It is a pragmatic approach that translates the theoretical principles and scientific evidence on the study of cognition, emotion, social and brain domain in Neuromanagement Adapted to concrete, personalized and person-centered interventions. This methodology focuses exclusively on the implementation of advanced techniques and scientific tools to improve cognitive performance and emotional well-being, based on protocol evaluations obtained through Adapted Neuromanagement (34).

4.12. Key dimensions

Adapted Neuromanagement and NeuroIntegral Methodology raise key dimensions that are oriented to pragmatic work that is carried out through three clearly identifiable goals (Figure 9):

- **Prevention**: We understand that the best way to solve a problem is through prevention, which is why it is our main work strategy. In this dimension, the design and implementation of programs is carried out to improve general well-being and prevent the development of pathologies through a comprehensive biopsychosocial approach: The main program is the Human Flourishing Program.

- **Correction**: Mental health is a pressing issue that should not only be worked on from clinical approaches to psychopathology; on the contrary, 'positive' interventions are necessary that contribute to enriching people's general well-being, skills and abilities. . For these reasons, our corrective programs are oriented towards the application of specific interventions and treatments to manage and correct existing pathologies, mainly working from neuropsychological guidance. Neuropsychologicalcorrection and rehabilitationprogram (35).

- **Optimization**: Finally, our third key dimension is oriented to the work of optimizing people's well-being, performance and functioning. To this end, interventions are developed to improve cognitive, emotional and social performance in various groups of people (athletes, executives, students, etc.).

The key dimensions of our methodological work are guided by the three main lines of work for governance in the 21st century and are the basis of working with people for the new millennium, we refer to Wellbeing, Resilience and Sustainability, the new trinity of governance (Joseph & McGregor, 2020). Thus, our methodology aims to work to increase

well-being, develop more resilient behaviors in the face of people's contexts, and to provide the basic elements so that behaviors, thoughts and emotions are independently sustainable by the people we accompany in their lives processes (37).

Figure 9. Methodology: Key Dimensions
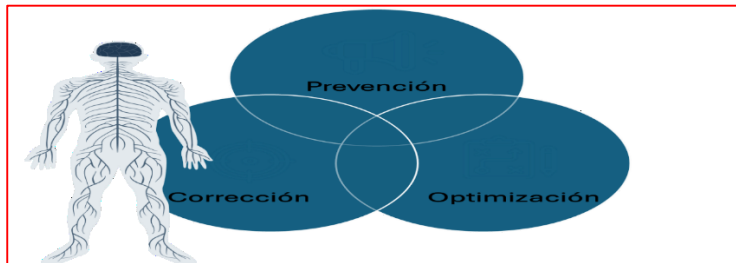
Evaluation Protocol: Adults

Our care protocols involve a biopsychosocial analysis of the people we accompany, so the broad evaluation that is developed allows a 360 NeuroIntegral Evaluation that offers an image of the different processes that constitute the human being in its adaptive behavior, the critical path of Our procedures are carried out in a total of three sessions carefully prepared and adapted to the needs of our clients and people we accompany, the general route is as follows:

Session 1

1) Record of reasons for consultation and sociodemographic data of the file
2) Open interview to examine ego patterns

Session 2

3) PIA Assessment
a. IP-HEXACO-60
b. HMP-Cognitive Performance
c. Wellness Profile and Character Strengths
4) Five Digit Test (mental flexibility)
5) Neuroimagingrecords
a. Base line
b. In cognitive performance tests
c. Return to base line

Session 3

6) Customerfeedback
7) Return of factor A (Adaptive).

4.13. Evaluation Protocol: Children

Working with school-age children (ages 6 to 12) is vitally important for academic success and life outcomes. Research throughout the life cycle has shown that both cognitive and non-cognitive skills (personality and attitudes) are vital for professional success and to have better life outcomes in different domains such as health, work, life. as a couple or family, and in general to enjoy greater life satisfaction, well-being and intergenerational social mobility (Campos, 2016).

Given these reasons, working with infants is relevant in the NeuroIntegral Methodology, which is why a 360 Evaluation Protocol is developed for this age group. Theevaluationproposesthefollowinganalysisroute:

Session 1

1) Record of reasons for consultation and sociodemographic data of the file
2) Interview parentsorguardians
3) Interview with children and free play activity

Session 2. Parentsorguardians

4) Analysis of upbringing and parenting patterns
5) Children's Adaptive BehaviorScale
6) Well-being Profile and Character Strengths (Adults)

Session 2. Children

7) PIA Assessment
a. Perception of Child Self-Concept (PAI)
b. Raven's Progressive Matrices Test for Children
c. Well-being and Character Strengths Profile for Children
8) Five Digit Test (mental flexibility)
9) Neuroimagingrecords
d. Base line
e. In cognitive performance tests
f. Returntobaseline

Session 3

10) Feedbackfromparents and children
11) Return of the AR (Adaptive-Relational) factor.

4.14. NeuroIntegral Intervention Programs

Based on the protocol evaluations obtained through Adapted Neuromanagement, we apply a variety of personalized intervention techniques oriented from the NeuroIntegral Methodology. These techniques have given rise to different programs that facilitate timely intervention in the evaluation fields:

Intervention with Neurofeedback and Biofeedback: Personalized training programs to improve neuronal and physiological self-regulation.

Mindfulness and Relaxation Techniques: Implementation of specific protocols to reduce stress and improve attention, adapted to individual needs.

Virtual Reality Exposure Therapy: Development and application of personalized scenarios to treat phobias, anxiety and PTSD, with more than 150 environments available for various therapeutic applications.

Cognitive performance training based on computational interface: Implementation of adaptive programs to improve specific executive and cognitive functions, based on the individual neurocognitive profile (see Figure 7).

Qualitative neuropsychological training: Implementation of rehabilitation and neuropsychological correction programs aimed at improving the psychological and brain functioning of people.

Emotional Freedom Techniques: Application of emotional reprocessing protocols to improve self-regulation, adapted to specific emotional needs.

Guided Neuroplasticity Interventions: Application of cognitive stimulation techniques designed to promote neuroplasticity in specific brain areas.

Character Strengths Program: Implementation of psychological well-being management programs based on scientific evidence.

Personalized Neuromanagement Education: Development and implementation of personalized educational programs on brain functioning, adapted to the level of understanding and needs of each individual or group.

4.14. NeuroIntegral Intervention with Children

Neurointegral intervention programs for children use most of the interventions carried out with adults, however, there is an important differentiator in working with neuropsychological factors for the correction and optimization of children's activity. These factors are: programming and control, sequential organization of movements and actions, phonemic hearing, kinesthetic analysis and synthesis, audio-verbal retention, visual retention, perceptual-analytical, global perceptual and cortical tone (González-Moreno, et al., 2012), which are described from greater to lesser integrative complexity (see Figure 10).

Figure 10. Neuropsychological of child intervention in 360 protocols

Factores	Descripción
Programación y control	Garantiza el proceso de ejecución de una tarea de acuerdo con el objetivo planteado (instrucción, regla o seguimiento) establecido.
Organización secuencial de movimientos y acciones	Garantiza el paso fluente de un movimiento a otro, inhibe el eslabón motor anterior para el paso flexible al eslabón motor posterior.
Oído fonemático	Garantiza la diferenciación de sonidos verbales del idioma dado de acuerdo con las oposiciones fonemáticas.
Análisis y síntesis kinestésica	Garantiza la estabilidad de las huellas mnésicas (volumen de percepción) en la modalidad audio-verbal en condiciones de interferencia.
Retención audio-verbal	Garantiza la estabilidad de las huellas mnésicas en la modalidad visual en condiciones de interferencia.
Perceptivo analítico	Garantiza la percepción y producción adecuada de rasgos esenciales y su ubicación en las relaciones espaciales entre los elementos de una situación.
Perceptual global	Garantiza la percepción y la producción adecuada de la forma general, de los aspectos métricos y las proporciones de los objetos.
Tono cortical y fondo general emocional	Garantiza el fondo emocional y la estabilidad de la ejecución de la acción, la correspondencia entre motivo y objetivo de la acción y la cognición social.

Note. Adapted Neuromanagement and its derivation in the NeuroIntegral Methodology take up the work of sociocultural neuropsychology to provide solutions for neuropsychological correction and rehabilitation in children and adults, therefore it recognizes the impact of the analysis and work from the factors inherent to the activity. Prepared and adapted with information from González-Moreno, et al. (2012).

4.15. Implementation Process

- **Intervention Design**: Based on the results of the multimodal neurocognitive diagnosis, a personalized intervention plan is designed.

- **Gradual Application**: The techniques are implemented gradually, allowing adaptation and adjustment according to the individual's response.

- **Continuous Monitoring**: During the intervention, constant monitoring is carried out using the diagnostic tools of Adapted Neuromanagement.

- **Dynamic Adjustment**: The intervention plan is dynamically adjusted according to the individual's progress and responses.

- **Results Evaluation**: Established success metrics are used to evaluate the effectiveness of the intervention.

4.15. Scientific Validation

Our adapted Neuromanagement approach contains theoretical-epistemological foundations that have been described in the first part of this document. Its derivation in the NeuroIntegral Methodology is offered from this foundation of practical work that is based on the discoveries and applications of neuromanagement, psychology, artificial intelligence and cognitive management in general, as well as interdisciplinary fields such as neuroeconomics and behavioral economics. Likewise, the methodology has been validated through rigorous case studies and publications in scientific journals. Our recent article 'Adaptive Neuromanagement and Neuro-Integral Methodology' presents empirical evidence demonstrating the effectiveness of our interventions in various contexts.

4.16. Success Metrics

We measure the success of our interventions by:

- **Changes in Brain Activity**: Using EEG and qEEG, we observed positive changes in brain activity after the interventions.

- **Reduction of Stress and Anxiety Levels**: We use standardized questionnaires to evaluate reductions in stress and anxiety levels.

- **Improvements in Cognitive Performance**: Through neuropsychological tests, we measure improvements in executive functions, working memory and attention.

- **Participant Feedback**: We collect testimonials and evaluations from participants to measure satisfaction and perceived impact.

4.17. Ethical Considerations

All our interventions are carried out under strict ethical standards, with informed consent, guaranteeing the privacy and confidentiality of the data, and respecting the highest ethical standards in research and clinical practice.

Our commitment to social responsibility and innovation raises this strong ethical and bioethical commitment that is reflected in our care protocols:

- Safeguarding of files and client information
- Informedconsentforevaluation
- Informedconsentforinterventionprocesses
- Feedbackpapers and adaptive factors
- Ethics protocols in research and intervention

4.18. Limitations and Future Directions

We recognize current limitations and are working on:

- **Database Expansion**: Collect more data to improve our AI-based predictive models.

- **Continuing Research and Longitudinal Studies**: Conduct long-term studies to evaluate the lasting effects of our interventions.

- **Improved Adaptability and Personalization of Interventions**: Continue developing techniques to better adapt them to different populations and contexts.

CONCLUSIONS

ICN, Bogota has created something that truly sets us apart: we "ask" the brain, and it responds. The NeuroIntegral 360 Diagnosis, a powerful tool for well-being and human potential optimization, offers a comprehensive and personalized view of the brain.

This innovative approach, grounded in solid scientific research in neuroimaging, adaptive psychometrics, and cognitive neuromanagement, uses cutting-edge technologies to assess cognitive and emotional functioning in real-world contexts. Complementing traditional clinical assessments, NeuroIntegral 360 provides a holistic perspective that enhances the participant's understanding and supports informed decision-making about their health and well-being. Through real-life simulations, the diagnosis can detect indicators of potential pathologies or anomalies, facilitating referral to specialized medical care when necessary.

Paper remains at disposal to discuss in greater depth the technical and methodological aspects. We strongly believe that our approach represents a significant advance in the field of applied neuromanagement and we are excited to share our findings and methodologies with the scientific community.

Prepare for a quantum leap in understanding and optimizing the human brain. After a decade of intensive research, we present the NeuroIntegral Methodology: an approach that not only revolutionizes neuromanagement but also redefines our interaction with the human mind.

Herman and Neethling Whole Brain Assessment is a powerful tool designed to uncover the unique cognitive preferences and strengths of individuals. This assessment dives deep into the four quadrants of the brain: analytical, practical, relational, and experimental thinking. By evaluating how a person naturally approaches problems, makes decisions, and interacts with others, the assessment provides a comprehensive understanding of their cognitive profile. It not only highlights areas of strength but also identifies potential blind spots, offering valuable insights for personal and professional growth. By leveraging these insights, individuals can enhance their communication, teamwork, and overall effectiveness, fostering a more balanced and holistic approach to challenges and opportunities.

In the evolving landscape of talent acquisition, brain-based approaches are setting new standards. By integrating Quantitative Electroencephalogram (QEEG) findings into the recruitment process, organizations can gain profound insights into a candidate's cognitive functions and mental aptitudes. QEEG assessments provide a detailed map of brain activity, highlighting areas of strength and potential challenges.

This data-driven approach allows recruiters to identify candidates whose cognitive profiles align with the specific demands of a role. For instance, high beta activity might indicate strong analytical and problem-solving skills, while elevated theta activity could suggest creative thinking and innovation potential. By understanding these nuances, companies can match candidates to roles where they are most likely to excel and thrive.

Moreover, brain-based talent acquisition goes beyond traditional metrics like experience and education. It focuses on innate cognitive abilities and neuroplasticity, ensuring a more holistic and precise fit between the candidate and the role. This not only enhances job performance and satisfaction but also contributes to a more dynamic and adaptable workforce, capable of meeting the complex challenges of today's business environment.

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EXPLORING THE NEXUS BETWEEN ENTREPRENEURSHIP AND INTERNATIONAL BUSINESS: A CASE STUDY OF BHUTAN

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Abstract: This study delves into the relationship between entrepreneurship and international business in Bhutan, a small, landlocked kingdom that primarily depends on agriculture and hydropower. It aims to assess the current state of entrepreneurship in Bhutan, explore the trends in international trade involving Bhutanese businesses, and pinpoint the challenges and opportunities that Bhutanese entrepreneurs face in the global market. By using secondary data involving the information pertaining to economic environment of Bhutan, the study reveals that Bhutanese entrepreneurs encounter significant obstacles to going global, such as limited access to finance, a shortage of skilled workers, and complex regulatory environments. However, there are opportunities in government policies that promote entrepreneurship and regional trade agreements. The study concludes with policy recommendations to better integrate Bhutanese entrepreneurial ventures into the global market, focusing on regulatory reforms, improved access to finance, and capacity-building initiatives.

Keywords: Entrepreneurship, International business, Bhutan, Challenges, Opportunities

1. INTRODUCTION
1.1 Background and significance of the study

Bhutan is a small landlocked kingdom nestled between two of the world's largest economies, India and China. Being completely landlocked and mountainous Bhutan has limited access to foreign markets due to which Bhutan heavily relies on India for its trade routes, making India a major trading partner. Bhutan's small domestic market and unfavorable resource endowment for industrialization mean that a significant portion of its population depends on primary sectors such as agriculture, forestry, and hydropower (Cheong, Bark & Jeong, 2015). Trade issues are not typically national policy priorities, reflecting the country's focus on holistic development over rapid industrialization (Cheong, Bark & Jeong, 2015).

According to Warr (2012), historically, landlocked countries have been pessimistic about the scope for an export-oriented development strategy and often choose inward-looking development strategies. Hence, as a landlocked country with limited economic power, Bhutan

has exhibited a passive attitude toward international trade (Cheong, Bark & Jeong, 2015). With a population of approximately 774,000 and a GDP of $2.84 billion, Bhutan is renowned for its unique development philosophy centered on Gross National Happiness (GNH) rather than Gross Domestic Product (GDP). This approach prioritizes sustainable and equitable socio-economic growth, environmental conservation, cultural preservation, and good governance.

However, achieving steady socio-economic growth has been a hurdle for the small kingdom with a largely underdeveloped trade sector and even more nascent engagement in international trade. Bhutan is heavily reliant on hydropower and tourism for revenue, leaving the country vulnerable to climate change and global pandemics or changes in tourism patterns. The World Bank reports that a decline in electricity production could lead to a 3-4 percentage point drop in GDP and a decrease in government revenue by approximately 0.5-1 percent of GDP (Razzaque, 2020). Additionally, due to travel restrictions imposed by COVID-19, tourism revenue fell drastically from $225 million in 2019 to $19 million in 2020 (Rinzin, 2021). Vijayasri (2013) states that international trade leads to economic growth and is important for achieving a quicker pace of economic development.

Therefore, as Bhutan looks to restart its economy after COVID-19, improving international trade is essential for Bhutan's economic development. By participating in international trade, Bhutan can diversify its economy, lessen its dependence on a limited number of sectors, and improve its economic resilience. Studying the relationship between entrepreneurship and international trade in Bhutan can unlock new growth avenues, improve economic resilience, and contribute to the overall well-being of its population. This study aims to provide a comprehensive understanding of this nexus, offering actionable insights for entrepreneurs, policymakers, and other stakeholders to foster a vibrant and globally integrated entrepreneurial ecosystem in Bhutan.

1.2 Research objectives and research questions

1.2.1 Research Objectives

- Analyze the Current State of Entrepreneurship in Bhutan
- Examine the Patterns and Trends of International Trade Involving Bhutanese Businesses
- Identify the Challenges and Opportunities Faced by Bhutanese Entrepreneurs in the International Market
- Assess the Impact of International Trade on Entrepreneurial Growth and Economic Development in Bhutan
- Provide Recommendations for Policymakers to Support and Enhance the Nexus Between Entrepreneurship and International Trade

1.2.2 Research Questions

- What is the current landscape of entrepreneurship in Bhutan?
- How are Bhutanese entrepreneurs participating in international trade?
- What barriers do Bhutanese entrepreneurs face in accessing international markets?
- What opportunities exist for Bhutanese entrepreneurs in the global market?
- What role do government policies and trade agreements play in facilitating international trade for Bhutanese businesses?

- How does international trade influence the growth and success of entrepreneurial ventures in Bhutan?
- What policy recommendations can be made to improve the nexus between entrepreneurship and international trade in Bhutan?

1.3 Scope and limitations
1.3.1 Scope

This study focuses on exploring the relationship between entrepreneurship and international trade in Bhutan. The research will cover:

- **Entrepreneurial Landscape:** Analysis of the current state of entrepreneurship, including key sectors, demographic characteristics, and the level of entrepreneurial activity.
- **International Trade Patterns:** Examination of Bhutan's trade volumes, main products and services traded, and primary trade partners.
- **Challenges and Opportunities:** Identification of barriers and opportunities for Bhutanese entrepreneurs in the international market.
- **Economic Impact:** Assessment of the contribution of international trade to GDP, employment, innovation, and business growth in Bhutan.
- **Policy Analysis:** Evaluation of existing policies and trade agreements, and formulation of recommendations for enhancing international trade and entrepreneurship.

1.3.2 Limitations

- **Data Availability:** The limited availability of comprehensive and up-to-date data on Bhutanese entrepreneurship and trade activities may affect the depth of analysis.
- **Geographical Focus:** The study is confined to Bhutan, and findings may not be generalizable to other countries with different economic and trade contexts.
- **Time Constraints:** The conduction of the study over a few months may limit the depth and accuracy of the findings.
- **Resource Limitations**: Limited resources may restrict the extent of fieldwork case studies conducted.

2. LITERATURE REVIEW

2.1 Theoretical framework: Linkages between entrepreneurship and international business

The connection between entrepreneurship and international business in Bhutan is extremely important owing to Bhutan's unique economic landscape due to its geographic location, economic dependencies and policy priorities centered around Gross National Happiness (GNH). This review aims to delve into theoretical frameworks, the entrepreneurial ecosystem, factors influencing international business, and existing studies to provide a comprehensive understanding of the challenges and opportunities for Bhutanese entrepreneurs in the global marketplace.

We must be familiar with several theoretical perspectives to understand the connection between entrepreneurship and international business. One such perspective is the Resource-

Based View (RBV), which argues that businesses can achieve success in global markets by leveraging their unique resources and capabilities (Barney, 1991). This implies that Bhutanese entrepreneurs should focus on developing and utilizing their strengths to compete effectively on the international stage. Additionally, another theory that highlights this is the comparative advantage theory which states that nations should specialize in productions that result in lower opportunity costs to drive efficient international trade (Boyce, 2023).

Another relevant theoretical framework is the Uppsala Internationalization Model, which proposes that businesses gradually expand their international operations, starting with markets closer to home and then progressing to more distant ones as they gain experience and knowledge (Johanson & Vahlne, 1977). The Uppsala Model is relevant to Bhutanese businesses because it suggests a gradual approach to international expansion by starting with neighbouring markets (e.g., India) and progressively venturing into more distant markets based on experience and market knowledge.

Next, the Network Theory emphasizes the importance of social networks and relationships in international business activities (Johanson & Mattsson, 1988). For Bhutanese entrepreneurs, building strong networks with international partners and stakeholders can provide valuable opportunities for market access and growth.

There is also the Effectuation Theory which encourages entrepreneurs to embrace uncertainty, leverage their strengths and networks, and adopt a flexible and adaptive approach to entrepreneurship (Sarasvathy, 2001). This will guide Bhutanese entrepreneurs in navigating uncertain international business landscapes by focusing on creating opportunities, leveraging local strengths, and adapting to emerging market demands with creativity and resilience.

2.2 Entrepreneurial ecosystem and internationalization

An entrepreneurial ecosystem comprises of various elements such as access to funding, mentorship, supportive policies and a conducive regulatory environment (Isenberg, 2010). In Bhutan, the entrepreneurial ecosystem is evolving. Ura et al. (2012) highlight that "Bhutan's policies aligned with the Gross National Happiness (GNH) framework promote sustainable development, social entrepreneurship, and ethical business practices."

There are also entrepreneur support organizations such as the Bhutan Innovation and Technology Centre (BITC) that provide resources and guidance to startups. As noted by Johanson and Mattsson (1988), "Mentorship programs and incubators within the entrepreneurial ecosystem play a pivotal role in fostering innovation and guiding entrepreneurs through challenges."

Research suggests that a supportive entrepreneurial ecosystem is instrumental in facilitating internationalization for startups and small businesses (Acs, Szerb, & Autio, 2014). Access to finance, mentorship programs and networking opportunities can enable Bhutanese entrepreneurs to expand their businesses globally. However, "Internationalization is the process of increasing involvement in international operations, such as foreign markets, cross-border production, or global value chains, which may include exporting, importing, licensing, franchising, foreign direct investment, joint ventures, and strategic alliances" (Rugman & Collinson, 2012). It is a strategic imperative for Bhutanese businesses seeking to expand globally. According to Knight and Cavusgil (2004), "Internationalization allows Bhutanese

enterprises to diversify their customer base, reduce dependence on domestic markets, and tap into new revenue streams."

Another important detail is that export opportunities contribute to economic growth. Cheong, Bark, and Jeong (2015) state that "Internationalization facilitates export opportunities for Bhutanese products and services, promoting economic development and industry growth."

The aforementioned studies reiterate that fostering a strong entrepreneurial ecosystem and embracing internationalization are integral to Bhutan's economic development and global competitiveness. Collaborative efforts among stakeholders, supportive policies, and strategic initiatives are vital for empowering Bhutanese entrepreneurs to succeed in the dynamic global marketplace.

2.3 Factors influencing international business activities in Bhutan

Several factors influence international business activities in Bhutan. Geographical factors, such as Bhutan's landlocked status between India and China, impact trade routes and market access (Warr, 2012).

Economic factors, such as dependence on hydropower and tourism, contribute to Bhutan's vulnerability to external shocks and market fluctuations (Razzaque, 2020; Rinzin, 2021). Moreover, the World Bank (2019), suggests that the dependence on state-led hydropower might have resulted in crowding out of the private sector which indirectly impacts international trade.

Government policies, particularly those aligned with the GNH philosophy, shape Bhutan's approach to international trade and investment (Ura et al., 2012).

Cultural and institutional factors also play a role in influencing international business activities in Bhutan. Brooks (2013) states that "Understanding cultural preferences and social norms is essential for effective market entry and relationship building in Bhutan."

Infrastructure development also influences trade and connectivity. Warr (2012) highlights that "Improvements in transportation networks and energy infrastructure can enhance Bhutan's trade capabilities and reduce logistical barriers."

Trade policies and agreements also greatly help to shape Bhutan's trade relations. Cheong, Bark, and Jeong (2015) mention that "Bhutan's participation in regional trade agreements impacts market access and trade flows."

2.4 Existing studies on entrepreneurship and international business in Bhutan

Several studies have contributed to understanding entrepreneurship and international business in Bhutan. Cheong, Bark, and Jeong (2015) conducted a study on "Regional Cooperation and Trade Issues in Bhutan," highlighting the challenges and opportunities in regional trade partnerships.

In their other study on Bhutan's trade policy titled "A Framework of Trade Policy for Bhutan Compatible with the Gross National Happiness", Cheong, Bark, and Jeong (2015) emphasize the importance of joining global supply chains for economic gains. They also highlight that while Bhutan's trade policy should support Gross National Happiness (GNH) by balancing economic growth with social well-being, it is crucial for Bhutan to adopt economic reforms and trade liberalization to improve its international competitiveness.

Warr (2012) conducted research on the economic strategies of landlocked countries, including Bhutan. His study provides insights into the economic challenges and strategic approaches adopted by landlocked nations like Bhutan.

Razzaque (2020) focused on the economic impact of hydropower on Bhutan's economy. The study discusses the significance of hydropower revenues in Bhutan's international trade and economic development.

Ura, Alkire, and Zangmo (2012) explored the influence of Bhutan's Gross National Happiness (GNH) framework on economic policies. Their study delves into how GNH principles shape Bhutan's approach to international business and economic development.

Brooks (2013) conducted research on cultural and institutional factors affecting business practices in Bhutan. The study provides insights into how cultural values and institutional frameworks influence entrepreneurship and international business activities.

Knight and Cavusgil (2004) discuss market entry strategies for Bhutanese enterprises in their work on international business expansion. Their insights into market diversification and entry modes are relevant for Bhutanese businesses aiming to expand globally.

Ayaji Fujita, Jigme Lhendup, and Sangay Thinley (2022) shed light on the significant administrative hurdles, financial constraints, and cultural barriers that hinder entrepreneurial activities in Bhutan in their study titled "Promoting Entrepreneurship in Bhutan".

Vijayasri (2013) explores the impact of globalization on Bhutanese businesses and strategies for building resilience in international markets. The study provides recommendations for enhancing business competitiveness and sustainability in a globalized context.

These studies offer valuable insights, best practices and strategic recommendations for fostering economic growth, innovation, and sustainable development in the country.

In conclusion, the literature review has explored how entrepreneurship and international business intersect, especially in Bhutan. We've looked at theories that connect entrepreneurship with global trade and how a strong entrepreneurial environment supports businesses going global. Factors like Bhutan's unique geography, economic dependencies, and policies focused on Gross National Happiness (GNH) have a significant impact on international business activities. The existing studies we've reviewed shed light on regional cooperation, economic strategies, and cultural influences on Bhutanese businesses. Bringing all this together, it's clear that leveraging technology, fostering innovation, and building strong international relationships are key for Bhutan's continued growth and success in the global business arena.

3. METHODOLOGY
3.1 Research Design and Approach

This research utilizes a combination of descriptive analysis and macroeconomic evaluation to investigate the relationship between entrepreneurship and international business in Bhutan. The descriptive approach facilitates a comprehensive understanding of the relationship, while the macroeconomic assessment offers insights into broader economic patterns and elements affecting entrepreneurship and business within the country.

3.2 Data Collection Methods

This study's data collection process exclusively utilizes secondary data obtained through a comprehensive review of relevant government documents, case analysis, departments official reports, and research publications. These resources provide quantitative information on Bhutan's trade dynamics, governmental policies, and entrepreneurial landscape. By utilising secondary data, the research benefits from an extensive examination of existing studies and macroeconomic indicators.

3.3 Sampling Techniques and Data Sources

As the research relies on secondary data, no primary data collection was undertaken. Instead, information was gathered from diverse international and national sources, including publications from the World Bank, Asian Development Bank, and Bhutanese governmental bodies, as well as academic research focused on Bhutan's economy and international business.

3.4 Data Analysis Techniques

The collected data were analysed using macroeconomic metrics such as GDP expansion, trade quantities, and economic sector contributions. Visual representations and charts depicting trade patterns were sourced from various governmental publications and official websites. The analysis also included an evaluation of Bhutan's trade policies, trade agreements, and entrepreneurial environment to identify patterns, obstacles, and prospects for enhancing international business activities.

4. ENTREPRENEURSHIP LANDSCAPE IN BHUTAN
4.1 Overview of the entrepreneurial ecosystem

Bhutan's entrepreneurship ecosystem has been progressively growing, reflecting the nation's aspirations to expand its economic base beyond conventional industries like hydropower and agriculture. The ecosystem includes a blend of educational institutions, government agencies, non-profit organizations, and private sector players who collectively contribute to fostering entrepreneurship. Initiatives like the Springboard Programme and the establishment of the Startup Centre are pivotal in providing necessary skills and mentorship to aspiring entrepreneurs (UNDP, 2024).Despite the increasing number of incubators, co-working spaces like the inaugural startup centre, and startup competitions, encouraging young people to view entrepreneurship as a fulfilling career option remains a challenge. This cultural hurdle is reinforced by conventional family settings that often do not see entrepreneurship as a viable professional path (Daily Bhutan, 2024). Businesses in Bhutan are categorized based on their investment levels and workforce size:

- Small Industries: Investments of Nu 1 million to Nu 10 million (≈$13,000–$130,000) and employ 5 to 19 people.
- Cottage Businesses: Investments of less than Nu 1 million (≈$13,000) and employ up to 4 people.

This categorization helps structure the support and resources provided to businesses at different stages of development. The government's efforts to create a conducive environment for entrepreneurship are evident in initiatives like the G2B (Government to Business) portal, which simplifies the business registration process for small and cottage industries (G2B, n.d.).

Moreover, programs like the Springboard Programme and the Loden Entrepreneurship Programme (LEP) provide essential skills, mentorship, and financial support to young entrepreneurs, helping them navigate the entrepreneurial landscape and make their startups investment-ready (EBhutan, 2024). These initiatives indicate a supportive ecosystem, although more efforts are needed to foster a culture that fully embraces entrepreneurship as a career choice. Moreover, Bhutan lacks investors and targeted financial institution packages for financial support that can give entrepreneurs access to finance. Getting funding is still one of the largest obstacles in business development, regardless of the stage at which a company is founded or is growing and expanding (ITC, n.d.).

4.2 Government policies and initiatives promoting entrepreneurship

Entrepreneurship is vital for economic growth, innovation, and job creation, and the Bhutanese government has recognized this importance. Several laws and programs have been enacted to encourage economic diversification and support entrepreneurship.

The government has established Industrial Estate zones in districts such as Samtse, Gelephu, Samdrup Jongkhar, Mongar, Tsirang, and Thimphu. These zones provide land, electricity, and water, creating a conducive environment for new and innovative ventures. Additionally, special fiscal incentives are offered, and these zones benefit from better market access due to their proximity to neighboring India.

The Ministry of Industry, Commerce, and Employment (formerly the Ministry of Labor and Human Resources) has initiated various programs to promote entrepreneurship awareness and development. These include:

- EDP Training: Conducted with Dzongkhags, NGOs, and other institutions to foster entrepreneurial skills.
- Student Business Seedling Programme: Encourages young students to explore entrepreneurship.
- Training of Trainers in New Business Creation: Builds capacity among trainers to support new entrepreneurs.
- Counseling and Mentoring: Provides guidance and support to budding entrepreneurs.
- Start-Up Weekend: An event to brainstorm and develop business ideas.
- Business Idea Competition of Bhutan: Encourages innovation and recognition of creative business ideas.
- Expanding Horizons, A guide for export growth from Bhutan to Australia: is an initiative by the Ministry of Foreign Affairs and External Trade to help Bhutanese export to Australia by using the success of Bhutan Blossoms as a guideline.

The government also supports entrepreneurs through collaborations with organizations like the Loden Foundation. The Loden Foundation provides funding, mentorship, and capacity-building programs. They organize events such as the Festival of Entrepreneurs in October, in place of Global Entrepreneurship Week, in collaboration with national and international agencies (Bhutan Foundation, 2019). Overall, these policies and initiatives reflect the government's commitment to creating an environment that fosters entrepreneurship, supports small enterprises, and drives economic diversification.

4.3 Support organizations and networks for entrepreneurs

Several organizations and foundations support entrepreneurs with relation to financing, training, and different programs associated with the building of one's capability in Bhutan. Some of the most prominent associations and networks are as follows:

i. Bhutan Innovation and Technology Centre (BITC) and the Bhutan Innovation and Technology Foundation (BITF): For the support of Startups in Bhutan, there are new policies and favorable environment exists such as the Bhutan Innovation and Technology Centre (BITC) and the Bhutan Innovation and Technology Foundation (BITF). These institutions assist those willing to bring their ideas to practice by availing of incubation funding and mentorship services (Jain Kai, 2023). (Jain Kai, 2023).

ii. Loden Foundation: The Loden Foundation is a Registered Civil Society Organization in Bhutan (CSO) and has been in business since 1999. The foundation initially started as an education support group but later supported the ones who studied from Loden Foundation's funding to become successful entrepreneurs through entrepreneur education and funding. Loden Foundation also has a program named Student Empowerment through Entrepreneurship Development (SEED) to empower students to learn about entrepreneurship (Tradition, n.d.)

iii. Bhutan CSI Association: An association known as Bhutan CSI Association was established by a group of Startups to further advance and develop the cottage and small industries, or CSIs, in the country. The main goal of having this association is to inform the Government of the actual needs of CSI entrepreneurs and recommend implementing policies that help the startups build innovative and robust CSI ecosystems (Dekar, 2023).

iv. Startup First: CEFE (Competency-based Economies through Formation of Entrepreneurs) Bhutan's Startup First institute provides training for entrepreneurs, conducts research, and offers advisory services to teen entrepreneurs. It also offers capacity development courses for start-up ecosystem stakeholders (CEFE International – Glimpses of Entrepreneurship in Bhutan, 2023).

v. Bhutan Chambers of Commerce and Industry: Bhutan Centre for Entrepreneurs and Innovators is a non-governmental organization with the vision of promoting entrepreneurship in Bhutan which was set up with the blessing of H.M the King in 1980. Another strategic vision of BCCI is about promoting entrepreneurship since it provides human capital development in the private sector (About Us, n.d.).

vi. Druk Holding and Investment (DHI): Druk Holding and Investment provides support to organizations and networks of business-oriented through the usage of many programs where DHI funds programs like the Business Acceleration Program (BizAP) under which DHI grants Nu. 500,000 to the entrepreneurs who took part in the acceleration program. This program was developed to assist new businesspersons in establishing networks with professionals in the business industry and getting to understand the proper way of running their business ventures (Zangmo, 2019).

4.4 Challenges and opportunities for entrepreneurs in Bhutan

Challenges:

i. Financial Constraints: Entrepreneurs face significant challenges in securing funding, regardless of their business stage. Bhutan lacks targeted financial institution packages and

investors willing to support startups. A survey was done of 133 people who attended the entrepreneurship program held by Thimphu Tech-Park In 2016-2017 and the result showed that some of the young minds could not become an official entrepreneur due to the lack of necessary funding (Singh et al., 2020)

ii. Lack of financial incentives and no weak relations with the banks: Singh et al. (2020) did some research on other research papers and in that research, it was found that individuals who failed at starting a business were mainly due to having no connection with the banks and insufficient financial initiatives by the Government.

iii. Entrepreneurship and career choice: In a study involving 921 students from different educational institutions in Bhutan, showed that there is a greater number of students wanting to acquire government jobs despite the problem of unemployment rising in the country. This is mainly due to the lack of emphasis on entrepreneurship education and poor instructional strategies in the education curriculum (Utha et al., 2016). While there are opportunities for training and coaching during the initial phases, there is limited support for scaling businesses.

Opportunities:

i. Supportive Ecosystem: The growing number of incubators, co-working spaces, and startup competitions indicate a supportive ecosystem for entrepreneurs (EBhutan, 2024). Another opportunity lies in the different kinds of programs being held by the government of Bhutan to help individuals get employed and have training to improve their entrepreneurial skills and creativity. For example, the Ministry of Labor and Human Resources introduced a small cottage industry and start-up flagship program worth Nu. 1.2B (Lhamo, 2020).

ii. Sectoral Focus: Sectors like agriculture, IT/ITES, and tourism offer significant opportunities for innovation and growth. Government initiatives like allowing 100% foreign ownership in agriculture highlight the potential in this area (MoIC, 2023).

iii. Technological and Educational Integration: Programs focusing on digital skills and freelancing are opening new avenues for tech-based startups, further supported by infrastructure developments like Thimphu Techpark (Daily Bhutan, 2024). In addition, on 9th February 2021 a Memorandum of Understanding was signed by the Department of Employment and Human Resources under the Ministry of Human and Labor Resources and the Royal Education Council under the Ministry of Education to incorporate entrepreneurship-related courses in the education curriculum (Bhattarai, 2021).

iv. NEHUB and SAWDF: There are many forms of enhancing women's entrepreneurship and such form of opportunities are Nepal Entrepreneurs Hub (NEHUB) and South Asian Women Development Forum (SAWDF) whereby both of these interventions are related to policies and opportunities for women's entrepreneurship in the SAARC region (South Asian Association of Regional Corporation) which includes Bhutan as well (Goodrich et al., 2018).

5. INTERNATIONAL BUSINESS ACTIVITIES IN BHUTAN

5.1 Patterns and trends in international trade

According to the United Nations Conference on Trade and Development (UNCTAD) (2024) report on key statistics and trends in international trade, the following has been observed:

i. Unpredictability and Division:

Since the COVID-19 pandemic began, international trade has shown significant fluctuations. Trade dcreased sharply in 2020 but saw a robust recovery in 2021 and 2022, hitting unprecedented levels. However, trade growth reduced in 2023 due to geopolitical issues and economic instability.

ii. Regional Differences:

Trade performance has varied widely across regions. Developed countries saw a smaller decline in trade compared to developing nations. The European Union and the United States, in particular, showed stronger trade performance, whereas East Asia and other parts of Asia experienced larger setbacks.

Figure 1. Global Trade Trends
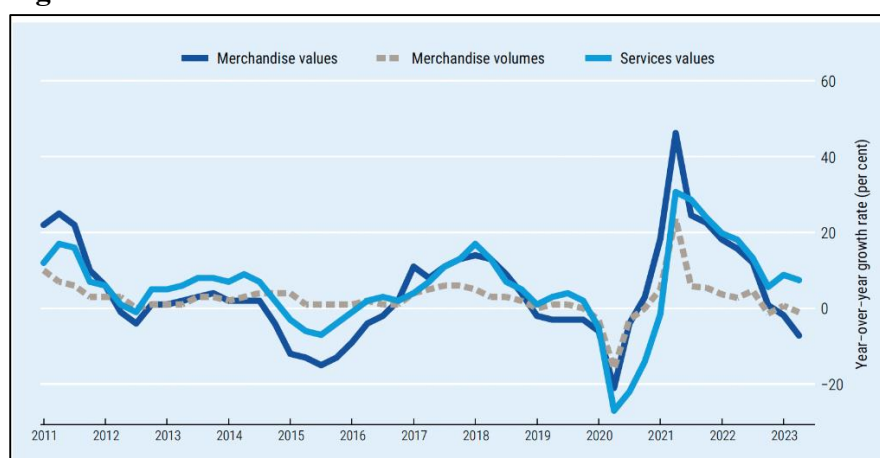
Source: (United Nations Conference on Trade and Development, 2024)

iii. Regional Trade Agreements (RTAs):

Trade within RTAs has generally been more stable. Agreements such as MERCOSUR, AfCFTA, USMCA, and intra-EU trade have performed better than trade outside these agreements. Nonetheless, intra-RTA trade performance has differed, with some agreements like CPTPP witnessing relatively poorer intra-regional trade.

iv. Developing vs. Developed Countries:

The share of trade between developing countries has grown significantly, from 17% in 2010 to 21% in 2022. BRICS nations have a substantial share in global trade, particularly in goods and services.

v. Commodities and Manufacturing:

Intermediate goods form the largest share of world trade, followed by primary and consumer goods. Manufacturing trade dominates, especially among developed nations, while developing countries have a significant share in natural resources and agricultural exports.

vi. Sector Performance:

Sectors such as chemicals, communication equipment, and energy products (oil, gas, coal) represent a significant portion of global trade. Developing nations have increased their market shares in most sectors since 2015, although some sectors like energy have seen a shift back towards developed countries.

vii. Import and Export Tendencies:

Many developing nations have high import and export tendencies, indicating significant dependence on international trade. Southeast Asian economies, Central and Eastern European countries, and several African countries are particularly export-dependent.

viii. Trade Balances:

In 2022, China, Russia, UAE, Ireland, and Saudi Arabia had the largest trade surpluses, while the United States had the largest trade deficit. Trade imbalances are relatively small in relation to GDP for most countries, but some African countries show large imbalances.

ix. Export Diversification:

Developing countries generally exhibit lower export diversification compared to developed countries. African nations, in particular, have highly concentrated export portfolios, making them more vulnerable to economic shocks.

x. Patterns and Trends of Bhutan's International Trade

Import Trend: There was a steady increase in imports from 2020 to 2022, which indicates higher consumption or dependency on foreign goods. The slight decrease in 2023 could be due to import restrictions due to low foreign reserves in Bhutan.

Export Trend: Exports showed an increasing trend until 2021, after which there was a decrease.

Trade Deficit: The increasing trade deficit from 2020 to 2022 reflects the higher growth rate of imports compared to exports.

Figure 2. Export trend of Bhutan by country and commodity. Trade deficit status of Bhutan
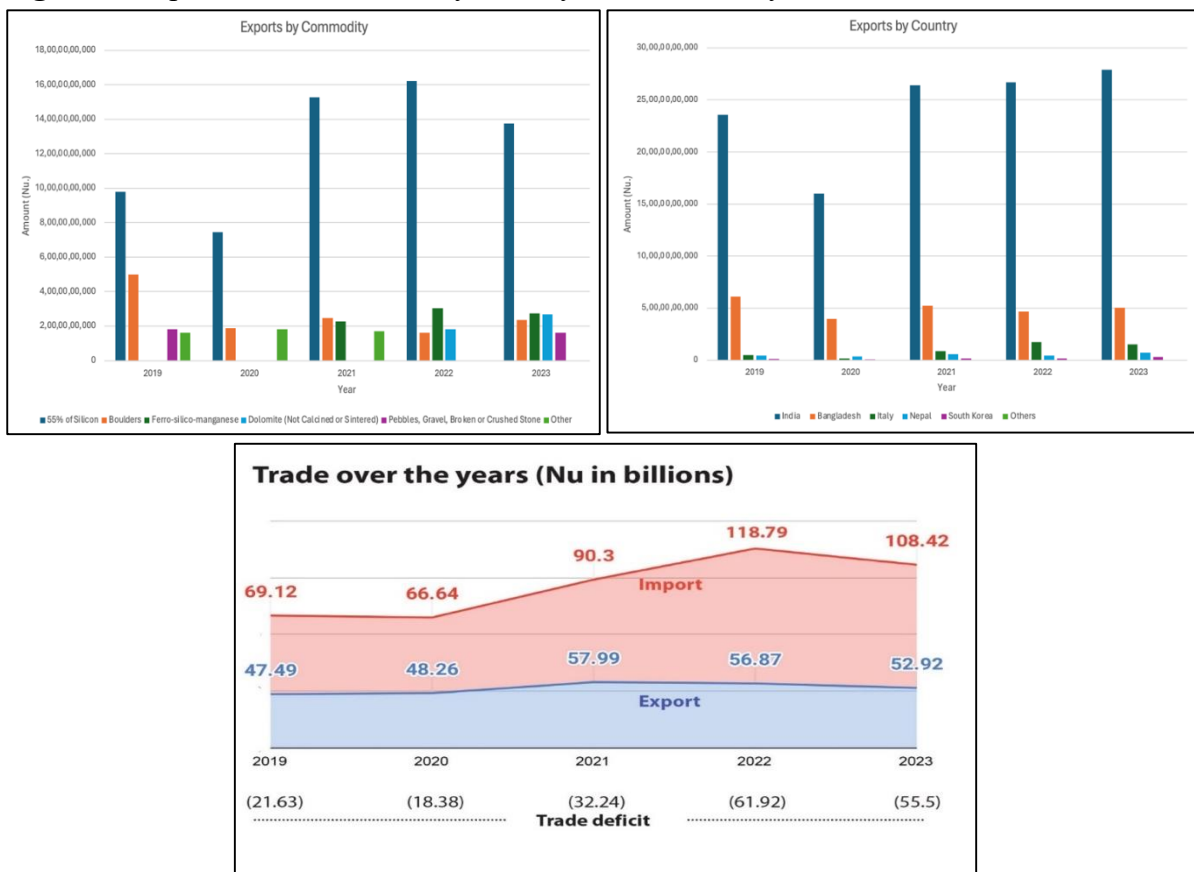
Source: (Ministry of Finance, 2023)

5.2Analysis of Bhutan's trade partners and export-import commodities
Export Patterns
Dominance of India as a Trade Partner:

India is by far Bhutan's largest trading partner, both in terms of exports and imports. The export values to India are significantly higher than to any other country, underscoring the strong economic ties between the two nations. This reliance on India is evident across all years, with exports peaking at substantial amounts. Despite a noticeable dip in 2020, likely due to the global impact of the COVID-19 pandemic, exports to India quickly rebounded in subsequent years. This trend highlights the resilience and importance of the India-Bhutan trade relationship.

Exports to Other Countries:

While India remains the dominant partner, Bhutan also engages in trade with Bangladesh, Italy, Nepal, South Korea, and other countries. Exports to Bangladesh are the second largest, although they are significantly lower than those to India. The trade with other nations remains minimal, indicating limited diversification in Bhutan's export markets. This lack of diversification can pose risks and opportunities for expanding Bhutan's trade network.

Key Export Commodities:

- **55% of Silicon:** This is Bhutan's major export commodity, reflecting high export values consistently over the years. The significant dip in 2020 was followed by a quick recovery, indicating stable global demand.
- **Boulders:** Another key export commodity, boulders show relatively stable export values, contributing significantly to Bhutan's export portfolio.
- **Ferro-silico-manganese, Dolomite, and Other Commodities:** These commodities have lower export values compared to silicon and boulders but are essential in diversifying Bhutan's export base.

Import Patterns
Heavy Reliance on India for Imports:

Similar to exports, Bhutan's imports are predominantly sourced from India. The import values from India far exceed those from any other country, reflecting a heavy dependence on India for various goods. This trend highlights the critical role of India in Bhutan's trade dynamics.

Imports from Other Countries:

China emerges as a notable import partner, although the values are much lower compared to India. Imports from countries like France, Singapore, and Thailand are minimal, with some variation over the years. This pattern again points to limited diversification in Bhutan's import sources.

Key Import Commodities:

- **Other Light Oils and Preparations (HSD):** This category is the largest import commodity, showing high import values each year. The dip in 2020, followed by a rebound, aligns with global economic trends during the COVID-19 pandemic.

- **Ferrous Products and Motor Spirit (Gasoline):** These are significant import commodities, showing variations that could reflect changes in global prices and domestic demand.
- **Semi-milled or Wholly Milled Rice:** This commodity consistently shows notable import values, indicating its importance in Bhutan's food security.
- **Other Commodities:** Various other commodities contribute to the import basket, providing some level of diversification.

Analysis of Trends

Figure 3. Imports trend of Bhutan by country and commodity
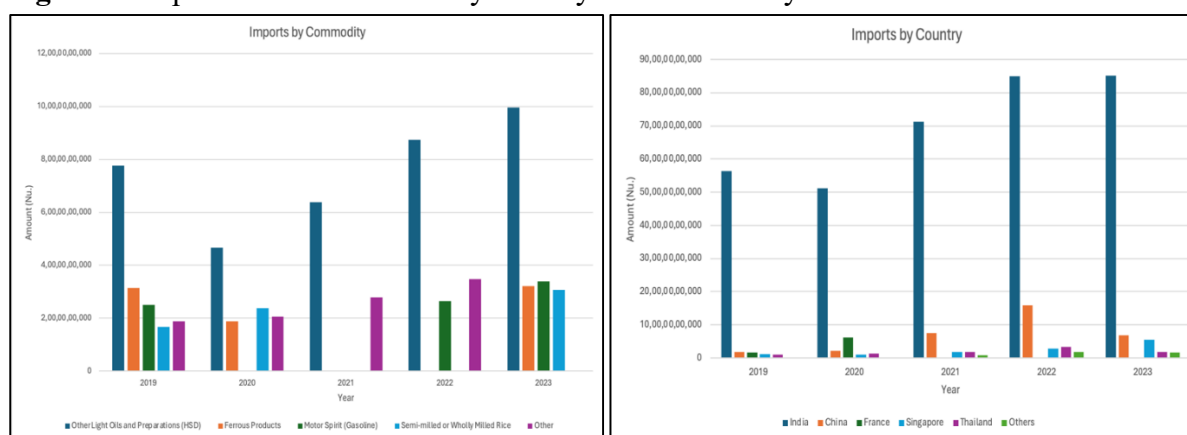
Source: (Ministry of Finance, 2023)

Impact of COVID-19:

The year 2020 shows a noticeable dip in both exports and imports, reflecting the global economic disruptions caused by the COVID-19 pandemic. However, Bhutan's trade appears to have rebounded quickly, showcasing resilience in its trade practices.

Heavy Dependence on India:

Bhutan's trade is heavily dominated by India, which poses both opportunities and risks. While the strong relationship with India provides a stable trade partner, it also makes Bhutan vulnerable to economic fluctuations in India and potential geopolitical tensions.

Commodity Concentration:

Bhutan's exports are concentrated in a few key commodities, with silicon being the most significant. This concentration suggests limited diversification, which could be a risk if global demand for these commodities declines. Diversification into other sectors could enhance economic stability.

Limited Market Diversification:

While Bhutan engages in trade with several countries, the volumes are relatively small compared to India. Expanding trade relationships with other countries could provide new opportunities and reduce dependency on a single market.

Stable Import Patterns:

The import patterns show consistency in terms of key commodities like oil, ferrous products, and rice. These stable patterns indicate a steady demand for essential goods, highlighting areas where Bhutan may need to develop domestic alternatives to reduce import dependency.

5.3 Foreign direct investment (FDI) in Bhutan

Foreign Direct Investment (FDI) refers to when a party invests in a business or corporation in a different country, aiming to establish a long-term stake or interest (Hayes, 2024). In Bhutan, an FDI company is an entity incorporated under the Companies Act of the Kingdom of Bhutan, primarily for conducting commercial activities within the nation. This company must have a minimum of 20% equity held by foreign investors, with individual foreign investors required to own at least 10% equity. For foreign institutional investors, the FDI company must have at least 10% of its equity owned by such institutions (MoICE, 2023).

Key Highlights of Bhutan's FDI Framework:
  i.   **FDI Policy Evolution:**

Bhutan introduced its first FDI policy in 2002, with significant revisions in 2010, 2014, and the latest in 2019. These revisions aim to create a more investor-friendly environment and adapt to changing economic conditions. The FDI Policy of 2019 notably emphasizes maximizing equity shareholding for foreign investors, allowing up to 49% participation in most sectors, while also permitting 100% foreign ownership in select high-priority sectors (MoICE, 2023).

  ii.   **Sectoral Distribution:**

The distribution of FDI inflows in Bhutan reflects a strong focus on the service sector, which includes areas such as hospitality, information technology, and IT-enabled services. However, other sectors are also attracting FDI, including manufacturing, dairy, and agro-based projects. As per FDI Annual Report, 2023, the Department of Industry authorized 12 foreign investment projects worth BTN 7,606.95 million in 2023, out of which seven of the projects are in the service sector, and five are in the manufacturing sector, highlighting the diverse opportunities for investment across various industries.

Figure 1. No. of FDI projects approved over the years
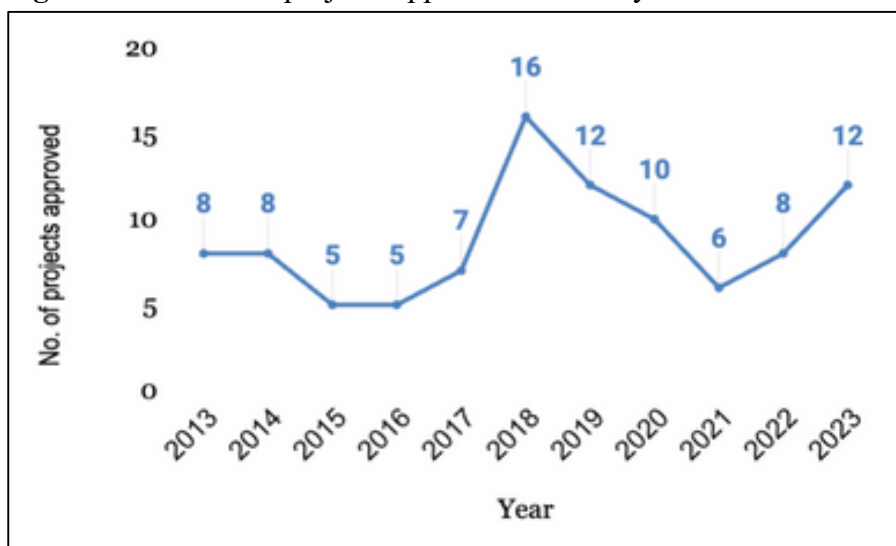
Source: MoICE, FDI Annual Report (2023)

The total number of FDIs as of 2023 is 108 projects, in which India remains the major source of investment in Bhutan with a 57 % share followed by Singapore (13 %) and Thailand (10 %). In this overall, Asia accounts for over 65% of foreign investors, followed by Europe (17%) and America (11%) (MoICE, 2023).

Figure 2. Part of foreign investors
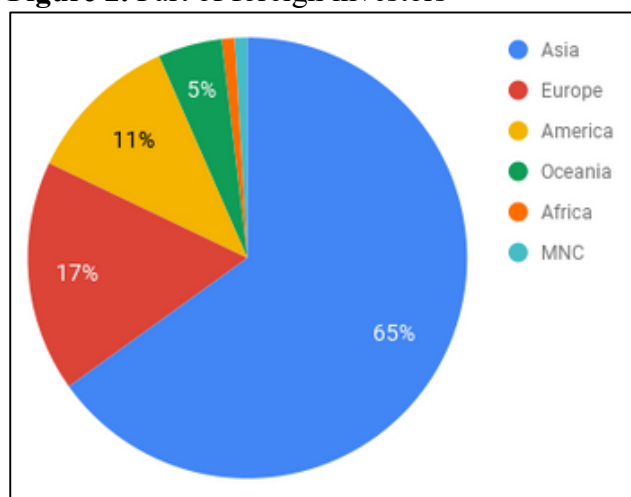
Source: MoICE. FDI Annual Report (2023)

iii.   Investment Incentives:

To attract foreign direct investment (FDI), Bhutan offers several incentives that create a favorable investment climate. These include a low-emission development environment, political stability, and transparency, along with subsidized electricity (Royal Bhutanese Embassy, n.d.). Additionally, the government has recently announced that it will allow 100% foreign ownership in the agriculture sector for FDI. This decision was made during the opening session of the Bhutan Agrifood Trade and Investment Forum (BATIF) 2024, highlighting the government's commitment to enhancing investment opportunities in key sectors (World Bank, n.d.).

iv.   Regulatory Framework:

All businesses engaging in FDI must incorporate under the Companies Act of the Kingdom of Bhutan, which ensures that they comply with the local corporate governance standards. In 2019, the Ministry of Economic Affairs established an FDI Division specifically to promote investment and provide single-window services to investors. Whereby, under the FDI Policy 2019, a maximum equity shareholding of 49% is allowed to foreign investors by the government with a minimum project cost for small-scale production and manufacturing sectors set at Nu. 5 million (MoEA, 2019).

v.   Geographical Distribution and Employment:

Foreign investment projects in Bhutan are primarily concentrated in the Chukha, Paro, and Thimphu Dzongkhags. As of December 2023, these projects directly employed 4,327 Bhutanese individuals, with a gender distribution of 47% female and 53% male (Royal Bhutanese Embassy, n.d.; MoICE, 2023). The highest number of FDI received is in the hotel sector with 34.9 % followed by IT sector with 21.7% as per the FDI Annual report, 2023.

Figure 3. Sectoral share of FDI
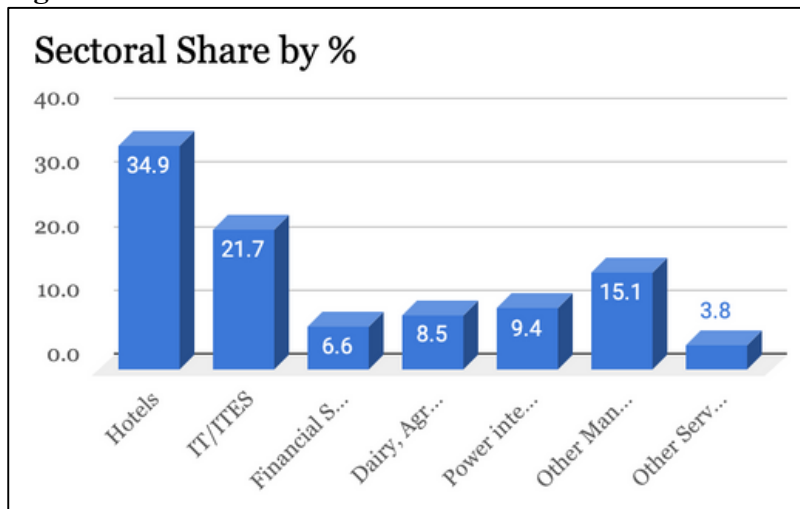
Source: MoICE. FDI Annual Report (2023)

vi. Agriculture Sector Focus:

To enhance the production of six key agricultural commodities—mandarin oranges, quinoa, rainbow trout, black pepper, asparagus, and strawberries—the government will allow 100% foreign ownership in the agriculture sector. Bhutan has set ambitious targets to increase the agriculture sector's contribution to the GDP, aiming for $365 million in 2022, $625 million by 2029, and $854 million by 2034 (World Bank, n.d.).

However, despite the conducive policy environment, Bhutan's FDI inflows have been relatively modest, averaging less than $20 million annually since 2010 (World bank, n.d.). However, Bhutan's unique selling points, such as its commitment to Gross National Happiness (GNH) and clean, green environment, offer a unique investment appeal. Bhutan's policies aim to attract responsible and sustainable investments that contribute to the country's long-term development goals.

5.4 Trade policies and regulations affecting international business

Bhutan's trade policies and regulations are designed to foster international business while maintaining sustainable development and economic stability. The key elements influencing international trade and business in Bhutan include its trade deficit, membership in regional trade agreements, and sector-specific regulations.

Trade Deficit and Economic Overview

Bhutan has consistently registered a trade deficit since 2008, primarily due to higher imports compared to exports. In 2023, Bhutan exported BTN 52.9 billion worth of goods and imported BTN 108.4 billion, resulting in a trade deficit of BTN 55.5 billion. The primary trading partner is India, which accounts for over half of Bhutan's total exports and nearly 80% of its imports. Other significant trade partners include Bangladesh, Italy, Nepal, China, Singapore, and Thailand (Lloyds Banks, 2024).

Trade Policies and Regulatory Framework

Bhutan's trade policies are influenced by several regulatory frameworks:

i. **Customs Rules and Regulations of Bhutan: Revised Edition 2023:**

The Customs Rules and Regulations of Bhutan govern the import and export of goods, ensuring adherence to both national and international standards. These regulations include various provisions related to the valuation, classification, and clearance of goods, as outlined by the Ministry of Finance (MoF, 2023).

In accordance with the Customs Duty Act of Bhutan 2021, customs duty is levied on imported goods during international business. This duty is applicable during the importation process, reinforcing the need for compliance with established customs regulations to facilitate smooth trade operations.

ii. **Bhutan Trade Information Portal (BTIP):**

The BTIP provides essential trade information, including market analysis, export-import procedures, and strategic resources for entrepreneurs. It serves as a one-stop-shop for all trade-related information and is managed by the Ministry of Economic Affairs (MoE, 2023).

iii. **Sector-specific policies:**

The government of Bhutan has introduced various sector-specific policies to enhance economic growth and development. In the agriculture sector, the government has recently allowed 100% foreign ownership, which aims to boost production of key commodities. This initiative is a part of the broader goal to increase the sector's contribution to GDP (World Bank).

In addition, the service and manufacturing sectors have also seen significant developments. In 2023, 12 foreign investment projects worth BTN 7,606.95 million were authorized, with a significant focus on the service sector (hotels, IT/ITES) and manufacturing (MoICE, 2023). These initiatives reflect the government's commitment to attracting foreign investment and fostering growth in key industries.

iv. **Investment Regulations**

Foreign Direct Investment (FDI) in Bhutan is governed by the FDI Policy 2019 and the Companies Act, some of the rules include minimum of 20% equity must be held by foreign investors in FDI companies. Specific incentives for various sectors, including full foreign ownership in high-priority areas like agriculture and IT services (MoICE).

v. **Regional and International Trade Agreements**

Bhutan is a member of several regional trade agreements which facilitate international business, whose ruels and regulations also apply when engaging in international trade:

- South Asian Association for Regional Cooperation (SAARC)
- Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)
- Agreement on South Asian Free Trade Area (SAFTA)
- Soon World Trade Organization (WTO)

These memberships aim to enhance economic cooperation and trade liberalization within the region, offering Bhutan access to larger markets and potential trade benefits (Lloyds Banks, 2024).

5. Analysis and Findings

Identification of key factors influencing the relationship between entrepreneurship and international business in Bhutan

As per the data analysed from various sources, the key factors influencing the relationship between entrepreneurship and international business in Bhutan can be classified into two categories i.e. from the side of the entrepreneurial environment and the international trade environment:

Figure 4. Prepared by group. Venn diagram on key factors influencing the relationship between entrepreneurship and international business in Bhutan
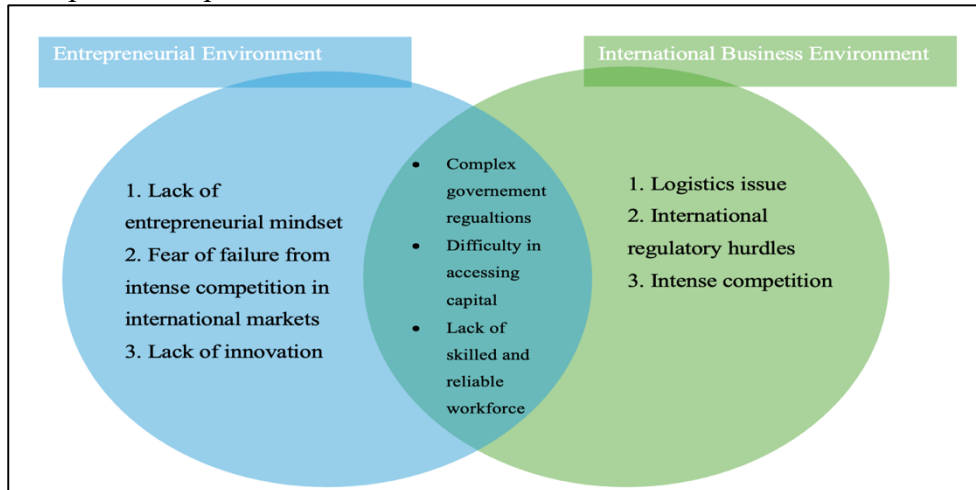
7. Discussion

7.1 Synthesis of findings and comparison with existing literature

The study reveals multiple issues that entrepreneurs in Bhutan face, which align with findings from existing literature. According to Fujita, Lhendup, and Thinley (2022), challenges faced by entrepreneurs in Bhutan are related to the complex and lengthy process of establishing businesses, difficulty in accessing finance, and lack of entrepreneurial mindset with many preferring government jobs.

Furthermore, Bhutan's ranking of 89th out of 190 countries in the Ease of Doing Business (EOB) index, as reported by the World Bank (2020), shows the presence of complex government regulations and procedures. These factors contribute to a challenging business environment characterized with complex administrative procedures, difficulty in accessing finance, and a lack of business culture. The importance of nurturing an entrepreneurial mindset is emphasized by Cooney (2012), asserting that having an entrepreneurial mindset and upskilling is important for business growth. The OECD SME and Entrepreneurship Outlook Report (2019) further highlights the significance of nurturing an entrepreneurial culture to drive innovation and economic growth.

Access to capital remains a critical challenge for entrepreneurs, as noted by the Asian Development Bank (2022). They identified that lengthy loan processes and difficulties in accessing credit facilities hinder financial support for businesses in the country. According to Dolkar (2022), small and medium enterprises (SME) have complained of needing to know the bank officials personally to get the loans sanctioned during the sensitization of credit lending

schemes between private sectors and financial institutions meeting in July, 2022. This aligns with the observations made by Giudici, Sannajust, and Auken (2021), who state that access to finance is essential, as SMEs play a significant role in the international business landscape.

Lastly, logistical issues present another hurdle for businesses in Bhutan. Warr (2012) points out that landlocked countries historically face challenges in adopting export-oriented development strategies, often resorting to inward-looking approaches. Supporting this, Business Bhutan (2019) states that the lack of railways and waterways, huge dependency on Port of Kolkata, limited air travel poses hurdles to businesses in Bhutan. Overall, these findings highlight the interconnected challenges that must be addressed to foster a more conducive environment for entrepreneurship and international business development in Bhutan.

7.2. Implications for entrepreneurship and international business development in Bhutan

The findings reveal that there are multiple hurdles for initial business establishment and then for that business to grow and become internationally capable. If no interventions are carried out, the development of entrepreneurship and its contribution to economic development may continue to be very little. Cooney (2012) states that the relevance of entrepreneurship to economic development has been established by multiple studies. Entrepreneurship drives innovation, creates jobs, and fosters economic growth. In the context of Bhutan, overcoming these hurdles is crucial to harness the potential of entrepreneurship for national development.

Regulatory challenges pose significant obstacles, as complex and lengthy processes of establishing businesses and accessing finance create barriers for entrepreneurs. Without regulatory reforms that simplify and streamline these processes, new businesses may struggle to survive, limiting their ability to grow and expand into international markets. More entrepreneur-friendly regulatory reforms are essential to create a more conducive environment for business operations.

Financial accessibility is another critical issue, as many entrepreneurs face difficulty in securing the capital needed to start or expand their business. Without improvements in financial accessibility, many potentially viable business ideas may never materialize. Policies that facilitate easier access to credit and financial resources are necessary to foster entrepreneurial ventures. The lack of an entrepreneurial mindset and preference for government jobs over entrepreneurship stifle innovation and business creation. Fostering an entrepreneurial culture through education and awareness programs can encourage more individuals to consider entrepreneurship as a viable career path. Developing entrepreneurial skills at an early stage through educational reforms will be key to shifting societal perceptions.

Inadequate infrastructure and logistical challenges hamper the ability of businesses to operate efficiently and engage in international trade. Improving transportation networks, digital infrastructure, and connectivity are essential to enhance connectivity and reduce the cost and time of doing business. Government support is crucial for addressing challenges related to regulations and international trade. Complex government regulations and insufficient knowledge among officials can discourage both local and international business activities. Government support in the form of trade agreements, export advisory services, and participation in international trade organizations can help businesses overcome these challenges and access new markets while boosting their competitiveness.

Finally, the availability of a skilled workforce is another significant hurdle. Many businesses struggle to find employees with the necessary skills to meet their needs. Providing vocational training and skill development programs aligned with industry demands can ensure that the workforce meets the demands of modern businesses and supports their growth and internationalization.

7.3 Policy recommendations for promoting the internationalization of Bhutanese entrepreneurial ventures
i. Regulatory Reforms

Simplify and streamline business registration and licensing processes by adopting best practices from countries like Singapore, which consistently ranks among the top five in the Ease of Doing Business (EOB) index. Singapore's "GoBusiness Licensing" portal offers a single registration window for new business registration and fee payments, providing a seamless experience for entrepreneurs. In addition, Singapore's corporate income tax (CIT) at 17%, one of the lowest in the world, has contributed to establish its pro-business environment, benefiting local businesses and attracting international businesses (World Bank, 2019).

In contrast, Bhutan's CIT stands at 30% for fully tax-liable firms and 25% for limited tax-liable companies, which may discourage business growth. Therefore, the government could explore reducing CIT to encourage business establishments and allow firms to retain larger profits. This would enable companies to increase retained earnings, facilitating growth, expansion, or reinvestment in research and development.

ii. Development of entrepreneurial mindset and capacity building

Incorporate entrepreneurial studies into the national syllabus to foster an entrepreneurial mindset from an early stage. Additionally, provide seminars, training programs, and mentorship opportunities to equip individuals with practical skills and knowledge. Furthermore, popularize success stories of Bhutanese entrepreneurs, such as Bhutan Blossoms, to inspire and motivate aspiring entrepreneurs.

iii. Sensitization of relevant government agencies

Improve coordination and efficiency, by making it mandatory for relevant government agencies to meet regularly and collaborate. Additionally, establishing a common web portal will streamline access to information and provide updates on any changes in service delivery rules. Furthermore, setting up an entrepreneurship development and international trade office, along with a customer complaints division, to address discrepancies and ensure seamless access to trade-related information.

iv. Enhance Financial Accessibility

Develop specialized financial products for SMEs and startups, and establish government-backed loan guarantee schemes like the National Credit Guarantee Scheme launched during the pandemic but later discontinued (Dolkar, 2023).

v. Launch more initiatives like the Expanding Horizons guidebook
vi. Skill Development Programs

Offer vocational training aligned with industry needs and foster collaborations between educational institutions and businesses.

8. CONCLUSIONS

8.1 Summary of the study's key findings

The study revealed several factors contributing to Bhutan's 89th position in the Ease of Doing Business (EOB) ranking out of 190 countries. Key challenges include complex government regulations, coupled with a lack of awareness among government officials. Limited access to finance and inadequate infrastructure, compounded by the country's geographical challenges, further restrict business growth. Additionally, there is a shortage of a skilled workforce and an entrepreneurial mindset, limiting innovation. Moreover, Foreign Direct Investments (FDIs) are predominantly concentrated in the hotel sector, signaling a need to diversify investments. The study emphasizes the importance of policy reforms and enhanced capital access avenues to facilitate entrepreneurial growth and facilitate international trade.

8.2 Contributions to the Field of Entrepreneurship and International Business

This research makes several significant contributions to the fields of entrepreneurship and international business. It applies both case studies and comparative analysis to provide insights by drawing parallels between Bhutan's entrepreneurial landscape and those of other economies. Through longitudinal studies, the research tracks changes and trends in trade balance and economic growth, offering a broader understanding over time. It also sheds light on the entrepreneurial ecosystem of small developing economies like Bhutan, revealing how regulatory, financial, and cultural factors shape these ecosystems.

Moreover, the study identifies key barriers hindering business growth and internationalization, such as complex regulations, limited financial access, logistical issues, and a lack of entrepreneurial mindset. With these, policy recommendations which can be used to stimulate entrepreneurship and facilitate international business development include, simplifying regulatory processes, improving financial accessibility, promoting entrepreneurial culture, and developing infrastructure to support business growth. In addition, the importance of financial accessibility for small and medium enterprises (SMEs) is also highlighted, with suggestions for improving credit availability and fostering financial inclusion. The study underscores the need for education reforms to integrate entrepreneurship at all stages, thereby nurturing an entrepreneurial mindset from an early stage. Furthermore, briefly highlights the impact of government policies on entrepreneurship, evaluating the existing regulatory environment and system.

8.3 Suggestions for Future Research

This study identifies several areas for future research. Future studies with proper data collection can help strengthen the understanding of the link between entrepreneurship and international business in Bhutan. Additionally, the impact of regional trade agreements on Bhutan's international trade dynamics along with the effects of specific government policies, such as high taxation, on entrepreneurship and trade can be further examined. Another scope for future research involves analyzing how FDIs influence Bhutan's trade and entrepreneurial environment, helping policymakers craft more effective strategies to attract and manage foreign investments.

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THE EXPERIENCE OF ILLNESS: EMOTIONAL AND ECONOMIC IMPACTS

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Abstract: *This study examines the complex emotional and economic consequences of illness, focusing on individuals' subjective experiences and their broader societal impact. Employing a multi-level methodological approach, it combines theoretical insights with wavelet transform analysis to investigate long-term sickness trends in the UK. The findings highlight a significant increase in economically inactive individuals due to long-term sickness, driven by factors such as mental health conditions, chronic diseases, and the COVID-19 pandemic. The emotional aspects of illness are explored through their influence on relationships, personal identity, and societal attitudes, underscoring the necessity of patient-centered care that addresses both psychological and social needs. The economic analysis reveals the substantial burden of illness manifested in decreased labor force participation, rising healthcare costs, and productivity losses. Wavelet transform analysis captures both short-term variations and long-term patterns, offering valuable insights into the dynamic, non-stationary nature of sickness-related economic inactivity. This research emphasizes the critical need for proactive healthcare policies, workplace accommodations, and robust mental health support to reduce the adverse effects of illness on individuals and economies. By integrating advanced analytical methods and interdisciplinary perspectives, the study enhances our understanding of the intricate connections between illness, emotional health, and economic resilience.*
Keywords: economic impact of illness; emotional impact; experience of illness.

INTRODUCTION

The world is facing a persistent global mental health crisis exacerbated by the COVID-19 pandemic, rising living costs, and increasing global challenges. These factors have intensified pre-existing issues and created more significant uncertainty for many. According to the World Health Organization, approximately 15% of the global working-age population experiences mental illness, impacting not only individual well-being and relationships but also the workplace. Depression and anxiety are estimated to cost the global economy $1 trillion annually, equating to 12 billion lost workdays. A recent Deloitte study highlights the significant mental health challenges faced by Gen Z and millennials, who comprise a large portion of the workforce. The research found that 40% of Gen Zs and 35% of millennials report feeling stressed or anxious most of the time, with nearly half experiencing workplace burnout.

The experience of illness is a highly relevant topic with profound implications for healthcare, policy, and society. Exploring this subject can deepen our understanding of how illness affects individuals physically, emotionally, and socially beyond what traditional biomedical models capture. It can also highlight the diversity of personal responses to illness and the role of cultural, psychological, and social factors in shaping those experiences.

From a scientific perspective, studying the experience of illness can lead to improved patient-centered care, as it helps healthcare professionals recognize and respond to patients' unique needs and perspectives. It can inform interventions that address not only the symptoms but also the psychosocial aspects of illness, improving overall quality of life for patients.

The experience of illness is a multifaceted phenomenon encompassing many personal, social, and cultural dimensions. It is not merely about the physical symptoms but also involves the individual's subjective experience, which includes changes in self-identity, time perception, and existential meaning, as highlighted by Havi Carel's phenomenological analysis (Carel, 2015). The diagnosis process plays a crucial role in shaping the illness experience, as it involves navigating complex power dynamics and social interactions that can significantly impact how patients perceive and manage their conditions (Jeske et al., 2023). Moreover, the experience of illness is deeply intertwined with the search for meaning as individuals and caregivers grapple with questions about the purpose of life amidst suffering. This search for meaning can lead to either despair or a heightened sense of awareness and responsibility, serving as a therapeutic resource (Bruzzone, 2021). The social construction of illness further complicates this experience, as it is influenced by cultural norms and societal values, which shape how individuals interpret and respond to their conditions (Skrzypek, 2014). Illness narratives, which are personal stories about living with illness, provide valuable insights into these experiences, though they must be critically examined for their epistemological properties to ensure they accurately reflect the realities of the individuals' experiences (Lucius-Hoene et al., 2018). Additionally, the patient experience is a complex construct that includes determinants such as the quality of healthcare services and the politics of healthcare, which influence patient satisfaction and engagement (Zakkar, 2019). Overall, understanding the experience of illness requires a holistic approach that considers the interplay of personal, social, and systemic factors, as well as the narratives and meanings individuals ascribe to their experiences (Locock et al. (2017), Cipolletta, (2020), Palmeira & Gewehr (2018)).

The experience of illness is a profoundly personal and often life-altering journey, shaped by a range of physical, emotional, and psychological challenges. Unlike clinical definitions that focus on biological abnormalities and diagnostic criteria, the experience of illness is subjective, encompassing how individuals perceive, interpret, and react to their health conditions. This viewpoint enlightens the lived reality of patients, revealing how illness interrupts daily routines, reshapes identities, and affects relationships (Shrout et al., 2024). Studying the experience of illness uncovers symptoms and treatments and the intricate connections between the body, mind, and society. While healthcare professionals focus on diagnosis and treatment, the experience of illness highlights how individuals interpret their suffering and adapt to the changes it brings. This process involves many emotions—from fear and uncertainty to resilience and acceptance—and emphasizes the significant influence of culture, family, and personal beliefs on how illness is understood. Acknowledging the

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experience of illness is crucial for healthcare providers, as it bridges the divide between clinical care and patient-centered support, promoting empathy and comprehensive approaches that consider both medical and personal dimensions.

This paper aims to identify theoretical aspects of the emotional and economic impacts of illness and create a methodology to value the effect of COVID-19 on illness and stress.

This paper is organized as follows: Section 2 gives insights into the theoretical basis of understanding illness's emotional and economic impact. Section 3 analysing the research methodology focusing on the idea of wavelet transformation. Section 4 describes the results and discussion, and finally, we present our conclusions and recommendations.

LITERATURE REVIEW
Emotional impact

Illness significantly impacts relationships, often transforming them in complex ways. Long-term illness can lead to positive and negative social network changes, as individuals may experience increased support from family and friends. At the same time, some relationships may become distant or dissolve due to the strain of illness. Long-term illnesses can lead to shifts in social networks, with some relationships becoming more supportive while others diminish, reflecting the complex nature of social support during illness (Espvall & Dellgran, 2016). Chronic illness, mainly when concealable, can challenge couples' communication and relational well-being, often resulting in lower satisfaction and increased burden. However, when couples engage in open communication and dyadic coping strategies, they can enhance their relational satisfaction and closeness (Shrout et al., 2023). Emotionally focused therapy has been shown to help couples enrich their emotional quality, allowing them to express deep-seated emotions and meet each other's needs despite the challenges posed by chronic illness (Chawla & Kafescioglu, 2012). The stress of illness can also lead to role changes within relationships, where partners may need to take on additional responsibilities, potentially leading to feelings of resentment and grief on both sides (Campling & Sharpe, 2008). Communication-debilitating illnesses further complicate relationships by necessitating adjustments in how individuals interact with loved ones, often requiring new strategies to maintain relational bonds (Bute et al., 2007). In young adults, chronic illness can disrupt normative relationship development, leading to insecure attachments and lower relationship satisfaction compared to healthy peers (Cole & Karantzas, 2006). Family dynamics are also affected, as serious illness can lead to protective behaviors that isolate family members from one another when mutual support is most needed. Chronic illness in children also affects family dynamics, with older children experiencing weaker family relationships, although these relationships can be strengthened by better health and reduced anxiety or depressive symptoms (Cox et al., 2021). Despite these challenges, sharing personal narratives and life challenges can help individuals with chronic illnesses redefine their identities and foster healthier relationships with family and friends (Huang et al., 2018). Chronic illness profoundly transforms relationships, highlighting the resilience and adaptability of individuals and their social networks as they navigate evolving challenges and roles.

Individuals experiencing illness frequently exhibit diverse emotional responses characterized by complexity and nuance. Common emotional responses include feelings of

depression, anxiety, fatigue, and a desire to limit social interactions, collectively known as the sickness response, which is an adaptive behavior aimed at conserving energy and improving survival during illness (Lekander, 2022). This response is functionally similar to classical emotions like fear and can be exacerbated by low-grade inflammation, contributing to symptoms in both somatic and mental health contexts (Lekander, 2022). Emotional reactions to illness are not only individual but also relational, affecting family dynamics and manifesting in themes such as denial versus acceptance, despair versus hope, and isolation versus connection (McDaniel et al., 2000). The phenomenological perspective, as discussed by Madeira et al. (2019), introduces the concept of the "uncanny" in illness, where individuals experience a disconcerting shift in their sense of being, leading to feelings of fear and loss of control (Madeira et al., 2019). The severity of the illness does not always correlate with the intensity of psychological reactions, as even minor illnesses require lifestyle adjustments and can lead to significant emotional distress, including anxiety and depression (G. G. Lloyd, 2007). A lack of empathy from others can further exacerbate the emotional burden of illness, leading to feelings of isolation and frustration (Havi, 2008). The author reflects on the emotional toll of experiencing rapid physical decline at a young age, noting the anxiety and dread that accompany each deterioration in health. This includes concerns about losing the ability to engage in once-manageable activities, leading to a shrinking world and a sense of helplessness (Havi, 2008). While fear and sadness are common, they are often normal emotional responses to the threat posed by illness, and understanding these emotions can aid in better patient adaptation and management (Bowman, 2001). The paper concludes that the traditional psychopathological paradigm, which primarily emphasizes anxiety and depression as indicators of patient reactions to acute illness, is insufficient due to the considerable variability in how these emotions are measured and interpreted across different populations. It calls for a shift in perspective, advocating for recognizing emotional responses to illness as normal reactions rather than pathological ones, and suggests that future research should adopt this approach to enhance the understanding of patient experiences. (Bowman, 2001) Individuals facing illness often experience a complex spectrum of emotions, including fear, sadness, anger, guilt, and isolation, alongside moments of hope, gratitude, and acceptance. These emotions, shaped by personal and social contexts, evolve and reflect the profound psychological impact of living with illness.

Understanding the emotional responses to illness is crucial for improving patient care and support, as it directly influences patient outcomes and satisfaction. Recognizing and addressing patients' emotional reactions, such as fear, anger, sadness, joy, and compassion, can enhance the provider-patient relationship and facilitate better health outcomes (Naidorf (2024), Beale (2017). By recognizing patients' emotions, addressing their concerns, and involving them in treatment decisions, healthcare providers can enhance patient outcomes and create a more compassionate and collaborative healthcare environment (Naidorf, 2024). Emotional responses can profoundly influence a patient's capacity to understand and act on health information, frequently posing obstacles to accessing healthcare services (Beale, 2017). Integrating technology, including intelligent support systems and biofeedback sensors, offers valuable tools for evaluating and managing patients' emotional states, delivering emotional support and practical assistance in their daily lives (Maj et al., (2024), Wilson et al. (2016). The system will

facilitate communication between patients and doctors, allowing for preliminary diagnoses and tailored treatment plans based on collected data. It will also provide patients with health reports and treatment recommendations to aid their recovery (Maj et al., 2024). Moreover, incorporating psychotherapeutic teaching into medical education can enhance communication skills among healthcare providers, enabling them to understand better and address the emotional aspects of illness (Groves, 2015). Emotional support is vital to patient satisfaction but is frequently underemphasized in healthcare settings. By recognizing and implementing practical strategies for providing emotional support, healthcare organizations can enhance patient satisfaction and elevate the overall quality of care. (Adamson et al., 2012)

Moreover, the emotional impact of illness and care, particularly in chronic conditions like advanced kidney disease, emphasizes the need for healthcare providers to acknowledge and address patients' emotional experiences. Neglecting these aspects can foster mistrust and isolation, adversely affecting the care experience (O'Hare et al., 2018). Patients often struggle with feelings of personal responsibility for their illness, commonly blaming themselves for their kidney disease and believing it was preventable. This tendency toward self-blame underscores the importance of healthcare providers addressing the emotional dimensions of chronic illness to enhance overall patient care and support (O'Hare et al., 2018). Illness requires adaptations in communication and roles, making effective management and open dialogue essential for sustaining and strengthening relationships in the face of challenges associated with chronic and mental health conditions (Bute et al., 2007). A comprehensive understanding of patients' emotional responses to illness can lead to more effective, empathetic, and patient-centered care, ultimately enhancing the healing process and patient satisfaction (Picton, 2011). Addressing and understanding the emotional aspects of illness are crucial for improving patient care and satisfaction. By incorporating empathy, clear communication, innovative technologies, and comprehensive provider training, healthcare systems can develop a more compassionate, patient-focused approach that fully acknowledges the emotional impact of illness. This approach enhances the provider-patient relationship, supports better health outcomes, builds trust, and elevates the overall quality of care.

Economic impact

The economic impact of illness is multifaceted, affecting individuals, households, and broader economies in various ways. Mental health illnesses, for instance, impose a significant economic burden, as evidenced by studies from countries like Canada, where costs are projected to increase six-fold over the next 30 years, potentially exceeding A\$2.8 trillion (Doran & Kinchin, 2017). In Nigeria, mental health issues are prevalent and pose a threat to economic stability without robust policy interventions (Owoeye, 2024).

Chronic illnesses also have profound economic implications, particularly in low- and middle-income countries. In Nigeria, chronic illnesses lead to substantial direct and indirect costs, with many households spending over 10% of their income on health, often resorting to borrowing or selling assets to cope (Okediji et al., 2017).

Similarly, catastrophic health expenditures in Korea are rising, especially among low-income groups, highlighting the inadequacy of current health safety nets. Despite universal health coverage in Thailand, severe illness significantly increases out-of-pocket expenses and

reduces household labor income by nearly a third, forcing reliance on informal financial support (Neelsen et al., 2015). The impact of illness on employment is also notable; in Australia, illness-related early retirement results in significant income loss, increased government support payments, and reduced tax revenue, amounting to billions annually (Schofield et al., 2011). In rural India, adult illness reduces workforce participation and earnings, though households attempt to mitigate these effects through increased labor participation by non-sick members (Alam et al., 2018). Furthermore, illnesses like hypercholesterolemia contribute to the economic burden of cardiovascular diseases, with direct costs ranging significantly, underscoring the need for updated research and public health strategies (Ferrara et al., 2021). Overall, the economic impact of illness is substantial, necessitating comprehensive policy responses to mitigate these effects and support affected individuals and economies.

Mental health illnesses contribute significantly to the economic burden across various countries, impacting both direct and indirect costs. In South America, mental health conditions, along with other noncommunicable diseases, are projected to cost approximately 7.3trillion from 2020 to 2050, equating to about 47.3 trillion from 2020 to 2050, equating to about 42.5 trillion, with indirect costs, such as lost productivity, being particularly substantial (Ferranna et al., 2023). In developed countries, mental health issues account for around 4% of GDP, with significant productivity losses, as mental illness is prevalent among working-age populations (Frank, (2022), Doran & Kinchin (2020)). In Canada, the economic costs of mental illness are expected to increase six-fold over the next 30 years, highlighting the growing financial impact (Layard, 2016). In Germany, mental illnesses accounted for societal costs of 146 billion euros in 2015, representing 4.8% of GDP, with a significant portion attributed to direct health costs (Doran & Kinchin, 2017). The economic burden is not limited to direct healthcare expenses but extends to lost productivity, social exclusion, and reduced educational attainment, which are common across various regions, including Europe and Nigeria (Lambert et al., (2023), Agboola et al. (2018)). Mental disorders such as depression, anxiety, and schizophrenia are particularly burdensome, necessitating increased investments in mental health care and cost-effective interventions to mitigate these impacts (Turk & Albreht, 2010). The economic implications of mental health are profound, affecting individuals, families, and national economies, and underscore the need for comprehensive policy responses to address these challenges effectively (Razzouk, 2017).

The economic costs associated with mental health illnesses are substantial and multifaceted, encompassing both direct and indirect expenses across various countries. Direct costs primarily include healthcare expenditures such as hospital stays, medication, and therapy, which in Germany alone amounted to 44.4 billion euros in 2015, representing a significant portion of the country's GDP (Lambert et al., 2023). Indirect costs, however, often surpass direct costs and include loss of productivity, unemployment, and social exclusion, which collectively contribute to a global financial burden estimated at 2.5 trillion annually, projected to rise to 2.5 trillion annually, projected to rise to 6 trillion by 2030 (Frank (2022), Sowers et al. (2019)). In the United States, mental illnesses affect about 20% of the population, with social costs growing more rapidly than healthcare costs, highlighting the broader societal impact (R. Frank & Glied, 2023). In South America, the macroeconomic burden of

noncommunicable diseases, including mental health conditions, is estimated to reduce GDP by about 4% over the period from 2020 to 2050 (Ferranna et al., 2023) (Ferranna et al., 2023). The indirect costs are further exacerbated by factors such as poverty, low educational levels, and gender inequity, which are prevalent in many regions (Razzouk, 2017). In Nigeria, the economic burden on households is significant, with many individuals unable to afford even essential goods due to the high costs associated with managing mental illnesses (Agboola et al., 2018). These costs burden individuals, families, and national economies, necessitating increased investments in mental health care and implementing cost-effective interventions to mitigate these impacts (Razzouk (2017), Martini & Attallah (2019). The complexity of estimating these costs is compounded by variations in definitions, populations studied, and incomplete data, yet improved methodologies are helping to provide a clearer picture of the economic impact of mental disorders (Trautmann et al., 2016). Overall, the economic costs of mental health illnesses are profound, affecting not just healthcare systems but also the broader economic and social fabric of societies worldwide.

METHODOLOGY

The methodologies used to estimate the economic burden of mental health illnesses vary significantly across different regions, reflecting diverse approaches and challenges. One common method is the human capital approach, which considers both direct costs, such as healthcare expenses, and indirect costs, including productivity losses due to disability or death (Frank, 2022). This approach is complemented by the value of the statistical life (VSL) method, which assesses the economic impact of mental health by evaluating trade-offs between risks and capital, similar to methods used for other major diseases like cardiovascular conditions (Frank, 2022). In Canada, a comprehensive measure of the economic burden incorporates medical resource use, productivity losses, and reductions in health-related quality of life (HRQOL), highlighting the significant role of indirect costs (Lim et al., 2008). The economic evaluation frameworks often used in these studies include cost-of-illness studies, which are crucial for informing resource allocation decisions by comparing costs and outcomes to assess efficiency (Patel, 2018). However, these evaluations face methodological challenges, such as determining the appropriate perspective (e.g., societal or health service) and the measurement of costs and outcomes, with debates surrounding the use of quality-adjusted life years (QALYs) in mental health studies (McCrone, 2011). In Europe, the economic burden of mental disorders like depression is primarily driven by indirect costs, such as productivity losses, which account for a significant portion of the total costs. Variations in definitions further compound the complexity of estimating these costs, populations studied, and cost components, necessitating more standardized approaches to achieve consensus (Jacobs et al., 2018). Additionally, the multidisciplinary nature of mental health interventions requires consideration of diverse cost categories, including social care, informal care, and education, which are often impacted by mental health issues (Shearer et al., 2016). Overall, while methodologies differ, there is a consensus on the substantial economic burden posed by mental health illnesses, underscoring the need for improved methods and increased investment in mental health care (Razzouk, 2017), Trautmann et al. (2016)).

Our research design is placed in Figure 1.

Figure 1. *Methodological framework*

1 step

Overview of UK trends: *The number of people in the UK unable to work due to long-term illness (from 2000 Q1 to 2024 Q3)*

The number of workers reporting work-related stress, depression or anxiety (period 2008/09-2022/23)

2 step
Descriptive statistics
One-way Tabulation

3 step
Wavelet Transform Analysis:
Orthogonal transform
Overlap
MRA as seasonal adjustment
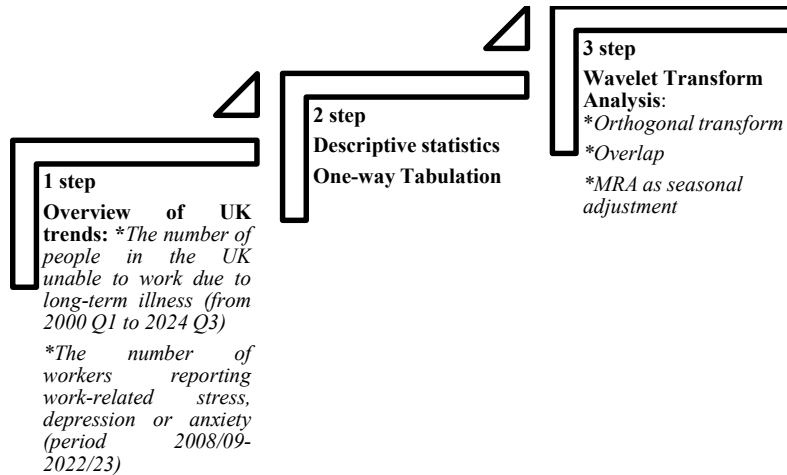
Source: Done by authors

Wavelet transforms are typically categorized into two main types:

1. Continuous Wavelet Transform (CWT): Provides a highly detailed time-frequency representation by continuously scaling and shifting the wavelet. The results are often visualized as a scalogram, which shows the signal's energy distribution across time and scales (Mallat (1999), Torrence & Compo (1998)).

2. Discrete Wavelet Transform (DWT): Uses discrete scales and translations for computational efficiency, making it widely used in practical applications like signal denoising and compression.

Advantages of Wavelet Transform Analysis

- Time-Frequency Localization: Captures transient features and patterns that occur only at specific times.
- Multiscale Analysis: Decomposes signals into components at different resolutions, allowing simultaneous analysis of global trends and local details.
- Noise Robustness: Effectively separates noise from meaningful signal components, enhancing data interpretability (Mallat, 1999).

Wavelet Transform Analysis is a robust mathematical technique used to decompose a signal into components localized in both time and frequency domains. Unlike Fourier analysis, which provides a global frequency representation, wavelet analysis can reveal transient and time-varying features within a signal. This makes it particularly useful for analyzing non-stationary data across various scientific and engineering domains. Wavelet analysis usually consists of transforms, variance decomposition, thresholding, and outlier detection.

RESULTS AND DISCUSSION:
Overview of the UK situation.

For our analysis, we have taken the UK as a case because in this country people unable to work due to long-term illness peaked a lot. Overall, it is estimated that nearly one-fifth of the UK's working-age population has a condition that limits their ability to work. The think tank suggests that this issue has grown so severe that it now poses a significant threat to the country's economic potential.

In early 2024, the number of people in the UK unable to work due to long-term illness peaked at 2.82 million, though this figure declined slightly in subsequent months. This marks a significant rise from just over 2 million in 2019. Before 2022, the previous high of 2.38 million occurred in late 2021 and early 2022. At that time, caregiving for family members was the leading cause of inactivity. Since late 2021, however, long-term and temporary illnesses have become the dominant factors, comprising 32.2% of the economically inactive population by Q3 2024.

Figure 2. *The number of people in the UK unable to work due to long-term illness*

Source: Done by authors using data from Statista

The reasons behind this increase remain uncertain if we want to focus on the causes of rising long-term illness. As of 2022, mental health conditions were the leading causes, with 313,000 citing mental illness and 282,000 naming depression-related issues. The COVID-19 pandemic also likely played a role; in April 2022, 1.8 million people reported experiencing Long Covid. While long-term sickness remains most prevalent among those over 50, younger groups have seen notable increases. Between 2019 and 2022, the number of individuals aged 16–34 on long-term sick leave rose by 140,000, compared to a 32,000 increase for those aged 35–49. The UK labor market has remained tight in recent years, favoring job seekers. In 2022, unemployment hit its lowest level since the 1970s, with job vacancies peaking at 1.3 million in May. Although wage growth was robust during this time, high inflation led to real-term pay reductions between late 2021 and mid-2023. By December 2023, redundancies reached their highest levels since April 2021 at 116,000, signaling potential cooling in 2024. Despite this, the labor market remains resilient by historical standards.

Figure 3. *Number of workers reporting work-related stress, depression or anxiety in Great Britain from 2008/09 to 2022/23 (in 1,000s)*
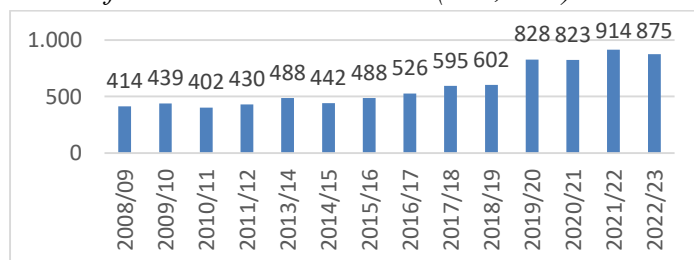
Source: Done by authors using data from Statista

From 2008/09 to 2022/23, the number of workers in Great Britain reporting work-related stress, depression, or anxiety has shown a significant upward trend. In 2008/09, approximately 415,000 workers reported such conditions. This figure increased over the years, reaching around 602,000 in 2014/15. A notable rise occurred during the COVID-19 pandemic, with reports peaking at approximately 914,000 in 2021/22. In 2022/23, the number slightly decreased to about 875,000 workers. These statistics underscore the escalating concern of work-related mental health issues in the UK workforce over the past decade and a half.

Descriptive Statistics and One Way Tabulation

We start our quantitative analysis by calculating the main descriptive statistics parameters. Analyzing the data from 2000 Q1 until 2024 Q3, we can see that the maximum number of economically inactive people due to long-term sickness in the United Kingdom was at the highest level in 2024 Q1 and reached 2 820 (in 1,000s) while the quarterly average was 2227,404 (more data of descriptive statistics in Table 1).

Table 1. *Results of Descriptive Statistics.*

Mean	2227,404
Median	2209
Maximum	2820
Minimum	1959
Std. Dev.	198,3388
Skewness	1,30528
Kurtosis	4,730509
Jarque-Bera	40,46496
Probability	0
Observations	99

Source: Done by authors using Eviews and data from Statista

The descriptive statistics provide an overview of the patterns and characteristics of economically inactive individuals due to long-term sickness, offering insights into the UK's health and labor market challenges. The data reveals trends, variability, and anomalies that are critical for understanding the broader socio-economic implications.

The mean value of 2227.404 thousand people represents the average number of economically inactive individuals due to long-term sickness per quarter across the dataset. The median value of 2209 thousand people is slightly below the mean, indicating that the dataset includes some higher values (outliers) that increase the mean. This reflects periods where sickness-related inactivity spiked, likely during major health crises or demographic shifts. The dataset spans from a minimum of 1959 thousand people to a maximum of 2820 thousand people, a range of 861 thousand. This range highlights the variability in inactivity levels over time, likely influenced by underlying factors such as chronic illness prevalence, healthcare accessibility, demographic trends, and external shocks like the COVID-19 pandemic.

The standard deviation of 198.34 thousand people reflects moderate variation around the mean, indicating that while inactivity levels were generally consistent, there were notable fluctuations during the observed period. The positive skewness of 1.30528 suggests that the

distribution is right-skewed, with a few quarters experiencing significantly higher levels of inactivity. This likely reflects acute events, such as pandemics or systemic health crises. The kurtosis value of 4.730509 indicates a leptokurtic distribution, with a sharper peak and heavier tails than a normal distribution. This suggests that while most observations are close to the mean, extreme values (outliers) are more common than in a normal distribution. The Jarque-Bera test statistic of 40.46496 with a probability of 0 indicates a significant departure from normality. This non-normality can be attributed to the presence of outliers, skewness, and kurtosis in the dataset. With 99 observations, the dataset covers a substantial period, likely capturing long-term trends and episodic events affecting economic inactivity.

The distribution indicates a relatively stable baseline of economically inactive individuals due to long-term sickness, with the mean and median close in value. However, the positive skew and leptokurtic nature suggest the influence of episodic events, such as the COVID-19 pandemic, that temporarily elevated inactivity levels. The variability in the data highlights the dual challenge for policymakers: addressing the steady baseline of long-term sickness through healthcare improvements and chronic disease management while preparing for and mitigating the impact of acute health crises. The high mean value reflects a significant and persistent economic burden on the labor market and public resources. This underscores the need for targeted interventions to reduce long-term sickness-related inactivity, including preventive healthcare, workplace accommodations, and mental health support programs.

The data's non-normal distribution and right skew call for further investigation into the drivers of extreme values. Time-series methods, such as wavelet analysis, could be employed to identify periodicity, trends, and the impact of specific events (e.g., pandemic waves, policy changes). The descriptive statistics highlight the substantial and variable burden of long-term sickness on economic inactivity in the UK. The findings emphasize the importance of sustained efforts to improve public health infrastructure and resilience, addressing both chronic and acute factors influencing labor market participation.

In the next step, we will conduct a one-way tabulation, which offers a detailed dataset summary by presenting the frequency distribution of a single variable. This analysis is particularly useful for understanding data distribution, as it helps identify how data points are spread across different categories or values. It also assists in detecting outliers by spotting values that occur infrequently, which may indicate anomalies. The results of a one-way tabulation can be found in Table 2.

Table 2. *Results of One Way Tabulation.*

Value	Count	Percent	Cumulative count	Cumulative Percent
[1800,2000)	8	8,08	8	8,08
[2000,2200)	38	38,38	46	46,46
[2200,2400)	44	44,44	90	90,91
[2400,2600)	1	1,01	91	91,92
[2600,2800)	5	5,05	96	96,97
[2800,3000)	3	3,03	99	100,00
Total	99	100,00	99	100,00

Source: Done by authors using Eviews and data from Statista

Based on the results in Table 2 the tabulated results provide a detailed distribution of the quarterly number of economically inactive individuals due to long-term sickness, highlighting both the concentration and variability within the dataset. This analysis is critical for understanding patterns and trends in economic inactivity caused by health conditions. The majority of observations (82.82%) fall within the [2000,2400) range, with the [2200,2400) category being the most prevalent (44.44%). This concentration indicates that, over the observed period, the typical number of inactive individuals remained relatively stable. The lower range [1800,2000) accounts for only 8.08%, suggesting that values below 2000 were rare, potentially reflective of either improved health or a smaller affected population in earlier years. The upper ranges [2400,2600), [2600,2800), and [2800,3000) collectively represent 9.09% of the dataset. These values likely correspond to significant disruptions, such as the COVID-19 pandemic that temporarily increased long-term sickness rates.

The scarcity of values in the [2400,2600) (1.01%) and [2800,3000) (3.03%) ranges highlights that deviations from the central trend, whether due to health improvements or crises, were limited in duration and frequency. By the [2200,2400) range, the cumulative percentage reaches 90.91%, indicating that most periods were characterized by relatively moderate levels of long-term sickness-related inactivity. This suggests that fluctuations occurred but were generally confined to predictable limits. The clustering of data within the [2000,2400) range reflects temporal stability in the number of individuals inactive due to sickness, which may align with long-term trends in chronic illness prevalence, healthcare access, and demographic factors. The relatively few observations in higher ranges, especially [2800,3000), may signify the influence of significant but short-lived events like the COVID-19 pandemic, which temporarily elevated inactivity rates. This finding highlights the importance of monitoring and mitigating such disruptions. The relatively consistent mid-range values suggest that targeted policies to improve healthcare access and manage chronic conditions could significantly reduce the burden of long-term sickness. However, the occurrence of high-end values underscores the need for preparedness to address unexpected health crises that can strain the labor market.

In conclusion, this distribution analysis provides valuable insights into the dynamics of long-term sickness-related economic inactivity in the UK. It underscores the importance of a dual approach: addressing the steady baseline of chronic illness while preparing for and mitigating the effects of health crises on the labor force.

Wavelet Transform Analysis

Wavelet analysis typically begins with a wavelet transform of the time series of interest, a process conceptually similar to a Fourier transform. In this step, the time series is broken down into its spectral (frequency) components across different scales. In wavelet analysis, the concept of scale is analogous to frequency in Fourier analysis. This process re-expresses the time series data from its time-domain representation to its frequency-domain behavior. This transformation helps identify the signal's activity's most prominent scales (or frequencies).

We made Wavelet Transform Analysis based on decomposition: Orthogonal transform –DWT, filter class – Haar. Wavelet transform analysis can be practically applied to study the number of economically inactive people due to long-term sickness by examining how the patterns and trends in this data evolve over time, particularly when complex, non-stationary factors like economic conditions, health crises, or policy changes influence these patterns.

Figure 4. *Wavelet transform analysis: Orthogonal transform*
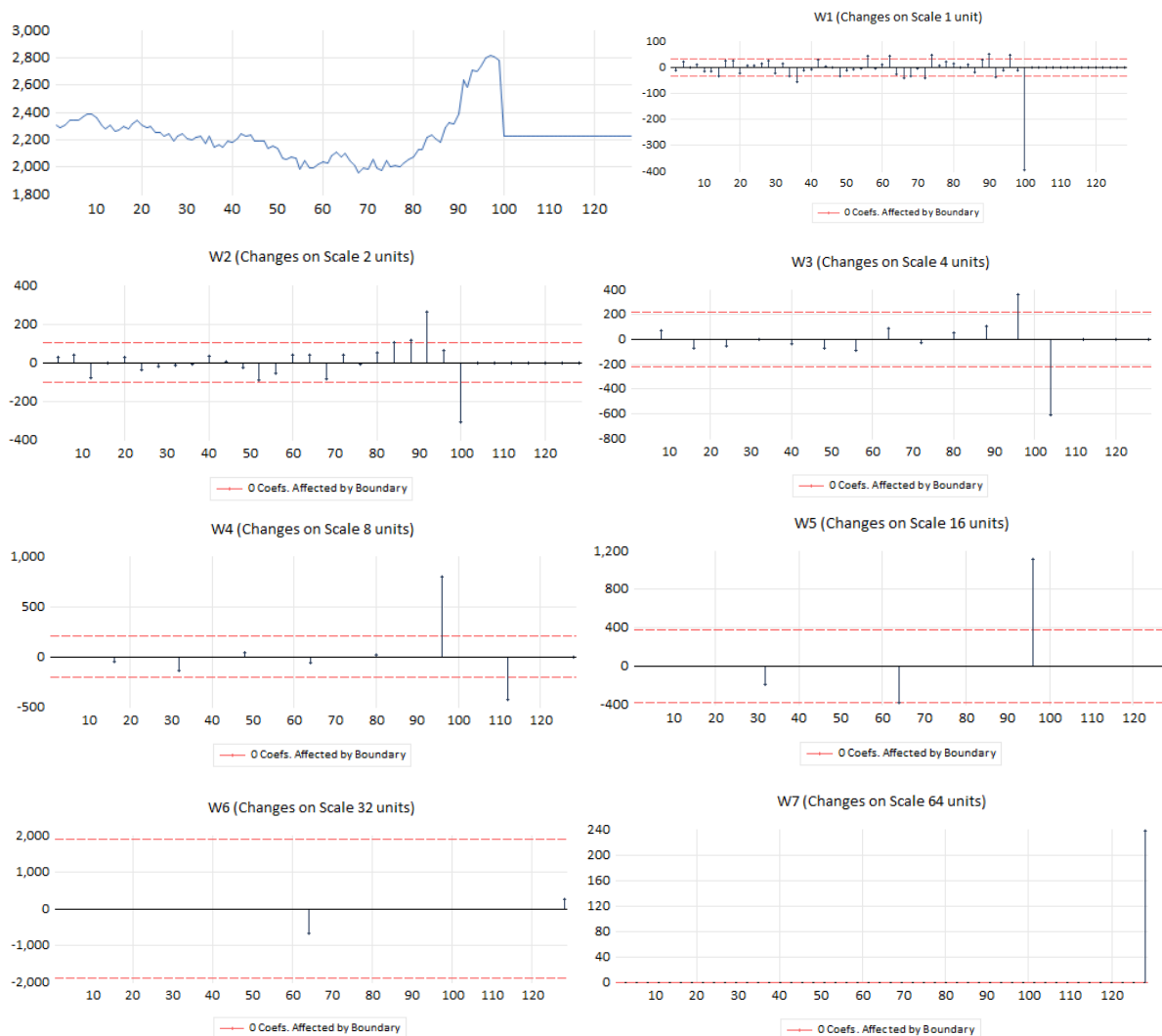
Figure 4. indicates a summary of the wavelet transformation performed. The first plot in the output is a plot of the original series and the padded values in case a dyadic adjustment was applied. The last 7 plots are, respectively, the wavelet coefficients. At the first scale of wavelet decomposition, the frequency spectrum is effectively divided into two equal parts: low and high-frequency components. The low-frequency portion corresponds to the scaling coefficients (VV), while the high-frequency portion corresponds to the wavelet coefficients (WW). Notably, the spectra associated with the wavelet coefficients are significantly less pronounced than those of the scaling coefficients, suggesting that the number of economically inactive people due to long-term sickness in the United Kingdom series may be non-stationary.

Additionally, the wavelet plot includes two dashed red lines, which denote the ±1 standard deviation range for the coefficients at that scale. This visualization aids in identifying wavelet coefficients that should be shrunk to zero as part of wavelet shrinkage applications, highlighting the insignificant coefficients. Coefficients that exceed a specific threshold—here, the standard deviation—are retained, while the rest are shrunk to zero. From this, it becomes clear that most wavelet coefficients at scale 1 can be disregarded, providing further evidence that high-frequency components in the number of economically inactive people due to long-term sickness in the United Kingdom series are not prominent.

Figure 5. *Wavelet transform analysis: Overlap*
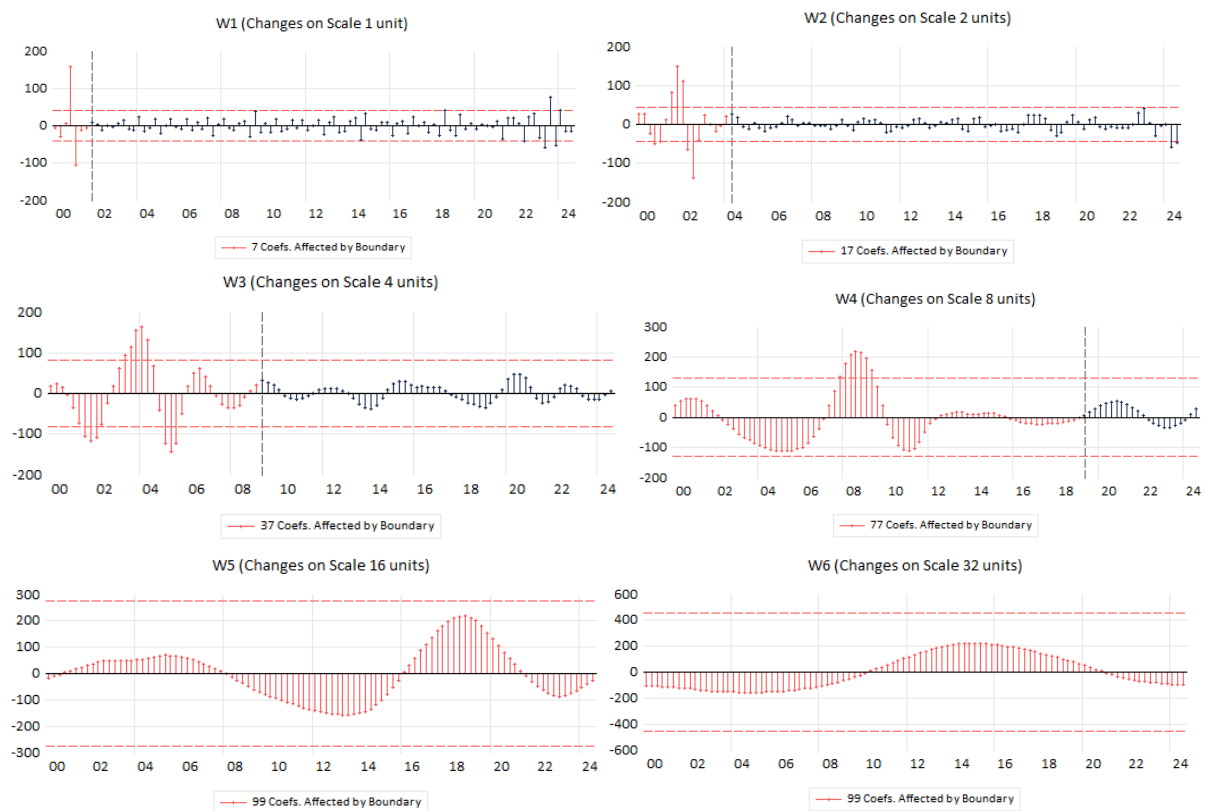
Although wavelet decomposition is not a formal statistical test, it provides an excellent method for identifying which scales (or frequencies) dominate the behavior of the underlying series. This analysis is not restricted to the first scale. To illustrate this, we will repeat the abovementioned process using the maximum overlap discrete wavelet transform (MODWT) with the Daubechies (daublet) filter of length 6. The transform will be applied up to the maximum possible scale, indicating which and how many wavelet coefficients are influenced by boundary conditions.

Figure 6. *Wavelet transform analysis: MRA as seasonal adjustment*
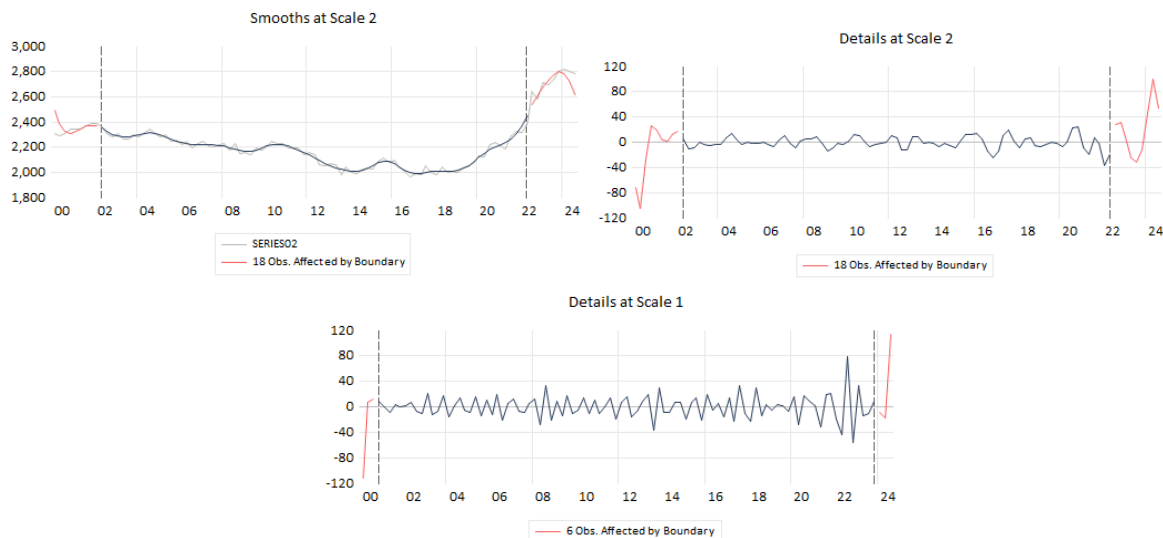
Wavelet analysis helps identify patterns and uncover trends in long-term sickness-related inactivity (e.g., seasonal effects, economic cycles). The results reveal that certain times of the year show spikes in inactivity due to sickness, which may be linked to flu seasons or other health-related phenomena. From our analysis, we see that the COVID-19 pandemic had a huge impact on UK number of economically inactive people due to long-term sickness. At the same time, we see a significant change in the number of workers reporting work-related stress, depression or anxiety in the UK. By analyzing low-frequency components, wavelet transforms identify broader trends, such as a gradual increase or decrease in long-term sickness rates over decades, potentially linked to aging populations or healthcare accessibility. Analyzing short-term fluctuations, high-frequency components are used to detect abrupt changes, such as those caused by significant events (e.g., a pandemic, economic downturns, or policy changes like stricter sick leave regulations). Wavelet-based models help forecast future inactivity rates by understanding past patterns, aiding policymakers and healthcare providers in preparing for potential increases in long-term sickness. Our results show that the level after the COVID-19 pandemic has changed significantly and can affect future trends considerably. It is essential to initiate changes in social security or healthcare policies which can help to create shifts in inactivity rates. Wavelet analysis can help pinpoint when these changes occurred and assess their immediate and long-term effects.

The main findings of this research identify that an increase in economically inactive people due to long-term sickness over the last years from 2020 can be due to aging populations or chronic diseases; extreme weather conditions, which can be related to climate change challenges, but the most probable is the COVID-19 pandemic highlighting the need for targeted healthcare interventions. On the other side, we think that one of the reasons, but not the main factor, can be the attitude towards sickness, which has changed after the COVID-19 pandemic because, before it, many people continued working even after being sick. By understanding these dynamics, policymakers can design better health and labor policies, allocate resources more effectively, and implement preventive measures to mitigate future risks associated with long-term sickness and economic inactivity. The UK must take serious decisions to manage this problem as it can start affecting economic trends and increase health problems.

CONCLUSIONS

The UK has witnessed a substantial rise in the number of economically inactive individuals due to long-term sickness, with the highest levels recorded in early 2024. This increase, from approximately 2 million in 2019 to over 2.8 million in 2024, highlights a pressing issue affecting the nation's workforce. The trend suggests that a combination of factors, including aging populations and the increasing prevalence of chronic diseases, drive this growth. Notably, the data indicates a demographic shift in long-term sickness, with younger populations also exhibiting higher rates of inactivity. This phenomenon underscores the need for comprehensive health monitoring systems and proactive intervention strategies to manage the impacts of these changes on economic productivity. Wavelet transform analysis was instrumental in decomposing the time-series data of economically inactive individuals, revealing complex, multi-scale patterns of change over time. This method effectively captured short-term fluctuations linked to transient factors such as seasonal health issues and acute

economic disruptions by isolating high-frequency components. Simultaneously, low-frequency components illustrated the underlying long-term trends, enabling a clearer understanding of persistent factors like chronic illnesses and systemic changes in health and labor market conditions. This dual analysis provided nuanced insights, allowing policymakers and researchers to identify the causes of sickness-related inactivity and the optimal time frames for implementing policy interventions.

The COVID-19 pandemic was a significant catalyst for the rise in long-term sickness rates, with lasting repercussions beyond the immediate health crisis. The pandemic's direct impacts, such as Long COVID symptoms affecting an estimated 1.8 million people in April 2022, compounded pre-existing health challenges. Moreover, the pandemic induced broader societal shifts, including heightened awareness and sensitivity toward illness and a greater propensity for individuals to prioritize health over economic activity. This marked change in attitudes likely contributed to a reduction in the normalization of working while unwell, suggesting that COVID-19 has permanently altered societal and workplace norms regarding health and productivity.

Mental health conditions have emerged as a leading cause of long-term sickness-related economic inactivity, particularly among younger demographics. Between 2019 and 2022, individuals aged 16–34 reported a sharp increase in mental health-related sickness, reflecting a growing vulnerability among younger workers to conditions such as anxiety, depression, and work-related stress. This trend aligns with broader findings that mental health challenges have surged globally, fueled by post-pandemic recovery pressures, economic uncertainty, and workplace burnout. These findings underscore the urgency of integrating mental health support into employment policies, including initiatives for stress management, flexible working conditions, and workplace mental health programs, to prevent further deterioration of the labor force's well-being. The rising levels of long-term sickness-related economic inactivity present a critical challenge to the UK's economic potential. A smaller active labor force, increased healthcare expenditures, and social security demands could constrain economic growth. Policymakers must prioritize investments in healthcare infrastructure and social safety nets to address the root causes of long-term sickness. Simultaneously, labor market policies should incentivize businesses to adopt flexible and inclusive employment practices, enabling individuals with chronic or mental health conditions to remain economically active. Addressing these challenges will require cross-sector collaboration, integrating healthcare, social policy, and economic strategies to mitigate the adverse effects of long-term illness on both individuals and the broader economy.

Wavelet-based models demonstrated their utility as a forecasting tool, highlighting both immediate and long-term trends in sickness-related inactivity. By analyzing historical patterns, these models can predict future surges in inactivity rates, aiding in strategic resource allocation. For example, the models identified the COVID-19 pandemic as a pivotal event that disrupted historical trends and set a new trajectory for inactivity levels. Policymakers can use these insights to anticipate potential shocks, such as future pandemics or climate-related health crises, and proactively design interventions to reduce their impact. This approach ensures public health and economic resilience by enabling a rapid, informed response to emerging challenges.

To develop effective solutions for the rising rates of long-term sickness, further research must explore the interplay between various contributing factors, including demographic shifts, climate change, mental health, and socioeconomic conditions. Longitudinal studies could provide deeper insights into how these elements interact and evolve over time. Additionally, a focus on regional disparities and vulnerable populations would ensure that policies address the specific needs of diverse groups. Policymakers should emphasize preventive healthcare measures, such as regular health screenings, mental health education, and community-based wellness programs, to reduce the incidence of long-term sickness. Furthermore, economic policies must consider the financial implications of inactivity and incentivize businesses to proactively support employee health and well-being.

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FROM ORIGINS TO INNOVATIONS: AI'S ROLE AND THE COST IMPACT ON COMPUTER VISION

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Abstract: The field of Computer Vision, a pivotal subdomain of Artificial Intelligence (AI), has seen extraordinary advancements since its emergence in the 1960s. This paper examines the historical development of Computer Vision technologies, tracing the journey from early foundational models, such as Frank Rosenblatt's Perceptron, to contemporary breakthroughs driven by Deep Learning. Key milestones are explored, including the development of algorithms like Scale-Invariant Feature Transform (SIFT), Viola-Jones for face detection, and Eigenfaces, which paved the way for modern solutions such as Convolutional Neural Networks (CNNs), YOLO and FaceNet. The paper highlights the evolution of face detection and recognition techniques, contrasting traditional methods with the transformative capabilities of Deep Learning-driven approaches. Additionally, we analyze the growing computational demands of modern algorithms, discussing the trade-offs between accuracy and efficiency and their implications for practical applications. This study underscores the rapid progression of Computer Vision, its challenges, and its role as a cornerstone in shaping the future of Artificial Intelligence.

Keywords: Computer Vision, Algorithms, Deep Learning, Artificial Intelligence, Convolutional Neural Networks.

INTRODUCTION

Computer Vision, a critical branch of Artificial Intelligence (AI), enables machines to interpret and process visual data with minimal human involvement. What began as a set of basic algorithms in the 1960s has grown into a sophisticated field that powers applications across industries such as healthcare, automotive, and security. This paper explores the historical trajectory of Computer Vision, starting with early milestones like the Perceptron, which showcased the promise of neural-inspired machine learning algorithms. Subsequent breakthroughs, including feature-detection techniques like SIFT and early face detection models like Viola-Jones, set the stage for today's sophisticated methods. The advent of Machine Learning and Deep Learning marked a turning point, introducing transformative technologies such as Convolutional Neural Networks (CNNs), YOLO, and FaceNet. These models deliver remarkable accuracy and efficiency in object detection and recognition.

Through this analysis, the paper provides an in-depth perspective on the evolution of Computer Vision—from its experimental origins to its current status as a pivotal field shaping the future of AI. Particular focus is given to the interplay between accuracy, computational efficiency, and practical usability, highlighting both the achievements and the ongoing challenges that define this dynamic domain.

The Rise of Computer Vision

Computer Vision, a specialized subfield of Artificial Intelligence (AI), empowers machines to "see" and interpret visual data. By leveraging Computer Vision techniques, machines can process, analyze, and extract meaningful insights from images and other visual inputs without human intervention (IBM, n.d.).

The origins of Computer Vision date back to the 1960s, when researchers began experimenting with algorithms to enable computers to interpret and analyze visual data, laying the foundation for this transformative field. In this discussion, we will explore the evolution of Computer Vision from its early experimental stages in the 1960s to its remarkable advancements in the 21st century (Minsky, 1966).

Frank Rosenblatt's Perceptron

Before we step into the origins of Computer Vision, first we need to understand Frank Rosenblatt's Perceptron. Introduced in 1958 by Frank Rosenblatt, the Perceptron was the earliest model that could demonstrate that machines could effectively learn and act from data. Frank's design was inspired by human's neurons and the Perceptron in itself was a simplified version of it. Perceptron showcased that a simple algorithm can be further improved by exposing the model to batches of data, laying the foundations for the creation of the more complex algorithms such as the modern Deep Learning models and Neural Networks used in today's era (Rosenblatt, 1958).

The Perceptron is a binary classifier, meaning it decides whether an input or stimuli belongs to one or two binary classes. It included 3 crucial components which we can also recognize in today's algorithms: Inputs & Weights, Activation Function and the Learning Algorithm.

The way the Perceptron works is that it takes one or more inputs, each assigned with an adaptable weight resembling the input's contribution to the output. The weighted sum of the inputs is that ran through an activation function which determines if the output is classified as a 0 or 1 based on a set threshold. To get the desired output, the weights are adjusted according to the error in the output compared to the desired output (weight = current weight + (error $*$ input)), a form of a learning algorithm. Despite its limitations of the time, the Perceptron laid the groundwork for ongoing advancements in Neural Networks and Machine Learning.

MIT's Summer Vision Project

During the 1960's researchers had tried to develop ways for computers to recognize and understand visual data. On 1963, Lawrence Gilman Roberts, known as Larry Roberts, presented his thesis "Machine Perception of Three-Dimensional Solids" where he presented methods to reconstruct 3D objects from 2D images, paving the path for 3D Computer Vision. He also introduced the idea of edge detection to identify the boundaries of objects in an image as well as mathematical models, which all contributed to future developments of Computer Vision technologies (Roberts, 1963).

During the summer of 1966, the "Summer Vision Project" at MIT's Artificial Intelligence Laboratory led by Marvin Minsky and Seymour Papert was built to develop a computer system that could recognize objects in images. The project was quite ambitious for the time and marked the beginning for further research in the area of Computer Vision. Its goal

was to develop algorithms that could make machines able to "see" and interpret data from real environments (Minsky, 1966).

The project focused on:

- Image Processing: Techniques for controlling and evaluating digital images, including filtering, enhancement and feature extraction.
- Object Detection: Development of algorithms that could capture and localize objects or faces within images or videos.
- Pattern Recognition: Development of methods for recognizing and differentiating patterns in visual information.

While the project didn't meet its initial objectives due to the difficulties of the time, including lack of processing power, sophisticated algorithms and computational models, it greatly influenced and inspired further research and innovations in the field of Computer Vision.

David Marr's Vision

David Marr was a British innovator and neuroscientist who made important contributions to the field of Computer Science throughout the years. During the late 1970s and early 1980s, Marr developed a theoretical framework for understanding vision systems, changing the way researchers thought about vision systems. In the book named "Vision" released on 1982, Marr proposed a general framework of how the human brain processes visuals and how machines could replicate this process (Marr, 1982). Marr's framework is divided into 3 levels to better understand how vision overall works:

- The Computational Level: The first level showcases the problem of what the vision is trying to accomplish. At the base, the computational level is about identifying this problem, specifically, the initial analysis is about trying to identify how the brain is able to create 3D objects from 2D images.
- The Algorithmic Level: The second level of analysis covers how to solve the problem the Computational Level puts on the board. It describes the specific methods used to tackle the issue. Marr concluded that the human brain must perform specific complex calculations to extract the needed information. As the name of the level, he theorized in the face that these calculations could be implemented/transformed into an algorithm. Marr proposed that detecting edges (contrast) is crucial for recognizing objects in a scene.
- Implementation/Physical Level: The final level of the framework explains how the system or the human body can achieve the goal set in the computational level. In the case of human body, neural structures and neuronal activities present in the brain and eye.

Marr also put forward the "Theory of Visual Perception" where he described the human vision as a hierarchical process, where the visual processing system includes several stages, from getting input as a two-dimensional visual array (on the retina) and progressing through different stages we will cover next to produce a three-dimensional description of the world as output (Marr, 1982).

- Primal Sketch: The initial stage of the process describes how the first step to visual processing is to create a low-level image by extracting basic visual features like edges and textures without any context.
- 2.5D Sketch: Once a low-level image has been created, the visual system tries to convert the image into 3D by assigning depth, orientation and spatial relationship of edges.
- 3D Model: In the final stage, a full 3D model is created, with every object identified and positioned independent of the observer's viewpoint.

David Marr's work in the theory of vision, to this day is highly regarded and serves as a cornerstone In the Computer Vision field.

Emergence of Machine Learning, Computer Vision Machine Learning Algorithms

During the 1980s and 1990s, with the increase of the computational power and advancements in the field of Artificial Intelligence technology, researchers started to experiment, develop and deploy advanced algorithms, Machine Learning algorithms to solve Computer Vision problems. In this section we will feature some important algorithms used throughout the years before the emergence of Deep Learning models which we will cover later on.

Scale-Invariant Feature Transform

Scale-Invariant Feature Transform (SIFT) is a feature detection algorithm introduced in 1999 by David Lowe, a researcher in computer vision. SIFT is designed to identify distinctive features within an image that are invariant to changes in scale and rotation. This makes SIFT a valuable tool for various computer vision tasks, including object recognition, image matching, and scene analysis. The algorithm begins by detecting keypoints/features, which are distinctive and scale-invariant within an image, such as corners or edges. To achieve this, SIFT constructs a scale-space representation of the image by applying Gaussian filters with varying levels of blur (Lowe, 1999).

Mathematically can be described as:

$L(x,y,\sigma)=G(x,y,\sigma)*I(x,y)$

where $L(x,y,\sigma)$ is the blurred image at scale σ, $G(x,y,\sigma)$ is the Gaussian kernel, (x,y) is the original image and σ is the scale parameter. The image is also downsampled (reduced in size) after each octave, allowing features to be detected at smaller resolutions (or sizes) as well (Lowe, 1999).

Differences between successive Gaussian-blurred images, known as the Difference of Gaussians (DoG), are used to identify keypoints. Mathematically, the DoG is represented as:

$DoG(x,y,\sigma)=L(x,y,k\sigma)-L(x,y,\sigma)$

where k is a constant (typically around square root of 2) that controls the scale between successive Gaussian images. This difference highlights the edges and key points in the image at various scales and then the algorithm detects keypoints by finding the maxima and the minima which are selected only if the specific pixel value is larger than all of these neighbors or smaller than them all (Lowe, 1999). These keypoints are further refined by eliminating low-contrast or poorly localized points to ensure that only the most stable keypoints are retained (Lowe, 1999).

Once keypoints are identified, SIFT generates descriptors that describe the local appearance around each keypoint. This process involves analyzing the image gradients within a neighborhood surrounding the keypoint and creating a histogram of gradient orientations. The descriptor is constructed as a 128-dimensional vector summarizing these gradients, ensuring invariance to rotation and minor changes in lighting. These descriptors act as unique signatures for each keypoint, enabling robust comparisons between different images.

To match keypoints between two images, SIFT compares their descriptors, by identifying and matching keypoints, SIFT enables computers to perform complex tasks such as recognizing objects, combining overlapping images into seamless panoramas, reconstructing 3D structures from multiple views, and analyzing spatial relationships within scenes. By finding and matching these keypoints, SIFT can help machines perform tasks like:
- Object Detection
- Image Stitching
- 3D Reconstruction

SIFT is a key part of many modern computer vision systems. It is applied in different fields of AI like Object Recognition where SIFT features can be used to identify objects in images or videos, Image Stitching where SIFT features can help stitch multiple images together to create panoramas, 3D Reconstruction where SIFT features can be used to establish correspondences between images, enabling 3D reconstruction and Augmented Reality (AR) where SIFT features can be used to track objects or scenes in real-time for augmented reality applications (Lowe, 1999).

Viola Jones, Face Detection Algorithm

In 2001 Paul Viola and Michael Jones published a paper called "Rapid Object Detection using A Boosted Cascade of Simple Features" where they first introduced the Viola-Jones algorithm. The Viola Jones algorithm revolutionized real-time face detection and despite being an older method, due to its low computational needs and fast speed, it still finds use as face detection model in the current day (Viola, 2001).

There are three main steps in face detection by Viola Jones Algorithm:
- Integral Image: The first step creates a new image representation, known as the integral image, which allows for fast feature evaluation.
- AdaBoost: The second step utilizes AdaBoost, an algorithm to iteratively train weak classifiers on different parts of the training data.
- Cascade Classifier: The third step is to combine more complex classifiers in cascade structure which dramatically increases the speed of the detector by focusing attention on promising regions of the image. Viola and Jones used Haar-like features (more complex) to detect faces in this algorithm. Haar-like features help in detecting faces by capturing differences in intensity between rectangular regions of an image. These differences, often between contrasting areas, are key to identifying facial structures (Viola, 2001).

The Viola Jones algorithm maximizes speed while achieving high detection accuracy, making it suitable for live-video systems like surveillance systems. The algorithm, however is susceptible to image variations such as changes in lighting, non-regular frontal poses or

different expressions, lowering its accuracy significantly. Newer Deep Learning models can also outperform and outpace the Viola Jones algorithm.

Eigenfaces

Eigenfaces is a method used in face recognition, based on the idea of representing faces as a combination of principal components (or eigenvectors) of a set of training face images. It was introduced in the 1990s and is one of the earlier methods for face recognition (Turk, 1991). The method uses Principal Component Analysis (PCA) to reduce the dimensionality of face images while preserving the key features required for distinguishing between faces. The Eigenfaces method deconstructs face images into a small set of characteristic feature images, which form the basis of the initial training set. Recognition occurs by projecting a new image into the "face space" defined by these Eigenfaces. The new image is then classified by comparing its position to those of known Eigenfaces. Eigenfaces are a set of eigenvectors used in computer vision to address human face recognition. This approach focuses on capturing the variations within a collection of face images and uses this information to encode and compare individual faces in a holistic manner.

The primary objective of the Eigenfaces algorithm is to represent facial features in a lower-dimensional space by capturing the principal components of facial images. However, a notable limitation of PCA is its sensitivity to variations in lighting conditions. Since it captures overall variance, changes in illumination can significantly impact its effectiveness (Tirana, 2024).

Fisherfaces

Another famous algorithm used for face recognition is Fisherfaces, primarily of its ability to maximize the class distinguishing in the training process (Belhumeur, 1997). Fisherfaces combines PCA (Principal Component Analysis) to reduce face space dimension and LDA (Linear Discriminant Analysis) to obtain feature of image characteristic (Martinez, 2001). Fisherfaces is an extension of the Eigenfaces method, designed to improve face recognition performance, especially when dealing with interchanging conditions. The key difference between Eigenfaces and Fisherfaces is in the way how they handle variations (Belhumeur, 1997).

Eigenfaces focuses on the overall variation in the face dataset, while Fisherfaces seeks to enhance the class separability by focusing on the variation between classes rather than just the overall variance (Martinez, 2001). This approach utilizes LDA to identify a projection that enhances the separation between classes (individuals) while minimizing variations within the same class. LDA aims to maximize the ratio of between-class scatter to within-class scatter, emphasizing the discriminative power of features. The representation generated by Fisherfaces is specifically designed to highlight differences between individuals, making the selected features particularly effective for classification (Belhumeur, 1997).

However, Fisherfaces can be sensitive to certain challenges, especially in cases with small datasets or high within-class scatter. Significant variability in the images of the same individual—such as differences in facial expressions, poses, or lighting conditions—can limit its ability to capture the distinguishing features necessary for accurate recognition. The method can also become computationally expensive, especially with large datasets (Martinez, 2001).

Support Vector Machines (SVM)

Support Vector Machines (SVM) are supervised machine learning classifying algorithm designed to classify data into two distinct groups. They are widely used for their effectiveness in handling high-dimensional feature spaces, making them a popular choice for tasks like face recognition after the features are extracted. SVMs work by mapping data into a high-dimensional space where separating different categories becomes easier, even when the data is not initially separable. The algorithm identifies the best separator, known as a hyperplane, which divides the data into distinct classes. Once the data is transformed into this space, the hyperplane serves as the decision boundary (Dasgupta, Ray, & Talukdar, 2018). When new data points are introduced, the model determines their classification based on their position relative to the hyperplane (Cortes, 1995).

SVMs are split into two main types: Linear and Non-Linear SVMs. A Linear SVM is applied when the data can be perfectly separated by a straight line which happens rarely in real world applications, while a Non-Linear SVM is used for scenarios where the data points cannot be linearly separated. In these cases, techniques like kernel tricks are employed to facilitate classification (Cristianini, 2000).

SVM performs faster and more accurately when the data is linearly separable, and the kernel trick enables the algorithm to solve more complex problems. However, certain challenges in applications like face recognition must be addressed, such as selecting an appropriate kernel, managing inaccuracies with large datasets, and fine-tuning hyperparameters. While a classifier algorithm was essential in the past to perform facial recognition, the modern Deep Learning models often integrate built-in classifiers as part of their architecture (Tirana, 2024).

Modern Deep Learning Computer Vision Algorithms

Deep Learning algorithms have immensely changed the field of Artificial Intelligence, especially the field of Computer Vision. By leveraging multi-layered neural networks, these algorithms are exceptional at finding complicated patterns within large datasets. Convolutional Neural Networks (CNNs) are in the center of this revolution and they are great identifying features in images, including facial characteristics. These algorithms automatically learn hierarchical representations of data, getting rid of the need for manual feature extraction (O'Shea & Nash, 2015). Additionally different techniques have been created such as transfer learning which have further enhanced their performance, allowing pre-trained models to be well-tuned for specific applications. This chapter will explore the evolution of Computer Vision algorithms, focusing on Deep Learning's impact on facial recognition and detection technology. We will also compare the differences between the old Machine Learning algorithms and modern cutting-edge CNN-utilizing algorithms, showcasing the progress made in the 21st century in the field of Computer Vision.

Convolutional Neural Networks (CNN)

Before we get into the algorithms used in the modern era, first we need to understand how Convolutional Neural Networks (CNNs) are designed and how they work. CNNs are at the core of every modern Deep Learning algorithm's architecture. CNNs are the extended

version of Artificial Neural Networks (ANN) which are predominantly used to extract the feature from the grid-like matrix dataset. Convolutional Neural Network consists of multiple layers like the input layer, Convolutional layer, Pooling layer, and fully connected layers (O'Shea & Nash, 2015).

- Input Layer: The first layer of the architecture, will take the raw input, prepare it for processing and hold the pixel values of the image.
- Convolutional Layer: This layer is key as it performs feature extraction. Convolutional Layers apply a convolution filter or kernel in which these filters are responsible for detecting low-level features like edges, textures, or gradients, which are then combined into higher-level features in subsequent layers followed by a non-linear activation function, such the Rectified Linear Unit (ReLU).

To further understand the structure, we must discuss ReLU. A non-linear activation function that has a simple derivative. (It eradicates negative values and only outputs positive values, the derivative of ReLU is either 0 or 1). ReLU has become the standard activation function in modern Deep Learning networks because it has an improved gradient propagation and it helps the network converge faster and mitigates the vanishing gradient problem (Agarap, 2018).

- Pooling Layer: The layer will then perform downsampling along the spatial dimensionality of the given input, reducing their dimensions while retaining the most important information.
- Fully Connected Layer: The last layer in the architecture, connects every neuron in the layer to every neuron in the previous layer (Han, Mao, & Dally, 2015). It acts as a decision-making layer as it combines the extracted features into a prediction for the final output (Taherdoost & Madanchian, 2023).

When these layers are stacked, a CNN architecture is formed (O'Shea & Nash, 2015).

Modern Face Detection Algorithms, One Stage vs Two Stage Detection Models

Modern face detection algorithms are split into two categories: One Stage and Two Stage Detection Models.

- One Stage Detection Models: Object classification and bounding-box regression are done without using pre-generated region proposals (candidate object bounding-boxes) (Redmon, 2016).
- Two Stage Detection Models: Contrary to One Stage Detection Models, Two Stage Detection Models utilize two steps, generation of region proposals either by selective search or Region Proposal Network (RPN) and then object classification is done for each region proposal. Two Stage Detection Models are more accurate but require more computing power and are quite slower than their counterpart (Ren, 2015).

We will cover one state-of-the-art algorithm for each of these, respectively: YOLO (You Only Look Once) and Faster R-CNN.

YOLO (You Only Look Once)

YOLO is a very fast, accurate object detector, making it ideal for Computer Vision applications. As a One Stage Detection Model, it is an approach of object detection that simplifies the process by treating it as a single regression problem rather than a traditional

classification task and unlike many other detectors that focus on region proposals, YOLO performs detection in one step, predicting both the class and location of objects in an image simultaneously hence the name You Only Look Once. The core concept behind YOLO is its efficiency: it looks at the image only once to detect what objects are present and where they are located (Redmon, 2016).

YOLO's architecture is composed of 24 convolutional layers followed by 2 fully connected layers. Convolutional layers are responsible for feature extraction, while the fully connected layers handle the final predictions.

The way YOLO works is as follow: the system splits the image into a grid of cells, with each cell predicting B bounding boxes and confidence scores for those boxes. The confidence score reflects both the probability that the box contains an object and the accuracy of the predicted box. Each grid cell in YOLO predicts C conditional class probabilities, generating a single set of class probabilities per grid cell, regardless of the number of predicted bounding boxes B. During the testing phase, these class probabilities are multiplied by the individual box confidence scores, resulting in class-specific confidence values for each bounding box. These scores indicate represent the likelihood that the object in the cell belongs to a specific class, assuming an object exists and how the box fits the object.

The algorithm also uses the Intersection over Union (IoU) metric to assess the accuracy of bounding box predictions. By default, an IoU threshold of 0.5 is used, which can be adjusted to control false positives and false negatives. A higher IoU threshold reduces false positives but may increase false negatives, as only boxes with an IoU greater than the threshold are considered valid detections. The output is then encoded as an $S \times S \times (B * 5 + C)$ tensor, where $S \times S$ are the grid dimensions, B is the number bounding boxes, 5 represents the 4 coordinate values for each bounding box + 1 confidence score and C stands for the number of classes.

A key component of YOLO is Non-Maximum Suppression (NMS), which ensures that each object is detected only once, even if multiple bounding boxes are predicted for the same object. NMS keeps only the bounding box with the highest confidence score for each object and removes the others. After NMS, YOLO outputs the final set of bounding boxes, each associated with a class label and a confidence score showing the probability of the class and how well the bounding box fits the object.

As YOLO processes each image in a single pass, it is very fast (YOLO processes images in real-time at 45 frames per second), doesn't require the highest computational power but may lose in accuracy, especially when detecting small objects in the image compared to Two Stage Detection Models such as R-CNN which we will be covering next. YOLO has been significantly improved since release, with each variation improving the issues of the latter, up to version YOLOv9 which is the latest release.

R-CNN

R-CNN is a Two-Stage Detection Model which operates by first generating potential object proposals and then classifying each proposal in the second stage. Unlike one-stage models like YOLO, R-CNN takes a more methodical approach by dividing the process into two steps, which contributes to its higher accuracy, especially in complex scenarios (Girshick, 2014).

R-CNN's architecture begins with a region proposal step, where potential object regions are identified using selective search. Selective search generates a set of candidate object regions (bounding boxes) by grouping similar regions from the image. In the second stage, each of these proposed regions is then passed through a Convolutional Neural Network (CNN), which extracts features for classification and bounding box regression.

The network uses CNN features to perform a classification task where each region proposal is classified into one of the predefined object categories or marked as background. Additionally, the algorithm predicts bounding box corrections to improve the accuracy of the initial proposals. This two-step approach ensures that R-CNN can focus on the most likely object areas, leading to more accurate predictions compared to one-stage models like YOLO.

While R-CNN achieves high accuracy, especially in detecting objects of various sizes and complexities, its main drawback is slowness and its very high computing power cost. This is due to the fact that R-CNN requires the CNN to process each individual region proposal separately, which is computationally expensive and time-consuming (Liu, Hu, Weng, & Yang, 2017). For every image, hundreds or thousands of proposals are generated, and each one is forwarded through the CNN for feature extraction, followed by classification. This multiple-step process makes R-CNN much slower than single-shot detectors like YOLO.

To improve efficiency, Fast R-CNN was introduced, which shares convolutional features across all region proposals to reduce redundant computations, but it still maintains the two-stage approach. Further optimization led to Faster R-CNN, which integrated Region Proposal Networks (RPN) into the pipeline, eliminating the need for selective search and improving both speed and accuracy.

R-CNN is effective in detecting objects in a wide range of images, but its two-stage process makes it more suited for tasks where accuracy is prioritized over real-time speed, such as in applications where detection quality is critical, and computational resources are available.

In summary, R-CNN's two-stage approach allows it to achieve high accuracy by focusing on region proposals and using a CNN for classification and bounding box regression. However, the method is slower and require more computation power compared to single-shot detectors like YOLO, making it less suitable for real-time applications. Despite this, R-CNN and its improved versions (Fast R-CNN and Faster R-CNN) remain vital in the evolution of deep learning-based object detection.

Modern Face Recognition Algorithms, FaceNet

FaceNet is a Deep Learning face recognition model introduced in 2015 by Google researchers. The idea behind FaceNet is to transform images of faces into a fixed-length Euclidean space, known as embeddings, where the distances reflect the similarity or dissimilarity between faces. This enables the system to perform both face recognition, verification and face clustering, using a process known as one-shot learning (Schroff, 2015).

FaceNet uses a Deep Convolutional Neural Network (CNN) architecture to learn a 128-dimensional embedding for each face. This embedding is a compact representation of a face's features, trained so similar faces are closer together in the embeddings and faces of different people are farther apart. Its architecture follows the following schema: an input layer where each image is resized to 160x160 for standardization, followed by 22 convolutional layers, structured in 13 blocks.

Each block consists of convolutional layers followed by batch normalization and ReLU activation functions (Huang, Liu, & Weinberger, 2016; Lim, Kim, Choo, & Choi, 2023; Dubey & Jain, 2019). Multiple max pooling layers, placed after every few convolutional layers perform downsampling along the spatial dimensionality which help decrease the computational cost while maintaining the key features.

To optimize FaceNet for face recognition, the network uses a triplet loss function. In this loss function, the network is trained using triplets of images: one anchor image, one positive image (same person as the anchor), and one negative image (different person). The goal is to minimize the distance between the anchor and positive image embeddings, while maximizing the distance between the anchor and negative image embeddings. This helps the network learn the similarity relationships between different faces.

Once the features are extracted, 3 fully connected layers containing 1024 neurons followed by batch normalization and ReLU activation, 512 and 128-dimensional embedding vector respectively process the output and give as output the 128-dimensional embedding vector which is then used to perform facial recognition or identification on the output layer. To verify if two faces belong to the same person, the embeddings of both faces are compared using the Euclidean distance. If the distance is below a set threshold (typically 0.6), the faces are considered a match.

Due to its well-designed deep CNNs architecture and the triplet loss function, FaceNet is extremely accurate as shown with its accuracy of 99.63% in the Labeled Faces in the Wild (LFW) dataset. Due to it utilizing the one-shot learning technique, FaceNet is also very fast. However, FaceNet requires large amounts of computational power due to its deep CNNs architecture and the triplet loss function can be difficult to optimize. Overall FaceNet is a massive improvement compared with its predecessors and comes inherently with a classifier so an algorithm like SVM isn't needed for classification.

Cost Perspective: From Perception to Deep Learning

The journey of Computer Vision from its inception to the modern age has not only been marked by technical advancements but also by evolving cost structures. Understanding this progression provides insights into the technological and financial investments required to achieve breakthroughs.

The Perceptron hardware was relatively inexpensive for its time, as it relied on simple circuitry to implement neural-like computations. However, the computational capabilities were limited (Rosenblatt, 1958):

- Costs: Low due to the simplicity of components and reliance on existing computing technologies.
- Performance vs. Cost: Inefficient for complex tasks due to hardware limitations and inability to solve nonlinear problems.
- Use Cases: Minimal, mostly experimental and limited to binary classification tasks.

Algorithms like Scale-Invariant Feature Transform (SIFT), Viola-Jones, and Eigenfaces brought about practical applications but at varying costs:

- SIFT:

- Computationally expensive due to the need for Gaussian blurring and keypoint detection at multiple scales.
- Costs were tied to the processing power of the time, which was growing but still limited for large datasets.
- Applications: Object detection, image stitching.
- Viola-Jones (Viola, 2001):
  - Lower computational cost due to simplified features and the use of AdaBoost.
  - Suited for real-time face detection with modest hardware, making it accessible for security and surveillance systems.
- Eigenfaces (Belhumeur, 1997):
  - High sensitivity to variations in lighting and pose.
  - Cost tied to dataset preparation and PCA computation.
  - Effective for small-scale, controlled environments.

With the introduction of Support Vector Machines (SVMs) and Fisherfaces, costs began to shift:

- SVMs:
  - Computational costs increased due to the need for hyperparameter tuning and kernel tricks.
  - Effective but resource-intensive for large datasets.
- Fisherfaces (Belhumeur, 1997):
  - Combined PCA and LDA, increasing computational requirements while improving robustness.
  - Performance depended heavily on dataset quality and size, adding costs for data preprocessing.

The rise of Convolutional Neural Networks (CNNs) and models like YOLO, R-CNN, and FaceNet has revolutionized vision capabilities but at a steep cost:

- Hardware:
  - Requires GPUs or TPUs for training and inference, significantly increasing infrastructure costs.
  - Cloud computing services (e.g., AWS, Google Cloud) have democratized access but introduced recurring expenses.
- Energy Consumption:
  - High during training due to large datasets and deep architectures.
  - YOLO is optimized for real-time applications, lowering energy costs but with slightly reduced accuracy compared to R-CNN.
- Data Preparation:
  - Costs tied to collecting and labeling large datasets.
  - Techniques like transfer learning help reduce training time and data needs, lowering costs slightly.
- Model Complexity:
  - R-CNN variants achieve high accuracy but are resource-intensive.
  - YOLO offers a trade-off, being faster and cheaper for real-time applications.

The following tables summarizes the cost comparisons:

Technology	Cost (Relative)	Performance/Accuracy	Computational Needs	Use Case Scope
Perceptron	Low	Minimal	Very Low	Experimental
SIFT	Medium	Good	Medium	Object Detection
Viola-Jones	Low	Moderate	Low	Real-Time Detection
Eigenfaces	Medium	Moderate	Medium	Face Recognition
SVM	High	Good	High	Classification
CNN (YOLO)	High	Very Good	Medium	Real-Time Applications
CNN (R-CNN)	Very High	Excellent	Very High	Accuracy-Critical

Source: Author's own elaboration. (2024)

CONCLUSIONS

The progression of Artificial Intelligence in Computer Vision showcases an extraordinary transformation from its early days of handcrafted feature-based methods to the advanced, Deep Learning-driven models we see today. In the realm of face detection, modern algorithms like YOLO and R-CNN have significantly outperformed traditional approaches such as the Viola-Jones algorithm, offering higher accuracy and greater adaptability to varying conditions. Similarly, advancements like FaceNet have surpassed earlier models, achieving exceptional precision that rival human vision. However, a trade-off exists: while these contemporary methods provide unparalleled accuracy, they demand substantial computational power and often operate slower than their predecessors, except for optimized models like YOLO. Despite the widespread adoption of cloud computing, the balance between accuracy and computational efficiency doesn't meet the needs of every business or use case.

The evolution of Computer Vision algorithms underscores the rapid pace of innovation, suggesting that ongoing research and development will continue to optimize and refine these technologies as we advance into a promising era of Artificial Intelligence.

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THE DIFFERENCES BETWEEN PEOPLE UNDER THE AGE OF 60 AND OVER THE AGE OF 60 IN COVID-19 VACCINATION RATES AND VACCINE BRAND PERCEPTION

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Abstract: This article deals with differences in users' perception towards COVID-19 vaccination and towards individual COVID-19 vaccine brands. Since COVID-19 is much more dangerous to the elderly population, this article deals with differences between those under the age of 60 and those over the age of 60. The results show that there are some differences between those two groups. For the group of people under the age of 60, the duration of protection is more important (39%), while the brand of vaccine is less important (25%). In contrast, the vaccine brand is of much greater importance (34%) and the duration of protection less important (25%) for the group of people over the age of 60. The study also showed differences in relation to individual brands of COVID-19 vaccines, with both groups preferring Pfizer to other brands, which is not surprising, since there was the least amount of negative media coverage about Pfizer, especially compared to AstraZeneca. The vaccine brand is surprisingly more important to those over the age of 60 than to those under the age of 60, while the effectiveness of the vaccine is equally important for both groups and both groups are equally sensitive to duration and side effects of the vaccine.
Keywords: COVID-19, vaccination, perception

INTRODUCTION

Coronavirus disease 2019 ("Covid – 19," 2022), also known as the coronavirus, or COVID, is a contagious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Most people (81%) develop mild to moderate symptoms (up to mild pneumonia), while 14% develop severe symptoms (dyspnoea, hypoxia, or - more than 50%-lung involvement on imaging). 5% suffer critical symptoms (respiratory failure, shock, or multiorgan dysfunction) ("Covid – 19," 2022). More than 704 million cases were confirmed from December 2019 until April 2024 and 7.01 million people died because of the disease, which brings us to 0,99 % mortality ("Mortality Risk of COVID-19," 2024). In Slovenia, there have been as at 11 April 2024 a total of 1.356.546 confirmed cases of COVID-19, and 7,100 deaths were caused by the disease, which means a 0,52 % mortality ("Slovenia COVID - Coronavirus statistics," 2024). Within less than a year of the pandemic's outbreak, several successful vaccines have already been announced and approved for use ("Coronavirus (COVID-19) Vaccinations," 2024). In Slovenia Pfizer, AstraZeneca, Moderna, and Johnson & Johnson (Janssen) vaccines have been approved and used. 59,8% of population in Slovenia

received at least one dose of until July 5 2022 ("Share of people who received at least one dose of COVID-19 vaccine," 2024).

Even though vaccination is the only way to overcome the COVID-19, there are negative anti-vaccination campaigns going on all over the world, which are nearly identical to the claims made about smallpox immunizations 120 years ago, e.g. the ingredients are toxic and unnatural, the vaccines are insufficiently tested, the scientists who produced them are quacks and profiteers, the cell cultures involved in some shots are an affront to the religious, the authorities working to protect public health are guilty of tyrannical overreach ("Anti-vaxxers Think This Is Their Moment, " 2022), etc. However, the authors believe, that the terms negative publicity and brand perception should also be taken into consideration when discussing beliefs, attitudes, and behaviours towards different brands of vaccines.

The authors believe that in this case, it is not just negative publicity against vaccination in general but negative publicity about individual brands of vaccines. In Slovenia, the National vaccination strategy, which determines the types of vaccines and priority groups for vaccination, is being changed frequently. Thus, in Slovenia it was not allowed to vaccinate elderly consumers with AstraZeneca for some time, then vaccination with AstraZeneca was stopped due to verification of possible connections between the vaccine and blood clots and some other negative side effects. AstraZeneca also has, compared to Pfizer, Moderna, and Johnson & Johnson, more common mild side effects, such as fever, headache, muscle aches, etc., which are otherwise completely harmless and go away in a day or two. It is known although, but not much has been reported in media, that other vaccine brands can also have similar side effects. AstraZeneca has also been faced with several restrictions, especially in terms of who can receive AstraZeneca's vaccine and under what conditions. The restrictions have changed frequently, which also didn't have a positive effect on consumers' trust in the AstraZeneca's vaccine. This and other similar things brought a great deal of distrust in the AstraZeneca brand as compared to other vaccine brands and led to the result that consumers started to refuse vaccination with AstraZeneca.

The purpose of this study was to determine the differences in vaccine brand perception and vaccination in general between people under the age of 60 and people over the age of 60.

Purpose and objectives of the research

The purpose of this study was to find the differences in vaccine brand perception and vaccination in general between people under the age of 60 and people over the age of 60.

The objectives of this study were to determine whether:
- the vaccine brand is more important to those under the age of 60 or to those over the age of 60
- the vaccine's effectiveness is equally important for both groups, and
- both groups are equally sensitive on duration and side effects of the vaccine

Literature review and the research hypotheses

A concerted effort to develop effective drugs and vaccines against existing and potential future coronavirus infections and other highly pathogenic virus outbreaks is necessary to reduce overwhelming impacts on human life and worldwide healthcare systems (Liu et. al., 2020). But considerable effort is also needed in communications, to convince people of the benefits of vaccination.

In emergencies, such as an epidemic, people behave differently than in normal times. The authors even believe that we can draw some parallels with states of war. Namely, just like in times of war, when a country's spending on defence increases significantly, countries in Africa must view the COVID-19 pandemic as a 'war' to be won and must be prepared to increase public health spending significantly (Atakuba, 2020). Even the Nazis in World War II were already aware of the important role propaganda plays in achieving goals. Their propaganda employed a range of strategies in its presentation of self and the other, which aimed to increase in-group cohesion and also create fear towards the other (Kohl, 2011). And the side effects of AstraZeneca's vaccine have been highlighted the most in media, leading those consumers to fear AstraZeneca's vaccine and to begin refusing vaccination with it. As Staut (2011) mentioned, even before Hitler came to power, he described in Mein Kampf how much the Nazi Party would rely on propaganda. Goebbels and the Reich Ministry of Public Enlightenment and Propaganda (Pro-Mi) expedited Hitler's rise to power, and Nazi control of all German media ensured near-complete control on what the German people heard and knew about the war and about both national and international affairs (Staut, 2011).

The fear part can be said to have been achieved, as people grew more and more afraid of becoming infected as the pandemic progressed, as people's perception of the government's performance in addressing the pandemic worsened and finally, having relatives and loved ones who contracted COVID-19 had a huge impact. The above explanation even led to people's willingness to pay for a vaccine (Cerda & Garcia, 2021). Even more, as became evident, people in general behaved irrationally during the COVID-19 pandemic (Sofi et. al., 2020).

It was found by Sago & Hinnenkamp (2014) that negative corporate news impacts consumers' behaviour – even towards consumers' favourite brands. The results of the survey (de Matos & Veiga, 2004) show that the group that received no negative news obtained a higher average (positive) in the three variables (Corporate image, Product image, and Behavioural intention) of the analysis. Younger people follow the modern media, in which there have been frequent announcements about vaccines and their side effects, more often than older people. Older people are also more worried about their health and therefore are not so selective about the brand of vaccine. Besides that, there is the fact that older adults are at greater risk of requiring hospitalization or dying if they contract COVID-19 ("What's the chance of dying if you get COVID-19," 2024).

Figure 1. *Risk for COVID-19 infection, hospitalization, and death by age group* ("What's the chance of dying if you get COVID-19," 2024).

Rate compared to 5–17-years old[1]	0-4 years old	5-17 years old	18-29 years old	30-39 years old	40-49 years old	50-64 years old	65-74 years old	75-84 years old	85+ years old
Cases[2]	<1x	Reference group	2x	2x	2x	2x	1x	1x	2x
Hospitalization[3]	2x	Reference group	6x	10x	15x	25x	40x	65x	95x
Death[4]	1x	Reference group	10x	45x	130x	440x	1300x	3200x	8700x

All rates are relative to the 5–17-year-old age category. Sample interpretation: Compared with 5–17-year-olds, the rate of death is 45 times higher in 30–39-year-olds and 8,700 times higher in 85+-year-olds.

How to Slow the Spread of COVID-19

Wear a mask   Stay 6 feet apart   Avoid crowds and poorly ventilated spaces   Wash your hands

CDC   cdc.gov/coronavirus

As shown in Figure 1, the risk of serious consequences and death due to COVID-19 infection increases with age. Therefore, the authors presume that older people are less sensitive regarding vaccine brand than younger people.

People are now living a greater number of healthy years, but also have an increased risk of illness, which increases the needs for health care. Knowing the foundations of the aging process is such a challenge that each of us wonders what should be done to live as long as possible, but also to live full, active, vital lives to the end of our days (Werntoft et. al., 2005; Milavec Kapun 2011). It was also found that older people care more about their health than do younger ones ("Starejši Bolj Skrbijo Za Svoje Zdravje," 2024). This is logical, as older people are aware that their quality of life and life expectancy depend on their psychophysical well-being. Therefore, the authors formulated the first hypothesis H1: the vaccine brand is more important to those under the age of 60 than to those over the age of 60.

The Authors also anticipate that both those under the age of 60 and those over the age of 60 want maximum possible vaccination efficacy. Therefore, the Authors formulated the hypothesis H2: the efficacy of vaccination is equally important for both those under the age of 60 and those over the age of 60. However, the Authors anticipate that both those under the age of 60 and those over the age of 60 want as long-lasting protection from COVID-19 and as few side effects as possible. Therefore, the Authors formulated the hypothesis H3: both those under the age of 60 and those over the age of 60 are equally sensitive regarding the vaccine's duration and its side effects.

Data and research methodology

Conjoint analysis was used in the study, a survey statistical technique that helps determine how people evaluate different characteristics, such as the benefits, functions, and properties that make up a particular product or service. It is used in a variety of market research areas (i.e. healthcare, economics, human resources, computing, machine learning and other tasks (Steiner & Meißner, 2018).

In this case, CBC (conjoint-based conjoint) was used, which has also been the most commonly used method lately. We created a questionnaire in the SSI Web module of the Sawtooth software program (Green & Rao, 1971; Orme 2006)

Based on the question, the respondents chose the most appropriate option, which consisted of four attributes:
Vaccine brand (Pfizer-BioNTech, Modern, Johnson & Johnson, Sputnik, AstraZeneca),
Duration of protection (1 year, 6 months, 3 months),
Efficacy (100%, 80%, 60%), and
Side effects (blood clots, memory impairment, headache, muscle, and joint pain)

Online question display: **Which option would you most likely choose, if possible?**

It was repeated 10 times for each respondent, but each time with different combinations of features, among which we asked the respondents to individually choose the most preferred one. In each presentation, respondents were shown three computer-generated combinations with different combinations of four attributes (Figure 2).

Figure 2. *Presentation of one page of the questionnaire with the given combinations, among which the respondents chose the most suitable one*
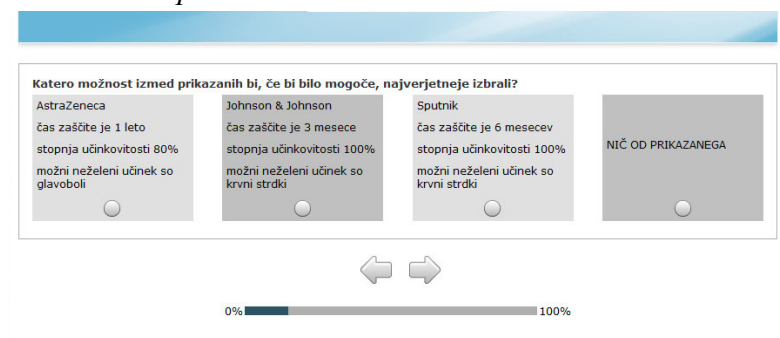
Respondents had to choose the combination that they felt was most appropriate, and they also had the option to answer with: "**None of the above**".

The web questionnaire was completed by 369 respondents, of whom 50.7% were female. The educational demographics of the sample was 44% secondary school, 43.5% college degree, and 12.5% master's degree or doctorate.

To compare the behaviour of the under-60 and over-60 group in vaccination decisions against COVID- 19, the whole sample was divided into two groups. The group of younger people included respondents up to 60 years of age, who make up 183 or about 50% of the total sample. The second group, aged 60 and over, numbered 186 respondents, which is also about 50%. All analyses were continued for both groups and will be described and compared below.

Results and discussion

The relative impact of the individual attribute level was first counted in the display in the table. Counting offers an intuitive measurement of the impact of each attribute level. Counting represents proportions from 0 to 1. For example, counting 0.31 for an attribute level Pfizer-BioNTech means that respondents chose it 31% of the time the Pfizer-BioNTech displayed, including that particular level.

Table 1. *The relative impact of the individual attribute level*

Choice Tasks Included: All Random

Vaccine brand	respondent under 60 years	respondent 60 years and over
	Total	Total
Total Respondents	183	186
Pfizer-BioNTech	0.31	0.47
Moderna	0.23	0.27
Johnson & Johnson	0.20	0.19
Sputnik	0.20	0.14
AstraZeneca	0.20	0.17
Within Att. Chi-Square	45.63	323.74
D.F.	4	4
Significance	p < .01	p < .01

On average, both groups chose Pfizer-BioNTech. However, the probability of choosing this vaccine compared to Moderna was almost twice as high among the elderly, namely 47% for Pfizer-BioNTech and 27% for Moderna. There is a significantly smaller difference for under-60s, 31% versus 23%. In the last place in terms of vaccine popularity in both groups is Astra Zeneca.

Table 2. *Preferences regarding the length of duration*

Duration of protection		
	Total	Total
Total Respondents	183	186
1 year	0.36	0.36
6 months	0.22	0.23
3 months	0.11	0.15
Within Att. Chi-Square	261.82	170.27
D.F.	2	2
Significance	p < .01	p < .01

Preferences regarding the length of duration is almost identical in both groups of respondents. The range of importance, however, is very linear between the periods of 1 year, 6 months, and 3 months.

Table 3. *Preferences regarding protection efficiency*

Protection efficiency		
	Total	Total
Total Respondents	183	186
100%	0.36	0.32
80%	0.22	0.25
60%	0.11	0.18
Within Att. Chi-Square	261.82	69.99
D.F.	2	2
Significance	p < .01	p < .01

As expected, the level of protection is an important variable and both groups showed the same order. In most cases, 100% protection was chosen, followed by 80%, and lastly 60% protection. However, there are significant differences in the assessment of materiality between the groups. For younger people, the level of protection is more important, as the ratio of those choosing 100% and 60% protection is about 3 to 1, or 36% of respondents vs. 11%. In the elderly, it is just under 2 to 1, or 32% of respondents to 18%.

Table 4. *Preferences regarding side effects*

Side effects		
	Total	Total
Total Respondents	183	186
muscle and joint pain	0,32	0,30
headache	0,30	0,32
memory impairment	0,15	0,20
blood clots	0,14	0,17
Within Att. Chi-Square	170,24	91,49
D.F.	3	3
Significance	p < .01	p < .01

For adverse reactions, the opposite should be considered, as for the previous variables. A higher percentage means that the level of this attribute was more desirable because they are less afraid of the selected side effect. In both groups, the result is quite similar. Slightly more unpopular are the possible effects of memory loss or blood clots in younger people than in older people.

In the next step of the conjoint analysis, a multinominal logit analysis was performed, and the calculation of the part-worth utilities indicated the preference levels of the individual level of attributes, representing the probability of choice (desirability) if a combination of two levels of attributes was calculated. The results already described in the count analysis are shown as part-worth utilities in the graphs.

Figure 3. *The preference levels of the individual level of attributes*
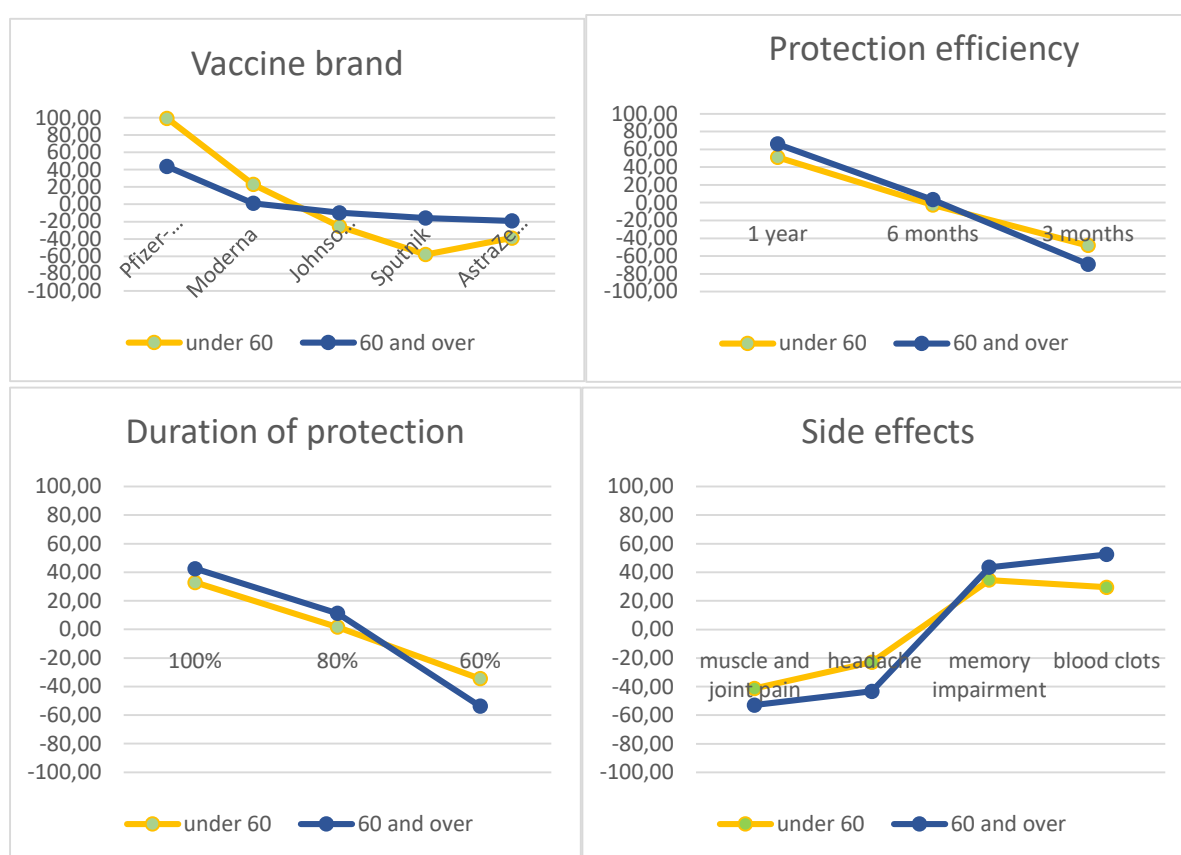
To calculate the t-value for the first and second attribute, the following equitation (1) was used:

$$t = \frac{\beta_{1i} - \beta_{2i}}{\sqrt{\sigma_{1i}{}^2 + \sigma_{2i}{}^2}} \tag{1}$$

where β_{1i}/ β_{2i} is part-worth utility of the level Pfizer-BioNTech/ Moderna and σ_{1i} /σ_{2i} is a standard error of part-worth utility of the Pfizer-BioNTech/Moderna.

For the under-60 group, part-worth utility for Pfizer-BioNTech was 76.34 points higher than Moderna. The result proves that the difference is significant (p<0.001), wherefore it could be concluded that the Pfizer-BioNTech vaccine is more preferred than Moderna. In the same way, the t value was calculated for the over-60 group, where Pfizer-BioNTech is by 42.69

utility points more preferable than Moderna, and, as in the previous group, that difference is significant (p<0.001).

The hypothesis H1, which says that the vaccine brand is more important to those under the age of 60 than to those over the age of 60, was rejected.

As regards the duration of protection against infection, the difference between utilities for 1 year and 6 months was 53.69 points for the under-60 group and 62.66 points for the over-60 group in favour of protection. In both cases, the calculation of the t value proves that the difference is significant (p <0.001), so it can be concluded that a longer duration of protection is important to our respondents.

The hypothesis H2, which says that the vaccine's efficacy is equally important for both those under the age of 60 and those over the age of 60, was accepted.

Both the under- and over-60 groups were equally sensitive regarding the vaccine's duration and side effects.

In the final part of the analysis, the relative importance of the attributes was also calculated, predicting which of them is more or less important when respondents decided about their selection of property combinations in assessing vaccination conditions.

The relative importance (RI) of an attribute is calculated according to Equation 2 as the difference between the highest and lowest part-worth utility (most and least preferred level) relative to the sum of these differences across attributes (Equation 2):

$$RI_i = \frac{\beta_{(max)i} - \beta_{(min),i}}{\sum_{i=1}^{n} (\beta_{(max)} - \beta_{(min)})} \cdot 100 \qquad (2)$$

where RI_i is a relative importance of an attribute i, $\beta_{(max)i}$/$\beta_{(min)i}$ is the highest/lowest part-worth utility of level within attribute i, $\beta_{(max)}$/$\beta_{(min)}$ is the highest/lowest part-worth utility of a level within any attribute from i=1 to n, and n is the number of attributes.

The hypothesis H3, which says that both those under and over the age of 60 should be equally sensitive as regards the vaccine's duration and side effects, was therefore accepted.

In this calculation, we find that certain differences are shown. For the under-60 group, the duration of protection was more important (39%), whereas the brand of vaccine was less important (25%).(Inner circle in the graph). In contrast, the vaccine brand is of much greater importance (34%) although with much shorter duration of protection (25%) for the group of people aged "60 and over", which is evident from the outer circle of the graph.

Figure 4. *Average importances of individual attributes*
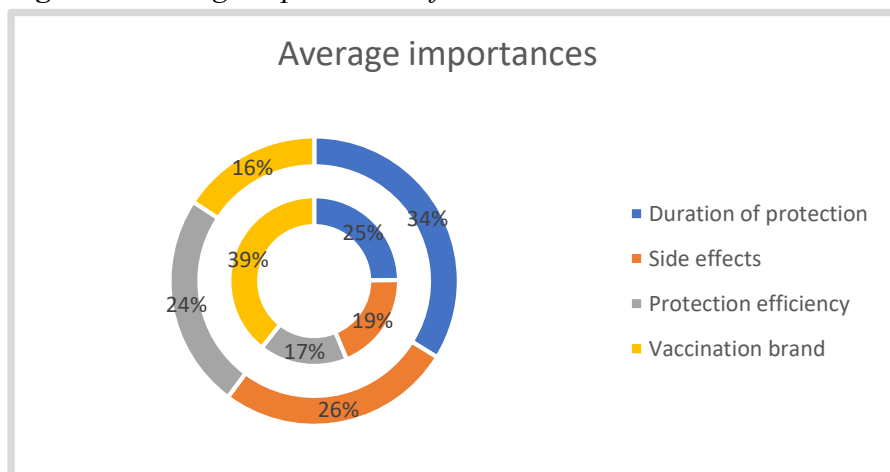
CONCLUSIONS

In professional and lay circles, the COVID-19 virus and related issues are a central topic of conversation. Vaccination has been an especially burning issue in the last six months. While the professional public predominantly advocates the positive effects and necessity of vaccination against COVID-19, several groups have formed that see everything surrounding COVID-19, especially regarding vaccination, as only a conspiracy theory. Those, let us say conspiracy theory groups, are also very loud and they spread their views through all possible media outlets. In the media, the side effects of vaccines are mentioned much more frequently in connection with certain brands of vaccines, especially AstraZeneca.

These facts raise the question of how people perceive individual brands of vaccines. Especially interesting are the differences between the under-60 and over-60, as on the one hand young people are more likely to follow social networks, through which topics about COVID-19 and vaccination against it were widely discussed, and on the other hand, the over-60 group is much more at risk if they become infected with COVID-19. Despite the fact that COVID-19 is a very "popular" topic in all circles, the authors of this study, are according to their knowledge the first ones to investigate the differences in the perception of vaccination between the under-60s and over-60s.

The results of this research clearly show that, on average, both groups chose Pfizer-BioNTech. However, the probability of choosing this vaccine compared to Moderna is almost twice as high among the over-60s, with 47% opting for Pfizer-BioNTech and 27% for Moderna. There is a significantly smaller difference for under-60s, namely 31% versus 23%. In the last place in vaccine popularity for both groups is Astra Zeneca. We can say that this finding is surprising, as the under-60s follow the modern media more and we concluded that they would prefer brands that received more positive opinions in the media, while the over-60 were expected not to place such importance on the brand of vaccine, but rather on getting vaccinated as quickly as possible so as to protect themselves from the possible consequences of the disease.

For the duration of protection and side effects of the vaccine, and also its efficacy, we can conclude based on the results of this research that there are no differences between those under the age of 60 and those over the age of 60, which is not surprising, since it is logical that people want as long a duration as possible, maximum effectiveness, and minimum side effects, regardless of the age.

The main limitation of the paper is the fact that the study was conducted only in one country. The question arises as to whether the results would be the same if the study had been conducted in countries with different political, social, economic, and cultural backgrounds. The second limitation of this paper, as predicted by the authors, is the fact that a relatively small sample was used. Nevertheless, the authors believe that the sample is still big enough to confirm the results and, even more, the authors believe that, had a bigger sample been gathered, would have yielded the same results.

In light of these findings the authors recommend further research in several different countries, as well as extending the research to identifying differences between several different age groups and educational structures.

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DOCTOR MIGRATION: UNPACKING ECONOMIC AND SOCIAL IMPACTS

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Abstract: Health expenditures are vital indicators of a nation's social and economic progress, playing a key role in welfare and sustainable development. A well-functioning healthcare system relies on an adequate and skilled workforce, yet many countries face shortages, prompting reliance on international labor migration. This study investigates the economic and social drivers of health labor migration, focusing on doctors in 15 high-income countries from 2011 to 2019. Using panel data analysis, we found that lower wages significantly drive migration, with a 1% increase in wages reducing health worker migration by 0.08%. The results underscore the importance of fair remuneration in retaining healthcare professionals within their home countries. Moreover, destination countries with better training infrastructure and career advancement opportunities create additional pull factors, compounding the challenges faced by source countries. Globalization further facilitates migration by lowering barriers and harmonizing professional standards. These findings highlight the urgent need for policy interventions to address wage disparities and mitigate brain drain while ensuring global health workforce equity.

Keywords: Health, Reasons for Migration, Panel Data Analysis

1. Introduction

Health expenditures are one of the important indicators of social and economic development. Additionally, expenditures on the health sector are among the most basic elements of welfare and sustainable development. For a health system to achieve its primary purpose, which is to provide health services, it must have a sufficient number and quality of healthcare workforce capacity. Building the necessary capacity is possible by employing appropriate health workers at the right place and at the right time. This capacity can be created from domestic resources as well as through the employment of foreign resources (Diallo, 2004, p. 603). International migration of healthcare professionals has become an increasingly important issue on the international health policy agenda in recent years. Brain drains of highly qualified human capital are an important social phenomenon. When we look at the causes of migration in general, external migration is made from low-income countries to higher-income

countries to improve working conditions and economic conditions. The top-level factors that determine the general dynamics of the free movement of healthcare workers are globalization, technological developments, aging of the population, economic and political factors, increasing societal expectations, changing disease patterns, EU dynamics, and international organizations. According to this, the factors in the upper plan are mainly composed of factors other than families and individuals (WHO, 2023).

This study aims to contribute to the literature by examining the top-level factors, econometrically, for developed economies and supporting them with empirical practice. In this way, this migration movement of health workers will be examined and tried to be better understood. To better understand the dynamics of the econometric model, the 7 top factors that explain the reasons for migration, as identified by WHO (2000), will be detailed. First, when we consider the concept of globalization, it is a dynamic process that covers the mobility of the workforce through its structure and nature. Thus, globalization is highly intertwined with the international movement of the health workforce. Free trade agreements are an important dynamic of globalization, and this affects the health sector significantly by accelerating international migration and reducing the barriers to the movement of goods and services, people, and even health workers (Bundred, Matineau, and Kitchiner, 2004, p. 77-78; Martineau, Decker et al., Kitchiner, 2002, p. 3-4). In addition, with the increasing global trade, specialized institutions dealing with the employment of international health workers are also increasing, thus maintaining international migration mobility (WHO, 2006).

Another important development related to globalization in health workforce migration is that various occupational groups, including health professions, have achieved common standards in certain areas. Another factor is that the decreasing barriers between borders with international agreements have led to the emergence of new legal frameworks that control the circulation and production of the health workforce. When it comes to the technological innovation factor, it is a factor that increases and offers alternative opportunities in the supply and structuring of health services. It is the dynamics in the light of new technologies by keeping the scientific knowledge skills and usability in the health workforce. Development in technology determines the type of work to be performed or the services to be provided, the environment, and the structure of the practices, and its impact on the health workforce is very important. With the development of technology, new service areas have emerged, leading to a change in the form of supply and professional talent components in the service structure, bringing the demand for healthcare professionals who will work in these areas (OECD, 2008).

However, access to information on opportunities and gaps in relevant positions on global migration has been facilitated by the widespread use of the Internet, that is, job search processes are simplified and accelerated with the Internet. Developments in technology cause the migration of the health workforce in two different ways. First, new business areas and increased specialization increase the need and demand for healthcare professionals. Secondly, the fact that the countries have underdeveloped technology is a factor that increases the health workforce migration to countries with better technology, to countries with higher technology to get education and even to work (OECD, 2007).

Demographic trends are another crucial component of health workforce optimization, influencing both the makeup and delivery of the health workforce directly and indirectly thro

ugh thedemand for goods and services (Dubois, Mckee et al., Rachel, 2006). Considering the population dynamics, while life expectancy at birth increases, the fertility rate decreases and the population is getting older, especially in developed countries (Dubois, Mckee, & Rechel, 2006; RAND, 2005; Lanzieri, 2008). With the increasing elderly population in population dynamics, health needs and disease structures are also changing (WHO, 2008). This change increases the demand for a larger healthcare workforce by increasing the need for healthcare services. In addition, with the increasing number of elderly people in the population dynamics, the health workers in that country are both aging and decreasing in number. Therefore, the need for a health workforce increases bilaterally, with both the decreasing health workforce in that country and the increase in the elderly population in the changing population dynamics.

In developed countries such as Norway, Sweden, France, Denmark and Iceland, the effects of changes in population dynamics on the health workforce are quite clear. Since the average age of nurses is in the 41-45 age band, aging nurses are experiencing labor force problems (WHO, 2007). Similarly, these problems apply to doctors. In New Zealand, the average age of physicians is 44, while nurses are 43, and allied health workers are over 40. In France, 55% of physicians were under the age of 40 in 1985, but this rate decreased to 23% by 2000 (Dubois, Mckee and Rechel, 2006; Bagat and Sekelj, 2006, p. 378). Between this demand and supply in healthcare, the workforce is met by the imported labor force, rather than policies aimed at encouraging participation in the workforce, especially by developed countries. Developed countries especially do not produce the unhealthiest workforce and consciously prefer imported workforce (WHO, 2006). Because by policy makers, eliminating the health workforce gap is seen as a situation that needs to be solved urgently. This is because it takes 3 to 5 years to train a nurse, while it takes 15 to 20 years to train a senior doctor, similarly. Therefore, when the imported health workforce is preferred, the health workforce shortage problem can be solved urgently, without training costs (Buchan, 2007, p. 10).

Economic conditions also play a crucial role in driving health worker migration. Research indicates that migration often flows from less affluent nations to more prosperous ones. However, movement also occurs among developed countries, driven by opportunities for improved quality of life and professional benefits. Furthermore, rising societal expectations, fueled by advancements in education, globalization, and technology, have made populations more aware and demanding. With these heightened expectations, healthcare professionals strive to enhance their expertise and seek environments offering advanced education, cutting-edge technology, and efficient administrative systems. This pursuit of better prospects significantly influences health workforce migration patterns.

This paper addresses a critical gap in the literature by focusing on the economic and social drivers of doctors' migration within developed economies, an area that remains under-explored. It provides empirical insights using panel data analysis to uncover how factors like wages, globalization, and human development influence the migration of health workers. The structure of the paper is as follows: the next section reviews the relevant literature, followed by an analysis of the key factors driving health worker migration and their implications.

2. Literature Review

When the international migration literature of healthcare professionals is examined, it is possible to encounter many different studies. The international migration of health workers,

which is frequently on the agenda today, is not the first time that it has come to the fore. It is seen that researchers studied the reasons for the migration of health workers such as physicians and nurses to another country in 1962 (Seale 1962). In previous years, it is seen that the most important reasons for migration are from countries with lower economies to countries with higher welfare. Here, the occupational group that has the largest share of health migration is doctors compared to nurses. However, the number of nurses emigrating after doctors is quite high (Mej'ia et al., 1979). Physicians are a more attractive profession group compared to nurses in terms of immigration country. Because physicians receive more training compared to nurses and this causes a higher cost (Bezuidenhout et al., 2009; Saluja et al., 2020).

Medicine is one of the highly skilled professions in Europe. It is also quite inadequate in terms of workforce (Becker and Teney, 2020, Botezat and Ramos, 2020). In this respect, it has been subjected to serious criticism in the public due to the immigration of doctors who have completed their specialization to a better European country due to free movement in Europe (Żuk et al., 2019). The reasons for migration vary from country to country. A better career and quality of life has been on the main causes of migration in countries in the southern part of Europe (Becker and Teney, 2020). Some of the doctors working in the United Kingdom stated that the working hours are too much and this situation disrupts the balance between work and life, and they want to migrate because they cannot get enough help from their colleagues (Brugha et al., 2020). 34% of doctors who immigrated from Poland stated that high earnings and better working conditions were among the reasons for their migration (Dubas-Jakonczyk et al., 2020). Health workers in Ireland, on the other hand, stated that they had to migrate because they were not satisfied with their working conditions and thought that their career prospects would be bad (Brugha et al., 2020).

Martineau et al. (2002), examined the international migration of healthcare professionals from historical, contemporary, and future perspectives. While some of the world's wealthiest countries have benefited from international migration, some of the world's poorest countries have said it has had an overall negative impact on healthcare. However, they added that the responsibilities of both source and recipient countries need to be clarified, saying that the effects on international migration are often more complex than portrayed. They underlined that despite the development of codes of practice regarding ethical international recruitment, the increase in the demand for healthcare professionals is inevitable, and they stated that more radical strategies are needed to protect the health systems of the world's poorest countries.

Võrk et al. (2004), analyzed the size and determinants of potential migration flows of Estonian health professionals using a 2003 opinion survey. According to the results of the analysis, it has been reached that about half of the Estonian health workers, about 5% of them want to work abroad, either permanently or temporarily. The results of the logistic regression models show that the intention to migrate depends on the usual socio-demographic and economic variables such as age, gender, marital status, living area, risk of losing a job, and dissatisfaction with current wages.

Mcelmurry et al. (2006), argue that international nurse migration is a natural and expected situation. Migration flow models have stated that it occurs largely from developing countries to developed countries, and in their study, they examine nurse migration using primary health care (PHC) as an ethical framework. While PHC principles state to bring

healthcare as close as possible to where people live and work, nurse migration often moves nurses away from where they are most needed, and this conflicts with the principles of health for all. They stated that nurse migration policies and procedures should address nurse workforce migration, and that fair financial arrangements and PHC ethical criteria could be met and improved.

Henderson and Tulloch (2008), show that there is no global model for improving the retention and performance of health workers. While economic factors play an important role in workers' decisions to stay in the health sector, the evidence shows that they are not the only ones, saying that this is a critical issue that needs to be addressed through the policy, planning and implementation of innovative strategies such as incentives to retain and motivate healthcare workers in Pacific and Asian countries. Based on research findings from the Asia-Pacific region, they concluded that salaries and benefits, along with working conditions, supervision and management, and education and training opportunities, are important. They underlined the offering of financial and non-financial incentives in the form of packages.

Bradby (2014), pointed out that the widely estimated reason for the shortage of skilled health personnel in Africa is the widespread belief that rich countries are stealing trained health professionals from poor countries. They have criticized this widespread notion that it promotes medical professional interests and ignores historical patterns of underinvestment in health systems and structures. In response to the global debt crisis of the late 1970s, African countries had to prioritize investment in their social sectors, including health and education, in favor of promoting an export currency, and poor working conditions in areas where HIV spread led to a migration of medical personnel. pointed out that it exacerbated the famine. They also said that together with globalization, the means and most importantly the motivation to migrate between nations and continents causes the unavoidable desire for migration and it is very difficult to regulate.

Gruber et al. (2020), investigated the immigration of Croatian doctors after Croatia acceded to the EU. According to their study there are both economic and non-economic factors that affect the choice of individuals to migrate. For Croatian physicians, the benefits of immigration are expressed in higher satisfaction with standard of the living, income, professional development and better working conditions. However, they also point out that there are some clear psychological costs, such as being away from family members, friends and familiar surroundings, mastery of another language, which hinder immigrants and their families and make it difficult to establish a social network and integrate into society. They say that high-income countries should strive for self-sufficiency by training, retaining and maintaining sufficient numbers of doctors to staff their health systems.

Hagopian et al. (2005), investigated the immigration of West African-trained doctors to rich countries, especially the USA and England. In their study, qualitative data were collected from six medical schools in Africa to investigate the magnitude, causes and consequences of migration. According to the results of the research, they concluded that there is a developed medical migration culture. They also concluded that this culture is firmly rooted and even encourages immigration, and that they are proud of their students who migrated as role models in medical school.

When the literature is evaluated in general, international migration movements of health workers have been examined from different perspectives. When the literature is considered

from a broad perspective, it is generally deduced that countries that migrate their health workforce should protect their health workforce by regulating their migration policies.

3. Methodology

In this study, we analyzed a group of 15 high-income countries, estimating coefficients using both random effects and fixed effects models through panel data analysis. These countries were chosen based on their high Human Development Index (HDI) rankings. Additionally, they are classified as middle- or high-income economies under the European Union's economic classification system. The primary reason for selecting developed countries is the availability of comprehensive data and evidence from the literature indicating significant health worker migration occurring between developed nations. The selected countries are as follows:

Table 1. Developed Countries Group

Belgium	Estonia	Germany	Ireland	Slovenia
Czech Republic	Finland	Holland	Italy	United Kingdom
Denmark	France	Hungary	Norway	

This study utilized the Stata-17 software package for data analysis, following a methodology similar to that employed by Rutten (2009). Panel data analysis was chosen as it enables multiple observations to be gathered from the same sample over time. The functional model applied in this analysis is structured as follows:

$$Y_{it} = \alpha_{0it} + \beta_{1it} X_{1it0} + \beta_{kit} X_{kit} + \varepsilon_{it} \tag{1}$$
$$i = 1, 2, 3, \ldots, N \quad t = 1, 2, 3, \ldots, T$$

In equation (1) shown above i cross sections, t represents the unit of time. In this equation, there are individual effects that cannot be observed in terms of independent variables, do not change over time, but include cross-section-specific features. It is also included in the error term of the different effects of the units (Baltagi 2005, p. 11-12).

There are two basic approaches used in regressions with panel data. The first of these is the "Fixed Effects Model" while the other is the "Random Effects Model". In the fixed effects model, a different fixed value occurs for each cross-section. It is assumed that the slope coefficients in the model (β) do not change, however, the constant coefficients can vary only between cross-section or time data, or even within both. If differentiation is only time-dependent, it is called a one-way fixed effects model. However, if the differentiation between data depends on both cross-section and time, it is called a two-way fixed effects model.

However, in panel data analysis, the cross-section effect is considered rather than the time effect, so panel data models appear as one-way models (Hsiao 2002, p. 30). The fixed effects model can be shown as equation (1) and equation (2) as one and two-sided, respectively, as follows;

$$Y_{it} = (\alpha_{it} + \mu_{it}) + \beta_{1it} X_{1it} + \beta_{kit} X_{kit} + \varepsilon_{it} \tag{2}$$
$$Y_{it} = (\alpha_{it} + \mu_{it} + \lambda_{it}) + \beta_{1it} X_{1it} + \ldots + \beta_{kit} X_{kit} + \varepsilon_{it} \tag{3}$$

There εit ≈ iid (0, σ2) is an assumption here. In other words, ε_{it} It is assumed to have a white noise feature. In addition, the independent variables are independent of the error term (Baltagi 2005, p. 12). In the fixed effects model, different constants are estimated for each cross-section, ensuring that the constant coefficient is different for the cross-sections.

In the random effects model, changes in sections or time-dependent changes in sections are included in the model as a component of the error term. Compared to the fixed effects model, its prominent feature is that there is no loss of degrees of freedom. It also allows the inclusion of out-of-sample effects in the model. The random effects model can be shown as follows;

$$Y_{it} = \alpha_{it} + \beta_{1i}X_{1it} + \ldots + \beta_{ki}X_{kit} + (\mu_{it} + \lambda_{it} + v_{it}) \tag{4}$$

$$Y_{it} = \alpha_{it} + \beta_{1it}X_{1it} + \ldots + \beta_{kit}X_{kit} + (\mu_{it} + \lambda_{it} + v_{it}) \tag{5}$$

Equations (4) and (5) represent the one-way and two-way random effects models, respectively. The error term in these models consists of two distinct components. $v_{it} \approx$ iid (0, σ2) and $\mu_i \approx$ iid (0, σ2)there is an assumption. μ_i error term,$i = 1, 2, 3, \ldots, N$ The first component represents the value of a cross-section that remains constant across the time dimension. Conversely, the second component accounts for the remaining parts that vary over time but are interconnected within the time dimension. This component is independent of the section effect within the model. Additionally, both components are uncorrelated with any independent variable. Consequently, these components, along with the overall model, are consistent and unbiased when estimated using the least squares method.

3.1.Data Description and Variables

The model includes the following variables: GERD [a high GERD/GDP ratio can be used to measure a country's success in technological advancement and knowledge creation (R&D intensity), migration of specialist doctors, wages of health workers (in US dollars), and the population aged 65 and over (percentage of the total population).Data on R&D expenditures as a percentage of GDP, the Human Development Index (HDI), and the Globalization Index (KOF) were gathered annually for 15 nations between 2011 and 2019. Globalization (KOF) from the Swiss Institute of Economics, HDI from the UNDP, migration of specialist doctors (MIG), wages of health workers (WAGE), population aged 65 and over (POP), and GERD were all sourced from the OECD. The following is a summary table that provides the sources and explanations for the variables.

Table 2. Table of Variables

Variables	Explanation	Resources
mig	Migration of specialist doctors	OECD
wage	Wages of health workers (us dollars),	OECD
hdi	Human Development Index	UNDP
pop	The population aged 65 and over (percentage of the total population)	OECD

| gerd | The high GERD/GDP ratio can be used to measure a country's success in a technological advancement and knowledge creation (R&D intensity). | OECD |
| kof | Globalization index | OECD |

In the study, 15 groups of developed countries were chosen between 2011 and 2019, and with the aid of panel data analysis, the coefficients were attempted to be estimated using the fixed effects model and the random effects model. The model uses logarithmic form for the wage and mig variables. The following is the econometric model that was developed.

$$(lnmig)_{it} = \beta_0 + \beta_1(lnwage)_{it} + \beta_2(hdi)_{it} + \beta_3(pop)_{it} + \beta_4(gerd)_{it} + \beta_5(kof)_{it} + \varepsilon_{it}$$
(6)

In equation (6), **lnmig** serves as the dependent variable, while **lnwage**, **hdi**, **pop**, **gerd**, and **kof** are the independent variables. The constant term coefficient of the model is denoted by β_0, while β_1, β_2, and subsequent terms represent the coefficients of the explanatory variables. The model's error term, denoted by ε, captures unexplained variability not accounted for by the independent variables.

3.2. Empirical Strategy

The descriptive summary statistics of the variables used in the model are as follows.

Table 3. Summary Statistics

Stat.	lnmig	lnwage	hdi	pop	gerd	kof
Mean	10.71	11.52	0.91	17.7	2.23	85.3
Median	10.40	11.77	0.92	18.1	2.14	85.8
Maximum	12.92	12.41	0.96	22.9	5.14	91.1
Minimum	8.54	9.99	0.83	10.1	1.17	75.7
Std. Dev.	1.26	0.64	0.03	2.82	0.84	3.85

The variables utilized in the Table 3 are summarized statistically. There are no outliers in the data set when the statistics are analyzed generally. Furthermore, the variables employed in the summary are also used to extract a priori information from their correlation links. The variables utilized in the model have the following correlation table.

Table 4. Correlation Statistics

Corr.	lnmig	lnwage	hdi	pop	gerd	kof
lnmig	1.00					
lnwage	0.29	1.00				
hdi	0.06	0.79	1.00			
pop	0.41	-0.23	-0.03	1.00		
gerd	-0.05	0.39	0.36	-0.27	1.00	
kof	0.41	0.40	0.41	0.41	-0.21	1.00

It is evident from examining the correlation relations via demonstrating in Table 4 that there are strong relationships between the variables. Wages and health migration have a positive correlation of 0.29, the population over 65 has a positive correlation of 0.41, and the globalization index has a positive correlation of 0.41. Gerd, which represents high technology, is negatively correlated with health migration.

Table 5. Panel Data Regression Estimates

Model	LnWAGE	HDI	KOF	POP	GERD
Fixed Effects	-0.078(0.007) ***	5,997(0.000) ***	0.011(0.097) *	-0.005(0.460)	0.018(0.148)
Random Effects	-0.076(0.009) ***	5,919(0.000) ***	0.011(0.080) *	-0.005(0.500)	0.018(0.149)
Hausman	10,934 (0.052)*				
1- *, ** and *** indicate critical values at 10%, 5% and 1% significance levels, respectively.					
2- Values in parentheses indicate probability values.					
3- According to the Hausman test, the Fixed Effects Model was found to be preferable.					

In Table 5, we may observe Fixed and Random effects throughout the independent predictors. When the coefficients in the fixed effects model are interpreted; As expected, a negative and significant relationship was found between the migration of health workers and the wages of health workers. A 1% increase in wages reduces the migration of health workers by 0.08%.

As anticipated, a positive and significant relationship was identified between health worker migration and globalization. Specifically, a one-unit increase in globalization leads to a 0.01-unit rise in healthcare worker migration. Similarly, a significant connection was observed between health worker migration and human development, with a one-unit increase in the human development index resulting in a 5.9-unit rise in migration. However, in the current model sample, no significant relationship was found between the proportion of the population aged 65 and over, GDP expenditures on R&D, and the migration of health workers.

4. Conclusions

This study aims to contribute to the literature by supporting the top-level migration reasons of health workers, for developed economies, by modeling them econometrically and supporting them with empirical practice. In our study, 15 high-income country groups were selected, and the coefficients were tried to be estimated using the random effects model and fixed effects model with the help of panel data analysis. This country group has been selected according to countries with a high human development index. In addition, this group of countries is classified as middle or high-income economies according to the economic classification of the European Union.

According to panel data regression estimations, lnwage and HDI variables were significant in 1% and of variable in 10% in both fixed and random effects models. Pop and GERD variables are not statistically significant. According to the Hausman test, the Fixed

Effects Model was found to be preferable. When the coefficients in the fixed effects model are interpreted; As expected, a negative and significant relationship was found between the migration of health workers and the wages of health workers. A decrease in wages due to the desire to increase welfare from one country to another is a factor that increases health workforce migration. In this analysis for developed economies, a 1% increase in wages reduces the migration of health workers by 0.08%.

A clear and significant positive relationship was observed between globalization and the migration of health workers. Globalization, as a dynamic process, inherently facilitates workforce mobility by breaking down barriers and establishing common professional standards across borders. Consequently, health professionals are less inclined to work in countries with lower welfare levels if the nature of their work remains unchanged. Furthermore, international agreements have introduced legal frameworks to regulate the movement and production of the health workforce. In the context of developed economies, a one-unit rise in globalization correlates with a 0.01-unit increase in healthcare worker migration.

Similarly, a strong positive relationship was identified between migration and human development. This is unsurprising given that the countries examined in this study are developed nations. Literature suggests that migration often occurs between developed nations, driven by factors such as wage differentials. The Human Development Index (HDI), comprising health, education, and income components, highlights that income changes play a significant role in influencing labor migration. In this analysis, a one-unit increase in HDI corresponds to a 5.9-unit rise in healthcare worker migration. However, no significant relationship was found between migration and variables such as the proportion of the population over 65 years or GDP expenditure on R&D in this sample, rendering them uninterpretable.

Health workforce migration poses a significant loss of human capital for emigrant countries and presents challenges to national economies. Policymakers must adopt diverse strategies to protect the welfare of health workers at international standards and retain this skilled workforce domestically, ensuring sustainable human capital through harmonized standards.

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CORPORATE DECISION-MAKING AND THE IMPACT OF ACQUISITIONS ON SHARE PRICES: THE CASE OF VERIZON

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Abstract: *This study investigates the impact of Verizon Communications Inc.'s acquisition of Yahoo on the company's stock performance, using a combination of statistical, visual, and multiscale analytical methods. The research analyzes how strategic corporate decisions, particularly acquisitions, influence short-term and long-term stock behavior. Data spanning from 2014 to 2024 was analyzed to capture pre-acquisition, acquisition, and post-acquisition trends. The methodology integrates boxplot visualizations to explore variability and outliers, quantile analysis to assess distributional characteristics, and descriptive statistics to summarize key metrics such as mean, standard deviation, skewness, and kurtosis. Tabulation analysis evaluates associations between stock returns and trading volumes, while wavelet analysis decomposes stock returns into multiple time scales to identify short-term fluctuations and long-term trends. Results reveal significant volatility during key events, such as the Yahoo acquisition in 2017 and the COVID-19 pandemic, with daily fluctuations peaking at ±6. Medium-term adjustments (4–8 days) exhibited moderate changes, and long-term trends (32-day cycles) showed structural shifts, including positive coefficients in 2017 (+0.5) and negative coefficients in 2020 (-0.6). The research highlights the heavy-tailed nature of return distributions and skewed trading volume patterns. This study provides insights into the multifaceted effects of acquisitions on stock performance, offering valuable implications for investors and corporate managers in optimizing strategic decisions.*

Keywords*: mergers and acquisitions, stock prices, market reactions, corporate strategy, event study.*

INTRODUCTION

Mergers and acquisitions (M&A) represent a critical area of research in corporate finance, economics, and strategic management due to their profound implications for companies, industries, and economies. These transactions are essential tools for organizations seeking growth, diversification, operational efficiency, or market dominance, and they significantly influence stock prices, making them a focal point for financial market research. The announcement of an M&A deal often triggers immediate market reactions, with stock

prices of both the acquiring and target companies reflecting investor perceptions of the transaction's strategic value, potential synergies, and associated risks. These price movements, whether short-term volatility or long-term trends, provide a window into market sentiment and the effectiveness of corporate decision-making. Despite their widespread use, M&A outcomes are often unpredictable, with studies revealing mixed impacts on shareholder value and stock price performance. This unpredictability makes it essential to analyze the factors influencing M&A success, such as strategic fit, cultural alignment, and integration processes. Furthermore, M&A activities are shaped by global trends like technological disruption, geopolitical changes, and sustainability objectives, adding complexity to their study. By exploring the financial impacts of M&A, particularly on stock prices, researchers can generate insights to guide corporate leaders, investors, and policymakers in navigating these transformative business events.

Corporate decision-making regarding mergers and acquisitions (M&A) significantly impacts share prices, with varying effects observed in different contexts and timeframes. The short-term impact of M&A on stock prices often involves fluctuations. (Jiang et al., 2024). This pattern is not unique to developed markets; in India, M&A activities have shown varied impacts on stock market performance, with some firms experiencing positive abnormal returns while others face negative outcomes, particularly in the banking sector (Rani & Sangeeta, 2023). The strategic orientation of the target company also plays a crucial role; acquisitions of innovation-oriented firms tend to result in lower announcement returns and poorer long-term performance compared to efficiency-oriented targets, especially when acquirers face agency problems (Liu & Yang, 2024). Furthermore, the risk of stock price crashes can influence M&A decisions, as firms with higher crash risks are more likely to become takeover targets, often resulting in lower bid premiums and more stock-based payments (Carline et al., 2023). The market's response to M&A announcements is also shaped by investor perceptions and management attitudes, which can drive short-term market dynamics but have limited long-term effects on stock performance (Mardiani et al., 2023). Additionally, the global M&A landscape shows that the impact on stock market volatility is contingent on the development goals and status of the firms involved, with M&A potentially having a positive or negative effect depending on these factors (Yu, 2023). The concept of a takeover premium, typically around 30%, further illustrates how acquisition strategies can influence share prices, as this premium is factored into the market's valuation of the target company (Egashira, 2023). Overall, M&A activities are complex transactions that affect various stakeholders, including shareholders, and require careful consideration of strategic, financial, and market factors to optimize corporate decision-making and shareholder value.

However, the decision-making process is fraught with risks, including managerial biases such as overconfidence and the winner's curse, which can lead to overvaluation and negatively affect stock prices (Asaoka, 2019). The broader market impact of M&A is complex, with some studies indicating that acquiring firms generally experience negative stock price effects, except in specific industries like oil, gas, and financial services, where positive impacts are noted (Stunda, 2014). In contrast, other research suggests that M&A announcements can lead to positive returns for acquiring companies, as observed in the Indian stock market, where cumulative returns increased post-announcement (Poornima & Chitra, 2013). Despite these

mixed results, M&A is often pursued for strategic reasons, such as achieving economies of scale and portfolio diversification, although these benefits do not always translate into immediate shareholder wealth increases (Sogomi et al., 2022). Furthermore, the role of financial advisors and market information is crucial, as shareholders tend to rely on less optimistic target advisor opinions, which can influence voting and post-merger performance (Ouyang, 2012). While M&A can be a strategic tool for growth and market expansion, its impact on share prices is influenced by managerial decision-making, industry context, and market perceptions, necessitating careful consideration by corporate leaders and investors.

The scientific problem addressed in this paper lies in the inconsistency and ambiguity of existing empirical evidence on the impact of M&A on stock prices. While some studies report positive abnormal returns for target companies and mixed outcomes for acquiring firms, others highlight the prevalence of long-term underperformance and challenges in achieving strategic goals. This discrepancy raises critical questions about the determinants of M&A success and their implications for corporate decision-making, market efficiency, and shareholder value.

The primary goal of this paper is to analyze the impact of corporate decision-making, specifically mergers and acquisitions (M&A), on stock prices, examining the short-term and long-term effects.

This paper is organized as follows: Section 1 gives insights into the literature review, Section 2 represents our research methodology. Section 3 focuses on research results and discussion, and finally, we present our conclusions and recommendations.

1. LITERATURE REVIEW

A merger occurs when companies of similar size and operational scope combine to form a new entity, pooling assets and resources for a unified market presence. In contrast, an acquisition typically involves a more prominent firm purchasing a smaller one, integrating the acquired firm's assets into its existing structure without forming a new entity. Acquisitions may be pursued to access new markets, enhance operational efficiency, or advance technology (DePamphilis, 2019).

Theoretical frameworks classify M&As into various types, each yielding distinct strategic outcomes. Horizontal mergers involve companies in the same industry and market level, often aimed at reducing competition and achieving economies of scale (Pautler, 2003). Vertical mergers bring together firms at different stages of production, such as suppliers and manufacturers, to increase operational efficiency, reduce costs, and secure supply chains (Singh & Montgomery, 1987). Conglomerate mergers, meanwhile, involve companies in unrelated industries, often to diversify business risk or enter entirely new markets (Trautwein, 1990).

Corporate decision-making acts as a strong determinant of the financial markets. M&A is one of a firm's strategic decisions by which companies extend their operations, differentiate their product and service offerings, or acquire certain competitive advantages. Mergers and acquisitions are considered useful strategies for the growth and expansion of businesses. (Rahman et al., 2018) However, a literature review gives one complex and sometimes ambiguous approach to the consequences of such decisions on stock prices. This

paper investigates the role of corporate investment decision-making, such as acquisition, in determining changes in stock prices.

Actions and decisions made by corporations drive the financial markets. One major corporate strategy is acquisitions. When a company acquires another, it merges the two corporations' assets, operations, and market presence. This can lead to a leading market position, economies of scale, and new technologies or markets.

Despite the assumed advantages of acquisitions, empirical evidence relating to the stock price impact varies widely. Various studies have given contradictory results in estimating whether an increase or a fall in stock price leads to acquisition. Therefore, this ambiguity is determined by different issues, such as the features of the acquiring and target firms, the nature of the acquisition deal, and the post-market state at the time of the acquisition.

Announcements of mergers and acquisitions immediately impact a target company's stock price, as induced reaction in the stock market causes investors to revise expectations about the company's future profitability (Panayides and Gong, 2002). According to the Efficient Markets Hypothesis, "prices reflect all publicly available information on an underlying asset" (Fama, 1970). The implication on common stock is usually a rise for the target company. The acquiring company's common stock would slightly drop because of apprehension over integration costs, leverage, or perceived risks. However, both stocks may gain long-term if the acquisition is considered an excellent strategic move.

Stock price reactions to acquisitions depend on the nature and type of the deal. In the case of friendly acquisitions, the target company's stock generally rises owing to premium offers. In contrast, that of the acquiring company may remain stable or increase if synergies are expected. In hostile takeovers, the acquirer's stock generally falls owing to perceived risks, while the target company's stock surges. While horizontal mergers tend to raise a target's stock, a vertical merger could raise an acquirer's stock on account of operational efficiencies. Movements in stock also depend on other factors, like financing methods and regulatory concerns.

The prospect of new profit opportunities or the probability of emerging risks are the reasons why M&A announcements have a direct and immediate impact on the stock prices of the respective company. According to the efficient market hypothesis, the stock price reflects all available information and investors' assessments (Kellner, 2024).

Whereas target companies typically see a gain in their stock price resulting from acquisition premiums, acquiring companies often face volatility in their stock price or even a drop in their stock price due to the anticipated issues with the integration process. The merger's success, concerning long-term performance in the acquirer's stock, is contingent upon the efficiency with which it generates its expected synergies and strategic fit. Mergers poorly executed may lead to poor performance, whereas those companies that are integrated well might enjoy the benefits of better long-term performance.

M&A is an important strategic alliance and a firm's favourite dynamic strategy in today's competitive business because firms can expose the required domestic and international strategies and geographic tactics through successful M&A (Datta, Basuil, & Agarwal, 2020). Mergers and Acquisitions (M&A) have been one of the most essential driving tools and preferable business strategies for the last several decades around the globe. As firms continue

to deploy M&A to expand the business and geographic scope, academics, market practitioners, and policymakers must fully understand the possible consequences and appropriate cost-benefit analysis of engaging in M&A. (Hossain, 2021)

Over the years, mergers and acquisitions (M&A) have been the research subject, particularly in Europe and North America. This trend has now extended to countries that have experienced significant economic growth (Rahman et al., 2018b). Several theories, including the neoclassical theory and the theory of non-maximization of value, could explain the M&A operations. The neoclassical theory claims that the motivation for mergers and acquisitions coincides with the main objective: increasing business value. The second theory believes that M&A exists to satisfy the manager's enrichment of the emerging prestige of business dimensions (Lobo & Gomes, 2022).

The topic of mergers and acquisitions is still relevant for researchers because the results influencing the firms' performance worldwide are still not consensual. Many companies view M&A with an expectation of creating value through better efficiency, reducing costs through economies of scale, and larger product offerings. Large M&A can affect the industry, the local economy, and, in certain cases, even the global economy. The extent to which M&A affects the economy has been the subject of various empirical studies and is closely monitored by the government (Shah & Arora, 2014). This literature review examines the current research on the correlation between corporate acquisitions and stock price performance.

Shareholders and markets, overall, have different reactions to the announcement of M&A. Several studies indicate that shareholders often experience zero or even negative returns, especially for large public deals (Renneboog & Vansteenkiste, 2019). On average, acquirer's shareholders suffer losses of around 0.5% - 0.7% on a market-adjusted basis around the announcement date (Hazelkorn et al., 2004). Scholars argue that the stock market does not view acquisitions as good news and is not overly enthusiastic about them (Corhay & Rad, 2000). Datta and Puia (1995) found that, on average, cross-border acquisitions destroy value for U.S. bidding firms' shareholders.

Facebook's acquisition of Instagram in 2012 is a well-known example of the impact acquisitions can have on the market. At the time, Instagram had only 13 full-time employees and was seen as a project with unpredictable long-term potential. However, Facebook saw things differently. Four years later, Facebook's $1 billion investment in the startup had fully paid off, proving one of the smartest strategic moves in technology acquisition. (Luckerson, 2016). With over 845 million users and counting, Facebook is a clear leader in social media. Nearly 300 million are said to access their account via their mobile device. With the acquisition of Instagram, Facebook signals its intention to pursue and push more strongly in this direction, with increased capabilities conditionally (Gonzalo, 2020).

As previously noted, existing studies assessing the effects of M&A show varying results, indicating minimal, negative, and even positive impacts on the stock prices of various firms. This has given rise to various hypotheses.

H1: Corporate acquisitions lead to positive abnormal stock returns in the short term.

In today's financial and economic environment, mergers and acquisitions have become increasingly important. When a company is targeted for acquisition, its stock price often goes up. This happens because the acquiring company typically pays a premium above the current

value when buying the target company (Soni, n.d.). Studies that report positive abnormal returns following an M&A announcement include Asquith et al. (1983), Fuller et al. (2002), Moeller et al. (2004), Draper and Paudyal (2006), and Hamzah et al. (2008).

H2: Stock price movements differ based on the type of acquisition and market conditions.

Acquisitions are driven by different motives, and it's important to distinguish between acquisitions with "pure explore" and "pure exploit" motives. While most acquisitions have multiple motives, there are also acquisitions with "ambidextrous" motives, which involve different combinations of explorative and exploitative motives. For instance, IBM purchased Red Hat for US$34 billion in 2019, and Broadcom bought CA Technologies for US$18.9 billion in 2018. The business press described both of these acquisitions as the acquirers' attempts to "procure their way into the future." However, not all acquisitions succeed, and those that fail often harm the acquirer (Aalbers et al., 2021).

H3: The long-term performance of acquiring firms is contingent upon successful integration and the realization of synergies.

Literature on the long-term post-acquisition performance as Agrawal and Jaffe (2000), Andrade et al. (2001), King et al. (2004), Martynova and Renneboog (2008a), Dutta and Jog (2009), and Bessembinder and Zhang (2013). Agrawal and Jaffe (2000) found strong evidence of long-term underperformance after a takeover. Acquiring firms tend to underperform compared to non-acquiring firms, especially in public takeovers. Despite numerous academic studies on factors affecting M&A announcement returns, many short-term performance boosters do not translate into sustained long-run returns. To understand value creation in M&As, it is crucial to identify firm and deal characteristics that can reliably predict long-term performance (Rennenboog & Vastenkiste, 2020). According to Cui and Leung (2020), the top management of firms is responsible for key decisions such as investments, financing, and strategy. It is widely believed in the business press and among managers that a firm's top management team, including its CEO, executive directors, and other senior executives, plays a crucial role in corporate decisions and business performance.

2. METHODOLOGY

This research aims to analyze the stock performance of Verizon Communications Inc., focusing on its acquisition of Yahoo and the subsequent impact on its financial behavior. The methodology is designed to study Verizon's stock systematically returns through a combination of statistical, visual, and multiscale analytical tools. The research is structured as it is placed in Figure 1.

Figure 1. *Methodology for Verizon Communications Inc. stock returns and trading volumes research*

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│ Data Collection                       │
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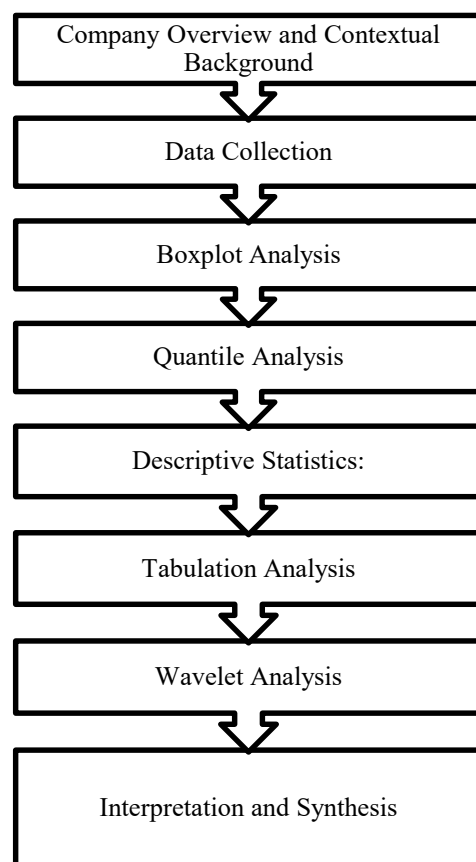
1. Company Overview and Contextual Background:
   o The study begins with an in-depth description of Verizon Communications, detailing its business model, market position, and strategic initiatives. Special emphasis is placed on the acquisition of Yahoo in 2017, including its objectives, financial scope, challenges, and outcomes. This context provides a foundation for understanding the potential impact of the acquisition on Verizon's stock performance.

2. Data Collection:
   o Historical daily stock return and volume data for Verizon Communications is collected for the period spanning November 2014 to November 2024 to capture pre-acquisition, acquisition, and post-acquisition trends. The dataset includes daily closing prices used to calculate stock returns.
   o Additional market data, such as major events and financial reports, is referenced to contextualize patterns observed in the stock returns.

3. Boxplot Analysis:
   o Boxplots are utilized to visually explore the distribution of Verizon Communications stock returns, highlighting key aspects such as the median, interquartile range (IQR), outliers, and overall variability.

4. Quantile Analysis:

- Quantile analysis is conducted to assess the distribution of stock returns across various percentiles (e.g., 10th, 25th, 50th, 75th, and 90th). This allows for a deeper understanding of the tail behavior of returns and the identification of extreme movements, which are particularly relevant during periods of significant market events such as the Yahoo acquisition.

5. Descriptive Statistics:
   - Key descriptive statistics, including mean, median, standard deviation, skewness, kurtosis, and range, are calculated for Verizon Communications stock returns.
   - The standard deviation is used to measure volatility, while skewness and kurtosis are examined to understand the asymmetry and extremity of return distributions, respectively.

6. Tabulation Analysis:
   - Tabular summaries of stock return performance are presented, categorized by key time periods and events. Metrics such as average return, volatility, and frequency of extreme movements (e.g., returns exceeding ±2 standard deviations) are compared to identify patterns linked to the acquisition and external events such as the COVID-19 pandemic.

7. Wavelet Analysis:
   - The study employs wavelet analysis to decompose Verizon Communications stock returns into multiple time scales, capturing both short-term fluctuations and long-term trends.
   - The wavelet decomposition is performed at six levels, corresponding to daily, weekly, biweekly, and monthly cycles. Scalograms and wavelet coefficients are analyzed to identify periods of heightened volatility, structural shifts, and long-term market trends, with particular focus on the impact of the Yahoo acquisition and the COVID-19 pandemic.

8. Interpretation and Synthesis:
   - The results from the boxplot, quantile analysis, descriptive statistics, tabulation, and wavelet analysis are synthesized to draw insights about Verizon Communications stock behavior over time. The study focuses on the changes in volatility, distributional characteristics, and multiscale dynamics during key periods, particularly around the Yahoo acquisition.
   - Findings are interpreted in the context of Verizon Communications strategic initiatives, market events, and industry conditions, highlighting both the short-term and long-term implications of the Yahoo acquisition on stock performance.

This comprehensive methodology ensures a robust analysis of Verizon Communications stock returns, leveraging both statistical and advanced analytical tools to uncover patterns and trends linked to the Yahoo acquisition and other significant events.

3. RESEARCH

Description of company and acquisition

In July 2016, Verizon Communications announced its intent to acquire Yahoo Inc.'s core internet business for $4.83 billion. The deal was part of Verizon's strategy to expand beyond its telecommunications roots and establish a more robust digital media and advertising foothold. By combining Yahoo's assets with AOL, which Verizon had acquired in 2015 for $4.4 billion, the company aimed to create a digital advertising powerhouse capable of competing with tech giants like Google and Facebook. The acquisition included Yahoo's search engine, email services, and advertising technology. Still, it excluded its stakes in Alibaba Group and Yahoo Japan, which were retained under a separate entity named Altaba Inc.

The acquisition faced significant challenges. In 2016, after the deal was announced, Yahoo disclosed two major security breaches before the acquisition, affecting billions of user accounts. These breaches resulted in a renegotiation of the purchase price, which was reduced by $350 million to $4.48 billion. Despite these setbacks, Verizon completed the acquisition in June 2017 and rebranded the combined Yahoo and AOL entities under the name "Oath." However, integrating the two companies proved challenging, with Oath struggling to scale its advertising platform and gain market share in a space dominated by Google and Facebook.

The financial performance of the acquisition fell short of expectations. In 2018, Verizon wrote down $4.6 billion of the value of Oath, reflecting the division's underperformance and its failure to meet revenue targets. Recognizing these difficulties, Verizon rebranded Oath as Verizon Media in 2019, shifting its focus toward premium content and advertising technology. However, the company's efforts to compete in digital advertising continued to face significant headwinds. In 2021, Verizon decided to exit the digital media space altogether, selling Yahoo and AOL to the private equity firm Apollo Global Management for $5 billion.

Verizon's acquisition of Yahoo underscores traditional companies' challenges when competing in fast-evolving digital markets. Despite the initial optimism surrounding the acquisition, Yahoo and AOL's integration and subsequent performance it has highlighted the difficulties of scaling in a sector dominated by established players. While Verizon ultimately recouped much of its investment through the 2021 sale, the acquisition serves as a case study of the complexities of diversification and the risks associated with entering highly competitive markets.

Data analysis:

The boxplot visualization for Verizon's stock returns and trading volumes provides valuable insights into their distributions, highlighting central tendencies, variability, and the presence of outliers.

Figure 2. *Boxplot visualization for Verizon Communications Inc. stock returns and trading volumes*
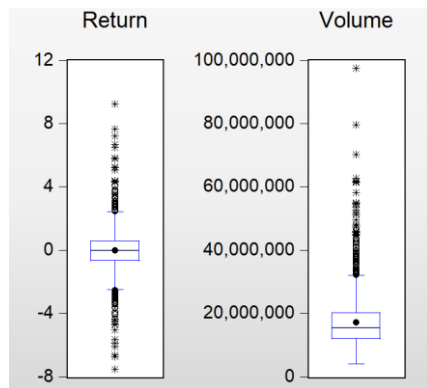
Done by authors using Nasdaq data and Eviews software

The returns boxplot (Figure 2.) shows a relatively symmetric distribution centered near zero, aligning with the small mean and median observed in the descriptive statistics. The compact interquartile range (IQR) suggests that the majority of daily returns are clustered within a narrow range. However, the presence of numerous outliers beyond the whiskers, especially on the positive side (up to approximately 9), reflects instances of extreme market movements or unusual trading events. Negative outliers, extending down to approximately -7, represent significant declines, likely linked to adverse news or market disruptions. On the other hand, the trading volumes boxplot reveals a heavily right-skewed distribution, with most trading activity concentrated at lower volume levels. The small IQR and whiskers extending toward high volume levels highlight the variability in trading activity, with numerous outliers exceeding 80 million shares. These high-volume outliers likely correspond to significant events, such as earnings announcements, acquisitions, or other market-moving news, such as the Yahoo acquisition in 2017. While both returns and volumes display significant outliers, their patterns differ; returns show a balanced dispersion of extreme values in both positive and negative directions, reflecting gains and losses on particular trading days, whereas volumes demonstrate a pronounced skew toward exceptionally high values, indicating infrequent but impactful trading activity. This skewed volume distribution suggests that trading activity is often event-driven while returns fluctuate within a narrower but volatile range. Overall, the figure underscores the importance of accounting for outliers in any analysis of Verizon's stock performance, as these extreme values represent rare yet influential occurrences that can significantly impact market dynamics.

Figure 3. *Quantiles for Verizon Communications Inc. stock returns and trading volumes*
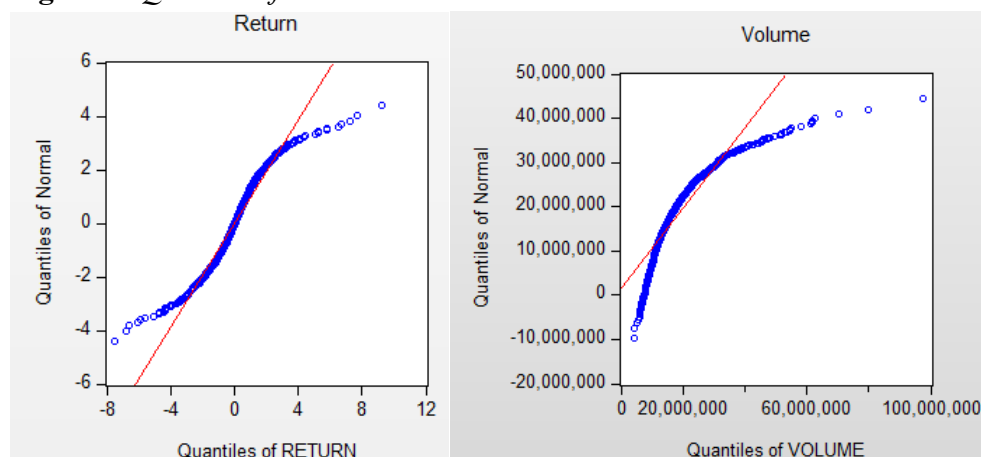
Done by authors using Nasdaq data and Eviews software

The Q-Q plot for Verizon's stock returns (Figure 3.) compares the quantiles of the observed return data to those of a theoretical normal distribution, providing insight into the normality of the return distribution. The plot shows that the data roughly aligns with the central region's red diagonal line, indicating that most returns follow a pattern close to normality. However, noticeable deviations occur in the tails of the distribution. At the lower end, the points diverge below the diagonal line, reflecting extreme negative returns that are more frequent than expected under a normal distribution. Similarly, the upper tail exhibits significant divergence, with points above the diagonal line indicating an overrepresentation of large positive returns.

These tail deviations confirm the presence of heavy-tailed behavior, consistent with the high kurtosis value observed in the descriptive statistics. This heavy-tailed nature suggests that extreme returns, both positive and negative, occur more frequently than a normal distribution would predict. This pattern aligns with financial return distributions, which often exhibit fat tails due to sudden market events, volatility spikes, or external shocks.

Overall, the Q-Q plot visually confirms that Verizon's stock returns deviate from normality, particularly in the tails. These deviations emphasize the importance of using robust statistical methods that can handle non-normal distributions and the presence of extreme values when analyzing the stock's performance.

The Q-Q plot for Verizon's trading volumes quantitatively illustrates deviations from a normal distribution. Observed volumes in the lower quantiles show some alignment with the expected average values, but deviations become pronounced as volumes increase. For instance, the theoretical maximum value under normality (upper quantiles) would be around 40,000,000, but the actual observed trading volumes exceed 100,000,000, reflecting extreme values well above standard expectations.

Similarly, the theoretical minimum under normality might approach -20,000,000 in the lower quantiles. Still, actual trading volumes are truncated at approximately 4,000,000, suggesting fewer instances of deficient trading activity than would be predicted by a normal distribution. These discrepancies confirm the heavy right skew, with high trading volumes disproportionately influencing the distribution.

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The upward curvature in the upper quantiles, particularly after 60,000,000, highlights the frequency of extreme trading days, which are outliers relative to a normal distribution. Combined with the descriptive statistics—skewness of 2.43 and kurtosis of 14.82—this plot confirms that Verizon's trading volumes exhibit significant non-normality, driven by an overrepresentation of extreme high-volume trading events. These quantitative deviations emphasize the importance of tailoring analytical models to accommodate such distributions when interpreting trading patterns.

Figure 4. *Descriptive statistics for Verizon Communications Inc. stock returns and trading volumes*

	RETURN	VOLUME
Mean	0.002199	17276944
Median	0.017602	15601150
Maximum	9.270468	97510640
Minimum	-7.497795	4108274.
Std. Dev.	1.237903	7629818.
Skewness	0.121474	2.427284
Kurtosis	8.751691	14.81694
Jarque-Bera	3474.279	17116.31
Probability	0.000000	0.000000
Sum	5.533649	4.35E+10
Sum Sq. Dev.	3853.997	1.46E+17
Observations	2516	2517

Done by authors using Nasdaq data and Eviews software

The descriptive statistics for Verizon's stock price returns (Figure 4.) and trading volumes provide valuable insights into the dataset's characteristics. For stock price returns, the mean is 0.002199, indicating a small average daily positive return, while the median return of 0.017602 is higher than the mean, suggesting a slightly right-skewed distribution. The standard deviation of 1.237903 points to moderate volatility in daily returns, with a wide range between a maximum return of 9.270468 and a minimum return of -7.497795, highlighting significant variability in stock performance.

The skewness of the return distribution is 0.121474, indicating a mild positive skew where small positive returns are more frequent than large negative ones. The kurtosis value of 8.751691 suggests heavy tails in the distribution, indicating the presence of extreme outliers or large fluctuations in returns. This is further confirmed by the Jarque-Bera test statistic of 3474.279 with a p-value of 0.000000, indicating that the returns do not follow a normal distribution. The high kurtosis and non-normality imply that extreme events significantly shape Verizon's stock price behavior.

The data reflects significant variability in trading volumes, with a mean daily volume of 17,276,944 shares and a median of 15,601,150 shares. The higher mean than the median suggests a positively skewed distribution, where a few days of unusually high trading volumes pull the average upward. The standard deviation of 7,629,818 indicates substantial fluctuations in trading activity, with a minimum volume of 4,108,274 and a maximum of 97,510,640, highlighting the presence of exceptionally high-volume days.

The distribution of trading volumes is heavily skewed to the right, with a skewness value of 2.427284, indicating that most trading days have relatively low volumes. In contrast,

a few days exhibit extraordinarily high activity. The kurtosis of 14.81694 underscores the presence of heavy tails, pointing to extreme trading volume spikes. The Jarque-Bera test statistic of 17116.31, with a p-value of 0.000000, confirms the non-normality of trading volumes, reinforcing the impact of these extreme outliers on the dataset.

The analysis reveals that stock returns and trading volumes exhibit non-normal distributions with significant skewness and heavy tails. These characteristics suggest extreme values and volatility are crucial in Verizon's stock performance and trading activity. The relatively small mean return and moderate standard deviation point to a typical stock behavior with periodic extreme events. Meanwhile, the high skewness and kurtosis in trading volumes highlight specific days with exceptionally high activity, likely driven by major market events, corporate news, or earnings announcements. These findings suggest that traditional analytical models assuming normality may not adequately capture Verizon's stock performance dynamics, necessitating more robust approaches to handle the observed patterns.

Figure 5. *Tabulation analysis for Verizon Communications Inc. stock returns and trading volumes*

Tabulation Summary					
Variable	Categories				
RETURN	4				
VOLUME	5				
Product of Categories	20				
Measures of Association	Value				
Phi Coefficient	0.595931				
Cramer's V	0.344061				
Contingency Coefficient	0.511923				
Test Statistics	df	Value	Prob		
Pearson X2	12	893.5172	0.0000		
Likelihood Ratio G2	12	114.9153	0.0000		

WARNING: Expected value is less than 5 in 60.00% of cells (12 of 20).

Count % Total		[0, 200000...	[20000000...	[40000000...	VOLUME [60000000...	[80000000...	Total
	[-10, -5)	0	1	5	0	1	7
		0.00	0.04	0.20	0.00	0.04	0.28
	[-5, 0)	873	325	16	3	0	1217
		34.70	12.92	0.64	0.12	0.00	48.37
RETURN	[0, 5)	992	278	11	1	0	1282
		39.43	11.05	0.44	0.04	0.00	50.95
	[5, 10)	0	4	4	2	0	10
		0.00	0.16	0.16	0.08	0.00	0.40
	Total	1865	608	36	6	1	2516
		74.13	24.17	1.43	0.24	0.04	100.00

Done by authors using Nasdaq data and Eviews software

The tabulation analysis (Figure 5.) explores the relationship between Verizon's stock returns and trading volume, using categorical return ranges and volume bins to structure the data. Measures of association, including the Phi coefficient (0.595931), Cramér's V (0.344061), and the contingency coefficient (0.511923), indicate a moderate positive association between the two variables. Statistical tests further support this relationship, as both the Pearson χ^2 test (χ^2 = 893.5172, p = 0.0000) and the Likelihood Ratio Test (G^2 = 114.9153, p = 0.0000) confirm that the association is statistically significant. These results highlight a meaningful dependency between Verizon stock returns and trading volume.

The distribution of data reveals interesting trends across different return categories. The smallest group, representing extreme negative returns in the range of [-10, -5], accounts for only 7 observations (0.28% of the total) and is almost entirely confined to low trading volumes. In contrast, the [-5, 0] return category comprises 1,217 observations (48.37%) and is predominantly concentrated in the 0–2 million volume bin, with diminishing frequencies in higher volume bins. The return category [0, 5] is the largest group, containing 1,282 observations (50.95%), and similarly shows a strong association with low trading volumes, as 992 of these instances fall in the 0–2 million volume bin. Lastly, the [5, 10] return category, representing positive returns, is sparse, with only 10 observations (0.40%), scattered across low to medium trading volumes.

An examination of the volume distribution reveals that most observations (74.13%) occur within the lowest trading volume range of 0–2 million. Higher trading volumes, particularly those above 6 million, are significantly less common, collectively contributing only 0.24% of total observations. The data also includes a warning that 60% of cells have expected values less than five, indicating sparsity in parts of the contingency table. This sparsity could potentially affect the robustness of the χ^2 test, though the results remain statistically significant.

The analysis suggests that while a moderate and statistically significant relationship exists between trading volume and stock returns, the association is dominated by low trading volume categories. Extreme return categories, such as [-10, -5] and [5, 10], are underrepresented, reflecting the rarity of these events and their limited impact on high trading volumes. This indicates that Verizon's stock performance is typically associated with moderate market activity, with significant shifts in returns less frequently accompanied by high trading volumes. The findings imply that changes in trading volume can serve as a signal for stock performance, though additional analysis, such as regression modeling, would be required to establish causality or deeper insights into these patterns.

Figure 6. *Wavelet analysis of Verizon Communications Inc. stock returns*
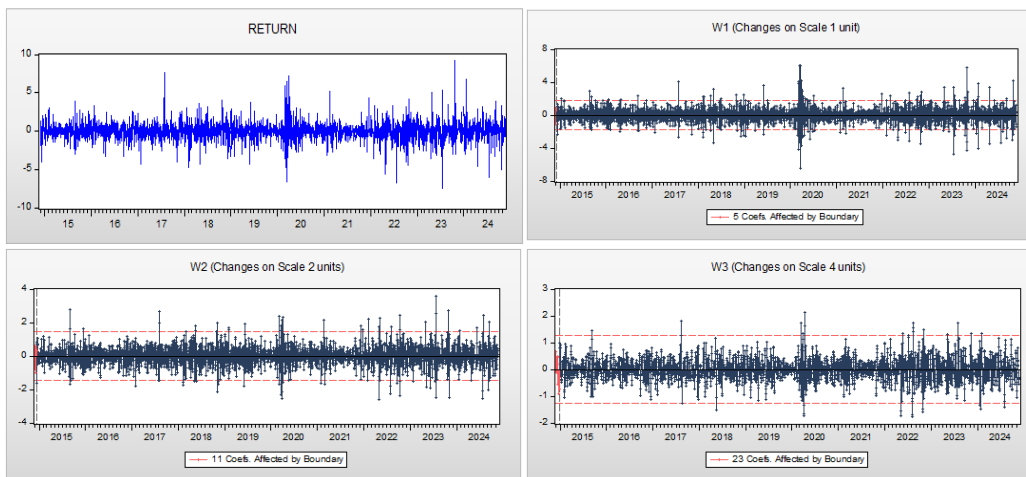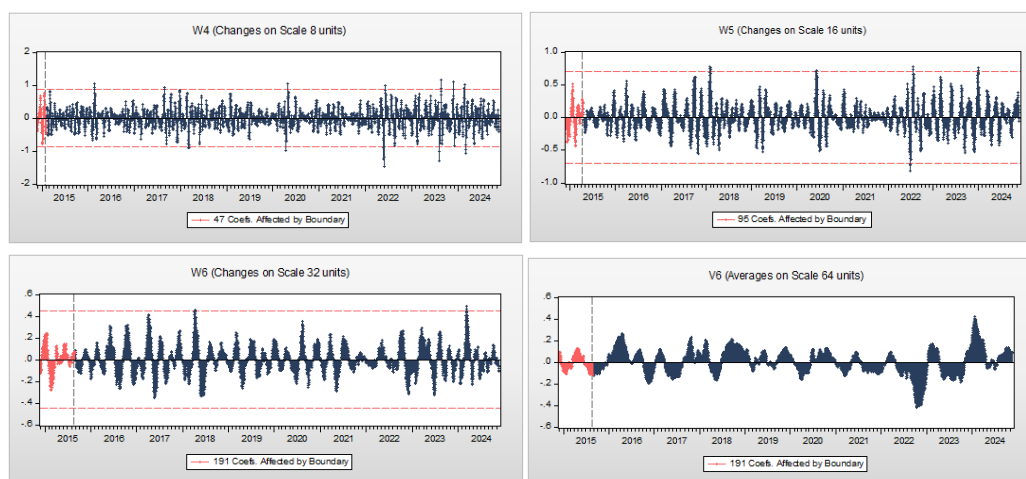
Based on the provided wavelet analysis (Figure 6) summary for Verizon's stock returns:

The analysis utilized the Maximum Overlap Discrete Wavelet Transform (MODWT) with the Daubechies 4 filter, covering a dataset spanning from November 24, 2014, to November 22, 2024, and including 2,516 observations. The decomposition was conducted with a maximum scale of 6, allowing for the investigation of both short- and long-term return dynamics. This setup suggests a comprehensive multiscale analysis, effectively capturing fluctuations in stock returns across various time horizons, ranging from high-frequency (daily/weekly) to low-frequency (monthly/annual) trends. Such an approach is well-suited to identify dominant frequencies, localized trends, and potential structural breaks in Verizon's return series over the specified 10-year period. Further exploration of scale-specific energy distributions and time-localized patterns could provide valuable insights for investors and analysts.

High-Frequency Movements (Scale 1 - Daily). The wavelet coefficients show high volatility at the finest scale (daily fluctuations), with multiple spikes exceeding ±4. The year 2017, coinciding with Verizon's acquisition of Yahoo, recorded notable peaks, with coefficients exceeding +5 and -4. This reflects significant market reactions to the acquisition. Additionally, the average coefficient for this scale remained around 0.2, suggesting that while short-term fluctuations were pronounced, they were balanced around a neutral trend. The period from 2019 to 2020 also showed sharp spikes, peaking at ±6, likely attributable to market uncertainty during the early stages of the COVID-19 pandemic.

Intermediate Movements (Scale 2 - 2 Days). The Scale 2 decomposition reveals moderate volatility, with coefficients largely contained within ±2. However, specific events in 2017 caused spikes as high as +3.5, particularly in the months following the announcement and completion of the Yahoo acquisition. The overall average coefficient at this scale was close to zero (0.1), indicating a lack of persistent trends at this frequency. In 2020, several spikes between +2.5 and -2.8 occurred during heightened market activity, reflecting intermediate-term reactions to global events such as the pandemic.

Medium-Term Movements (Scale 3 and Scale 4 - 4 Days and 8 Days). At Scale 3, fluctuations are dampened compared to higher frequencies, with coefficients typically within ±1.5. However, in 2017, distinct spikes were reaching +2 and -1.8, highlighting the medium-

term adjustments in Verizon's stock price related to the Yahoo integration. The Scale 4 decomposition shows further stability, with coefficients concentrated within ±1 for most of the period. Notable peaks in 2017, reaching ±1.2, reflect sustained investor reactions over an 8-day cycle following major announcements.

Low-Frequency Movements (Scale 5 and Scale 6 - 16 Days and 32 Days). At Scale 5, the coefficients show persistent trends with fluctuations between ±0.8. During 2017, the average coefficient reached +0.4, indicating a positive medium-term sentiment associated with the Yahoo acquisition. In contrast, the period between 2020 and 2021 showed more negative coefficients, bottoming at -0.7, aligning with broader market pessimism during the pandemic. Scale 6 (32-day cycles) revealed longer-term structural trends, with coefficients reaching ±0.6. Peaks in 2017 at +0.5 suggest optimism following strategic corporate decisions, while dips in 2020 reached as low as -0.6, highlighting the impact of external shocks on long-term investor confidence.

Long-Term Trends (Scale 6 Averages - Annual Trends). The long-term wavelet average at Scale 6 shows distinct oscillations, particularly around 2017 and 2020. 2017 the average coefficient was +0.3, reflecting the positive market outlook post-Yahoo acquisition. By contrast, 2020 exhibited a negative average of -0.5, coinciding with the economic turmoil caused by the COVID-19 pandemic. Post-2020, coefficients gradually returned to positive territory, with averages near +0.2 in 2023, indicating recovery and stabilization in Verizon's stock performance.

CONCLUSIONS

Three primary hypotheses frame the M&A-stock price relationship. First, acquisitions often yield positive abnormal stock returns for target firms in the short term due to acquisition premiums. Second, the success of an acquisition depends on its type, market conditions, and underlying motives, whether for exploration, exploitation, or ambidexterity. Finally, the long-term performance of acquiring firms hinges on effective integration and realisation of anticipated synergies, with research suggesting that poor post-acquisition performance can result if these are not achieved. Ultimately, the success of M&A strategies is influenced by firm-specific characteristics and the strategic decision-making of top management, underscoring the need for careful evaluation and management throughout the M&A process.

There are also implications for corporate managers when considering M&A strategies. Managers must consider these market responses when planning an M&A strategy. Acquisitions are usually successful when the cultural and strategic fit of the firms is good and synergies are realized. The managers must also be cautious with regulatory challenges and investor concerns so that the market reception is favorable and, in the long run, the deal is well placed.

All in all, the research found that mergers and acquisitions (M&A) significantly influence stock prices, depending largely on the strategic alignment, nature of the acquisition, and market conditions. While target companies often experience immediate stock price gains due to acquisition premiums, the stock prices of acquiring firms can exhibit volatility or decline due to uncertainties regarding integration and strategic alignment.

The wavelet analysis of Verizon's stock returns from 2014 to 2024 reveals key insights into multiscale market dynamics. Short-term daily fluctuations (Scale 1) peaked at ±6 during

2017 and 2020, reflecting sharp market reactions to Verizon's acquisition of Yahoo and the economic uncertainty caused by the COVID-19 pandemic, respectively. Medium-term adjustments (Scales 3 and 4, representing 4–8 day cycles) showed moderate fluctuations, with peaks reaching ±2 in 2017, indicating sustained investor responses to the Yahoo integration. Long-term trends (Scale 6, representing 32-day cycles) highlight structural shifts, with positive coefficients (+0.5) in 2017 reflecting optimism around the acquisition, contrasted with negative coefficients (-0.6) in 2020 during the pandemic. The 2017 Yahoo acquisition caused significant spikes across multiple scales, including daily fluctuations reaching +5 and weekly trends peaking at +3.5. The COVID-19 pandemic in 2020 drove sharp volatility across all scales, with prolonged negative impacts especially evident at lower frequencies. This multiscale analysis underscores the influence of both internal corporate events and external economic disruptions on Verizon's stock performance.

Investors can use the findings to make better investment decisions around acquisition announcements. They can use the study to their advantage by paying close attention to acquisition announcements. Moreover, they should look for strategic fit, the nature of the deal, and the involved industry. Generally speaking, acquisitions with relatively clear synergies and strong strategic fit often have positive market reactions in the short run and long-term value creation, while those transactions with poor prospects or cultural misalignment result in a decline in stock price.

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VALUATION MODEL OF CROWDFUNDING CAMPAIGNS APPLYING SIMPLE ADDITIVE WEIGHTING METHOD

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Abstract: *Every investor has some difficulties when investing into crowdfunding campaigns, as it is not clear how to evaluate specific crowdfunding campaign or what success factors to choose. The aim of this study is to propose the crowdfunding campaign assessment model, test it empirically and illustrate how to select the most appropriate crowdfunding campaign for individual investor to invest. Multi-criteria methods, used in the evaluation process, enable to get objective answers about the effectiveness of the optimal crowdfunding campaign comprehensively by presenting some generalized indicators and considering both quantitative and qualitative data. The obtained empirical results comparing two crowdfunding campaigns show that the proposed method could be used for evaluating complex processes of the optimal crowdfunding investments, and could be adapted for various situations.*
Keywords: *crowdfunding, crowdfunding campaign, valuation model, multi-criteria decision method, simple additive weighting*

INTRODUCTION

The crowdfunding industry increased significantly after the 2008 global financial crisis, as the typical financial system, especially the banking sector, was no longer trusted. Since then, crowdfunding has thrived globally (Jalal et al., 2024). Crowdfunding, being one of the key applications of Fintech that may disrupt traditional financial intermediation, is an emerging financing alternative form that connects those who can invest money directly with those who need financing for a specific project (Pandey et al., 2024; Wan et al., 2023). It is an internet-based way for companies, organizations or individuals to raise money through either donations or investments from multiple individuals (Hussain et al., 2023). The basic principle of crowdfunding is therefore to pool money from a group of individuals instead of professional parties (Mora-Cruz & Palos-Sanchez, 2023). The definitions of crowdfunding might be different, but they summarize the following key components: 1) raise funds in minor amounts; 2) many-to-many platform and 3) use of digital technology (Hussain et al., 2023; Mora-Cruz & Palos-Sanchez, 2023).

These days many crowdfunding campaigns are emerging. Due to the high variety of crowdfunding campaigns, it is very difficult to select the right one. In order to select the most wanted campaign, the crowdfunding campaigns must be evaluated whether it is worth to invest or not. It is very difficult to assess the crowdfunding campaign, as most campaigns are from

new companies which still do not have much accounting information or any tangible wealth. Also, there are not many specific success factors of crowdfunding campaigns to look.

The proposed model identifies the success factors and evaluates new campaigns from investor's perspective and reflects both their financial performance and overall attraction. This model is based on a multi-criteria decision weighting methodology and to be more precise – Simple Additive Weighting (SAW) method. The main benefits of this method are 1) ability to combine; 2) find relations; 3) evaluate both quantitative and qualitative criteria. This model follows main concept of all multi-criteria evaluation methods – it integrates the criteria values and weights into a single magnitude.

The general Simple Additive Weighting model framework is adopted to fit specifically crowdfunding campaigns. This model can be used by any individual investor having chosen the proposed criteria to evaluate the crowdfunding campaigns and make investment decisions for the most exciting campaigns. For application purposes, two different campaigns were discussed in the evaluation model.

The main goal of the paper is to propose the crowdfunding campaign assessment model, test it empirically and illustrate how to select the most appropriate crowdfunding campaign for individual investor to invest. Three tasks were developed:

1) To identify the main success factors that influence the value of crowdfunding campaigns.
2) To adopt the multi-criteria decision method based on SAW into crowdfunding campaign valuation process.
3) To test the model applicability and to evaluate two crowdfunding campaigns.

The paper is organized as follows: first, the literature review of financing crowdfunding campaigns and their success factors was conducted. Second, the applied methodology is described. Finally, the results, discussion, limitations and conclusions are discussed.

1. Literature review
1.1. Financing Crowdfunding Campaigns

An ecosystem of crowdfunding consists of three groups: the platform, campaign owners and backers. The dominant point of every crowdfunding ecosystem is a platform. A platform is a technologically supported solution used to link supply (those who provide funds) and demand (those who are seeking for funds). The supply side consists of lenders, investors, backers and donors. The demand side consists of individuals and various organizations that seek for financial support (Jenik et al., 2017; Kumar et al., 2024). Crowdfunding has become very novel and popular financing application worldwide (Huang et al., 2023; Liang et al., 2019). First studies that emphasised crowdfunding platforms, compared the decision-making process of equity crowdfunding with new venture capital funding (Hagedorn & Pinkwart, 2016; Löher, 2017).

However, there is not enough knowledge about the crowdfunding success targets should be evaluated. Additionally, studies on campaign success factors and investment criteria in equity crowdfunding is rare. On the other hand, knowledge of the crowdfunding success factors is required in order to better understand the dynamics of crowdfunding and its campaign success rates (Fan-Osuala et al., 2018). While the number of crowdfunding campaigns is

increasing, it is essential to understand what motivates people to fund these campaigns. The success of crowdfunding campaigns is influenced by various factors, including social capital theory (Butticè et al., 2017; Colombo et al., 2015; Skirnevskiy et al., 2017), signal theory (Ahlers et al., 2015; Courtney et al., 2017), the herding effect (Mohammadi & Shafi, 2018), and local bias (Mendes-Da-Silva et al., 2016). Therefore, success factors for crowdfunding campaigns will be discussed from traditional funding, venture capital and business angels theories. Moreover, crowdfunding can be comparable with traditional e-commerce transactions (Ahlers et al., 2015).

1.2. Success Factors for Crowdfunding Campaigns

Success factors for crowdfunding campaigns were taken from crowdfunding, venture capital and business angel theory and e-commerce literature. Most combinations of success factors were adapted from other study (Venslavienė et al., 2021) and are given in the table 1. According to the existing literature of crowdfunding theory, success factors are splitted into 4 categories: campaign characteristics, networks, understandability and quality signals (Cumming et al., 2020; Ferreira & Pereira, 2018). Those 4 categories included other sub-factors, in total counting 15 success factors from crowdfunding theory. While discussing Venture Capital and Business Angels theory, there were found 6 success factors (Huang et al., 2023; Liu et al., 2023; Zhu et al., 2023). Finally, from e-commerce theory, there were found three main factor groups related with risk, including 10 related risks. To summarize, 6 global factor groups including 24 success factors affect crowdfunding campaigns.

Table 1. *Success factors for crowdfunding campaigns found in the literature*

Theory	Global Success Factor	Codes	Success factor	Codes	Description
Crowdfunding theory	Campaign characteristics	C1	Campaign duration	SC11	duration of the project campaign
			Funding target	SC12	minimum sum needed to launch the project
			Min. Investment	SC13	minimum amount to invest to participate in the project campaign
			Provision of financials	SC14	financial forecasts/projections, early financial statements
			Number of early backers	SC15	number of investors who invest before the campaign is launched
			Capital raised	SC16	total capital raised for one project
			Number of investors	SC17	actual number of investors investing in the same project
	Networks	C2	Social media networks	SC21	the followers' social network of the project owner
			Private networks	SC22	family and friends who support the project
	Understandability	C3	Understandability	SC31	is it oriented to business (B2B) or customer (B2C)
			Information about risk	SC32	if the crowdfunding campaign is giving information about the risk

		Environment commitments	SC33	if the crowdfunding campaign is committed to the environment
	Quality signals	Updates	SC41	how often updates are sent to audience
		Spelling mistakes	SC42	are there any spelling errors in the campaign text
		Video	SC43	is there a descriptive video about the campaign/product
Venture Capital and Business Angels	Company ratings (C5)	Team rating	SC51	industry expertise
				educational background
				Experience
				the balance between team members' skill sets
				perceived motivation, drive, passion, commitment, honesty
		Markets rating	SC52	attainable market that determines the company's growth potential.
		Concept rating	SC53	how well the product fits the target market
				relevance of the end customer's problem
				how well the company addresses the problem compared to other alternatives
				value of the solution to the customer
		Scalability rating	SC54	it is easy to scale up the solution to the entire target market.
		Terms rating	SC55	valuation
				whether the targeted funding amount is sufficient to lift the company to the next level
		Stage rating	SC56	progress of the company on its development path
				remaining gap to the target state
				status of the product
				status of market validation
				existence of paying customers
E-commerce theory	Risk (C6)	Risks associated with the project	SC61	product risk/funding object risk
				Social risk
				psychological risk
				post-funding risk/ repayment risk
		Risks associated with the project initiator	SC62	project initiator risk/owner risk/seller risk
				time risk/convenience risk
				delivery risk
		Risks associated with the intermediary	SC63	intermediary risk/privacy risk
				financial risk
				performance risk/operating risk

Note: C5 and C4 labels appear in the table as column C values.

Source: Adapted from (Venslavienė et al., 2021)

These success factors should be used in evaluation model for crowdfunding campaigns.

2. Methodology

When assessing crowdfunding campaigns, investors usually do not have full information and have to turn their attention to secondary sources of information to help find out qualitative differences among crowdfunding campaigns. Thus, usually crowdfunding campaigns have both quantitative and qualitative success factors. Therefore, in order to create a model, six main factor groups were analyzed. Since these success factors are multidimensional, there is a need to apply methods that can link all criteria to one descriptive measure. Multi-criteria evaluation methods are the ones which can analyze those factors (Barretta et al., 2023; Hashemi et al., 2022; Khan et al., 2022). Multi-criteria decision making (MCDM) is applied to preferable decisions among available classified alternatives by multiple attributes (Taherdoost & Madanchian, 2023; Zavadskas et al., 2022). Multi-criteria desicion method is a method that does the analysis of several unrelated criteria. In this method environmental, economic, technological and social factors are discussed for the choice of the project and for making the choice sustainable (Alvarez et al., 2021).

In this paper, Simple Additive Weighting method, one of MCDM methods, will be used to create valuation model. SAW method is the oldest, one of the simplest, widely known and practically used (Amalia & Alita, 2023; Kelen et al., 2023; Rusidah et al., 2023; Sinaga & Riandari, 2020). The criterion of the method Sj clearly demonstrates the main concept of multi-criteria evaluation methods – the integration of the criteria values and weights into a single magnitude (Amalia & Alita, 2023; Sinaga & Riandari, 2020). The sum Sj of the weighted normalized values of all the criteria is calculated for the j-th object:

$$S_j = \sum_{i=1}^{m} \omega_i r_{ij},$$

$$(1)$$

Where ωi is weight of the i-th criterion r_{ij} is normalized *i-th* criterion's value for *j-th* object; $i = 1,..., m; j = 1,…, n; m$ is the number of the criteria used, n – is the number of the objects (alternatives) compared.

The largest value of criterion S_j corresponds on the best alternative (Rajagukguk et al., 2022). All the compared alternatives must be ranked in the decreasing order of the calculated values of the criterion S_j.

Adopting the SAW method in the crowdfunding campaign evaluation process several steps should be done:
1) Weights are given for each criterion as the importance of attribute
2) A value (score) is given for each alternative by criteria assessment
3) When there is already normalized matrix, every member of that matrix is multiplied by its weight and summed with other members of the alternative
4) The alternative with the highest score is selected.

Model consists of three stages. First, choose criteria. Second, use SAW to weight the evaluative criteria and the last, third stage gives the optimal crowdfunding campaign to fund for investor.

3. Application of valuation model crowdfunding campaigns

In order to have more specific and detailed valuation of factors, all factors were defined and grouped in smaller groups of sub-factors. Also, this way is easier for experts to evaluate

factors more precisely. After the expert evaluation, all sub-factors should be combined into factor groups with global weights and those factor groups will be used in the model to choose the most optimal crowdfunding campaign to invest in.

When all factors are set, the factor weights can be found. Here expert estimates are chosen. This estimation is very subjective, therefore five professionals with experience in investing into crowdfunding platforms were chosen. Three of them constantly invest into crowdfunding campaigns, while the other two are the owners of crowdfunding campaigns. The results of expert evaluations are given in table 2.

Table 2. *Expert estimation of factor weights*

No	Success factor	Codes	1	2	3	4	5	Total	Weights
1	Campaign duration	SC11	8	3	2	4	1	18	0.036
2	Funding target	SC12	4	4	3	3	1	15	0.030
3	Min. Investment	SC13	10	5	3	2	1	21	0.042
4	Provision of financials	SC14	3	3	2	3	5	16	0.032
5	Number of early backers	SC15	0	4	4	2	8	18	0.036
6	Capital raised	SC16	0	3	5	4	7	19	0.038
7	Number of investors	SC17	0	3	3	2	6	14	0.028
8	Social media networks	SC21	3	2	4	3	2	14	0.028
9	Private networks	SC22	3	2	20	9	6	40	0.080
10	Understandability	SC31	6	4	5	3	1	19	0.038
11	Information about risk	SC32	10	3	1	2	4	20	0.040
12	Environment commitments	SC33	5	2	1	3	3	14	0.028
13	Updates	SC41	3	2	1	2	4	12	0.024
14	Spelling mistakes	SC42	5	3	1	2	3	14	0.028
15	Video	SC43	0	4	1	3	5	13	0.026
16	Team rating	SC51	7	5	10	6	4	32	0.064
17	Markets rating	SC52	5	3	2	3	4	17	0.034
18	Concept rating	SC53	3	7	10	6	4	30	0.060
19	Scalability rating	SC54	0	3	4	3	5	15	0.030
20	Terms rating	SC55	0	5	4	3	2	14	0.028
21	Stage rating	SC56	0	5	4	3	2	14	0.028
22	Risks associated with the project	SC61	10	10	4	8	8	40	0.080
23	Risks associated with the project initiator	SC62	5	8	3	11	5	32	0.064
24	Risks associated with the intermediary	SC63	10	7	3	10	9	39	0.078
	Total		100	100	100	100	100	500	1.000

Simple additive weighting method uses the typical normalization. The values of the criterion Sj of the method range from 0 to 1 for all the alternatives considered, while the sum of the criterion values is equal to unity allowing for graphical (geometrical) interpretation of the method.

The global weights of each criterion should be estimated for further calculations. The global weights will show the most important factors from the whole group. The global weights are calculated in a very simple way – by finding simple arithmetic average from each sub-factor group. The results of global weights are found in table 3. The results shall be used in the valuation model to get which one of crowdfunding campaigns is more attractive to invest. The most important factors are related with Risk and with Networks, while the least important are quality signals.

Table 3. *Global weights of each factor group*

Global Success Factor	Codes	Success factor	Codes	Total	Weights	Global weights
Campaign characteristics	C1					0.0346
		Campaign duration	SC11	18	0.036	
		Funding target	SC12	15	0.030	
		Min. Investment	SC13	21	0.042	
		Provision of financials	SC14	16	0.032	
		Number of early backers	SC15	18	0.036	
		Capital raised	SC16	19	0.038	
		Number of investors	SC17	14	0.028	
Networks	C2					0.054
		Social media networks	SC21	14	0.028	
		Private networks	SC22	40	0.080	
Understandability	C3					0.0353
		Understandability	SC31	19	0.038	
		Information about risk	SC32	20	0.040	
		Environment commitments	SC33	14	0.028	
Quality signals	C4					0.0260
		Updates	SC41	12	0.024	
		Spelling mistakes	SC42	14	0.028	
		Video	SC43	13	0.026	
Company ratings	C5					0.0407
		Team rating	SC51	32	0.064	
		Markets rating	SC52	17	0.034	
		Concept rating	SC53	30	0.060	
		Scalability rating	SC54	15	0.030	
		Terms rating	SC55	14	0.028	
		Stage rating	SC56	14	0.028	
Risk	C6					0.0740
		Risks associated with the project	SC61	40	0.080	
		Risks associated with the project initiator	SC62	32	0.064	
		Risks associated with the intermediary	SC63	39	0.078	

The next step is to find out the most attractive crowdfunding campaign to invest in. There were analyzed two different crowdfunding campaigns from different sectors. The first crowdfunding campaign is in real estate and oriented to both foreign and local markets, while the second is innovative with unique product in the industry, but oriented only to local market. Moreover, both already have some early investors. Further, Crowdfunding Campaign 1 is considered to be on lower risk, while Crowdfunding Campaign 2 is the opposite – very risky.

With proper descriptions of the crowdfunding campaigns, it is likely to assess crowdfunding campaigns by scores. In other words, the factor matrix should be normalised. As input data for calculation are the factors and their values of importance, the matrix should be normalised according to these conditions by evaluating the values of factors in the interval from 1 to 5, where:

1) Negative value of factors (decreasing value of factors).
2) Insufficient value of factors (remaining the same).
3) Medium value of factors (medium increasing).
4) Sufficient value of factors (sufficient increasing).
5) High value of criteria (high increasing).

The normalized values of alternatives are provided in table 4. The estimation of aggregated values was done by applying the formula (1). The final results are presented in table 5. Based on the results, it is possible to draw some conclusions. As the optimal alternative, it should be selected the second crowdfunding campaign since its aggregated value is 1.0303 that is higher than the first crowdfunding campaign with aggregated value of 0.7982.

Table 4. *Global Normalized values for Crowdfunding campaigns*

Global Success Factor	Codes	Crowdfunding Campaign 1	Crowdfunding Campaign 2
Campaign characteristics	C1	5	4
Networks	C2	3	4
Understandability	C3	4	3
Quality signals	C4	2	3
Company ratings	C5	3	3
Risk	C6	2	5

Table 5. *Crowdfunding campaign value calculation using SAW method*

Global Success Factor	Codes	Crowdfunding Campaign 1	Crowdfunding Campaign 2	Global weights	Value of Crowdfunding Campaign 1	Value of Crowdfunding Campaign 2
Campaign characteristics	C1	5	4	0.0346	0.1729	0.1383
Networks	C2	3	4	0.0540	0.1620	0.2160
Understandability	C3	4	3	0.0353	0.1413	0.1060
Quality signals	C4	2	3	0.0260	0.0520	0.0780
Company ratings	C5	3	3	0.0407	0.1220	0.1220
Risk	C6	2	5	0.0740	0.1480	0.3700
Aggregated value					0.7982	1.0303

For this analysis six factor groups and 24 sub-factors were selected and 2 alternatives created. Multi-criteria evaluation method was applied to perform quantitative evaluation on these success factors. First, all values and weights of all factors were estimated and then they were applied to evaluation model. The overall conclusion from evaluation of those two alternatives shows not very wide dispersion, so it can be assumed that the factors and factor weights are selected correctly and the aggregated value sum of 1.0303 shows that alternative 2 is more attractive to choose for a decision considering the investment idea in some crowdfunding campaigns.

DISCUSSION

This paper provides the estimation framework to determine the optimal crowdfunding campaigns to invest. A new valuation model was proposed applying simple additive weighting methods which is part of multi-criteria evaluation method. The model suggests that crowdfunding investors should focus not only on traditional financial factors but also on their given parameters and conditions. The model works properly and helps for investors to decide on the best crowdfunding campaign. Moreover, it might be recommended to select more success factors or to use more combinations of other methods of multi-criteria evaluation to normalise the factors used and to pool the alternatives of various crowdfunding campaigns. The results from the implementation with more multi-criteria methods might show stronger and more effective results from different perspectives.

CONCLUSIONS

Before investing into new crowdfunding campaigns, investors must evaluate whether it is worth to invest or not. It is quite difficult to evaluate crowdfunding campaigns as most of them are very new in the market and there is little financial data.

The valuation model to assess crowdfunding campaigns was proposed in this paper. Moreover, the multi-criteria valuation method simple additive weighting was applied. Comparing with other models, simple additive weighting is effective, as different factors can be chosen by different investor according to his personal preferences.

For this analysis six factor groups and 24 sub-factors were selected and 2 alternatives created. Multi-criteria evaluation method was applied to perform quantitative evaluation on these success factors. First, all values and weights of all factors were estimated and then they were applied to evaluation model. Simple additive weighting method has worked properly and proved that it was the right method to apply in the model. The results of this method helped to choose the most optimal crowdfunding campaign to invest in. It can be concluded that the created model can be extensively applied for evaluating and selecting most optimal crowdfunding campaign. The overall conclusion from evaluation of those two alternatives shows not very wide dispersion, so it can be assumed that the factors and factor weights are selected correctly.

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THE EVOLUTION OF DIGITAL CURRENCIES: FROM PRIVATE INNOVATION TO CENTRAL BANK IMPLEMENTATION - A COMPREHENSIVE ANALYSIS OF CBDC DEVELOPMENT

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Abstract: This paper traces the development of digital currencies and central bank digital currencies (CBDCs), and how their conceptual models and implementation have evolved over the past decade. First conceptualized as private digital assets operating independently from central banking systems, digital currencies have evolved in that monetary authorities started to develop their own versions. Drawing from an explanation of CBDC projects under construction all over the world and their defining features, the study reveals that modern CBDCs are widely perceived as digital manifestations of national fiat currencies that perform largely similar functions to cash. While DLT in CBDC implementation is fairly typical, it certainly isn't a requirement. Analysis of data from 138 active CBDC projects underscores that most are in the research or development stages; only four are fully operational. Most target retail, but wholesale CBDCs have higher rates of DLT adoption, mainly for cross-border payments. The key drivers toward CBDC development include efficiency in the payment system, increasing financial inclusion, and maintaining monetary sovereignty. This paper, however, argues that consensus on the nature and functionality of CBDCs will only emerge once more pilot programs have been completed and real-world implementation data become available. This research adds to the understanding of the evolving nature of digital currencies and their potential impact on monetary systems.

Keywords: central bank digital currency, digital currency, blockchain, distributed ledgers, CBDC, DLT

INTRODUCTION

The active development of cryptocurrencies over the last decade has attracted the attention of both academic researchers and monetary authorities. The phenomenon of cryptocurrencies is interesting both because of the consequences of its development for the monetary and financial system and some aspects of its technical implementation. The principle of non-national issuance of means of payment, in which there is no fundamental need for a state intermediary, is interesting in itself, but it would not be realized without the technology that allows, in the absence of a state intermediary-regulator, to act as a guarantor of each specific transaction in particular and the history of transactions in general. In the most famous cryptocurrency bitcoin, the distributed ledger technology (DLT), called blockchain, has been successfully used as such a guarantor.

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However, since the emergence of the concept of Bitcoin as a digital non-state currency, the functioning of which is based on cryptographic methods, to the present day, when the central banks of the largest countries are busy developing digital currencies and implementing distributed ledger technologies, many variations of cryptocurrencies and products on the blockchain and other distributed ledgers, as well as approaches to defining and classifying the phenomenon of digital currencies have been developed; cryptocurrencies have demonstrated their actual suitability for performing the functions of a measure of value, a means of payment and accumulation, as well as de facto, but not de jure, world money **(**Bank of England, 2022), but not all states and monetary authorities are ready to recognize them as money. In this variety of interpretations, there is a difficulty in identifying the essence of digital currencies and central bank digital currencies, what are their inseparable and inherent qualities only to them. Therefore, tracking how the concept of digital currencies has evolved and how the definition of central bank digital currencies (CBDCs) emerged is of interest – especially in a situation where several central banks are preparing to launch their own digital currencies.

The article presents a study of the evolution of the concepts of digital currencies and central bank digital currencies, the practice of introducing digital currencies by central banks and the problems they solve in this way, in order to understand what constitutes the nature of digital currencies at the moment.

Digital currencies: evolution of the concept

It is useful to trace the evolution of the concept of digital money in recent years, since the interest in this phenomenon has emerged, since in some cases digital money has been defined in terms of the opposite of what we now call central bank digital currency.

Ideas for creating digital currencies based on cryptographic methods have been put forward since at least 1998, when anonymous remailer user Wei Dai published the concept of electronic assets based on decentralized B-money systems. In addition, the concept of a digital currency called Bit Gold was proposed by user Nick Szabo. Researchers C. Bronk, S. Monk and J. Villasenor, whose work was also used by researchers at the European Central Bank, also classified E-Gold as a digital currency. It was launched in 1996, ceased to process transactions in 2008 due to criminal prosecution of its creators for illegal financial transactions, and ceased to exist in 2015. However, this project differs significantly from B-money and Bit Gold: firstly, it was implemented, while B-money and Bit Gold were only concepts; secondly, E-Gold was backed by a real asset - real gold in the e-gold Ltd Gold Fund, while B-Money and Bit Gold were digital currency projects that were not backed by a real asset such as precious metals; Thirdly, E-gold was a centralized and privately managed payment method from the US, while Bit Gold and B-money were conceived as decentralized digital assets that did not have a single issuer and regulator. For this reason, the projects of users under the names or pseudonyms of Wei Day and Nick Szabo are much more similar to those digital currency projects that would later be called cryptocurrencies, and the document describing the principle of the most famous of them, Bitcoin, contains direct references to the B-money project. (Bank of Canada, 2020).

In 2008, Bitcoin: A Peer-to-Peer Electronic Cash System was published by Satoshi Nakamoto, an author or team of authors (Nakamoto, 2008). It outlined the concept of the first

of the digital assets that later became known as 'cryptocurrency' - bitcoin. Based on advances in cryptography, such as hashing and electronic signature, as well as on the principles of the distributed blockchain registry and the proof-of-work consensus algorithm (PoW), it was based on the principles of the blockchain. 'The concept was to create in a network a register of transactions with a unit of account - bitcoin - accessible to all network participants, the updating of which, as well as the issuance of this unit of account, would be decentralized, uncontrolled and at the same time secure, confirmed by cryptographic methods. Among other things, this meant the concept of a private, monetarily independent currency that could be circulated and issued without the involvement and supervision of intermediaries such as banks or the state.

The number of digital currencies that exist today has not yet emerged, and researchers have had to rely on the only digital currency project that has been implemented, Bitcoin, and it has not been possible to isolate common qualities from a large sample. However, another paper used by the European Bank, "Bitcoin: An Innovative Alternative Digital Currency" by R. Greenberg, provides a very precise characterization of Bitcoin as a digital, decentralized, partially anonymous currency that is not backed by any government or other legal entity, and relies on a peer-to-peer network and cryptography to maintain integrity (World Economic Forum, 2021). The definition also states that Bitcoin is "not redeemable for gold or any other commodity." In this context, this could mean that it is not necessarily redeemable for gold or any other commodity, just like the US dollar (for which the same wording is used). The definition of Bitcoin given in this paper includes a wide range of characteristics that would be common to many other digital currencies.

After some time, Bitcoin gained great popularity, the outlines of its functionality became approximately clear and, importantly, analogues began to appear on a mass scale. Researchers and government agencies came to the understanding that Bitcoin is not the only asset of its kind, but gave rise to a class of assets, the most common designation of which is digital currencies.

Whether the term "cryptocurrency" is a complete synonym for "digital currency" is debatable, or at least was previously, when the concept of digital currency was closely associated with decentralization and the DLT system. Even now, it is difficult to talk about one, generally accepted approach to how digital currencies and cryptocurrencies are related. In some cases, cryptocurrency is defined as a type of digital currency, the peculiarity of which is its private nature and the ability to carry out transactions with each other directly (International Monetary Fund, 2021), or (not only for cryptocurrencies, but for crypto-assets within digital assets) the defining feature is the combination of a non-state issuer and cryptographic methods that ensure the security of the value or rights embodied in electronic form. As of the mid-2010s. the boundaries between digital and cryptocurrency have become even more blurred, cryptocurrencies have been the most active and have attracted the most attention among all digital assets, so digital currencies and cryptocurrencies have often been used (and sometimes continue to be used) as synonyms. (Edward L. 2012)

One important course of action with regard to cryptocurrencies, or more generally digital currencies, is regulation and legislative recognition. Although even with the serious impact of cryptocurrencies on the financial system, states have not always had time - and still do not always have time - to regulate the digital currency market, which by 2015 reached

billions, and later hundreds of billions and trillions of US dollars (according to www.tradingview.com, accessed on 05.05.2024). The first definitions of digital currencies were characterized by the fact that researchers placed a great, if not the main emphasis in their attempts to identify the nature of digital currencies in definitions on the private nature of digital currencies.

Examples of this early stage of defining the nature of digital currency are two definitions from the European Central Bank and the Bank for International Settlements from 2015. The European Central Bank, in its 2015 document "Virtual Currency Schemes – A Further Analysis", which is a continuation of the research work initiated by the above-mentioned publication "Virtual currency schemes", does not distinguish between the concepts of virtual and digital currency, using primarily the former term. For example, the authors of the report call Bitcoin a virtual currency and cite other researchers on digital currencies in the context of discussing virtual currency. The report defines virtual currency as a digital representation of value, not issued by a central bank, credit institution or institution specializing in electronic money, which in certain circumstances can be used as an alternative to money, although the authors of the report specifically emphasize that they do not consider digital currency to be full-fledged money.

The Bank for International Settlements (BIS) paper Digital Currencies does not provide a separate, full definition of digital currencies; it merely states in a footnote that they are assets in digital form. However, beyond the definition, the paper does discuss the qualities of digital currencies in some detail, identifying three sets of characteristics, or three aspects, of digital currencies. First, it notes that they have some of the characteristics of currencies (e.g., being used as a means of payment), but are not typically issued in or linked to a sovereign currency, are not obligations of any entity, and are not backed by any authority, have zero intrinsic value, and therefore derive value only from the confidence of users that they can be exchanged for other goods or services or for a specified amount of sovereign currency at a later point in time. Second, the authors highlight the way these digital currencies are transferred or distributed, typically through an embedded distributed ledger, as "a truly innovative aspect." Third, the authors note the variety of third-party institutions, almost exclusively non-banks, that are actively developing and operating digital currency and distributed ledger mechanisms.

It should be noted that distributed ledger technology is not limited to the transfer of currency from one user to another; a transaction is an entry in the ledger, which in turn is copied among all network participants, or "distributed," hence the name distributed ledger technology.

Both definitions highlight the fact that digital (or virtual) currencies are not issued by central banks. There is some difference in the way the reports emphasize distributed ledger technology. The European Bank stated that a virtual currency may or may not use DLT, the BIS stated that DLT is typically used as the "transfer technology" of digital currencies. DLT was thus a popular but optional feature of digital currencies.

It is worth noting that by 2014, at least two of the most authoritative monetary institutions saw one of the main features of digital currencies as independence from central banks, the private nature of these assets.

Classification of money.

Since 2014, monetary authorities in different countries have begun to announce the start of studying the prospects of central bank digital currencies. In 2014, information appeared about the start of preliminary research in the field of CBDC by the Bank of Uruguay. In 2016, the Stella project was launched - a series of studies on the use of DLT in financial architecture as part of cooperation between the European Central Bank and the central bank of Japan (Bank of Japan, 2020). In 2017, their report on the first phase of the project was published. One of the most significant and well-known events in this area was the launch of the development and subsequent testing of the digital yuan (official name DCEP, also referred to as Digital Renminbi in English sources). As central banks have become increasingly interested in digital currencies and cryptocurrencies, and many have begun researching central bank digital currencies, the contradiction between the supposed independence of central banks from central regulators and the fact that monetary authorities are planning to issue digital currencies has become increasingly apparent.

A major influence on the popular understanding of digital currencies has been the taxonomy of money by M. Bech and R. Garratt in 2017, the so-called money flower in the work "Central Bank Cryptocurrencies". This method of classifying money is based on the identification of four characteristics of a monetary unit: issuer (central bank or other); form (electronic or physical); availability (universal or limited); transmission mechanism or peer-to-peer nature of the transaction network (centralized or decentralized, i.e. peer-to-peer). In the latter case, a centralized transmission mechanism implies the presence of a hierarchy of at least two participants in the transaction: the parties to the transaction at the lower level and the regulator, who is also the guarantor of the transaction at the upper level. Cryptocurrencies that run on a distributed ledger can be considered a peer-to-peer network because DLT eliminates intermediaries; cash can also be considered a peer-to-peer network because a cash transaction does not require a guarantor like a bank. (Federal Reserve Bank of New York, 2018)

Current CBDC Projects

At present, a relatively large number of central banks have already announced plans to create CBDCs. It is worth paying attention to how they define the nature of their own digital currencies.

The People's Bank of China in its Working Group on E-CNY Research and Development of the People's Bank of China, 2021, defines the digital yuan as a digital version of paper currency issued by the PBOC and managed by authorized operators. It is classified as a "retail" CBDC, and its prospects for use at the interbank and cross-border levels will be assessed after its domestic implementation. It should be noted that despite its status as a central bank digital currency, DCEP cannot be called an unambiguously decentralized peer-to-peer currency, and even the use of DLT remains questionable.

The Reserve Bank of India is developing both a retail and wholesale version of the CBDC. According to the concept of the digital rupee published by the FinTech Department of Reserve bank of India, 2022, it will not differ significantly from banknotes, but, being a digital form of national money, it will probably be simpler, faster and cheaper. It also has all the transactional advantages of other forms of digital money. The Central Bank of Brazil is still in

the development stage of the CBDC, but according to information on its official website (Banco Central do Brazil, 2024), it is planned to build an ecosystem based on DLT, in which regulated financial intermediaries convert the balances of demand deposits and e-money into Drex - a digital real, so that their clients have access to various smart financial services. The digital currency itself will also have the status of a digital form of the national currency. The European Central Bank in its glossary describes the digital euro as the retail digital currency of the European Central Bank, and generally defines a retail digital currency as a central bank liability in digital form offered to the general public (e.g. individual users, business users and governments or other public bodies) for retail payments.

It can be noted that a constant attribute of all definitions of CBDC is some form of reference to the central bank digital currency being a digital form of the national currency; it is often directly referred to as a central bank liability. Often, in addition, an analogy with cash is encountered, indicating their similarity. This is fully consistent with the typology of money by Bech and Garratt.

Stages of CBDC development: quantitative data

For the purposes of the study, data were collected and aggregated from the CBDC Tracker portal, a resource that semi-automatically collects and presents information on the stages of development and implementation of digital currencies by central banks, which is referenced, in particular, by the IMF (Nathaniel Popper, 2015). - with seven cancelled projects, 138 CBDC projects have been launched and not cancelled, 94 are at the research or development stage, 24 are at the concept testing stage, and 16 projects are at the pilot launch stage. The resource calls four projects fully launched as of 08.05.2024: Nigerian e-Naira, Bahamian Sand Dollar, Jamaican JEM-DEX and Zimbabwean ZiG. We will consider further statistical data only for currencies that have not been cancelled. (Reserve Bank of Zimbabwe, 2023).

It should be noted that the data on the portal may be updated. Thus, earlier, in October 2023, the DCash currency, issued by the Eastern Caribbean Central Bank, was listed as a fully launched central bank digital currency on the resource. At the time of the request on May 8, 2024, DCash was already listed on the portal as a pilot, which is confirmed by the statement on the official website (https://www.dcashec.com/). In October 2023, the Haiti CBDC currency was mentioned among the cancelled digital currencies, which was absent from the database at the time of the request on May 8, 2024, although in both periods the Gourde Digital currency was present at the research stage, developed by the same country (which makes it possible to assume the elimination of a duplicate under a different name, albeit with a different status). Thus, when working with CBDC data, including aggregated data from news and press releases such as those presented on the CBDC Tracker resource, it is worth considering the fragmentation of information, unclear wording in official press releases, the possibility of currencies rolling back from a later stage to an earlier one (for example, in the case of unsatisfactory results of the pilot - return to the study) and the emergence and elimination of duplicates.

Taking this into account, it should be noted that in addition to the above-mentioned Zimbabwean digital currency ZiG, the resource data also indicates an unnamed currency, the retail Zimbabwe CBDC, which is under development. With some probability, it may also be understood as ZiG, but since we do not have reliable information that this is the same initiative, in the analysis we will proceed from the data provided by the resource.

Figure 1. Development status, number of projects
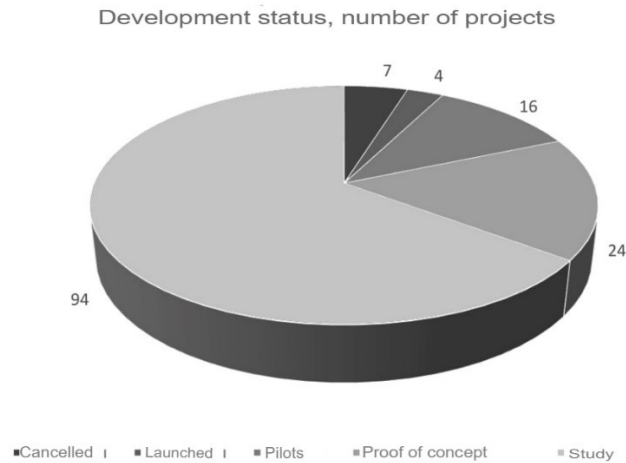
Source: prepared by the author based on CBDC Tracker

Most central banks developing digital currencies have not yet decided whether they will use DLT, but the vast majority of those that have, say yes. Of the 138 projects that have not been cancelled, DLT is used in 49 projects, 7 are not (the digital yuan falls into this category), and the majority, 82 projects, have no information on this yet. Thus, DLT is used in the majority of projects for which there is data. However, a significant number of projects are still in the early stages of development - only 24 and 16 have moved to the pilot or proof-of-concept stage, respectively, against 94 in the development stage (another 4 CBDCs can be considered fully launched).

Figure 2. Data on the use of DLT in active CBDC projects, number of projects
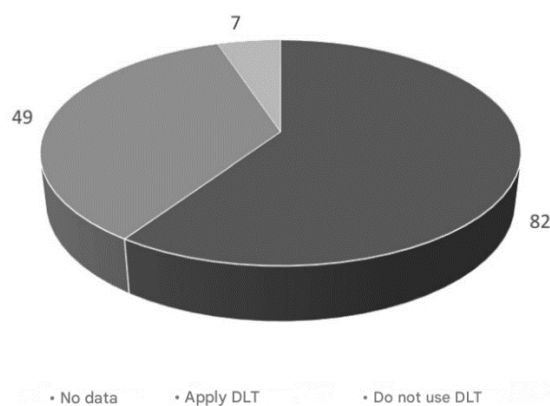
Source: prepared by the author based on CBDC Tracker data

It can be noted that the use of DLT is a noticeable trend, although it is too early to talk about it as a mandatory or inherent property of digital currencies in the overwhelming majority of cases: the first excludes the existence of digital currencies projects such as the digital yuan, and for the second statement there are too many projects with an unspecified transaction accounting technology.

It is also interesting to see the data on what currencies are mostly being developed by central banks: retail or wholesale. Most of the CBDCs being developed are of the retail variety. There is no information yet on the purpose or technology of the Ethiopian central bank digital currency announced in 2024. The currencies classified in the "Other" group by functionality include two projects that are not digital currencies as such, but rather experiments with technologies. These are the Stella project between the European and Japanese central banks, dedicated to studying the prospects of DLT in the field of transnational payments, and the Hamilton project, an experiment by the US Federal Reserve. This group also includes the stablecoin project of Palau, which does not have its own central bank, and the above-mentioned Zimbabwean currency ZiG. The resource does not indicate the exact reason for classifying these currencies as "Other", but the small amount of information on their account does not allow us to clearly classify these currencies as one group or another. The press release on the official website of the Reserve Bank of Zimbabwe does not answer this question and only indicates that the new currency will be backed by gold.

Figure 3. Data on active CBDC projects models (retail or wholesale models), number of projects


Retail and/or wholesale, number of projects (excluding cancelled ones)

■ Retail   ■ Wholesale   ■ Hybrid (both retail and wholesale)   ■ Other   ■ No data available
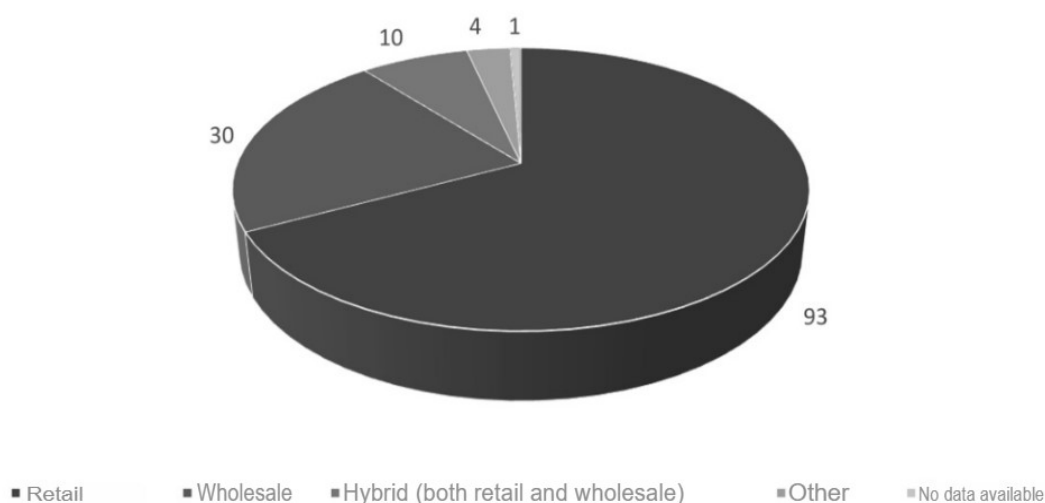
Source: prepared by the authors based on CBDC Tracker data.

All projects, with the exception of one (Agila), that claim not to use DLT, belong to the retail model of the CBDC system. Those developments that use distributed ledger technologies are equally divided in the access model between retail and wholesale models, with a slight advantage for wholesale.(**Eswar S**., 2021).

Figure 4. Data on active CBDC projects models using DLT (retail or wholesale models), number of projects

DLT Central Securities: Retail and/or Wholesale, number of projects (excluding cancelled ones)
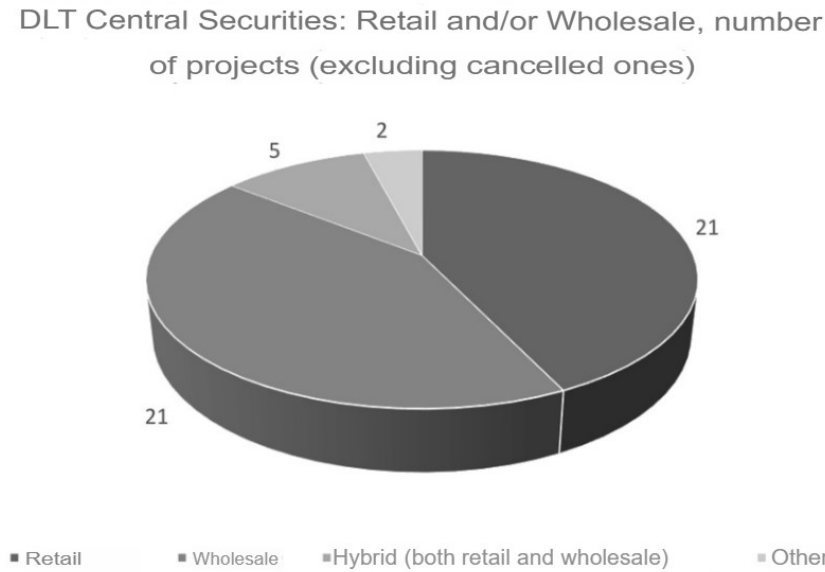
Source: prepared by the authors based on CBDC Tracker data

Of the 30 wholesale digital currency projects, 22 have already decided whether they will use DLT, and all but Agila have answered this question positively. It can be assumed that a significant portion of these wholesale currencies are being developed with the prospect of being used for cross-border settlements: since credit institutions are much more active participants in cross-border settlements than individuals, they are interested in the currency intended specifically for them performing cross-border payment tasks more efficiently. DLT has great potential in cross-border payments. Therefore, the prevalence of DLT among wholesale currencies can be attributed to the fact that distributed ledger technologies have demonstrated good results in cross-border settlements. As noted by I. O. Nesterov, the speed of international payments is low due to the above-mentioned strict security checks - KYC (Know Your Customer) and AML/CFT (Anti-Money Laundering / Combating the Financing of Terrorism) procedures, due to which the average international payment period took several days. Added to this are the high commission and poor predictability of commission and time costs for cross-border transfers due to the high and poorly defined number of intermediaries. Together, this increases transaction costs with all the ensuing negative consequences. (World Bank Group, 2021)

Research and testing in the area of merging the systems of the centralized digital currency exchanges of different countries, conducted by the monetary authorities of Thailand and Hong Kong, and later by China, the UAE and the Hong Kong hub of the Bank for International Settlements, have demonstrated an increase in the speed of international transfers from several days to several seconds, while maintaining control over all transactions by each of the monetary authorities. Since a significant part of international payments occurs in the interbank sector, such technologies can be developed as a specialized instrument for interbank exchange, i.e. a wholesale version of the centralized digital currency exchange. (The Committee on Payments and Market Infrastructures (CPMI), 2017).

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Purpose and reasons for developing the CBDC

As we found out from the analysis of definitions and data on the CBDC projects under development, there is a tendency to develop a retail version of central bank digital currencies, with a significant part of the projects being considered as a digital analogue of cash. From this, we can make a preliminary conclusion that some of the functions that the digital currency is planned to implement are comparable to those of cash. If we talk about CBDC projects for cross-border payments, the functions of such digital currencies are also partly known - facilitating faster and less expensive international payments.

The report "Central bank digital currencies: foundational principles and core features", produced by the Bank for International Settlements in collaboration with a number of central banks and monetary authorities , takes a closer look at the motivations of institutions exploring or developing CBDCs (Bank of Canada, 2023).

Most of the reasons are related to payments. These include: constant access to central bank money in regions and jurisdictions where access to cash is declining, which can be attributed to the above-mentioned functionality of digital currencies as a banknote substitute; increasing the operational resilience of the financial system in the event of technical problems with telecommunications or energy, which is also one of the functions of cash in the modern economy, as well as theoretically greater resistance to cyberattacks (however, the authors attribute this only to general-purpose CBDC systems); increasing the diversity of payment systems, which prevents their monopolization and fragmentation; encouraging financial inclusion and removing barriers of mistrust and low financial and technological literacy (although for CBDCs to have an effect in this regard, they need to be included in a whole array of reforms aimed at removing these barriers; they are unlikely to cope with this task alone). theoretical partial increase in the so-called public privacy and anonymity in electronic payments; the above-mentioned improvement in cross-border payments; facilitation of financial transfers, such as those carried out during the COVID-19 pandemic, i.e. direct transfer of money to citizens and businesses (however, either the advantage over the usual transfer to accounts will not be so great, or, on the contrary, so great that the line between fiscal and monetary policies and the independence of the latter will be erased to some extent).

The document also mentions the theoretical possibility of creating a CBDC with an interest rate, which would allow changes in interest rates to be transmitted directly to holders of the digital currency, but this would greatly change the transmission mechanism and increase the risks of destabilization of the financial system, so the authors of the report note that this possibility is not the main motivation of central banks and the main option for implementing a CBDC.

There is some uncertainty about the motives of the People's Bank of China. The report "Progress of Research & Development of E-CNY in China" prepared by the Working Group on E-CNY Research and Development of the People's Bank of China, Progress of Research & Development of E-CNY in China. People's Bank of China, 2021, explicitly states that the internationalization of a particular currency is a consequence of market competition, depth and openness of the financial markets of the issuing country. Therefore, as stated in the report, despite the technical readiness to use the digital yuan, including for cross-border payments, it

is currently focused only on servicing payments within the country. At the same time, researchers D.K. Lee, L. Yang and W. Wong point out that one of the reasons for the introduction of the digital yuan may still be to "counteract the hegemony of the dollar," which is difficult to imagine without the processes of internationalization of the national currency, at least at the regional level.

Another motive that periodically appears in publications is what researchers, both the authors of the BIS report in collaboration with central banks (International Monetary Fund, 2016). and Lee, Yang and Wong, call "asserting monetary sovereignty" (although the latter mention it in the context that this issue is of greater concern to the authorities of the G7 countries than to the Chinese regulator). This is understood as competition from private digital currencies. (G7 Working Group, 2021).

When assessing the prospects for the success of CBDCs in competition with private digital currencies, one should be cautious. It is highly likely that the reasons why different people and organizations prefer cryptocurrencies to fiat money lie outside the functionality — or, at least, the implemented functionality — of central bank digital currencies. One of the reasons for turning to them is high, albeit not absolute, anonymity and non-accountability to government institutions. Despite the motive for partially increasing the anonymity of payments indicated above in the BIS report, the same report notes that central banks will most likely be forced to take into account both anti-money laundering and combating the financing of terrorism (AML/CFT) requirements and specific supervisory requirements of their country's legislation when developing the architecture of a digital currency. People and organizations that turn to cryptocurrencies are not necessarily engaged in money laundering or terrorist financing, but may be motivated by a lack of trust in their own state or monetary authorities, or in states and regulators as an institution. For such economic agents, a CBDC will not have sufficient competitive advantages over cryptocurrencies.

Another common reason for turning to cryptocurrencies is speculative or investment interest. In this capacity, an interest-free digital currency can be considered a profitable investment to the extent that the national currency as a whole is considered to be such (although much will depend on the specific scheme of implementation and circulation of the digital currency: dependence on the infrastructure of commercial banks, the presence or absence of mechanisms for competition with the interest income of non-cash funds, etc.). Theoretically, the introduction and use of a digital form of the national currency, especially in the international payment system, can contribute to the growth of demand for the national currency, but in this case the national currency, including its digital form, will compete not only and not so much with cryptocurrencies as with other currencies and assets attractive to investors.

CONCLUSIONS

The concepts of digital currencies and central bank digital currencies have undergone rapid changes in the last decade. In the early stages, there was little understanding of what constituted the nature of digital currencies. Over time, some consensus developed that digital currencies were digital assets that could partially function as money, but were issued by private entities, not by national monetary authorities, and were likely to use DLT. This view came into conflict with reality: central banks began to develop their own digital currencies, and therefore

the premise of digital currencies being independent of monetary authorities, by which they were previously defined, no longer held true.

Current central bank definitions of their digital currencies suggest that they all view digital currencies as a new form of money, similar in many ways and functions to cash, but in digital form. The use of DLT remains an open question: although most central banks have not yet published data on whether they use distributed ledgers or not, those that have confirmed that they do. However, most of the definitions reviewed do not postulate the use of DLT. For now, it is an optional, albeit common, attribute of central bank digital currencies.

The intended functions of the CBDCs under development are largely determined by the motives that prompted central banks to develop them. Some of them, such as competition with cryptocurrencies and private currencies, are skeptical, while others are driven by current demands from society and financial system participants, but will only be effective in conjunction with large-scale reforms in other areas (for example, if we talk about the task of financial inclusion).

It can be said with relative certainty that consensus on what a central bank digital currency is and what its functionality will be will not be achieved until a significant number of CBDC pilots are launched. It will be clear whether a CBDC is a digital analogue of cash, whether most counterparties perceive it as a central bank obligation equivalent to banknotes, whether DLT will be a ubiquitous feature of CBDCs with some exceptions or will remain only an option, and which central bank currencies will be more widespread - for retail or wholesale payments. The highly important research - analyzing how wholesale and retail payments will affect the benefits of different economic actors, governments, households, businesses - will be fully possible after researchers have data on the implementation of CBDCs in other countries or at least a detailed description of how these currencies function. The concepts will again be tested by reality and adapted to it.

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PROFESSIONAL TRAINING OF HUMAN RESOURCES IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT AT THE LEVEL OF THE SĂLAJ COUNTY POLICE INSPECTORATE

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Abstract: *This study highlights the changes in human resource management, the shift from traditional paradigms to an individual-centered approach, and the importance of continuous learning and adaptability. It describes the sustainable development of human resources in the Sălaj County Police Inspectorate, emphasizing the crucial role in maintaining public order and cooperation with various institutions, the activity of the structures of the Human Resources Service and the Professional Training Office within the unit, structures with essential activities in the management and development of police personnel. The culmination of the study is the analysis of the professional training within the inspectorate, which highlights the progress and adaptability in the training of the personnel within the Sălaj County Police Inspectorate, but also the importance of effective communication and recognition of meritorious in achieving institutional performance.*

Keywords: human resources management, sustainable development, Sălaj County Police Inspectorate, professional training, institutional cooperation, Professional Training Office, police tactics.

INTRODUCTION

In a global context marked by emphasizing the importance of institutional transparency and accountability towards citizens and the sustainable development goals, this paper aims to examine the process of professional training of human resources at the level of the Sălaj County Police Inspectorate. The chosen theme facilitates a deeper understanding of the ways of training human resources in a public institution.

In the foreground, aspects regarding the evolution of human resources management are exposed, emphasizing the transition from traditional paradigms to an individual-centered approach, while highlighting the importance of continuous learning and adaptability in an ever-changing environment, as well as the role of human resources management in formulating organizational policies and strategies. The paper also emphasizes the concern of the Sălaj County Police Inspectorate for sustainable development and the involvement of specialists in training activities.

Reading the paper provides a detailed presentation of the sustainable development of human resources within the Inspectorate, which focuses on analyzing the evolution and progress of the activities carried out over three years, emphasizing the essential role of

professional training in the development of the organization and its adaptability to current needs and environmental changes.

This paper aims to present a deep and detailed understanding of the importance of professional training of human resources within a police institution, but also of the efforts and commitments of the Sălaj County Police Inspectorate, in order to ensure a quality service and adequate training of personnel for various interventions in the field.

1. Considerations regarding human resources management in the Police Inspectorate
1.1. General human resources challenges in the Police Inspectorate

Human resources management has changed significantly over time, given the evolution of society and the needs of employees. From a traditional approach, centered on efficiency and discipline, a modern perspective has been reached, which emphasizes the balance between the professional and personal lives of employees. In the context of totalitarian regimes, initiatives to improve the workforce focused on efficiency and expansion of work capacity, considering the collective to the detriment of the individual, who was perceived as part of the mass of employees (Mathis et al., 1997: 3). Currently, human resource management involves a series of strategic, consulting, and operational activities, aimed at ensuring the achievement of organizational objectives and meeting the needs of employees, focusing on the planning, supervision, and control of human resources in an enterprise, with less emphasis on individual employee issues (Manolescu, 2004: 29).

Thus, the human resources management must ensure that the recruitment, selection and classification of personnel are done in accordance with the organization's policies, but also develop programs and policies for managing stress and promoting a work-life balance of employees. It is essential for HR managers to provide access to psychological counseling and support services, identify the signs of employees' personal problems, and refer them to the appropriate support resources.

By constantly monitoring and evaluating the effectiveness of these programs, HR management can continuously adapt and improve existing policies and practices, ensuring that they respond to employee needs and challenges effectively. Thus, a healthy and supportive work environment can significantly contribute to managing stress and promoting the overall health and well-being of employees, positively impacting organizational performance as a whole.

Implementing a police evaluation and feedback system is crucial for improving employees' performance and career progression. It is important to have progressive staff planning and to reward and properly assess the results achieved. These strategies can strengthen the human resource base and ensure a quality public service (Urziceanu, 2019: 25).

Human resources development is crucial for the long-term growth and performance of an organization, including the Sălaj County Police Inspectorate. In recent years, strategies and programs have been implemented to improve the skills and abilities of police officers. The continuous training of personnel is a central aspect, and efforts have included the arrangement of shooting ranges and cars for practical training, the modernization of equipment and the purchase of simulators and advanced technologies for training.

The involvement of specialists from various fields in training activities, evaluation and constant feedback provided to police officers for performance improvement and career

progression are essential for a sustainable development of human resources. Progressive staff planning and using the results achieved to reward and appreciate employees are also necessary.

These measures and strategies can strengthen the human resource base of the police unit and ensure a quality public service, adapted to the needs of contemporary society.

1.2. Specific human resources development in the Sălaj County Police Inspectorate

The Sălaj County Police Inspectorate was established in 1968 as part of the Ministry of Interior, subordinated to the Security, the Militia and the State Archives. Currently, I.P.J. Sălaj is responsible for coordinating and managing the activities carried out in the county, ensuring public order and safety. The duties of the police unit cover a wide range of responsibilities, including investigating serious crime and combating organised, economic and banking crime. I.P.J. Sălaj participates in patrolling and intervention for crime prevention, investigation and investigation activities, control of compliance with the legislation on weapons and other dangerous materials, providing support and protection to informants and victims, as well as in humanitarian and cooperation missions, etc. The unit collaborates with other institutions, participates in rescue actions in case of emergencies and ensures that the population is informed about the activities carried out. Through their actions, I.P.J. Sălaj plays a vital role in maintaining safety and justice in the county (https://sj.politiaromana.ro/ro/informatii-generale/scurt-istoric).

The Sălaj County Police Inspectorate is structured on services, offices and compartments, as well as on city police. The unit is led by Chief Police Commissioner Marius-Anton Stupar and is subordinated to the Zalău Municipality Police, the Police of the Cities of Şimleu Silvaniei, Cehu Silvaniei and Jibou, as well as Rural Police Stations to which Communal Police Stations are assigned (https://sj.politiaromana.ro/ro/ipj-salaj/organigrama).

The police unit carried out integrated actions together with the gendarmes between January 5-7, 2024, to maintain public order and safety. 21 preventive actions and 45 filters were organized, involving 225 policemen, 95 gendarmes and other law enforcement agents. 562 vehicles were checked and 395 people were tested for alcohol or drugs, 345 contravention sanctions were applied in a total amount of 101,605 lei, 32 driving licenses and 5 registration certificates were retained.

The police officers carried out information activities on the new amendments to the Criminal Code regarding road accidents, drawing up criminal cases for driving under the influence of alcohol and robbery. They also informed about the legislation on penalties for drivers involved in fatal accidents under the influence of alcohol, drugs or without a license (https://sj.politiaromana.ro/ro/stiri-si-media/stiri/actiuni-preventiv-reactive-in-sistem-integrat-pentru-un-sfarsit-de-saptamana-in-siguranta1705317018).

The Human Resources Service is responsible for optimizing human resources within the police unit. It proposes measures for the selection and knowledge of candidates, the employment and promotion of personnel, but also for the promotion and dismissal from office, the transfer of police officers and agents on request (https://sj.politiaromana.ro/ro/ipj-salaj/servicii-si-birouri-judetene/serviciul-resurse-umane).

2. The establishment of the Professional Training Directorate, as a solution to integrated human resources development

In order to respond effectively to current crime and ensure a quality police service, the General Inspectorate of the Romanian Police (I.G.P.R.) has established, starting with 02.08.2021, the Professional Training Directorate. It is directly subordinated to the higher police unit and manages professional training in the Romanian Police. At the territorial level, within the County Police Inspectorates and the General Police Directorate of the Municipality of Bucharest, professional training structures have been created sized according to the number of police officers, respectively Professional Training Offices and Services.

The Professional Training Directorate deals exclusively with the training of police officers, in contrast to other units of the Ministry of Internal Affairs, where it is carried out within the Human Resources Services. The newly created structure manages activities on five lines of work: physical education and self-defense, police tactics, shooting instruction, driving vehicles in defensive and priority mode and specialized training.

A new department, established within the unit, the Professional Training Bureau, led by Chief Police Inspector Iftenie Sorin, coordinates the initial and continuous professional training of police officers, ensuring training in areas such as tactics, physical education, weapons transfers and driving. The objective of this office is to train competent police officers according to European standards, in order to achieve institutional objectives and fulfill the duties of the positions (Order No. 140 of 02.09.2016 of the Minister of Internal Affairs of Romania).

The professional training of police officers, regulated by normative acts, includes initial and continuous training and aims to maintain and improve skills, progress in career and advance in rank. The activities are carried out formally, non-formally and informally, and the annual training process starts on April 1 and ends on March 31 of the following year. At the level of the Sălaj police unit, a specific provision is issued annually, adapted to local needs, detailing the necessary documentation, the time budget, the responsibilities, the evaluations and the necessary preparation for the following year.

2.1. Training activities during the 2021-20222 year

In the 2021-2022 training year, at the level of the territorial unit I.P.J. Sălaj, the training activities were marked by the implementation of a Training Provision by the Human Resources Service. This provision has been negatively affected by several factors, including the COVID-19 pandemic, which has imposed severe restrictions on professional training activities, including the limitation of participants and activities with closed physical contact. It also faced a lack of specialized instructors and adequate infrastructure for defensive driving activities.

Starting with August 2021, the training activities were taken over by the Vocational Training Office, which caused an abrupt transition and syncope in their organization, given that the office initially did not have the necessary staff according to its structure. In order to remedy this situation, the hierarchically superior unit - IGPR, organized centralized competitions for filling vacant positions.

Within these competitions, emphasis was placed on the selection of well-trained police officers, capable of coordinating effective training stages. After the staff was hired, an

inventory of the available training infrastructure was made and new needs were identified for the continuous professional development of police officers.

The training activities included career initiation and specialization courses, practical internships on different lines of work and shooting sessions at the shooting range. A novelty this year was the introduction of practical night shooting sessions, necessary due to the real field conditions in which the police use the weapons.

The year 2021 marked a turning point in the professional training of police officers, with significant efforts to adapt and improve the training process in optimal and realistic conditions for operational missions.

2.2. Training activities during the 2022-2023 year

In the 2022-2023 training year, at the level of the police unit, the activities started with the elaboration of a Training Provision that regulated the manner and frequency of training activities for all personnel. The management of the unit and the professional training structure focused their efforts on carrying out an extensive number of practical activities and developing the training infrastructure necessary to achieve the proposed objectives.

This year, an important moment was marked by the organization for the first time of practical defensive driving activities within the police unit. These exercises were carried out in a public parking lot, adapted to reproduce the conditions of a car park, in order to train police officers in driving techniques to prevent accidents and anticipate traffic hazards. After acquiring these skills, the policemen were also trained in driving special vehicles with priority traffic regime, essential for missions and rapid interventions.

In the context of equipping the police with new weapons and noting the infrastructural deficiencies, it was decided to allocate funds for the rental of a private shooting range. This measure was necessary to ensure adequate training, including immediate evaluation of practical performance in the use of weapons. In contrast to military ranges, where resources are limited, the use of a private shooting range allowed for more efficient planning of firing sessions and immediate correction of identified deficiencies in the handling of weapons.

Particular attention was paid to the development of physical training, self-defense and police tactics, essential for the activities carried out by traffic police and public order. The acquisition of specific equipment and the use of modern training methods have increased the efficiency of training sessions and the involvement of police officers in these activities.

Following a significant number of new hires, the focus was on career initiation courses and staff specialization, including obtaining professional degrees and further training in various lines of work. An innovation in 2022-2023 was the introduction of a first aid training program, supported by specialists from I.S.U. Porolisum Sălaj. This program included theoretical and practical training for police officers in the field of first aid, with the use of specialized dummies and equipment.

The year 2022-2023 was marked by significant progress in the professional training of police officers within the Sălaj County Police Inspectorate, with a focus on developing practical and theoretical skills in various areas relevant to the efficient performance of job duties.

2.3. Training activities during the 2023-2024 year

In the 2023-2024 professional training year, activities were initiated at the Sălaj County Police Inspectorate according to a well-structured plan, starting with the drafting of a Training Provision for the entire staff. Each police structure developed its own training plan, which included both theoretical aspects and practical activities. Particular emphasis was placed on the development of the infrastructure necessary for carrying out practical activities and on improving the professional training system to accommodate the staff with this concept.

The training in defensive and priority driving included the identification and rental of an adequate area for the arrangement of a car park. The practical activities focused on practicing realistic situations encountered in traffic, such as emergency braking, obstacle avoidance and parking, addressing especially the police officers in the street segment, in order to reduce the road risk among them.

As for the shooting instruction, the collaboration with a private shooting range continued, where practical activities were carried out to simulate real shooting situations. A special emphasis was placed on theoretical training regarding the legislation on the use of weapons, given the increase in situations that require such interventions in current activities.

Physical education, self-defense and police tactics were approached by organizing activities structured on consecutive modules of three days, allowing the police officers to develop multidisciplinary. These modules included practical and theoretical training in self-defense, police tactics and the use of weapons, demonstrating the effectiveness of this format in the advancement of personnel.

In the field of specialized training, a significant amount of time was allocated for the theoretical training of police officers, with a focus on working procedures and legislation. The activities included case studies and the participation of specialists from various fields, providing complete and up-to-date training for staff.

As innovations, an observation sheet for the evaluation of training activities and an anonymous feedback questionnaire have been introduced, contributing to the continuous improvement of training programs.

CONCLUSIONS

After analyzing the three years of activity of the specialized professional training structure established within the unit, it was found that, in order to achieve a continuous development of this concept of professional training, it would be necessary for the institution not to limit itself only to the identification in the external environment of buildings/surfaces suitable for carrying out practical training activities, but also by expanding its own infrastructure and purchasing modern equipment to ensure preparation in step with developments in the field and to maximize the efficiency of the activities carried out.

Within the Romanian Police, professional training is vital for the continuous development of personnel skills and adaptation to the needs of contemporary society. The institution has implemented a structure dedicated to this purpose, reflecting its commitment to improving skills. Adaptability to change is essential for the success and efficiency of the organization in responding to current requirements.

For better efficiency, employee rewards must stimulate desired behaviors and encourage the development of new skills, including through financial and non-financial

rewards. Recognition of merit and fairness in reward are essential for employee morale and engagement. The police unit should value the diversity of non-financial rewards, such as recognition, promotion and leave benefits, in order to support job satisfaction and deep engagement in work. The integration of new employees and teamwork solidifies an effective and proactive team spirit.

In conclusion, the training strategy of the Romanian Police must be well-structured, effectively combining training, incentives and rewards to ensure optimal performance and a sustainable contribution to the community.

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