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Section 1. Economic policy

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ZANGAZUR CORRIDOR: A GUARANTOR OF REGIONAL ECONOMIC AND POLITICAL COOPERATION

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Abstract

The 44-day war has brought about very serious changes in the region. Against the background of this process, the importance of a new connecting corridor passing through Zangazur – historic Azerbaijani land – which will connect the main territory of Azerbaijan with the Nakhchivan Autonomous Republic, an integral part of the country, as well as with Turkey, is clearly evident. Undoubtedly, issues such as the attitude of various states towards this matter, the new opportunities the corridor may create in the context of regional and global cooperation, and the content of Azerbaijan's activities as an independent state have become relevant. In this regard, a geopolitical analysis of the realization of the Zangazur Corridor is highly topical.

Keywords: *Zangazur Corridor, Turkey, Azerbaijan, Nakhchivan, Armenia*

Introduction:

As noted, one of the issues of particular importance for the Zangazur Corridor is the organization of economic relations in a cheap, safe, and fast way. Experts who approach this from various angles also refer to the corridor as the "Northern Route," the "Middle Route," and the "Southern Route." More precisely, they classify the corridor according to different directions, arriving at these terms. For example, according to experts, the "Northern Route" passes through Russian territory and extends to Europe, ensuring deliveries to Europe. The "Middle Route" refers to the route encompassing Central Asia-Azerbaijan-Georgia-Turkey. The "Southern Route," in turn, is the direction passing through the territory of South Asian countries and also encompassing Iran. The most interesting and important aspect of all this is that the common space for all three directions, approached differently by various experts, is Azerbaijan. In other words, in all three directions, the route intersects in the South Caucasus on the territory of Azerbaijan. This opportunity is formed by the North-South, East-West, and South-West transport projects in which the Republic of Azerbaijan is an active participant. Thus,

via the "North-South" corridor from Russia, and the "East-West" corridor from Central Asia, the roads intersect in Azerbaijan, while the "Southern Route" also passes through Azerbaijani territory via the "South-West" route (Nasirov, A., 2022).

The Zangazur Corridor will consist of two segments: automobile and railway. Projects for both the automobile and railway segments of the new corridor are being intensively implemented on the territory of our country. During President Ilham Aliyev's visit to the Fuzuli, Zangilan, Lachin, and Jabrayil districts on February 14, 2021, the foundation was laid for the Horadiz-Aghband railway line, a crucial component of the Zangazur Corridor (Abdullayev, M. (n.d.)).

This 100-kilometer railway line is a very important infrastructure that will ensure the functionality of the Zangazur Corridor. The construction of the railway line is being carried out in 3 stages. In the first stage, it is planned to lay 30 km, including the Horadiz, Marjanli, Mahmudlu stations; in the second stage, 55 km, including the Soltanli, Gumlag stations; and in the third stage, 25.4 km of road, covering the Minjivan, Bartaz, and Aghband stations. Within the framework of the project, it is planned to construct 8 stations, 3 tunnels, 41 bridges, 3 galleries, 4 overpasses, and a total of nearly 300 artificial engineering structures. A great volume of work has already been carried out towards the implementation of the Horadiz-Aghband railway line project, an important part of the Zangazur Corridor. Certain parts of the transport connection have even been put into operation. Currently, the movement of freight trains is provided in those sections that have been put into use, and loads are being transported to the territories liberated from occupation. Simultaneously, work has also begun on the automobile road component of the Zangazur Corridor. Thus, on October 26, 2022, the foundation was laid for the Horadiz-Jabrayil-Zangilan-Aghband automobile road. The distance from the starting point of the road to Aghband, on the Armenian border, is 123.6 kilometers. This marks the beginning of the next stage in the creation of the Zangazur Corridor.

The line ending at Validagh will be extended 14 kilometers to the border with Armenia. If Armenia decides to contribute to the search for peace in the region and participates in these transport projects, it could connect its railway line from Baku to Horadiz and from Horadiz to the north of Nakhchivan (Shukurova, E., 2021). Thus, Armenia could obtain uninterrupted transport to Russia and Iran. Parallel to the railway line, automobile roads along these routes are also being put into use. The construction project of the Ahmadbeyli-Horadiz-Minjivan-Aghband automobile road, extending to Zangazur in Azerbaijan, has been initiated and is proceeding rapidly.

Azerbaijan, for its part, has access opportunities to the Turkey-Europe direction both via Georgia and, in the future, via the Zangazur transport corridor. Already, the world's major powers and large states recognize the importance of the Zangazur Corridor and support the realization of the project.

The Zangazur Corridor, promising intensive transport connections that are efficient for access to the global space, especially Europe, will first and foremost create broader-scale opportunities for the states of the region.

Our research and analysis show that the activation of the Zangazur Corridor on a regional and global scale will spur serious geopolitical and geoeconomic innovations in the region. Furthermore, the corridor will allow Azerbaijan to strengthen its position as a transport-logistics center of Eurasia and to consolidate its international status as an independent state (Aliyev, Z. B., 2023).

The geopolitical assessment of the Zangazur Corridor also has historical and political significance. It is no coincidence that in the ideas voiced by the President of Azerbaijan, in his interviews with transnational media, alongside the economic and strategic importance of the Zangazur Corridor, the historical-political motives of the territorial issue are also emphasized.

The realization of the Zangazur transport corridor, where regional, economic, and geopolitical interests intersect and collide, is a demand of the times. Roads leading to Zangazur in Azerbaijan are being rapidly repaired, and new roads are being built. It is possible that the corridor will be realized in a short time. At the current stage, Armenia must correctly assess the reality, comply with the terms of the Trilateral Declaration, and support the restoration of peace, security,

economic development, and progress in the region.

"Despite not having access to the open sea, we have turned Azerbaijan, located at the junction of East and West, North and South, into an important transport center. Based on the advantages of the geographical position, the entire transport chain has been diversified: a seaport, railway connection, several international airports, and highways," (Geopolitical factor increases interest in Zangazur corridor – ANALYSIS. (n.d.)) said President Ilham Aliyev during his speech at the Azerbaijan-Lithuania business forum. Many new proposals are being received by various states regarding the use of Azerbaijan's transport infrastructure. As the head of state noted, today the republic is a transit hub for the South Caucasus, Central Asia, and the entire Caspian region.

Conclusion

The Zangazur Corridor offers important functionality in terms of legal and international relations. The relevance of the Zangazur Corridor's prospects is the continuation of regional development upon Azerbaijan's interests. The main advantage is that this corridor, while presenting a regional power, can also provide a basis for solving transport issues (Ibrahimov, R., & Oztarsu, M. F., 2022). The corridor's leading role in solving functional issues increases its prospects in the eyes of many countries. However, Armenia and its partners ignore issues related to the prospects of this corridor, prioritizing their own political interests, which harms the regional development of the corridor.

In general, both the Zangazur Corridor and the "3+3" platform created in the region will serve as a guarantor of strengthening friendship, neighborhood, and solidarity among the peoples of the region, as well as sustainable peace, stability, security, tranquility, and development in the region.

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APPLICATION AND PERSPECTIVES OF "SMART MANAGEMENT" METHODS IN KARABAKH

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Abstract

One of the five national priorities for the socio-economic development of the Republic of Azerbaijan up to 2030 is defined as a *"Country of Clean Environment and Green Growth."* This priority includes environmental improvement, afforestation, rehabilitation of degraded lands, preservation of green spaces, efficient water resource management, and the promotion of sustainable energy sources. In the post-war period, special attention has been paid to the implementation of **smart city** and **smart village** initiatives in the territories liberated from Armenian occupation. These projects stand out due to their high level of coordination and integration of modern technologies.

Keywords: *Post-conflict, smart city, e-government, great return, communication, social development, paradigm, green energy*

1. Introduction

The new development model of Karabakh is characterized by a transitional phase in which the economy is being transformed, innovative management and organizational methods are being applied, and key challenges such as strengthening state sovereignty, fostering cultural dialogue, and establishing a green energy system are being addressed. These efforts also ensure that Azerbaijan will host the **COP-29** event. By the Decree of President Ilham Aliyev dated December 25, 2023, the year 2024 was proclaimed the *"Year of Solidarity for the Green World"* in Azerbaijan.

It should be recalled that during the occupation, the city of Agdam was completely destroyed and became known as the *"Hiroshima of the East."* Today, in the restored territories, high-speed internet is being introduced in smart villages, an e-health system capable of delivering results for 36 types of medical analyses within just 10 minutes is being established, and electronic services, e-classrooms, and other digital solutions are being provided to citizens. All of this fully

meets the demands of contemporary society (https://fed.az/az/ikt/azerbaycanda-agilli-kend-nece-olacag-detallar-ekskluziv-40730).

2. Smart Housing and E-Government as a Strategy for Sustainable Development

The concepts of **smart city** and **smart village** are central to the sustainable and efficient development of the **Great Return** strategy. Smart cities and villages use various electronic methods, voice-activated technologies, and sensors to collect data. To effectively manage resources, information assets, and services derived from databases, it is essential to improve operational efficiency within the city. This includes the management of transport and traffic systems, power generation facilities, water supply networks, utilities, information technology systems, educational institutions, libraries, hospitals, and other public services, as well as data received from citizens, devices, buildings, and other assets.

The application of advanced technological systems in Azerbaijan facilitates the monitoring, analysis, planning, and management of urban development, which directly contributes to an elevated quality of life. However, defining smart cities precisely can be challenging. According to Deakin and Al Waer, a smart city is characterized by four main factors:

1. The deployment of a diverse array of electronic and digital technologies within communities and urban settings.
2. The utilization of information and communication technologies (ICT) to enhance living and working environments.
3. The incorporation of ICT into government management systems.
4. The adoption of proposed innovations through ICT tools and the broadening of experiences that foster community engagement.

Initially, in Azerbaijan, the scarcity of specialists capable of implementing "smart" urban and rural initiatives hindered progress in this area. However, the forward-thinking policies of the national leadership have successfully overcome this challenge. Companies from Israel, a strategic partner of Azerbaijan, have excelled in this domain, having implemented similar projects globally. It is noteworthy that Tel Aviv was awarded the title of *"World's Smartest City"* in 2014. Thus, the strategic partnership between Azerbaijan and Israel ensures that the insights and experience of specialists from that country play a crucial role in developing smart cities and villages in the areas reclaimed from occupation.

3. International Experience in Smart City and Village Development

A brief overview of international experience is useful for understanding the global context. In Germany, the *"Smart Village"* initiative is being implemented in four locations, the most extensive being in Eisenberg. This region widely incorporates smart trade, logistics, and innovative energy solutions. In Finland and Lapland, significant advancements have been made in e-education, e-healthcare, alternative energy, e-commerce, and transport. For example, in Lapland, individuals wishing to travel to the city can use their mobile devices to access a specific program that shows the availability of empty seats in vehicles. The European Union actively supports efforts to expand smart cities and villages across its member states.

The Association of Southeast Asian Nations (ASEAN), comprising ten member nations and led by Singapore, shows substantial interest in the concept of smart cities, often surpassing several Western nations in this field. China and India, despite their high population densities, focus on developing smart cities managed by modern technology. The smart city concept has also been successfully implemented in the USA, Canada, and Australia. Thus, Azerbaijan is not following a unique path but is integrating into a global trend, while also adapting international experience to local conditions and needs.

4. The Political Strategy of Azerbaijan: From Liberation to Digital Transformation

From the very beginning of his presidency, Mr. Ilham Aliyev emphasized two key elements in Azerbaijan's political strategy: the liberation of Karabakh from occupation and the increasing significance of information and communication technologies. A review of the socio-economic and cultural policies of the

last two decades reveals a clear correlation with the principles outlined by the national leader in his electoral agenda. One of the crucial tenets of legitimacy in a democracy is enacting changes through reforms and fulfilling the promises laid out in the election platform.

The reform principles in Azerbaijan have been driven by the needs of the public. These reforms have elevated the country to a position among the world's influential nations and safeguarded the interests of Azerbaijanis living abroad during this modern, turbulent era. Today, we observe a rising trend in the application of information technology, improved interaction between citizens and the state, and an increase in both the quality and quantity of electronic government services. The progress we are witnessing is indicative of reduced costs in Karabakh's economic sector, enhanced productivity, and greater competitiveness in the region. It also leads to an improved standard of living nationwide and establishes a strong link between service quality and citizen satisfaction. Organizations that deliver high-quality services ensure satisfaction for citizens participating in the implementation of the Great Return program.

5. The Great Return: Main Aspects and Principles

The **Great Return** strategy primarily encompasses the following aspects:

- The signing of a peace agreement between Azerbaijan and Armenia;
- The repatriation of internally displaced persons to their ancestral lands;
- The development of smart housing, eco-friendly cities, and urban expansion;
- The return to historical regions in Western Zangezur;
- The drawing and marking of borders following the restoration of sovereignty, along with ongoing bilateral talks with Armenia;
- Upholding a unified stance among all Azerbaijanis around the world in a coordinated manner;
- Enhancing new proposals based on ideological foundations.

These seven principles form the basis of the Great Return initiative. Over the past twenty years, advancements in information and communication technology, along with the effects of globalization and the emergence of a *"network economy"* arising from these two factors, have brought about essential changes in social life. The evolution of the industrial system, the shift to an information-based society, and the transformation of socio-economic, cultural, and political frameworks have elevated the operational processes within government bodies and organizations to a new level.

In the 2000s, numerous nations, particularly within regional groups like the European Union, adopted strategies to transition from industrial to information societies and implemented various activities to achieve their objectives. These strategies have transformed public administration systems. The advancements in ICT have enhanced the quality of services delivered by government institutions to citizens. Unfortunately, it must be noted that in many instances, these countries have chosen to channel innovations not towards global peace and solidarity, but rather into exacerbating the conflicting realities of today's world. In contrast, in Azerbaijan, the communication capabilities of smart construction are specifically designed with a **social-intelligent application strategy** in mind. The equitable policies of the Azerbaijani state are founded on this strategy.

6. The Role of Communication in Intelligent Management Systems

The term *communication* is derived from the Latin words *"com"* (together, with) and *"unio"* (union). When combined, they convey the concept of *"together, to unite, to be together,"* thus connecting closely with meanings like *"sharing"* and *"common."* In this sense, communication is intricately tied to concepts of community, society, and social interactions. The foundation of this communication perspective is based on Weber's (1978) theory of social actions, which posits that social actions rely on the intentional behaviors of individuals and occur through information systems as well as in direct, face-to-face interactions.

The **intelligent management system** encompasses telecommunications, communication, information, broadcasting, and various other technologies (*Strategic Roadmap*

for the development of telecommunications and information technologies in the Republic of Azerbaijan). Data gathered within the communication system, along with news and information flow, is conveyed through both oral and written media, ranging from print to telecommunications and satellite broadcasting. Throughout this process, a new system is created and widely shared, while the old system remains intact. In this context, radio and television organizations significantly impact people's everyday lives.

The advancement of communication technologies and the establishment of global communication networks influence the concept of competition (Yasin Tashpinar, 2021). The rapid pace of global changes, market differentiation, alignment with international standards, and the evolution of information as a key resource enhance the interest and necessity for nations to invest in the information sector (Mahir Abbaszade 2019, 12). This development highlights the target audiences of various organizations on a global scale and underscores the importance of leveraging communication technologies. Consequently, the enhancement of e-government in our country accelerates smart construction initiatives in Karabakh.

7. E-Government: Concept, Significance, and Service Areas

There are numerous definitions of e-government. At its core, e-government means that the government delivers services and executes tasks for its citizens safely, efficiently, and continuously through electronic means. However, it is misleading to confine the idea of e-government solely to the application of information technologies. Electronic government also involves the active engagement of citizens in the distribution of updated services, as well as oversight and management processes within internal and external relations systems.

The significance of electronic government lies in enhancing the efficiency of public administration services provided to citizens. The swift advancement of information technology in a globalized society is leading to improved services from governments to their citizens, which in turn assures higher quality in the services that individuals expect from their governments. To address increasing demands, governments must deliver high-quality services and explore various methods to boost citizen satisfaction. In today's information-driven era, a key strategy employed by governments is the integration of information technology into their service offerings. **E-government** influences the efficiency, speed, effectiveness, convenience, and accessibility of the various services delivered by the government to its citizens, while also impacting overall service costs (Hakan Kahraman, 2014).

Through the **e-government system** of the Great Return platform, services offered to citizens can be categorized into four main areas:

- **Information services** – providing citizens with access to official information, laws, regulations, and public data;
- **Payment transactions** – enabling online payment of taxes, utility bills, fines, and other fees;
- **Integrated e-services** – comprehensive services that combine multiple functions (e.g., registering a business, applying for benefits, obtaining permits);
- **Communication and feedback** – mechanisms for citizens to communicate with government agencies, submit complaints, and provide suggestions.

The development of new settlements in Karabakh creates a favorable basis for e-government to explore more advantageous opportunities in these fields. The advancement of electronic government services in Karabakh aims not only to meet citizens' needs but also to foster competition with other rapidly progressing nations. The government of Azerbaijan guarantees the successful implementation of future investments in this sector.

8. Conclusion

The article provides an in-depth analysis of the **Great Return strategy** within the contemporary development framework of Azerbaijan, as well as the electronic government's perspective on this initiative. It demonstrates that the Azerbaijani state places significant emphasis on the effectiveness of electronic governance and the use of

modern communication technologies in the post-conflict reconstruction of Karabakh. Key paradigms that contribute to the rapid positive changes during this era are explored scientifically and methodologically.

The Great Return process is examined from a categorical standpoint, revealing its multi-dimensional nature: it includes not only the physical return of internally displaced persons to their ancestral lands but also the creation of a modern, technologically advanced, and environmentally sustainable living environment. The integration of smart management methods, e-government services, and green energy solutions ensures that the restored territories of Karabakh will become a model for the entire region. Thus, Azerbaijan is not merely rebuilding destroyed cities but is creating a new reality based on intelligence, communication, and sustainability.

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Section 2. Economics and Management

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THE LION CITY ROARS: SINGAPORE IN THE THIRD INDUSTRIAL REVOLUTION

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Abstract

The study is about the economic rise of Singapore and the reasons why it happened. The author solves the problem of a lack of clarity about the Singaporean model, synthesizing many research sources. The study was conducted through using a variety of primary and secondary sources, discovering that Singapore's mix of interventionist and laissez faire principles helped its economic growth. This paper's practical implications include the potential for developing countries using the Singapore Model to economically grow.

Keywords: *Singapore, Asian Tigers, economics, Third Industrial Revolution, Britain*

In 1819 Stamford Raffles, the Lieutenant-Governor of Bencoolen, a British colony, first gazed across the Singapore River. He saw only a small fishing port. Today, where sampans once bobbed in dirty waters, skyscrapers mirror the clouds. Singapore's metamorphosis from a filthy colonial swamp to a global power stands as one of the modern era's most remarkable economic transformations.

The rapid rise of the city-state of Singapore from a tiny fishing port to a global hub for innovation, trade, and travel was truly remarkable, marking the beginning of the development of the rest of Southeast Asia. During the 1960s and up to the 1980s, the Lion City, alongside the three other so-called Asian Tigers – Hong Kong, South Korea, and Taiwan – experienced a period of immense economic growth, though each followed different pathways (Corporate Finance Institute, 2020). Unlike previous phases of industrialization, however, while Singapore utilized manufacturing like its peers, its revolution was unique: it simultaneously engineered a financial and legal infrastructure that allowed it to leapfrog into a global service hub faster than its neighbours. Due to its beneficial natural geography, the establishment of core monetary and banking systems after independence, and the Singaporean government's mix of interventionist and laissez-faire economic policies, Singapore emerged as an unlikely financial engine of the Third Industrial Revolution.

Historical Context: How the Lion City came to Roar

On February 6, 1819, Raffles signed a treaty with Sultan Hussein Shah and the Temenggong people (National Library Board of Singapore, 2025). This treaty granted the British East India Company the right to establish a trading post on the island, marking the beginning of British rule and the establishment of the modern nation of Singapore (Raffles, 1979). Raffles considered Singapore to be a valuable foothold for the British in the East Indies, as it countered Dutch influence as well as served as a point of entry for ships connecting the British Raj and China.

Singapore joined the Straits Settlement Crown Colony in 1867, which also encompassed the colonies of Malacca, Penang, and the rest of Greater Malaya. The British occupation of Singapore brought both hardship and success. On one side, the British system was racist and hierarchical. The British imposed an iron fist on the territory and silenced Singaporean dissent, while discouraging manufacturing to help British exports. However, the British occupation of Singapore also nurtured Singapore's economy and social systems, marking the first step toward a Westernized society. The British established free markets, introduced common law, and took crucial steps towards democratizing and modernizing Singapore (Koh, 2019).

The British were, however, not the only colonial force in East Asia. Following resounding victories in both the Russo-Japanese War and the first Sino-Japanese War, the Japanese Empire was slowly consolidating power in the region and building a "prosperity-sphere" that eventually stretched from the cold and desolate Manchukuo all the way to the tropical jungles of Burma (Britannica, 2025).

By February 1942, Singapore stood as Britain's supposedly impregnable fortress in the East. Despite outnumbering Japanese forces two-to-one and possessing superior armaments, the British garrison faced a stunning defeat. Within a week of the February 8 invasion, Japanese troops overwhelmed the island's defenses, marking one of Britain's most catastrophic military failures since Gallipoli and shattering the myth of European invincibility.

During the Japanese occupation from 1942 to 1945, Singapore endured brutal oppression under military rule. The Sook Ching racial cleansing systematically targeted ethnic Chinese residents and British sympathizers, while the notorious Kempeitai secret police ruthlessly suppressed resistance to Japanese rule (Wong, National Library of Singapore, 2025). In addition, Singapore's past as a wealthy British colony was overshadowed by the city-state's massive struggles with hyperinflation and poverty. These three years marked one of the darkest chapters in Singapore's history, with thousands of civilians executed, in addition to the urban destitution of the city (National Archives of Singapore, 1992).

Yet following Japan's surrender at the end of World War II, the Allied forces reclaimed Singapore on September 12, 1945 to jubilant celebrations from its war-weary population (National Archives (United Kingdom), 1955). The British return, however, marked a new era. Korea, Taiwan and Hong Kong were also liberated from the Japanese Empire. The Japanese occupation taught the Singaporeans to resent occupation by a foreign power; and Britain, reshaped by its wartime income and adopting a new foreign strategy, chose to let both Singapore and Malaya determine their own futures in August 1963 (National Archives of Singapore, 1992).

Prime Minister Lee Kwan Yew advocated for the union of Malay with Singapore, but the racist, Malayan government kicked Singapore out. On August 9, 1965, with its expulsion from Malaya, Singapore became an independent country after almost 150 years of foreign rule (National Library Board of Singapore, n.d.). Now Singapore was free, in the next three decades, the Lion City would rise from a small, impoverished island with no natural resources, high unemployment, and a lack of defence capabilities to a global metropolis leading innovation in petroleum and finance, becoming a beacon of freedom and success in the east.

So began the rise of Singapore and most of East Asia in what historians call the Third Industrial Revolution (Bocock, n.d.). This third era of industrialization started in post-war East-Asian states, and is attributed to a multitude of causes, from smart governance

and economic opportunity to a focus on manufacturing and innovation. Among the major Tigers, Singapore focused on a trade and finance-based economy approach, while Hong Kong, South Korea and Taiwan opted to manufacture and innovate in the tech industry (Vogel, 1991).

Singapore and the Third Industrial Revolution

At independence, Singapore seemed an unlikely candidate for economic success – a tiny island at the southern tip of the Malay Peninsula, bereft of natural resources and populated by barely two million people. Singapore's growth was driven by the industrialization of the state. It seemed to have all the signs of a nation reliant on foreign aid and protection, rather than an economic powerhouse. Yet Singapore experienced an economic boom in the late 1960s and early 1970s that resulted from systematic governmental reform, followed by innovative policies aimed at economic freedom (Bocock, n.d.).

The industrial revolutions preceding this third wave–in Great Britain, the United States, Japan, and China–relied heavily on rapid industrial development. However, by the mid-twentieth century, economic revolution no longer required industrialization as its primary economic driver, as evidenced by Singapore.

The Lion City was unable to industrialize during its early days; however, Singapore eventually developed a modest manufacturing sector through chemical, petroleum, and machinery industries, which accounted for ~12% of Singapore's GDP by the 1960s (Ling Nah, Department of Statistics Singapore, 2006). The majority of Singapore's economic growth stemmed from trade, which was encouraged by the archipelago's unique advantages. Firstly, Singapore is situated on the shores of the Malacca Strait, the link between the East and the West, making it a hub for facilitating global commerce. Additionally, the depth of the South China Sea and its surrounding waters facilitated the accommodation of large cargo ships.

The Singaporean people were also hard-working, intelligent, and educated, and their leadership proved adept at seizing mid-century economic opportunities. Singaporeans considered Lee Kuan Yew, the prime minister elected in 1959, to be a strong leader. He reformed Singapore using a mixture of market and command-economy policies, while also encouraging social reforms aimed at westernizing the city.

Maritime Trade and Public Policy

Singapore's strategic position at the Strait of Malacca proved key as postwar trade exploded between a resurgent Europe and a rapidly developing East Asia. The Port of Singapore, established in 1964, became the driving force behind this strategy. By continuously modernizing its facilities and embracing containerization, Singapore established itself as the leading shipping hub in Asia. The city-state capitalized on its location by developing world-class port facilities. Singapore developed sophisticated financial services to support maritime trade, establishing itself as a central hub for foreign exchange. Its pro-business policies, stability, and uncompromising anti-corruption measures attracted multinational corporations – such as Levi Strauss, IBM and P&G– that were expanding in Asia (Shona, 2016).

Key to the nation was its strategy of entrepôt trade (Kenton, 2022). Entrepôt trading is the practice of importing goods, storing them, and then re-exporting them. A well-established trade system certainly facilitated the import and export of these goods.

Perhaps more crucially, Singapore embraced globalization before it became commonplace. While other developing nations pursued protectionism – including India's "License Raj," Indonesia with its almost 200% tariff, and most of Sub-Saharan Africa– in hopes of protecting their labour, Singapore opened its economy to foreign investment and free trade (Gazettes Africa, 1972). This freedom, combined with Singapore's location, infrastructure development, and entrepôt trading, created a cycle of growth that transformed the island into a global trade empire.

As Singapore capitalized on its postwar economic advantages, its government adopted a mixed approach to regulation. It mixed libertarian policies with strong governmental reforms, such as establishing the Development Bank of Singapore (DBS) and public housing. During the 1960s, when Singapore was a small,

developing state, the PAP (People's Action Party)'s reforms proved vital to ensuring its survival, as they provided a sustainable path for the country's economy to flourish while also offering relief to poorer citizens.

Established in 1961, the Economic Development Board was the primary department responsible for driving industrialization, increasing Singapore's GDP by 10% in the 1960s (Singapore Economic Development Board, 2020). It involved immense capital investment and aimed to build infrastructure similar to the Jurong Industrial Estate, creating jobs through labour-intensive industries. The Board also used governmental control to create tax breaks and incentives for multinational and foreign corporations through the 1967 Economic Expansion Incentives Relief Act (Singapore Economic Expansion Incentives, 2020). These companies, in turn, brought new jobs, provided stimulus to the economy, capital, and increased access to the global market. The government also established government-linked corporations to drive development in the absence of a strong private sector. Key entities included the Jurong Town Corporation, the Housing Development Board, the DBS, and the Port of Singapore Authority (National Library Board, 2020). These examples of governmental intervention established Singapore's banking system, the engine of Singapore's success in the Third Industrial Revolution.

Banking systems were essential. Long before Singapore gained its independence, local banks, such as the Oversea-Chinese Banking Corporation, emerged to cater to the needs of the local Chinese business community. Soon, the establishment of the DBS and United Overseas Bank led to increased industrial financing and retail banking. Although founded by the government, these institutions are now privately owned. Since the shift in policy towards more growth and freedom in 1979, Singapore emerged as an international finance center in Asia. Its financial sector outpaced the overall economy, averaging 20% growth per year and contributed about one-quarter of Singapore's GDP by the early 1990s, helping to transform Singapore's banking sector into a global financial market.

With this early phase of government intervention done, Singapore's free-market advocates encouraged laissez-faire practices. Lee Kwan Yew's government opened the country to the foreign exchange market, trading currencies and stocks, in which Singapore has become the fourth-largest global trading center, with a daily turnover of about US$81 billion by 1992 (Monetary Authority of Singapore, 2004). Additionally the meritocracy and flat tax rate, around 25% in the 1990s, incentivized entrepreneurs and businessmen to move to Singapore (Cheng, 1990).

Singapore's immigration system was also fairly liberal at the time, with a policy of open borders for the qualified and the merited, as Lee Kuan Yew once said: "Immigration has been a great strength for America. But mind you, immigration of the highly intelligent and highly hardworking. If it's immigration of fruit pickers, you won't get very far."

Singapore's pro-capitalist policies featured minimal regulation of foreign corporations, aiming to boost competition and drive innovation. The city-state had no minimum wage and limited social welfare benefits, including privatized healthcare. In addition, under a "freedom of contract" policy, employers and employees negotiated wages without a set minimum wage (Singapore, 2020).

Historians and economists debate the main reason for Singapore's rise: was it the dominant role of the government, or the power of the free market? Margaret Thatcher, former UK Prime Minister, emphasized that low taxes, free trade, the ease of doing business, talented immigrants, the rule of law, and zero tolerance for corruption were the keys to Singapore's growth. She referred to a quote from U. S. President Ronald Reagan: "Your country [Singapore] is a monument to what hard work and free enterprise can achieve" (Reagan, 1985).

Critics of this view, however, including Chinese President Xi Jinping, argue that stability and strong leadership were the proper drivers that allowed the Lion City to flourish. Political Scientists like Stephan Ortmann have pointed out that "In particular, there is great Chinese interest in Singapore's success in combining effective governance and efficient state capitalism with stable one-party dominant rule", underscoring the active and guiding role of the state in Singapore's success (Ortmann and Thompson, 2018).

Singapore's Financial Revolution

Singapore's transformation from a resource-scarce, unemployment-plagued former colony into one of the world's wealthiest nations within a single generation represents an economic revolution on overdrive. Singapore rejected socialism during the Cold War and opted for regulated capitalism that eventually leaned toward free-market policies (National Library Board, 2011). Lee Kuan Yew's government pursued a radical openness to trade and foreign investment, paired with meritocracy, heavy penalties for corruption, and relentless upgrading of industries and trade infrastructure. The result was three decades of an annual growth rate of 10%, the creation of a hyper-efficient global hub for manufacturing, finance, logistics, and innovation.

Some critics, however, including Sylvia Lim– leader of the WP, a left wing party – and Ha-Joon Chang, a Cambridge economist, argued that after stability was achieved, it was state capitalism, not laissez-faire economics, that led to Singapore's ultimate success (Chang, 2022). Yet these arguments crucially overlook the primary achievements of a laissez-faire economy: minimal interference in business operations, open competition, and individual economic freedom (Smith, n.d.).

In the short-term, Singapore's growth, alongside the rest of the Four Tigers, challenged the centuries-old notion of only "western" nations being able to succeed (Gulati, 1992). Singapore in particular showed that countries can still succeed despite having a dark history. Singapore's experience is paramount for leaders and economists in post-colonial African and Southeast Asian states as evidence that small, resource-scarce nations can still achieve first-world status through disciplined economic planning and openness to global markets.

In the long term, Singapore's rise extends beyond its borders. Given the unique blend of government intervention and free-market principles in Singapore's economy. Before Singapore, other nations in the region had no real-world example of a non-white, non-Western society that escaped poverty through export-led industrialization under a strong, meritocratic, one-party state (Page, 1994). In 1978, Chinese President Deng Xiaoping visited Singapore and remarked, "Singapore enjoys good social order and is well managed. We should tap [in] on their experience and learn how to manage better than them" (Vogel, 2005).

Also, the modern Suzhou and Shenzhen Special Economic Zones were modelled mainly after Singapore, especially their governance systems combined with classical liberal economics. Current Chinese President Xi Jinping even noted that "Over the past 30 years, the Suzhou Industrial Park has transformed low-lying farmland into an innovation city. It is a vivid example of mutually beneficial cooperation and a witness to Singapore's deep involvement in China's reform and opening-up" (Vogel, 2024).

Today Singapore remains a model for economic development, constantly shifting its strategy to remain a powerful commercial hub in our globalized world. Although Singapore started as a business-friendly environment, it is shifting to become a physical hub too. Singapore's revolution from a tiny archipelago to a global banking center demonstrates that no matter how bleak a nation's history, economic success may be only a generation away.

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Section 3. Environmental economics

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WHICH EXTENSION METHOD IS ADOPTED TO ENHANCE POTATO PRODUCTIVITY IN TUNISIA?

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Abstract

The objective of this work is to analyze the impact of extension services on the productivity of potato production factors. An analysis of the productivity of potato production factors in different farms adopting different extension sources was conducted. To achieve this, a questionnaire survey was carried out on a sample of 123 seasonal potato producers in the governorates of Nabeul, Kairouan, and Sidi Bouzid, with farmers selected randomly.

The results show that a low number of producers use extension services (42%) and rely on the following sources: (i) Regional Agricultural Development Commission (CRDA), (ii) Potato and Artichoke Technical Center (CTPT), and (iii) private advice. The low rate of supervision is mainly explained by the limited availability and number of extension workers. According to the justifications provided by extension workers, the lack of transport due to fuel problems, as well as the insufficient number of extension workers and equipment, contributed to this lack of participation. These logistical barriers may have limited the ability of extension workers to reach more potato producers and deliver extension services effectively.

The results of the analysis, based on the use of the Tanagra tool, show that participation in extension services allows producers to achieve better yields compared to non-participants. Using the Ad hoc model, our study finds that extension has a significantly positive impact on potato yield. This means that the extension service has successfully provided information, knowledge, and practices that have directly contributed to improving the productivity of potato cultivation factors, hence the importance of continuing to invest in extension services to ensure better productivity.

Keywords: *Agricultural Extension System, productivity, potato, Tunisia*

1. Introduction

Ranking as the third most important food crop globally after rice and wheat, the potato (*Solanum tuberosum* L.) is a fundamental pillar of international food security. According to FAOSTAT (2013) and Devaux et al. (2020), this tuber is cultivated across more than 95 countries, covering approximately 19 million hectares of arable land. With a total global output reaching 378 million tons, production is heavily concentrated in Asia and Europe, led primarily by China, followed by India and Russia. In Tunisia, the potato has transitioned into a staple food of strategic importance, reflected by a significant rise in per capita consumption from 22.6 kg/year in 1990 to over 30 kg/year in 2022 (ONAGRI, 2022). Currently, this crop accounts for 16% to 19% of the total annual area dedicated to irrigated vegetable production, covering approximately 24,700 hectares. While annual production levels fluctuate, they average 443,000 tons, typically ranging between 350,000 and 460,000 tons. National yields have shown a similar variability, averaging 16 t/ha over time, with recent figures reaching approximately 18 t/ha in 2020.

Despite this evolution, the Tunisian potato sector faces multi-dimensional challenges that hinder its full potential. Structurally, the industry is characterized by a complex, non-institutionalized network of diverse stakeholders, which complicates coordinated management. Environmental factors, particularly bioclimatic diversity and significant interannual and seasonal fluctuations in cultivated areas, further destabilize production. Critically, Tunisia's average yield remains low in comparison to both regional and international benchmarks. While Tunisia averages 16–18 t/ha, neighboring North African countries report higher productivity, such as Algeria (25 t/ha), Egypt (26 t/ha), and Morocco (28 t/ha), while European producers like Spain (33 t/ha) and France (48 t/ha) achieve significantly higher outputs. This performance gap is further evidenced by the internal yield disparity among Tunisian producers, where high-performing seasonal crops reach 30 to 45 t/ha, highlighting a substantial margin for technical and agronomic improvement. The stagnation and uncertainty within this sector are driven by a convergence of technical, socio-economic, and environmental constraints. Technical limitations, including the slow adoption of modern technologies, sub-optimal agricultural practices, and a disconnect between research findings and field extension methods, directly impact efficiency. These are compounded by socio-economic barriers such as the varying technical proficiency of producers, fragmented organizational structures, limited access to credit, and volatile market prices for both inputs and final produce. Furthermore, structural issues, notably the small size of family farms, impede economies of scale. Finally, the increasing frequency of climatic hazards and the broader impacts of climate change introduce significant interannual variability in productivity. These fluctuating indicators create a precarious environment for farmers, necessitating the development of resilient strategies to ensure the sustainability and profitability of the potato value chain in Tunisia.

Beyond technical and environmental barriers, the agricultural sector is increasingly defined by systemic uncertainty. Biotic stresses, including the evolution of resistant pathogens, pests, and invasive weeds, continuously challenge existing control protocols. Simultaneously, climate change acts as a risk multiplier, shifting precipitation patterns and increasing the frequency of thermal stress and extreme weather events. To mitigate these threats and ensure food security, it is imperative to transition toward adaptive management strategies that foster sustainable yield intensification. In this context, addressing the downward pressure on agricultural productivity has become a research priority, particularly as farmers navigate a landscape shaped by rapid socio-economic and environmental mutations.

A critical lever for revitalizing the potato sector lies in the efficacy of agricultural extension services. By bridging the gap between scientific innovation and field application, extension services facilitate the dissemination of technical knowledge, optimized inputs, and resilient technologies to rural communities. While the scientific community has identified diverse technical and institutional pathways to enhance productivity, the practical impact of these methods depends heavily on the communication channels used to reach the end-user. Consequently, this study

examines the interface between extension services and potato cultivation, focusing on the mechanisms of information transfer and the barriers to adoption.

The overarching aim of this research is to investigate how the integration of agricultural extension services shapes potato productivity within the Tunisian context. To achieve this, the study seeks to elucidate the socio-economic and structural drivers that govern a producer's decision to adopt these services, thereby providing a robust, evidence-based framework for the sustainable enhancement of the national value chain. Within this scope, the research tests two central hypotheses: first, that active participation in agricultural extension programs correlates significantly with improved potato yields (H1); and second, that the specific pedagogical approach – ranging from individualized coaching to collective group training – plays a decisive role in optimizing resource management efficiency and overall farm performance (H2).

2. Materials and methods. Agricultural Extension Methods used

2.1. Mass Extension Method

Mass agricultural extension is an approach aimed at disseminating agricultural knowledge on a large scale, reaching a wide number of farmers and stakeholders within the agricultural sector. Its primary objective is to maximize impact in terms of improving agricultural practices and enhancing productivity.

This method relies on various communication tools to transmit information, including brochures, leaflets, posters, radio, television, websites, as well as text messages (SMS) and voice messages delivered via mobile phones. The main characteristic of this approach lies in the dissemination of standardized, simple, and low-cost information, enabling broad geographic and social coverage. However, this method offers limited direct interaction with farmers and only marginally considers local specificities.

2.2. On-Farm Demonstration

On-farm demonstration is a widely used agricultural extension method designed to show farmers how to apply new agricultural techniques or technologies directly in field conditions. This approach allows farmers to observe the concrete benefits and tangible results of recommended practices, thereby facilitating experiential learning.

By providing hands-on experience, on-farm demonstrations enhance farmers' technical skills and promote the rapid and effective adoption of agricultural innovations. By making the benefits of improved practices visible, this method significantly contributes to increased yields, improved sustainability, and enhanced resilience of agricultural production systems in the face of environmental and economic constraints.

2.3. Approaches to Agricultural Extension

Agricultural extension approaches encompass the set of methods and strategies used to disseminate agricultural knowledge, information, and technologies to farmers, taking into account institutional, socio-economic, and environmental contexts.

2.4. Generalist Extension Approach

The generalist approach to agricultural extension is based on the assumption that agricultural information and techniques exist but are not adequately utilized by farmers. It aims to disseminate a broad range of agricultural knowledge and practices in a comprehensive manner, providing farmers with a general knowledge base that enables informed decision-making across different agricultural domains. The outcomes of this approach are commonly assessed through adoption rates of recommended practices and increases in national agricultural production.

2.5. Training and Visit Approach

The training and visit (T&V) approach emphasizes regular field visits and structured training sessions delivered by specialists in various agricultural disciplines. It involves the establishment of a predefined schedule for training activities and field visits, fostering close collaboration between researchers, extension agents, and farmers. The effectiveness of this approach is primarily evaluated based on increases in the production of targeted crops or commodities.

2.6. Project-Based Approach

The project-based approach involves the implementation of specific extension activities within a defined geographical area and over a limited time period, often supported by external funding. Its main objective is to demonstrate agricultural techniques and

methods that can be adopted and sustained by farmers beyond the project's completion. The results of this approach are generally measured through short-term changes observed at the project sites.

2.7 Participatory Approach

The participatory approach to agricultural extension is based on the active involvement of farmers in the planning, decision-making, and implementation of extension activities. It acknowledges and values farmers' local knowledge and expertise while promoting mutual learning between extension agents and farmers. This approach enhances ownership, relevance, and long-term sustainability of agricultural innovations.

2.8. Agricultural Systems Development Approach

The agricultural systems development approach adopts a holistic and systemic perspective, focusing on integrated and sustainable agricultural development. It aims to improve agricultural practices in a comprehensive manner by considering environmental, economic, and social dimensions. This approach promotes efficient use of natural resources, farm sustainability, food security, resilience to climate change, and the well-being of farmers and rural communities.

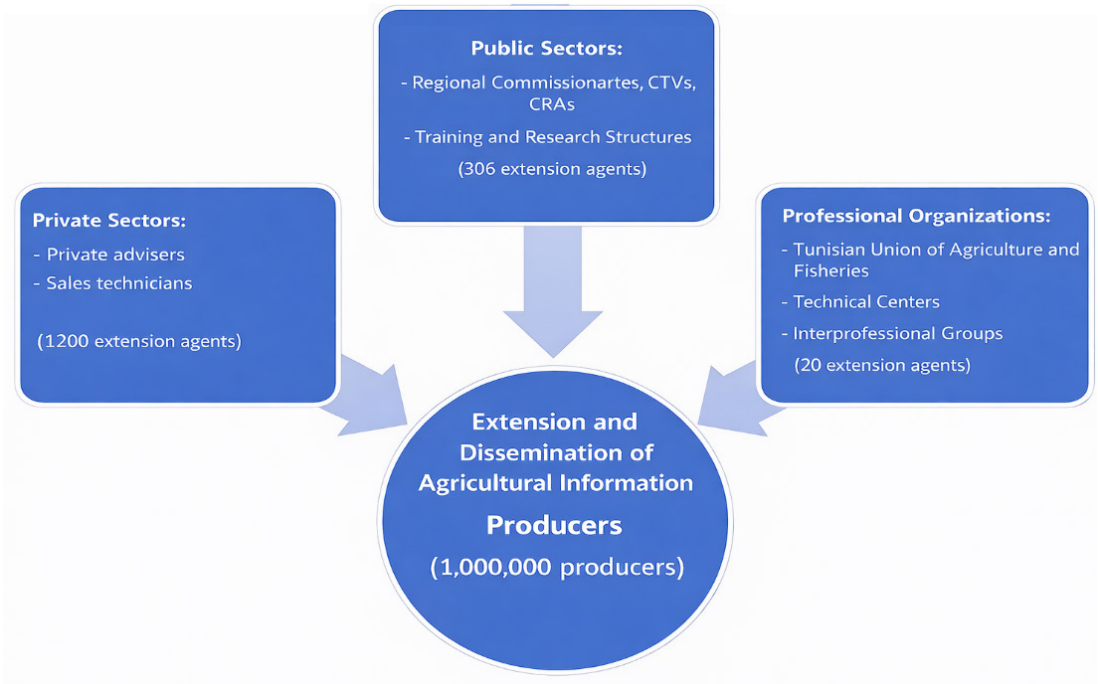
2.9. Education-Based Institutional Approach

This approach relies on educational and research institutions that possess the technical knowledge and scientific expertise required to provide extension services to rural populations. Extension activities are generally designed by institutions responsible for developing academic curricula and focus primarily on the transfer of technical knowledge. This centralized, state-driven approach is based on the assumption that necessary techniques and information exist but are underutilized. Its outcomes are measured through adoption rates of recommended practices and increases in national agricultural production.

2.10. Cost-Sharing Approach

The cost-sharing approach aims to involve local populations in financing agricultural development programs. It is based on the principle that sharing costs with beneficiaries enhances their commitment and accountability, while improving the relevance and sustainability of extension interventions (Figure.1).

Figure 1. *Structure of the agricultural extension and knowledge dissemination system in Tunisia potato production*



This study is based on an empirical approach to analyze the effect of agricultural extension services on potato productivity in Tunisia. The methodology combines a field

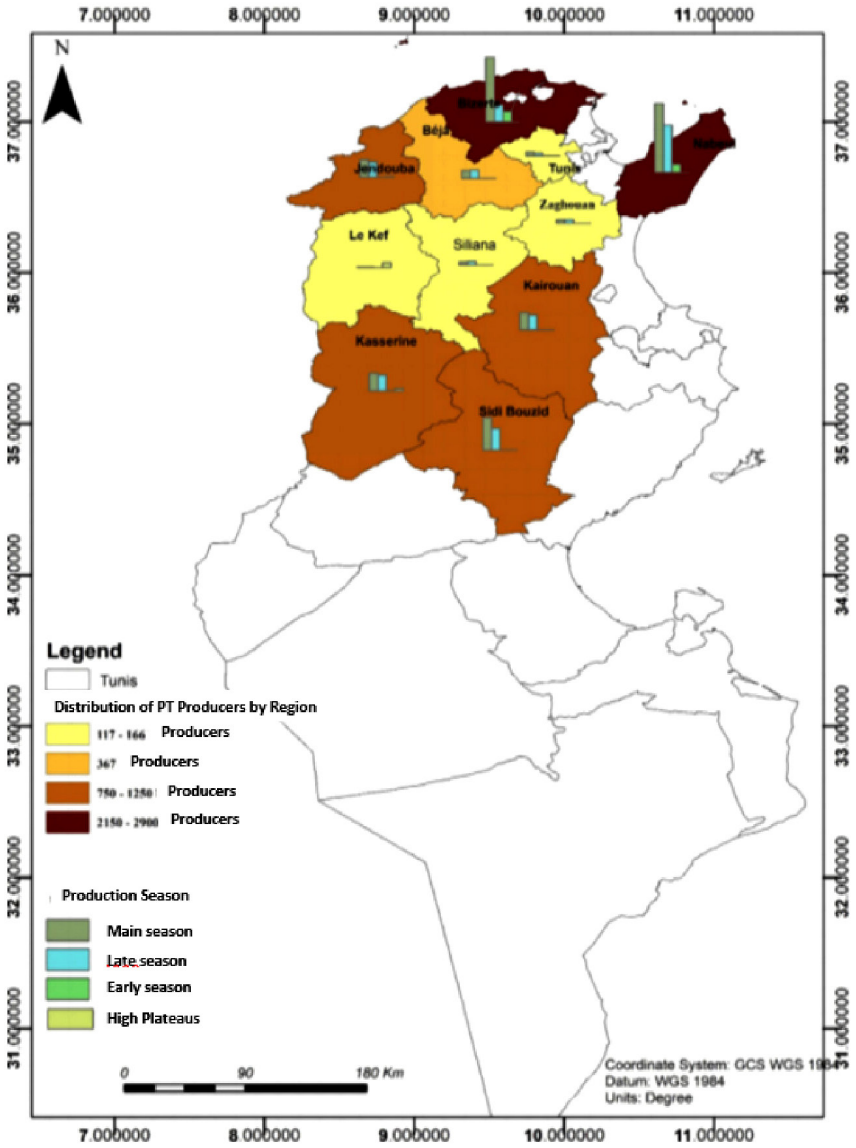
survey of producers and semi-structured interviews with institutional actors in agricultural extension.

Primary data collection was carried out through the development and administration of a structured questionnaire to potato producers, supplemented by visits and interviews with extension workers from public and professional structures (Agricultural Development Groups (GDA), Regional Agricultural Development Commissions (CRDA), Agricultural Investment Promotion Agency – APIA, etc.). This dual approach allows cross-referencing of producers' perceptions with those of extension agents to obtain a more complete vision of the functioning and effectiveness of extension services.

The field survey took place in December 2022 and January 2023. Interviews with extension workers were conducted based on key concepts related to services offered, available human and material resources, implemented extension strategies, and observed results in terms of innovation adoption and yield improvement.

2.2. Characterization of the Study Area

Figure 2. *Geographic location of the studied governorates (Nabeul, Kairouan, and Sidi Bouzid) within the Tunisian bioclimatic zones*



The research was conducted across three strategic governorates that constitute the primary potato production hubs in Tunisia: Nabeul, Kairouan, and Sidi Bouzid (Figure

2) The selection of these regions is based on their significant economic contribution to the national potato value chain and their distinct agro-ecological profiles. Furthermore, these areas were chosen due to the documented variability in local yields, suggesting substantial potential for productivity optimization through enhanced agricultural extension and improved management practices.

2.3. Questionnaire Development and Sampling

The survey questionnaire was structured into four main parts. The first part covers the socio-demographic characteristics of producers, including age, education level, and agricultural experience. The second part concerns the farm structure, including cultivated area, irrigation sources, cropping systems, and motivations related to potato production. The third part is dedicated to the agricultural extension system. It examines technological information sources mobilized by farmers, their participation in training activities, their membership in professional or non-governmental organizations, as well as their perception and evaluation of received extension services. Finally, the fourth part analyzes the impact of these services on potato yields, to evaluate their effectiveness in the study areas shown in table 1.

Table 1. *Distribution of surveyed farmers by delegation*

Governorate	Delegation	Number of farmers
Nabeul	Korba	40
	El Midaa	25
Kairouan	Chrarda	30
Sidi Bouzid	Souk Jdid	25
	Awled Hafouz	12
Total	**132**	

2.4. Data Analysis Methods

After collection, data were coded, processed, and analyzed using statistical software. A descriptive analysis was first carried out to characterize farms, surveyed producers, and mobilized extension services.

To analyze the effect of agricultural extension on productivity, the study relies on the Cobb-Douglas production function, widely used in agricultural productivity analyses. This function expresses the relationship between agricultural production and the various inputs mobilized.

The data were analyzed using Tanagra software, allowing a qualitative and statistical analysis of the effect of extension on yield. Then, Ad-hoc software was used to specifically test the differentiated impact of public and private extension on productivity.

The econometric model estimated is as follows:

$$Y_i = C + \alpha SPDT_i + \beta Vpriv_i + \\ + Б Vpub_i + \varrho Age_i$$

Where Y denotes yield of potao in the surveyed farmer i,

$SPDT_{i:}$ participation in potato extension services,

$Vpriv_{i:}$ private extension,

$Vpub_{i:}$ public extension,

$Age_{i:}$ farmer's age and $C, \alpha, \beta, Б, \varrho$ the partmeters and constant term.

3. Results and discussion

3.1. Socio-Economic Characterization of Surveyed Farms

The analysis of farm variables is essential to understand potato production conditions and the technical and organizational choices adopted by farmers. These variables mainly concern land tenure, irrigation sources, as well as crop rotation practices.

3.1.1. Land Tenure Mode

Land tenure is a structuring element of the farm, as it directly influences investment decisions, resource management, and the sustainability of production systems. Results show that the majority of surveyed farmers own their land. Indeed, nearly 67.4% of op-

erators have land in full ownership, giving them greater land security and an increased capacity to engage in long-term investments.

3.1.2. Potato Irrigation Source

Potato being a crop highly dependent on irrigation, water availability and management are determining factors for farm productivity and sustainability. Survey results reveal that the majority of farmers (78%) obtain irrigation water from private wells. This situation reflects a significant dependence on groundwater resources, often associated with high pumping costs and risks of aquifer overexploitation.

3.1.3. Crop Rotation and Frequency of Potato Return

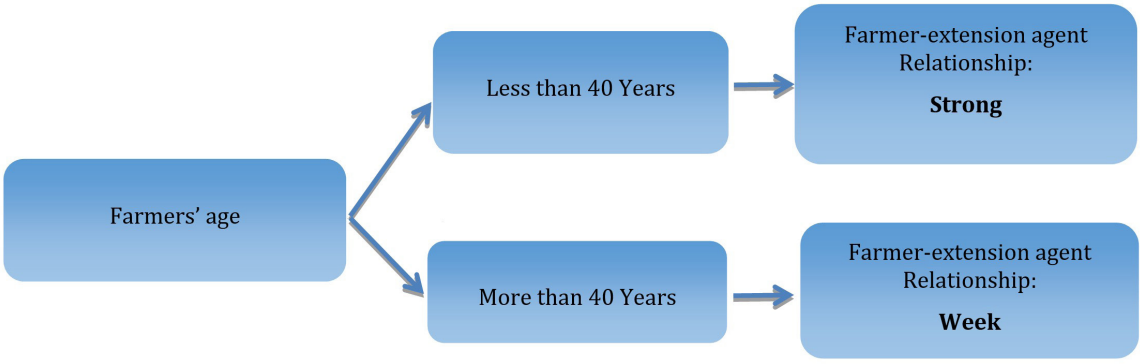
Crop rotation plays a key role in preserving soil fertility, reducing diseases, and improving agricultural yields. Survey results show that potato constitutes the main activity for nearly 93% of interviewed farmers. Among them, 57% respect crop rotation by cultivating potatoes on different plots, contributing to better agronomic sustainability.

3.2. Farmers' Perception vs. Agricultural Extension System

Figure 2 shows that when farmers are under 40 years of age, the relationship between extension agents and farmers is very strong. This can be explained by the fact that younger farmers actively seek useful information from resource persons, remain attentive to current developments, and place greater trust in new agricultural practices.

In contrast, farmers over 40 years of age tend to exhibit a weaker relationship with extension agents. According to these farmers, this weaker interaction is mainly explained by their professional maturity and the know-how acquired throughout their farming careers.

Figure 2. Effect of farmers' age on the type of relationship farmer-extension agent



Furthermore, the results derived from the decision tree identifying the relationship between farmers and extension agents indicate that when information originates from extension agents affiliated with the GIL and the CRDA, it is considered relevant and is likely to have a positive impact on income improvement.

Conversely, when the relationship between farmers and extension agents is weak, this suggests that farmers are less receptive to extension services and may be considering changing their agricultural activity.

3.2.1. Membership in Professional Agricultural Organizations

Analysis of survey results shows that 53% of farmers are members of at least one non-governmental Professional Agricultural Organization (OPA), such as UTAP, GDA, SMSA, or development associations. Membership in these structures allows farmers to benefit from technical services, organizational support, and better representation of their interests.

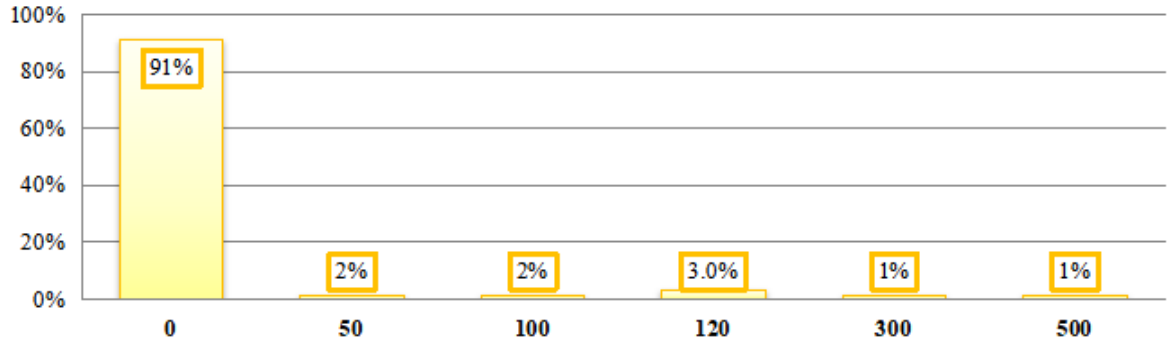
3.2.2. Specific Training in Potato Cultivation

Despite efforts by the Potato and Artichoke Technical Center (CTPTA), results indicate that 70% of farmers have not benefited from specific technical training for this crop. This low participation rate can be explained by the tradition of the activity, lack of information on training programs, and, in some cases, by behavior conditioned to the existence of material incentives.

3.2.3. Farmers' Willingness to Pay for Extension

Results show that over 91% of farmers are not willing to pay for agricultural extension services. This position is mainly justified by the continuous increase in production costs and the perception that the state should cover the extension system (figure 3).

Figure 3. *Farmers' willingness to pay for agricultural extension services*



Source: Our survey, 2022

Figure 3 shows that more than 91% of the interviewed potato farmers are not willing to pay fees for services provided by agricultural extension. Farmers believe that the State should strengthen the extension system, explore alternative approaches adapted to the current context such as irrigation water scarcity and salinity, the emergence of new diseases, early disease detection, digitalized advisory messages, improved storage, and marketing support motivate extension agents to effectively carry out this essential task, and assume responsibility for financing the entire extension system. Farmers justify this position by the continuously rising cost of production, which makes them financially unable to bear additional expenses related to agricultural extension services.

3.3.4. Relevance of Agricultural Extension to Farmers

Table 2. *Perceived relevance of agricultural extension*

Level of relevance	Not important at all	Slightly important	Moderately important	Important	Extremely important
Frequency	47	30	14	28	13
Percentage %	35	23	11	21	10

Source: Our survey, 2022

The table 2 highlights farmers' perceptions of the agricultural extension system. Survey results indicate that only 42% of the surveyed farmers (132 respondents) consider current extension systems to be relevant, with perceived levels ranging from extremely important (10%), important (21%), to moderately important (11%).

These findings indicate a clear need to implement new and more attractive agricultural extension methods. Farmers express a strong demand for change and improvement in existing extension systems. It is therefore essential to take these results into account when redesigning extension approaches, making them more effective, more relevant, and better aligned with farmers' needs. Furthermore, farmers' preferences regarding content, format, and information delivery methods should be considered to enhance the relevance and usefulness of agricultural extension services.

3.3. Effect of Extension on Seasonal Potato Yield

Table 3 shows that the effect of private and public extension on potato yield is highly significant. This suggests that extension activities, whether conducted by private or public entities, have a positive impact on potato crop yields. Hence the importance of agricultural extension in improving cultivation practices, adopting effective agricultural techniques, and increasing potato crop yields. These results support the need to continue investing in extension programs to promote sustainable

and productive agriculture. Note that private extension is more important than public extension (C = 0.186 > 0.143), explained by the fact that private extension workers have equipment in good condition and technologically more advanced than those of state extension workers, able to move throughout the territory at any time without any problem.

Table 3. *Estimation model of the effect of extension on seasonal potato yield*

Variable	Coefficient	Significance
(Constant)	1.276**	0.00**
Seasonal potato area (SPDT)	0.008	0.222
Private extension (Vpriv)	0.186**	0.002**
Public extension (Vpub)	0.143**	0.001**
Age	–0.001	0.454
R^2 = 18%		

***Significant at 1%*

According to the table, it is also noted that area has no effect on potato yield (sig=0.222), confirming Sridhar (2007) who shows through a study on the relationship between farm size and productivity an inverse relationship between farm size and production per hectare.

3.4. Effect of Extension Method on Seasonal Potato Productivity

Agricultural extension services significantly influence potato (PDT) yield outcomes, mediated by farmers' socioeconomic characteristics and perceptions. Decision tree analysis conducted using Tanagra software reveals that access to public extension institutions (CRDA, CTPTA) or private consultants is associated with average yields when advisory services are perceived as important or quite important, combined with higher income levels (1,000 to 4,000 TND) and primary to secondary education. Notably, farmers supported by the CRDA achieve superior yields, underscoring the importance of information quality and institutional effectiveness, while CTPTA and private consulting services are linked to intermediate yield outcomes. Conversely, limited engagement with extension services characterized by low perceived relevance, incomes below 1,000TND, and low educational level attainment systematically results in low yields. Interestingly, even in the absence of formal extension services, farmers who perceive advisory support as moderately relevant can attain average yields, suggesting that perception of relevance alone may encourage the adoption of improved agricultural practices. However, distrust in extension systems often arising from service unavailability or a lack of specialized expertise frequently shifts farm management responsibility entirely to farmers, thereby constraining productivity. Overall, these findings highlight agricultural extension services as a critical lever for enhancing productivity, whose effectiveness depends on socioeconomic conditions, institutional credibility, and farmers' attitudes toward advisory support.

4. Conclusions and Policy Recommendations

This study investigated the impact of agricultural extension services on potato productivity in Tunisia. Our findings reveal significant gaps in the current Agricultural Extension System (AES); only 30% of surveyed farmers received specialized potato training, while participation in broader extension programs remained low at 42%, despite 53% of respondents holding memberships in professional agricultural organizations. Extension agents identified critical sectoral deficiencies, specifically a lack of logistical support, transportation, and specialized equipment, which severely constrain their outreach and operational efficiency.

Data analysis via a decision tree model demonstrates that access to extension services is a primary determinant of yield performance, with participants achieving average-to-high yields, whereas non-participants were largely restricted to average-to-low productivity. No-

tably, the model suggests that income levels and formal education are not primary drivers of yield in this context, highlighting the vital role of specialized technical support. Furthermore, the results from the Ad hoc model confirm the central hypothesis: agricultural extension services exert a statistically positive influence on potato yields. This indicates that the dissemination of technical knowledge effectively enhances on-farm performance and optimizes agricultural practices.

Ultimately, this work suggests that the Tunisian AES remains rooted in a conventional "top-down" (research–extensionist–farmer) paradigm. To address modern challenges, a fundamental shift toward a more integrated and multidimensional vision is required.

Recommendations for Sectoral Development

To modernize the potato value chain and enhance the efficiency of the extension system, the following strategic measures are proposed:

– Digitalization of Outreach: Diversify communication channels by integrating social media platforms (e.g., Facebook, LinkedIn) to facilitate real-time information sharing and peer-to-peer resource exchange among producers;
– Technological Integration: Develop dedicated mobile agricultural applications to streamline the dissemination of technical protocols, climate alerts, and market data;
– Institutional Synergy: Establish robust public-private partnerships (PPP) to create a coordinated national framework for the exchange of technical innovations and advisory services;
– Fiscal Support: Advocate for targeted state intervention through dedicated budgetary allocations specifically for the modernization of extension infrastructure and logistical capacities;
– Participatory Innovation: Transition toward a "bottom-up" approach where technical innovations emerge from horizontal interactions between researchers, extension agents, and producers, ensuring that research findings are contextually relevant to farmers' needs.

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Section 4. Management

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SPIRITUAL VALUES IN MANAGERIAL DECISION-MAKING AND TEAM MANAGEMENT: TOWARD A HIERARCHICAL MODEL OF MANAGERIAL VALUES

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Abstract

In contexts shaped by technological change, economic uncertainty, and rising social expectations, organizations are increasingly expected to reconcile performance with ethical responsibility and human development. This article examines the role of spiritual values in managerial decision-making and team management and proposes a hierarchical model of managerial values represented as a colored pyramid. The study is based on a conceptual analysis of the literature on workplace spirituality, spiritual leadership, ethical management, and organizational behavior. Spiritual values are defined not in religious terms, but as universal inner orientations related to meaning, authenticity, integrity, compassion, transcendence, and commitment to the common good. The analysis shows that spiritual values deepen managerial judgment, reinforce ethical decision-making, strengthen interpersonal relations, and contribute to employee well-being and organizational sustainability.

Keywords: *workplace spirituality; managerial values; spiritual leadership; decision-making; team management; ethical leadership*

Introduction

Contemporary organizations operate in a climate of volatility, digitalization, ecological pressure, and increased demands for social responsibility. Under such conditions, managers are expected not only to ensure efficiency, but also to protect human dignity, cultivate trust, and align organizational goals with broader societal interests. Within this context, spiritual values have become an important dimension of management theory and practice.

In organizational studies, spiritual values refer to deep principles that orient individuals and institutions toward a purpose that transcends immediate material interests. They include integrity, compassion, authenticity, humility, service, inner peace, and responsibility for the common good. These values are not reducible to religion. Rather, they express

a universal aspiration for meaning, coherence, truth, and connection with others and with a purpose greater than the self. This distinction is especially important in plural organizational settings, where spirituality can function as an inclusive and humanistic category.

Mitroff and Denton (1999) described workplace spirituality as the search for ultimate meaning and connection with something larger than oneself. Fry (2003) conceptualized spiritual leadership through vision, hope or faith, and altruistic love. Giacalone and Jurkiewicz (2003) emphasized transcendence through work and connection with others, while Lips-Wiersma (2003) highlighted authenticity, unity, service, and meaning. Subsequent studies connected workplace spirituality with job satisfaction, lower turnover, engagement, well-being, innovation, and sustainable performance.

Despite this growing body of research, the structural place of spiritual values within the broader hierarchy of managerial values remains insufficiently conceptualized. This article therefore has two aims: to examine the impact of spiritual values on managerial decision-making and team management, and to propose a hierarchical model showing how spiritual values relate to other value categories in managerial practice. The model is presented as a colored pyramid and is referred to in the text as Figure 1.

Method

This article adopts a qualitative conceptual approach based on a structured review and interpretive synthesis of the literature contained in the source text provided by the author. The analysis brings together classical and contemporary contributions in workplace spirituality, spiritual leadership, ethical leadership, employee well-being, and team management. Its purpose is not to test a causal hypothesis, but to clarify concepts, identify recurrent dimensions, and organize them into a coherent theoretical framework.

The procedure involved three stages. First, the literature was reviewed to identify the principal definitions of spiritual values and to distinguish spirituality from ethics and religion. Second, the reported effects of spiritual values on managerial decision-making and team functioning were compared. Third, based on this synthesis, a hierarchical model of managerial values was constructed. The model includes five levels: basic, instrumental, interpersonal, ethical, and spiritual values. Each level was associated with a color whose symbolic meaning was drawn from color psychology, making the pyramid both a visual and theoretical representation of the progressive deepening of managerial consciousness.

Results

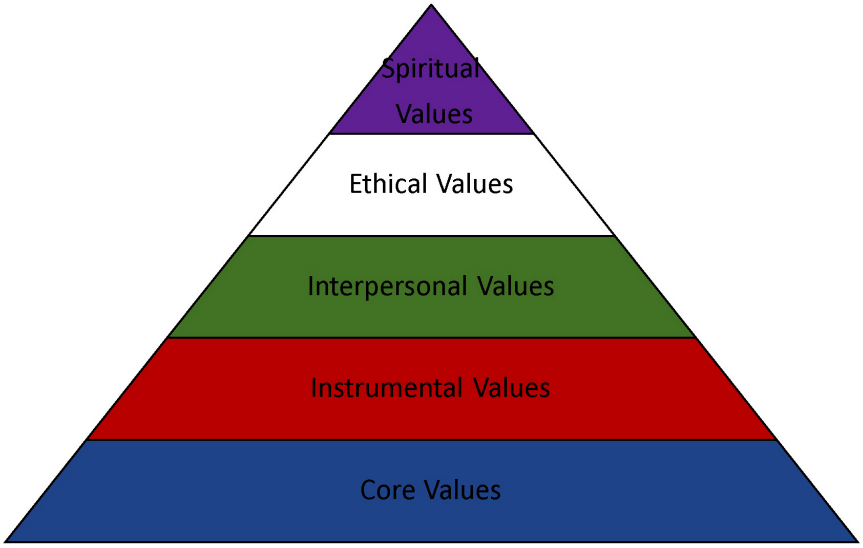
The analysis indicates that spiritual values exert a multidimensional influence on management. First, they shape managerial decision-making by providing an internal compass that complements formal ethical rules. Ethics answers the question of what ought to be done according to accepted norms, whereas spirituality addresses why one acts and what deeper meaning guides action. In organizational life, this distinction is crucial. A manager may comply with regulations and still act without moral depth, whereas spiritually grounded leadership implies alignment between action, conviction, and purpose.

Second, spiritual values foster more ethical and socially responsible decisions. Leaders guided by integrity, humility, compassion, and service are more likely to consider the long-term consequences of decisions for employees, communities, and the environment. Such a perspective expands managerial reasoning beyond short-term profitability and encourages more sustainable governance. In periods of crisis, spiritual values such as hope, resilience, and inner stability may also support thoughtful rather than reactive decision-making (De Klerk, 2021).

Third, spiritual values strongly affect team management. The literature reviewed in the source text shows that authenticity, empathy, mutual respect, and recognition improve cohesion, communication, trust, and collective resilience. Employees who perceive their work as meaningful and who feel recognized in their full humanity demonstrate stronger motivation, engagement, and commitment. Workplace spirituality therefore supports both individual well-being and collaboration (Fry & Egel, 2021).

On the basis of this review, the article proposes a hierarchical model of managerial values, represented in Figure 1.

Figure 1. *Hierarchy of a Manager's Values*



Source: Authors own work

At the base of the pyramid are basic (core) values, including punctuality, discipline, reliability, loyalty, and rigor. These values form the elementary conditions of professional credibility and stable functioning. The second level consists of instrumental values, such as initiative, adaptability, competence, creativity, and result orientation. These values guide managerial effectiveness and the capacity to achieve organizational goals. The third level is formed by interpersonal values: empathy, listening, cooperation, trust, mutual respect, and the ability to inspire others. At this stage, the manager is no longer focused only on performance but also on the quality of relationships. The fourth level contains ethical values, including honesty, justice, transparency, responsibility, integrity, and moral courage. These values orient managerial conduct toward fairness and accountability. At the summit of the pyramid are spiritual values. These include compassion, altruism, humility, gratitude, inner peace, transcendence of ego, harmony, global vision, and commitment to a higher purpose. Spiritual values are the most subtle and encompassing because they do not abolish the lower levels but integrate them into a more conscious and humanistic mode of leadership.

The model also incorporates a color interpretation. Blue is associated with the basic level because it symbolizes stability and reliability. Red corresponds to instrumental values because it conveys action, energy, and performance orientation. Green represents interpersonal values, reflecting harmony, growth, and positive social interaction. White is linked to ethical values because it suggests clarity, honesty, impartiality, and moral transparency. Violet marks the spiritual level, as it is traditionally associated with wisdom, contemplation, transcendence, and spiritual awakening.

Discussion

The proposed pyramid suggests that spiritual values occupy the highest place in the hierarchy of managerial values because they presuppose the consolidation of the preceding levels. A manager cannot credibly embody compassion, transcendence, or service to the common good while lacking discipline, competence, relational maturity, or ethical judgment. Spiritual values therefore become effective only when they rest on a solid foundation of enacted professional and moral values.

This interpretation reframes management as a developmental process. Leadership does not evolve solely through the acquisition of technical skills; it also involves the gradual interiorization of deeper values. It also explains why attempts to introduce spirituality into organizations may fail when they are reduced to rhetoric or superficial well-being initiatives. Spiritual values cannot be decreed administratively. They require

personal maturation, reflective capacity, and organizational conditions consistent with dignity, trust, and responsibility.

At the same time, the model should not be interpreted too rigidly. Human development is complex, and value integration does not always follow a strictly linear sequence. The boundaries between levels remain porous, and the model is heuristic rather than dogmatic. Its value lies in offering a structured way to think about the interplay between operational effectiveness, ethical responsibility, and existential meaning.

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MANAGEMENT OF STRATEGIC DEVELOPMENT OF AN ENTERPRISE

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Abstract

The article examines the theoretical and practical aspects of managing the strategic development of an enterprise in the context of a dynamic external environment. The study is based on the analysis of the private enterprise "Kalynskyi Kliuch," operating in the agricultural sector. Particular attention is paid to the assessment of financial and economic performance indicators, which reflect the effectiveness of strategic management decisions. The research identifies a positive trend in the enterprise's development, including a 6.6-fold increase in revenue, improved profitability, and strengthened financial stability. At the same time, certain constraints, such as the high level of depreciation of fixed assets and insufficient innovation activity, have been identified. The study substantiates the need for implementing a comprehensive strategic management approach focused on modernization, digitalization, and efficient resource utilization. The results obtained can be used to improve strategic decision-making and ensure sustainable development of enterprises in the agricultural sector.

Keywords: *strategic management, enterprise development, financial stability, competitiveness, agricultural enterprise, efficiency, innovation, resource management*

Introduction:

In modern economic conditions, enterprises operate in a highly competitive and dynamic environment characterized by uncertainty and rapid changes. This necessitates the application of strategic management approaches aimed at ensuring long-term development, adaptability, and sustainability.

Strategic development management plays a crucial role in shaping the competitive advantages of enterprises and enhancing their ability to respond effectively to external challenges.

The agricultural sector is particularly sensitive to environmental changes due to its dependence on natural, economic, and technological factors. Therefore, the development and implementation of effective strategies are essential for improving performance and ensuring stable growth. In this context, the study of strategic development management at the enterprise level becomes especially relevant.

Methodology and the Purpose of the Study:

The purpose of this study is to assess the effectiveness of strategic development management of an enterprise and to identify key directions for its improvement in the context of a changing external environment.

The methodological basis of the research includes general scientific and special methods, such as analysis and synthesis, comparison, systematization, and generalization. Financial and economic analysis methods were applied to evaluate the performance indicators of the enterprise, including profitability, liquidity, financial stability, and efficiency of resource utilization. The study is based on the analysis of statistical and financial data of the private enterprise "Kalynskyi Kliuch" for the period 2022–2024.

Research Objectives:

To analyze the strategic development and financial performance of "Kalynskyi Kliuch" enterprise in order to identify opportunities for improving competitiveness, resource efficiency, and long-term sustainability.

Literature Review

The issue of strategic management and enterprise development has been widely studied by both domestic and foreign scholars. The theoretical foundations of strategic management were developed in the works of well-known researchers such as I. Ansoff, M. Porter, and H. Mintzberg, who emphasized the importance of strategic planning, competitive advantage, and adaptability in achieving long-term success.

Modern studies focus on the integration of strategic management with innovation, digitalization, and sustainable development. Researchers highlight that effective strategic development management requires a comprehensive approach that combines internal resource potential with external environmental opportunities.

In the context of agricultural enterprises, particular attention is paid to the impact of natural and economic factors on strategic decision-making. Scholars emphasize the importance of efficient resource use, technological modernization, and the development of competitive strategies to ensure sustainable growth in the agricultural sector.

Analysis of results

Effective management of the strategic development of an enterprise is a key factor in ensuring its long-term competitiveness, financial stability, and adaptability to changes in the external environment. Under modern economic conditions, enterprises operate in an environment of increased uncertainty, which necessitates the application of a strategic management approach focused on forecasting, flexibility, and the rational use of resources. This is particularly important in the agricultural sector, where performance outcomes largely depend on natural and climatic, economic, and technological factors (Bielko I. A., 2018).

The object of the study is the private enterprise "Kalynskyi Kliuch," located in the village of Kalynia, Kamianets-Podilskyi district, Khmelnytskyi region. The main mission of the enterprise is the production and sale of agricultural products and their processed goods. The implementation of this mission is based on the efficient use of land resources, labor potential, technical support, and the introduction of modern technologies. The strategic goal of the enterprise is to increase the production of competitive products while simultaneously reducing costs and increasing profitability.

The enterprise specializes in the cultivation of grain and leguminous crops, oilseed crops, as well as dairy cattle breeding. In 2024, the area of agricultural land amounted to 761.36 hectares, which ensures a sufficient level of production potential for the

implementation of strategic development directions. Favorable natural and climatic conditions, including fertile chernozem soils, average annual precipitation of 550–600 mm, and a temperate climate, create the prerequisites for efficient agricultural production.

The organizational structure of the enterprise is based on a functional principle and includes production units and management services. Overall management is carried out by the director, who is responsible for the formation of the development strategy, coordination of the activities of structural units, and control over the achievement of established goals. An important role is played by specialized departments – agronomic, engineering, economic, and financial – which ensure the implementation of managerial decisions and improve the efficiency of the enterprise's functioning.

In the context of strategic management, the analysis of the dynamics of financial and economic indicators is of particular importance. The study showed that during 2022–2024, PE "Kalynskyi Kliuch" demonstrates steady growth in its key performance indicators. In particular, net revenue from sales in 2024 amounted to UAH 85,412 thousand, which is 6.6 times higher than in 2022. This dynamic is explained by the expansion of production, increased efficiency of sales activities, and the enterprise's adaptation to market conditions.

The cost of production increased by 2.2 times during this period, which is associated with rising expenses for material and technical resources, energy, and labor. However, the faster growth of revenues compared to costs indicates effective cost management. The net profit of the enterprise increased by 2.6 times, confirming the improvement in the efficiency of its economic activity.

The profitability of net revenue in 2024 reached 22.86%, which is 18.62 percentage points higher than in 2022. This indicates efficient resource utilization and the correctness of the chosen development strategy. At the same time, the return on equity increased by more than 22 percentage points, enhancing the investment attractiveness of the enterprise.

The analysis of assets showed that their total value in 2024 amounted to UAH 85,412.3 thousand, which is 43.9% higher compared to previous periods. The growth of assets occurred due to an increase in both non-current and current assets. Equity increased by 41.5%, contributing to a higher level of financial independence.

The equity ratio in 2024 reached 0.64, exceeding the standard value and indicating a sufficient level of financial stability. The financial dependence ratio decreased to 1.56, confirming a reduction in reliance on external sources of financing.

Liquidity indicators show a positive trend: the absolute liquidity ratio amounted to 0.31, the quick ratio to 1.12, and the current ratio to 1.64. This indicates the enterprise's ability to meet its short-term obligations in a timely manner and maintain a stable financial position.

At the same time, the analysis of production potential revealed certain problematic aspects. In particular, the share of production assets in the structure of property decreased from 83.5% to 80.0%, while the depreciation level of fixed assets increased to nearly 50%. This indicates the need for modernization of the material and technical base and the introduction of innovative technologies in production.

Asset turnover increased from 40.35 to 85.91 times, indicating improved efficiency in resource utilization. This dynamic is an important indicator of successful strategic management.

An important element of strategic development is the analysis of the external environment. The study showed that the enterprise operates in a highly dynamic market environment, with a level estimated at 4.0–4.5 points. The greatest impact on the enterprise's activities is exerted by economic factors, including inflation, the level of consumer purchasing power, and access to financial resources.

Political factors also play a significant role, as changes in tax legislation and state support for the agricultural sector directly affect the efficiency of enterprise operations. Technological factors determine the possibilities for innovation implementation, which is a key direction of strategic development (Bilous S. P., Trokhymenko A. S., Kaminskyi V. V., 2024).

The analysis of the competitive environment indicates the presence of a significant number of enterprises actively implementing modern technologies and marketing tools. This increases the level of competition and requires PE "Kalynskyi Kliuch" to continuously improve its activities.

Among the strengths of the enterprise are its positive business reputation, production stability, efficient use of resources, and the ability to expand into new markets (Dudnyk O. V., 2025). At the same time, weaknesses include a low level of innovation, limited investment resources, and the need to update fixed assets.

To improve the effectiveness of strategic development, the enterprise should implement a set of measures aimed at modernizing production, introducing digital technologies into management, optimizing costs, and expanding distribution channels. Particular attention should be paid to the formation of a clear competitive strategy that will strengthen the enterprise's market position.

An important direction of strategic development is also the improvement of personnel management, which includes enhancing motivation systems, increasing employee qualifications, and developing professional competencies. This will contribute to increased labor productivity and product quality.

In addition, the strategic development of the enterprise should be focused on the implementation of innovative solutions, including modern agricultural technologies and digital systems for managing production and resources, which will increase efficiency and reduce costs.

Conclusions

Thus, the results of the study indicate that PE "Kalynskyi Kliuch" is characterized by positive development dynamics, with revenue growth of 6.6 times, an increase in profitability to 22.86%, and strengthened financial stability, which confirms the effectiveness of strategic development management. At the same time, the identified problems, including the high level of depreciation of fixed assets and insufficient innovation activity, must be taken into account when forming further strategy. The implementation of a comprehensive approach to strategic management aimed at production modernization, improving resource efficiency, and adapting to changes in the external environment will ensure sustainable development and strengthen the enterprise's competitive position in the long term.

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STRATEGIC CLIENT RELATIONSHIP MANAGEMENT IN THE B2B TELECOMMUNICATIONS SECTOR: A FRAMEWORK FOR SUSTAINABLE CORPORATE PARTNERSHIPS

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Abstract

This article examines the critical success factors in Business-to-Business (B2B) client relationship management within the telecommunications industry, drawing on empirical observations from large-scale multinational operations. Through analysis of corporate account management practices at leading telecommunications providers, this study identifies key strategic frameworks that enhance client retention, service level agreement (SLA) compliance, and long-term partnership sustainability. The findings have practical implications for organizational management specialists, corporate account managers, and business administration professionals seeking to optimize B2B client relationships in competitive markets. The article also explores the broader evolution of the business administration discipline – from administrative support to strategic business partnership – demonstrating how modern administrators drive organizational excellence through interdisciplinary expertise, digital fluency, and strategic thinking.

Keywords: *B2B client relationship management, telecommunications, corporate account management, service level agreements, strategic partnership, business administration, organizational management, CRM, client retention, digital transformation*

Introduction

The telecommunications industry has undergone dramatic transformation over the past two decades, with B2B corporate services emerging as a critical revenue stream for major operators. Unlike consumer-facing retail services, corporate B2B relationships require sophisticated strategic management approaches, customized solution development, and sustained relationship investment.

Simultaneously, the field of business administration has undergone its own profound transformation. What was once primarily viewed as administrative support has evolved

into a sophisticated strategic discipline requiring advanced education, analytical capabilities, and genuine business acumen. This evolution reflects broader organizational changes and the growing recognition that exceptional administration drives competitive advantage.

This article explores proven methodologies for achieving excellence in B2B client management based on professional experience managing corporate portfolios at Vodafone Ukraine, part of the global Vodafone Group operating across 21 countries. It further situates these practices within the evolving landscape of modern business administration, arguing that the two phenomena – B2B relational excellence and the strategic repositioning of administration – are deeply interconnected.

International organizations require administrators who can navigate cross-cultural business environments, implement global standards while adapting to local contexts, and coordinate across time zones and regulatory systems. This interdisciplinary reality – combining design thinking, project management, data analytics, and communication theory – transforms administration from a support function into a strategic enabler.

Literature Review

Contemporary business administration literature emphasizes the importance of relationship marketing and strategic account management in B2B contexts (Kotler & Keller, 2016). Peter Drucker's seminal work on management by objectives and customer-centric business models provides foundational principles still relevant today. Recent research by Payne and Frow (2017) on customer relationship management (CRM) in telecommunications highlights the shift from transactional to relational approaches in corporate account management.

Porter (1985) established that sustainable competitive advantage arises not from individual activities in isolation, but from the coordinated system of activities that constitutes an organization's value chain. Applied to B2B telecommunications, this insight underscores the importance of viewing client relationship management not as an isolated function but as an integrated system spanning sales, service delivery, technical support, and executive engagement.

Drucker's (2007) emphasis on management by objectives is particularly relevant to SLA-driven environments, where measurable performance targets form the contractual and relational backbone of corporate partnerships. His insistence on customer-centric organizational design anticipates contemporary CRM theory by decades. The evolution of business administration from task execution to strategic thinking has been documented across organizational management literature. Traditional views emphasized task completion – managing schedules, processing documentation, coordinating logistics – but contemporary frameworks demand strategic alignment of administrative operations with organizational objectives (Kotler & Keller, 2016).

Methodology

This analysis draws on four years of professional practice (2018–2022) managing corporate client portfolios in telecommunications, supplemented by systematic observation of organizational practices, performance metrics analysis, and evaluation of client satisfaction indicators. The research examines practices implemented across multiple corporate accounts ranging from small-to-medium enterprises to large multinational corporations.

Qualitative methods were employed to identify patterns in client relationship development, with particular attention to SLA compliance trends, client retention outcomes, and the organizational conditions that enabled or constrained partnership sustainability. Supplementary analysis draws on 16 years of broader professional experience in business administration and organizational management.

Key Findings: Strategic Framework for B2B Excellence

Analysis of corporate portfolio management practice yields four interconnected strategic pillars that distinguish high-performing B2B relationships from transactional service arrangements.

1. Customized Solution Architecture

Corporate clients require tailored telecommunications solutions that align with

their specific business operations, security requirements, and scalability needs. A one-size-fits-all approach consistently fails in B2B contexts. Successful client management requires comprehensive needs assessment prior to solution design, a consultative rather than transactional approach, solution flexibility enabling adaptation as client needs evolve, and cross-functional integration spanning technical, commercial, and support teams.

2. **Proactive Relationship Management**

Exceptional B2B management demands proactive rather than reactive engagement strategies. This includes regular strategic reviews that surface emerging needs before they become problems, anticipatory problem resolution through continuous monitoring, value-added consulting that positions the account manager as a trusted advisor, and executive-level relationship building that secures institutional loyalty beyond individual contacts.

3. **SLA Excellence and Performance Optimization**

Service Level Agreements form the contractual foundation of B2B relationships. Rigorous performance monitoring against agreed SLA metrics, transparent communication when issues arise, continuous improvement cycles driven by performance data, and structured client feedback integration together constitute the operational backbone of partnership credibility.

4. **Strategic Contract Management**

Complex corporate contracts require sophisticated management capabilities including win-win negotiation frameworks that balance commercial sustainability with client value creation, risk mitigation strategies embedded in contract design, renewal optimization that begins well before contract expiry, and compliance excellence across all contractual dimensions.

Results and Discussion

Implementation of the strategic framework described above resulted in measurable improvements across key performance indicators during the period 2018–2022. Client retention rates improved significantly in portfolios where proactive relationship management protocols were consistently applied. SLA compliance metrics demonstrated sustained improvement in accounts receiving customized solution architecture versus those managed through standardized offerings.

These findings are consistent with Payne and Frow's (2017) theoretical framework, which identifies customer intimacy – the depth of understanding of a client's operations, culture, and strategic priorities – as the primary predictor of long-term partnership sustainability in B2B telecommunications contexts.

The parallel evolution of the business administration discipline reinforces these findings. Organizations that invest in administrators with genuine strategic capability – rather than limiting administrative roles to task execution – exhibit superior coordination, faster problem resolution, and more coherent client-facing operations. The interdisciplinary expertise described in this article, combining administrative management with design thinking, project management, and data analytics, directly supports B2B relationship quality.

Digital transformation has altered but not diminished the importance of the human relational dimension of B2B management. Technology removes repetitive transactional tasks but increases demand for strategic administrative expertise. Account managers who leverage CRM platforms, analytics dashboards, and automated monitoring tools are better positioned to dedicate cognitive resources to the high-value activities – strategic review, creative problem-solving, executive relationship cultivation – that determine partnership longevity. Working within Vodafone Ukraine – part of a global telecommunications network spanning 21 countries – demonstrated how administrative and relational excellence must simultaneously transcend geography and adapt to local contexts. Multinational B2B clients require account managers who understand cross-cultural business environments, can implement global service standards while accommodating local regulatory and cultural variation, and maintain coherent relationship continuity across organizational change on both sides of the partnership.

Practical Implications

Organizations seeking to optimize B2B client relationships should prioritize professional development that moves account man-

agers beyond technical product knowledge toward genuine strategic advisory capability. Technology infrastructure investment must be accompanied by training that enables staff to extract actionable insight from CRM and analytics platforms rather than merely entering data.

Cross-functional collaboration – breaking down silos between sales, technical, legal, and executive functions – is essential for delivering the integrated experience that sophisticated corporate clients demand. Performance measurement systems should track not only SLA compliance but leading indicators of relationship health such as frequency of strategic review meetings, client-initiated contact volume, and net promoter scores at decision-maker level.

A client-centric organizational culture, in which every function understands its contribution to the corporate client experience, ultimately determines whether individual relationship management competencies translate into sustained organizational performance. The strongest professionals will blend organizational skills with technological fluency, analytical capability, and change-leadership expertise.

Conclusion

Excellence in B2B client relationship management requires moving decisively beyond transactional interactions to strategic partnership models. The four-pillar framework presented here – customized solution architecture, proactive relationship management, SLA excellence, and strategic contract management – provides a practical guide for telecommunications organizations seeking to strengthen corporate client retention and satisfaction.

These findings reflect and reinforce a broader pattern in the evolution of business administration: the disciplines that once appeared purely operational are increasingly understood as sources of strategic value. Professionals who embrace this evolution – adopting a mindset of business enablement rather than task execution – will shape the future of organizational success in an increasingly complex and competitive world.

Future research should examine the long-term partnership outcomes of organizations that adopt systematically proactive B2B management models versus reactive ones, and investigate the relationship between administrative capability at organizational level and corporate client satisfaction scores.

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SOCIAL RISK MANAGEMENT AND FINANCIAL-STATISTICAL ANALYSIS OF COSTS

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Abstract

Evidence from industrialised nations indicates that governmental investments in social risk management substantially influence residents' quality of life. This study examines the segment of state spending allocated for social risk management. Social dangers emerge from the influence on metrics that define the level of living. To attain a favourable outcome in risk management, it is essential to identify risks, ascertain which indicators were not met, analyse the causes that triggered risk-generating factors, evaluate the degree of risk, and identify potential minimisation tools and management entities: the state or individuals. The objective of the study is to elucidate the relationship between the state's social policy expenditures and the quality of life of its residents through financial and statistical analysis. Data from the state budget regarding resources designated for social program financing, along with essential indices of living standards, like average wages, employment rates, and access to social services, are utilised.

The findings indicate that significant government expenditure on social risk management is directly correlated with enhancements in quality of life.

Augmented expenditure, particularly in social assistance, healthcare, and education, is favourably correlated with socio-economic variables, resulting in heightened income levels, job creation, and enhanced health quality.

Keywords: *Existence, financial and statistical analysis, Government expenditure, societal hazards*

1. Introduction

A significant difficulty confronting contemporary states is the assurance of social security for the populace. Social dangers, including poverty, unemployment, inadequate pension provision, health issues, and housing shortages, consistently impact people' quality of life and the sustainability of governmental institutions. Under these circumstances, the state's proactive involvement in social policy becomes criti-

cally significant. In the context of globalisation, demographic shifts, and economic instability, addressing societal risks cannot be achieved solely at the individual level. Consequently, it is imperative to develop a state strategy that guarantees the detection, prevention, and mitigation of risks. Efficient management of social hazards establishes the foundation for sustainable growth, social equity, and civil stability.

The matter of social risk management is very pertinent in Georgia. Economic challenges, geographical inequalities, and demographic changes necessitate robust and efficient governmental involvement. It is essential to evaluate current procedures, exchange international experiences, and identify future development potential for the system.

This study aims to deliver a theoretical and practical examination of social risk management in Georgia. The essay examines the nature of social risks, the state's role in their management, and the existing political and institutional frameworks. Social hazards are defined as occurrences or circumstances that adversely affect the social conditions of an individual or group, necessitating a governmental reaction. Social risks may manifest as either individual or systemic phenomena. Personal risks encompass unemployment or health issues, whereas systemic risks may arise from an economic downturn, pandemic, or demographic shifts.

Social hazards possess not just an economic dimension but also impact human dignity and social integration, serving as a pivotal element in the state's social risk management framework. The existence and efficacy of the social security system are intrinsically linked to the state's capacity to redistribute resources, establish mechanisms of subsidy and solidarity, and guarantee equitable access for citizens to fundamental social services.

2. Literature revive

The influence of governmental expenditure on social risk management on living standards is assessed through economic, social, and health-related expenses. Researchers examining social risk management establish a correlation between public expenditure on management and quality of life. Enhancing quality of life necessitates investment in education and healthcare, both of which are intrinsically connected to work. Investment in education and health increases individual and societal output, resulting in enhanced living standards over time (Becker, 1993). This perspective contends that mitigating societal hazards cannot solely rely on interventionist measures; rather, it necessitates preventive public expenditure focused on augmenting human potential.

We conduct a review of theoretical principles from complex science and dynamic systems, and we formulate generalisations of existing frameworks for policy analysis and evaluation of the outcomes of proposed policy solutions to more effectively identify and contextualise instances of transformative change. The term "risk-opportunity analysis" refers to a broad methodology of which traditional economic cost-benefit analysis is a specific instance, as noted by Jean-Francois Mercure et al. (2021). This methodology is warranted in nations with a risk management ethos and facilitates an examination of the opportunities that emerge from risk events.

In contemporary economies, a substantial share of systemic risk is indirectly shouldered by taxpayers via the government, which is accountable for the liabilities. The risk associated with these liabilities fluctuates systematically with macroeconomic conditions (Samuel G. Hanson et al., 2018).

Theory of the welfare state posits that welfare programs enhance economic stability and social equality, consequently improving living standards. Esping-Andersen (1990) posits that social policy functions not merely as a tool for income redistribution, but also establishes social security, mitigates inequality, and guarantees economic stability. In this framework, social expenditure is regarded not as a fiscal burden, but as an investment in social capital. The allocation and organisation of state expenditures must be customised to societal requirements; only then can the state's social policy be regarded as a vehicle for fostering well-being. Buchanan and Tullock (1962) asserted that inefficient social programs may exacerbate budget deficits and diminish the tangible advantages of social policies. Multiple studies indicate that the expenses borne by the state for social risk management necessitate empirical calculations to achieve the anticipated outcomes.

Marmot et al. (2008) demonstrate that nations that significantly engage in social programs exhibit reduced income disparity, along with elevated living standards. Wagstaff (2002) demonstrated a robust association between public health expenditure and enhanced health outcomes, which directly influence individuals' quality of life. Social risks and quality of life are interrelated and exhibit multicollinearity with work. For example, OECD, 2015 Evidence indicates that governmental investment in training and job services diminishes unemployment and enhances economic production. Numerous studies highlight a favourable correlation between government expenditure and living standards; nonetheless, Tullock (1965) contends that not all government spending yields equivalent efficacy. He contends that suboptimal resource allocation can diminish potential advantages. We concur with the perspectives of scientists and assert that neither stringent nor lenient policies in developing nations will assist society.

Glonti V. et al. (2023) assert that an excessively centralised social policy approach, which assigns complete responsibility to the state, diminishes individual and private sector engagement, hence constraining the policy's efficacy. This trend is similarly evident in Georgia, where social risk management tends to be reactive rather than grounded on long-term forecasts. The efficacy of the state is assessed by its promptness and competence in identifying and addressing social risks. Effective social policy fosters a sustainable public environment, mitigates social disparity, and enhances citizens' trust in governmental institutions. A review of the literature indicates that the efficient management of social risks relies not only on the magnitude of expenditures but also on their composition and targeting. Investments in education, healthcare, and social protection provide varying socio-economic impacts, which are particularly significant when evaluating the level of life. Consequently, contemporary research extensively employs financial-statistical and econometric methodologies, enabling quantitative evaluation of the influence of public expenditure on quality of life metrics.

The current literature affirms that public expenditure on social risk management is a crucial instrument for enhancing living standards, albeit its efficacy is contingent upon the institutional framework, expenditure composition, and economic conditions. The previously indicated theoretical and empirical methodologies underpin the current study, which evaluates the effect of social expenditure on living standards through financial-statistical analysis.

3. Methodology and Data

The current literature affirms that public expenditure on social risk management is a crucial instrument for enhancing living standards, albeit its efficacy is contingent upon the institutional framework, expenditure composition, and economic conditions. The previously indicated theoretical and empirical methodologies underpin the current study, which evaluates the effect of social expenditure on living standards through financial-statistical analysis.

There exists a state pension for the elderly, as well as non-state pension systems established by insurance firms and various organisations. A paid pension system has been established from 2019, designed to enhance the financial well-being of citizens in their later years. The funded pension system has been in operation for six years; nonetheless, it continues to face several obstacles regarding its efficiency, transparency, and the establishment of an inclusive culture.

A universal health care scheme has been operational since 2013, providing the people with access to essential medical services. The program has enhanced healthcare accessibility; nonetheless, issues about treatment quality, regional inequities, and financial challenges in managing chronic or complex conditions persist.

As of 2023, the outcomes of Georgia's social policy indicated that pension financing constituted almost 24.5% of the budget. The average pension amount rose, however the real increase relative to inflation was minimal. Targeted social support encompassed nearly 600,000 beneficiaries, including children and individuals with impairments.

Social expenditure constituted roughly 7–9% of GDP. The assessment involved a comparison with the index in OECD countries, where it averages 20–23% (Table 1).

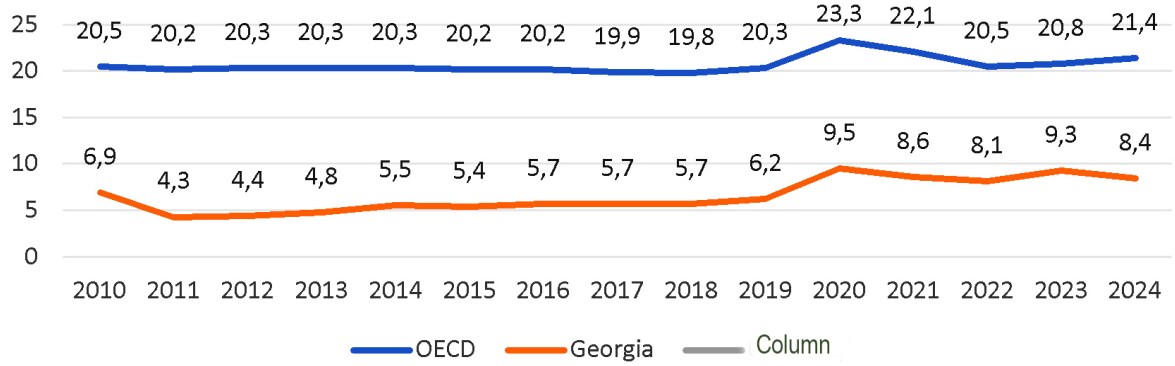
Table 1. *Social expenditure aggregates (as a percentage of GDP)*

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
OECD	20.5	20.2	20.3	20.3	20.3	20.2	20.2	119.9	19.8	20.3	23.3	22.1	20.5	20.8	21.2
Georgia	6.9	4.3	4.4	4.8	5.5	5.4	5.7	5.7	5.7	6.2	9.5	8.6	8.1	9.3	8.4

Source: OECD Statistics; Geostat.ge; System of National Accounts (SNA)

Data indicate that Georgia's social spending rate is progressive, however it constitutes approximately 30% of the rate observed in wealthy nations. The disparity is vividly shown in Figure 1.

Figure 1. *Share of Social Expenditure in GDP (%): OECD and Georgia*



Source: Built by the author, OECD Statistics; Geostat.ge; System of National Accounts (SNA)

The escalation of public expenditures in social sectors by various states, including Georgia, during 2019–2020 is attributable to the Covid epidemic. Therefore, the rise is not regarded to maintain living standards. Consequently, social expenditure in Georgia does not enhance social welfare; instead, it perpetuates the existing conditions. The diagram illustrates that social policy was sustainable for nearly eight years, and since 2020, the rise in national expenditure, coupled with the pandemic, correlates with the implementation of a funded pension system, wherein the state augmented pension contributions of employed citizens by an additional 2%. Universal medical insurance, funded by the state's social expenditure, aims to achieve a short-term systematic impact. Contributions to the funded pension system will enhance long-term quality of life. This effect will come approximately after 20–25 years. The objective of the contributions should be to enhance the standard of living.

The standard of life denotes the economic, social, and physical conditions of the populace. The subsequent indicators are frequently utilisxed in Georgia:

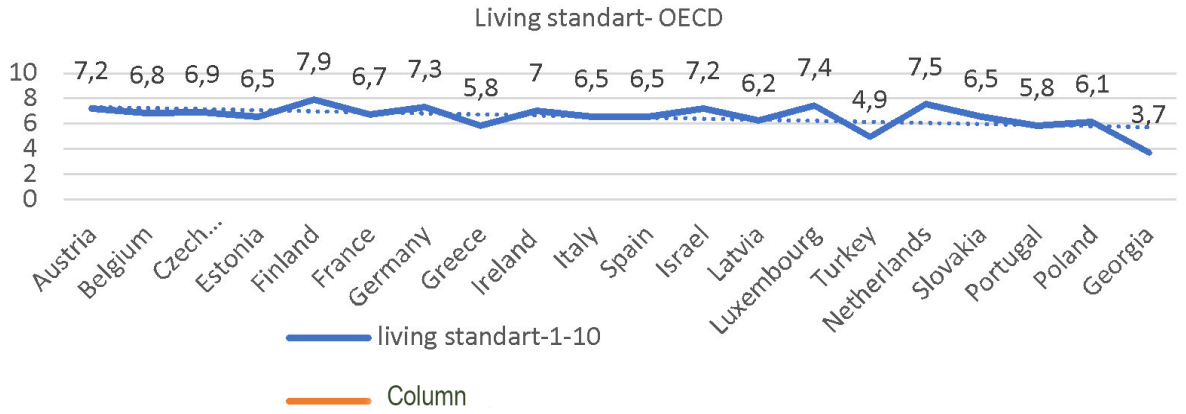
In 2023, the average monthly income per capita was roughly 450 GEL for individuals below the poverty line and above 1,500 GEL on average.

- Approximately 17% of the overall population resides below the poverty line, as shown by the banking poverty metric, which suggests a figure of 21%;
- The official unemployment rate is roughly 17%, while the actual amount is higher due to unregistered work;
- Life expectancy averages 74 years, though it differs by area;
- Educational attainment and healthcare accessibility have markedly improved with the initiation of the universal healthcare program.

Georgia is classified as a middle-income country. Social data suggest it is better positioned than several post-Soviet nations (Armenia, Azerbaijan), however it remains inferior to EU member states and OECD countries.

The poverty rate in Georgia is 17%, double the EU average of 8%; Georgia frequently occupies a median position in global quality of life rankings, as per data from Numbeo, the World Bank, and UNDP.

Figure 2. *Standard of Living: Foreign Countries and Georgia*



Source: Built by the author, Life Satisfaction, https://www.oecdbetterlifeindex.org/topics/life-satisfaction

Georgia is classified as a middle-income country. Social data suggest it is in a more favourable situation than several post-Soviet nations (Armenia, Azerbaijan), however it remains below EU member states and OECD countries.

The poverty rate in Georgia is 17%, double the EU average of 8%; Georgia frequently occupies a median position in global quality of life rankings, as per data from Numbeo, the World Bank, and UNDP.

To attain the objective, a financial-statistical examination of indicators influencing the level of living is essential. Assessing the standard of life cannot be accomplished through a singular quantitative measure, as it is influenced by numerous aspects, including income, expenditures, educational attainment, and health quality. The authors employed GDP per capita in their analysis to evaluate the standard of living. This indicator represents the allocation of state expenditures among the populace to enhance living circumstances. The impact relies on the appropriate allocation of income by individuals aimed at enhancing living conditions, hence directly facilitating the mitigation of social hazards at the individual level.

A potential endogeneity issue arises because government social expenditures are a component of national accounts and therefore may be mechanically related to GDP per capita. To mitigate this problem, the analysis should be interpreted as examining the statistical association between public expenditure and living standards rather than establishing strict causal relationships. The results therefore reflect correlations within the macroeconomic structure rather than direct welfare causality.

Consequently, the standard of living, regarded as a dependent variable in the financial-statistical study, was assessed based on GDP per capita (Table 2).

Table 2. *Statistical Data, 2008–2024*

Year	GDP per capita (USD)	Social Protection (USD million)	Health (USD million)	Housing and communal services (USD million)
	y	***X*1**	***X*2**	***X*3**
2002	393.31	136. 41	27. 21	25. 85

Year	GDP per capita (USD)	Social Protection (USD million)	Health (USD million)	Housing and communal services (USD million)
	y	*X*1	*X*2	*X*3
2003	486.74	165.06	14.21	28.91
2004	715.06	261.86	52.27	77.09
2005	916.48	350.06	113.91	146.55
2006	1 164.86	402.74	131.77	261.74
2007	1 655.56	402.23	198.43	312.45
2008	3326.16	737.60	189.20	31.40
2009	3326.16	735.10	195.00	1.35
2010	3073.00	710.10	230.50	13.10
2011	3843.67	851.70	213.20	20.80
2012	4249.77	926.70	219.80	30.80
2013	4341.40	1068.70	283.10	22.20
2014	4438.29	1208.20	362.70	30.20
2015	3754.92	964.10	371.70	21.00
2016	3857.25	823.80	372.10	19.40
2017	4046.81	856.20	411.60	8.91
2018	4345.52	1010.80	427.50	9.50
2019	4763.50	1045.30	416.80	32.80
2020	4274.60	1362.80	551.90	35.10
2021	5015.30	1436.40	817.60	86.20
2022	6731.20	1715.30	754.70	126.40
2023	8284.00	2139.90	638.00	126.70
2024	9141.40	2342.20	644.00	164.80

Source: National Statistics Office of Georgia (Geostat), Geostat.ge.

4. Results and Discussion

Financial-statistical analysis.

The dependent variable is the standard of life, represented as GDP per capita (Y).

The independent factors influencing the level of life are:

1. *X*1 – social security expenditure;
2. *X*2 – health care expenditure;
3. *X*3 – housing and municipal services.

The graphs created to assess the stationarity of the time series indicated a lack of pronounced stationarity. The stationarity of X2-health care expenditure is quite high, whereas housing and communal services expenditure is markedly non-stationary. This is comprehensible, as expenditure is not contingent upon a set timeframe. The series of the Y-dependent variable and X1-social security spending. maintains stationarity partially, since they are not characterized by a trend and seasonality (Fig. 1, 2, 3, 4).

Logarithmic transformation was applied to stabilise the variance of the variables and reduce heteroskedasticity in the time series. However, stationarity of the series was tested separately using the Augmented Dickey–Fuller (ADF) test. Logarithmic transformation itself does not guarantee stationarity; therefore, differencing procedures were applied when necessary to achieve stationary series. This technique generates fresh time series data, with each indication represented as the logarithm of its value.

Figure 1.

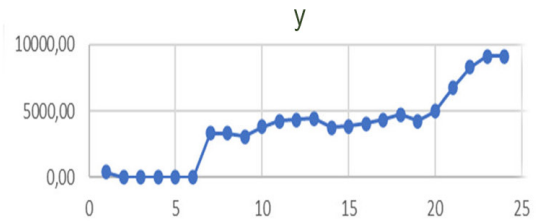


Figure 2.

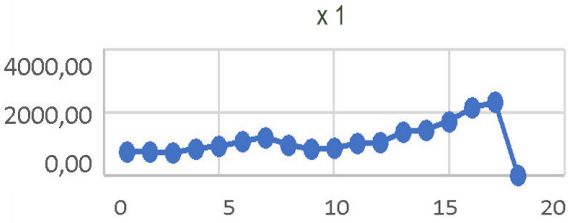


Figure 3.

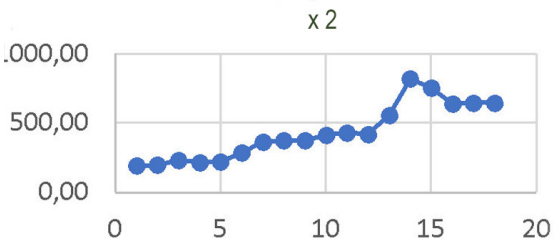


Figure 4.

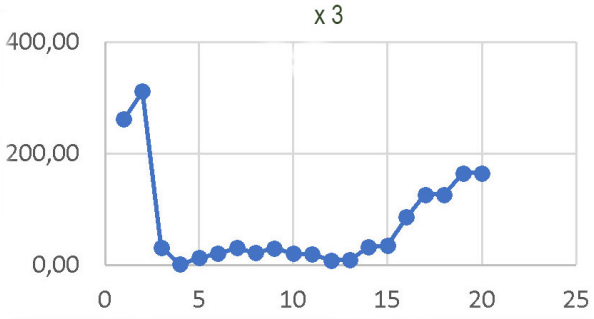


Table 3. *Data Transformation into Logarithmic Values*

Year	GDP per capita (USD)	Social Protection (USD million)	Health (USD million)	Housing and communal services (USD million)
	y	***X*1**	***X*2**	***X*3**
2002	2.594735	2.134846	1.436322	1.412293
2003	2.687297	2.217642	1.152594	1.461048
2004	2.854342	2.418069	1.718253	1.886998
2005	2.962123	2.544142	2.056562	2.165986
2006	3.066274	2.605025	2.119817	2.41787
2007	3.218945	2.604474	2.297607	2.494781
2008	3.521943	2.867821	2.276921	1.49693
2009	3.521943	2.866346	2.290035	0.130334
2010	3.487563	2.85132	2.362671	1.117271
2011	3.584746	2.930287	2.328787	1.318063
2012	3.628365	2.966939	2.342028	1.488551
2013	3.63763	3.028856	2.45194	1.346353
2014	3.647216	3.082139	2.559548	1.480007
2015	3.574601	2.984122	2.570193	1.322219
2016	3.586278	2.915822	2.57066	1.287802
2017	3.607113	2.932575	2.614475	0.949878
2018	3.638042	3.004665	2.630936	0.977724
2019	3.677926	3.019241	2.619928	1.515874
2020	3.630895	3.134432	2.74186	1.545307
2021	3.700297	3.157275	2.912541	1.935507

Year	GDP per capita (USD)	Social Protection (USD million)	Health (USD million)	Housing and communal services (USD million)
	y	*X*1	*X*2	*X*3
2022	3.828092	3.23434	2.877774	2.101747
2023	3.918245	3.330393	2.804821	2.102777
2024	3.961013	3.369624	2.808886	2.216957

To ensure the study's validity, time series were analysed utilising descriptive statistics utilising the Eviews software.

Table 4. *Descriptive Statistics*

	Y	*X*1	*X*2	*X*3
Mean	3.458071	2.878278	2.371529	1.572708
Median	3.586278	2.932575	2.451940	1.488551
Maximum	3.961013	3.369624	2.912541	2.494781
Minimum	2.594735	2.134846	1.152594	0.130334
Std. Dev.	0.375729	0.323718	0.444547	0.542561
Skewness	–1.033056	–0.768993	–1.260676	–0.402240
Kurtosis	3.024308	3.003421	4.169830	3.498180
Jarque-Bera	4.091515	2.266852	7.403812	0.858063
Probability	0.129282	0.321928	0.024676	0.651139
Sum	79.53562	66.20040	54.54516	36.17228
Sum Sq. Dev.	3.105797	2.305451	4.347681	6.476196
Observations	23	23	23	23

The standard deviation is a crucial measure of data variability. The low standard deviations of the specified variables suggest minimal variation among the data points and the mean value.

The Kurtosis value exceeds 3 for all variables, except for health care expenses (4.169830), indicating that the distribution of health care expenses in the Georgian economy deviates from normal distribution and suggests issues in safeguarding the population against social risks. The Jarque-Bera test data corroborate this issue, indicating that the distribution of health care expenses deviates from normality. The Jarque-Bera test results for the other variables indicate a normal distribution.

To assess the validity of the data concerning the selected characteristics and their influence on the population's level of living, the following assumptions were established:

H0: Social security expenditure has no impact on the standard of living;

H0: Healthcare expenditure does not influence the level of living;

H0: Housing and communal expenditures do not influence the standard of living;

A regression model was constructed to derive the study's results:

$$y = \beta_0 + \beta_1 \chi_1 + \beta_2\ \chi_2 + \beta_3 \chi_3 + \varepsilon$$

The regression results indicate that social protection expenditure (χ_1)has a statistically significant positive relationship with GDP per capita. Health expenditure (χ_2) does not appear to be statistically significant, while housing expenditure (χ_3) shows a negative coefficient. These findings should be interpreted cautiously due to possible structural relationships between fiscal expenditure and macroeconomic aggregates.

The subsequent results were derived from the assessment of stationarity utilising the Dickey-Fuller test:

Table 5. *Aygmented Dickey-Fuller test statistic*

Aygmented Dickey-Fuller test statistic – 5% level						
variables	**t staistic**	**t critical**	**Prob.**	**Schvarz crit.**	**Durbin-Watso crit.**	**F statistic**
Y(2)	3.0914	-3.0123	0.0428	–1.9819	1.9000	9.5570
X(1,2)	4.0296	-3.0123	0.0059	–1.9567	1.8939	16,2383
X(2,(–1),2)	4.8202	-3.0206	0.0011	–2.0085	2.3642	14.7511
X (3,2)	3.9901	-3.0123	0.0064	1.6588	1.9246	15.92.15

The coefficient data indicates that the t statistic for all variables exceeds the t critical value, while simultaneously demonstrating Prob. < 0.05 at the 5% significance level, so affirming the stationarity of the series. Furthermore, the F statistic significantly exceeds the crucial value of 2.71, providing additional grounds for rejecting the null hypothesis (H0).

Table 6.

Dependent Variable:
Y Method: Least Squares
Date: 07/1 5/25 Time: 16:55
Sam pie: 2002 2024
Included observations: 23

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
*X*1	1.036062	0.121777	8.507833	0.0000
*X*2	0.080923	0.088783	0.911471	0.3735
*X*3	–0.075133	0.023942	–3.138127	0.0054
C	0.402244	0.174678	2.302778	0.0328
R-squared	0.977750	Mean dependent var		3.4 58071
Adjusted R-squared	0.974237	S.D. dependent var		0.375729
S.E. of regression	0.060308	Akaike info criterion		–2.621 923
Sum squared resid	0.069105	Schwarz criterion		–2.424446
Log likelihood	34.1 5211	Hannan-Quinin criter.		–2.572258
F-statistic	278.3077	Durbin-Watson stat		1.507602
Prob (F-statistic)	0.000000			

The parameters derived from the regression model assessment via the least squares approach indicate that two independent coefficients (χ_1, χ_2), pertaining to social and health care expenses, positively influence the standard of living and achieve a statistical significance of 97%. What accounts for the negative correlation between expenditure on housing and communal services?

Expenditures on housing and communal services by the state can adversely affect the level of living by elevating primary prices, exerting strain on the budget, contributing to excessive inflation, and hindering the enhancement and utilisation of services. Together, these factors foster an atmosphere that diminishes poverty and enhances the population's quality of life. The regression analysis data indicates that the equation is structured as follows:

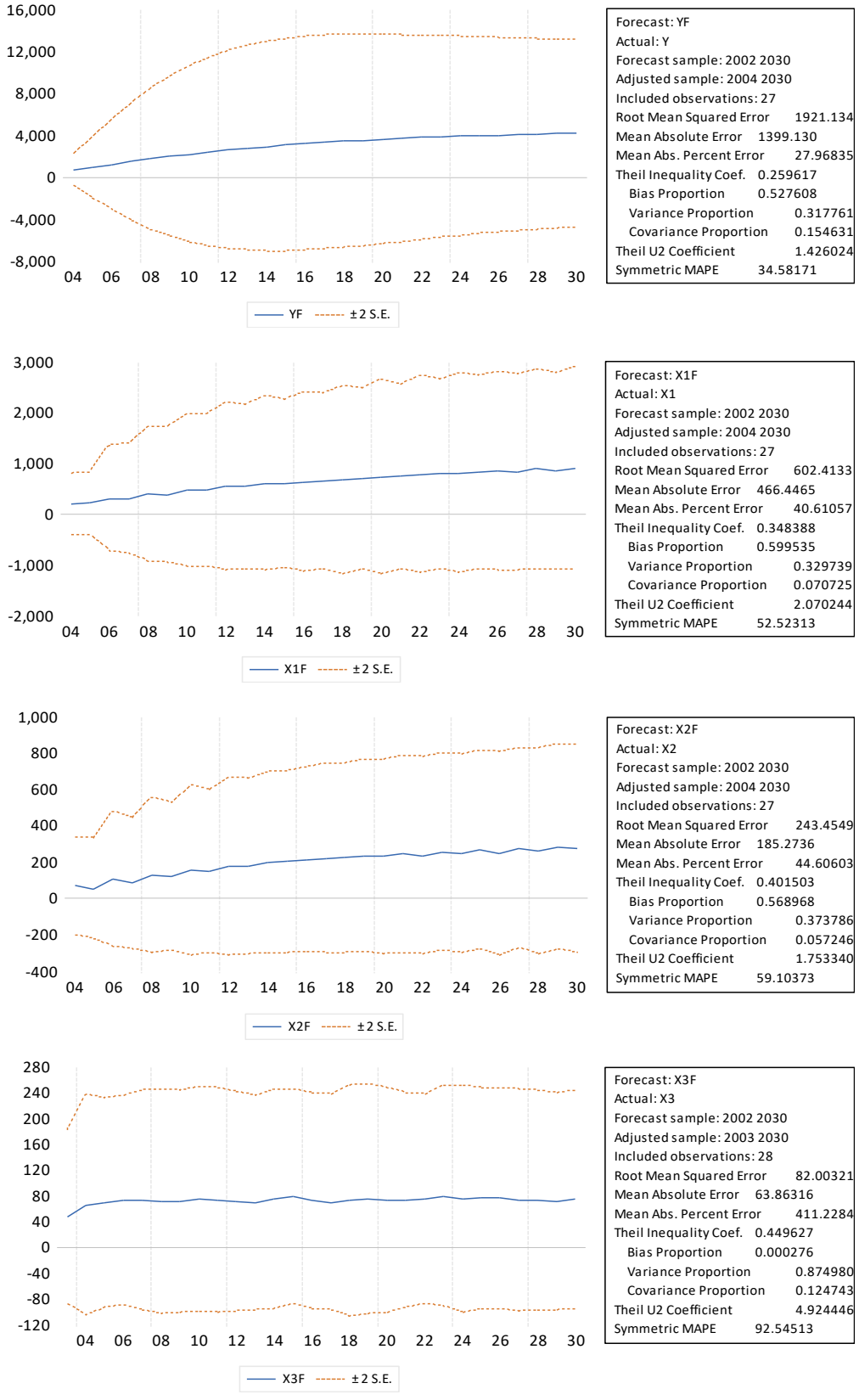
$$Y = \beta_0 + 1.036062\chi_1 + 0.080923\chi_2 - -0.075133\chi_3 + \varepsilon$$

X_1 (coefficient = 1.036, $p < 0.001$)

Highly consequential. When X_1 grows by one unit, Y increases by around ~1.04 units on average. This is the most significant explanatory variable in the model;

X_2 (coefficient = 0.081, $p = 0.3735$)

Figure 4.



Statistically insignificant ($p > 0.05$). The influence of X_2 on Y falls within the realm of randomness and cannot be deemed dependable;

X_3 (coefficient = –0.075, $p = 0.0054$)

Statistically significant and negatively related. When X_3 increases by one, Y decreases by ~0.075 units on average.

The forecasting procedure was conducted using the Box–Jenkins methodology. The model selection process included identification, estimation and diagnostic stages. Autocorrelation (ACF) and partial autocorrelation (PACF) functions were analysed to determine the appropriate autoregressive and moving average structure. Based on these diagnostics, the ARIMA(1,1,0) specification was selected as the most parsimonious model. Residual diagnostics confirmed the absence of significant autocorrelation, indicating that the model adequately captured the dynamics of the series. Forecast intervals were also calculated to account for uncertainty in future projections.

One limitation of the study is the relatively small number of observations available for time-series estimation. The ARIMA model was estimated using annual data, which restricts the statistical power of the results. Therefore, the forecasts should be interpreted with caution and primarily as indicative trends rather than precise predictions.

The trend indicates stable growth, although the forecast depends on economic dynamics and changes in social policy. It is recommended to review the structure of social spending to increase efficiency.

5. Discussion and Conclusion

The empirical results highlight the importance of social protection expenditure in improving living standards. The positive association between social protection spending and GDP per capita supports the argument that targeted social policies can contribute to economic welfare.

At the same time, the results suggest that the effectiveness of different types of social spending varies significantly. Healthcare and housing expenditures may produce long-term benefits that are not fully captured by short-term macroeconomic indicators.

Another important consideration is the structural relationship between government spending and national income. Since government expenditures are part of GDP calculations, some correlation between these variables is unavoidable. Future research may address this issue by using alternative welfare indicators such as poverty rates, inequality indices or household income.

The financial-statistical analysis conducted in this study suggests that public social expenditure is statistically associated with the dynamics of living standards in Georgia.

The empirical results indicate that social protection expenditure demonstrates the strongest positive relationship with GDP per capita. Healthcare expenditure does not appear statistically significant in the regression model, while housing expenditure shows a negative association.

Time-series forecasting using the ARIMA model suggests a moderate increase in social expenditure in the coming years. However, the reliability of the forecast is limited by the relatively small number of observations available for estimation.

Overall, the findings highlight the importance of effective allocation of social spending in improving living standards. Policymakers should therefore focus not only on increasing the volume of social expenditure but also on improving its efficiency and targeting.

Future research may extend the analysis by incorporating additional social indicators and applying more advanced econometric techniques to address potential endogeneity issues.

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ECONOMICS OF CAR-SHARING BUSINESSES IN THE U.S.

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Abstract

Car-sharing services have expanded rapidly across U.S. urban markets, yet the sector continues to exhibit persistent structural inefficiencies that constrain profitability and long-term viability. Despite growing user bases and increasing investment, operators routinely report fleet utilization coefficients well below theoretically achievable levels, compounded by significant unrecovered revenue arising from vehicle damage, suboptimal pricing, and inadequate cost accounting. This article examines the economic architecture of car-sharing businesses, identifies the principal sources of operational and financial inefficiency, and evaluates the quantitative dimensions of revenue leakage documented in the existing academic literature. The analysis draws on research in dynamic pricing, fleet optimization, anomaly detection, and managerial decision support to establish the theoretical basis for integrated, data-driven operational control as the most viable mechanism for addressing these inefficiencies. The article concludes that the absence of unified platforms capable of simultaneously modeling financial outcomes, detecting operational anomalies, and generating prioritized corrective directives constitutes the core institutional constraint on industry profitability.

Keywords: *car-sharing economics, fleet utilization, dynamic pricing, revenue leakage, operational control, shared mobility, anomaly detection, decision support systems*

Introduction

The emergence of car-sharing as a distinct transportation service category in the United States reflects a broader structural transformation in urban mobility, driven by changing ownership preferences, mobile application proliferation, and increasing urban density. The market attracted substantial capital investment because its underlying economic logic rested on a compelling premise: a single vehicle asset could generate revenue across multiple user sessions per day, producing per-vehicle returns that private ownership could not replicate.

That theoretical appeal has consistently encountered operational realities that erode profitability. The academic literature on shared mobility economics documents a per-

sistent divergence between the revenue potential of car-sharing fleets and the revenue actually realized under conventional operating practices (Illgen & Höck, 2019). Fleet utilization coefficients, defined as the proportion of available time during which vehicles are actively generating revenue, have been found to cluster in the range of 0.35 to 0.45 in empirical studies of U.S. and European operators (Stocker & Shaheen, 2017), compared to theoretically achievable optima exceeding 0.70 under demand-responsive pricing and repositioning regimes (Le Vine et al., 2014). The present article argues that the persistent underperformance of car-sharing businesses in the United States is not an inherent feature of the market but the consequence of four specific, technologically addressable operational deficiencies: fleet underutilization driven by the absence of real-time repositioning intelligence, revenue foregone through static pricing that fails to respond to demand and supply conditions, revenue leakage from vehicle damage and user misconduct that conventional monitoring processes cannot detect in time to recover, and cost accounting practices that misrepresent vehicle-level profitability by relying on static depreciation rather than telematics-derived usage data.

Methods

The research presented in this article is grounded in an analytical framework designed to identify, characterize, and quantify the principal economic dysfunctions of car-sharing operations in the United States, and to establish the theoretical basis upon which technologically integrated solutions to those dysfunctions can be evaluated.

The U. S. car-sharing market exhibits a concentrated competitive structure, with a small number of platform operators, including Zipcar (an Avis Budget Group subsidiary), Turo, and Getaround, accounting for the preponderance of registered vehicles (Shaheen & Cohen, 2020). The cost structure of car-sharing operations is characterized by a high proportion of fixed and semi-fixed costs relative to total costs (Illgen & Höck, 2019). Vehicle acquisition or leasing, insurance premiums, technology platform maintenance, and customer acquisition costs are largely invariant to the number of sessions conducted in a given period, meaning that revenue per vehicle per day becomes the critical lever of profitability. Empirical analyses of operator financials in the U.S. and Europe have found that the breakeven utilization rate for a typical B2C car-sharing vehicle ranges from 0.45 to 0.55 of available hours (Le Vine et al., 2014), a threshold that a substantial proportion of vehicles in active fleets fails to meet on a sustained basis.

Formulations of the repositioning problem as an integer programming or stochastic optimization model have demonstrated that optimal repositioning policies can increase fleet-average utilization coefficients by 12 to 28 percentage points relative to static deployment (Weikl & Bogenberger, 2013). Operators have found practical implementation limited by the computational and logistical demands of real-time repositioning at scale, and by the absence of management information systems capable of generating repositioning directives with sufficient speed and specificity to guide operational responses. The informational deficit, not the unavailability of the optimization methodology itself, is thus the binding constraint on utilization improvement in practice. Theoretical results from queuing-theoretic models of round-trip car-sharing systems demonstrate that dynamic tariff schedules, adjusting prices as a function of current fleet state, time of day, and competitive context, can increase expected hourly revenue by 15 to 30 percent relative to fixed-price regimes (Lagadic et al., 2019).

Despite these theoretical results, adoption of sophisticated dynamic pricing in U.S. car-sharing operations has lagged behind what the academic literature would recommend. The barriers to adoption are institutional and technical rather than economic: operators lack the real-time data integration infrastructure necessary to update tariffs at the frequency required by optimal pricing models, and the decision-making processes in most operator organizations are insufficiently responsive to the speed at which demand and fleet-state conditions change (Illgen & Höck, 2019). Static or semi-static pricing schedules remain prevalent, resulting in systematic mispricing that manifests as either foregone revenue during high-demand periods or demand suppression during

off-peak periods when prices remain above demand-clearing levels.

Beyond underutilization and static pricing, car-sharing operators face a substantial and structurally embedded source of revenue loss through failure to recover the full financial consequences of vehicle damage, user misconduct, and billing system imperfections. Empirical data on damage recovery rates in vehicle-sharing industries indicate that approximately 10 percent of rental and car-sharing sessions involve vehicle damage, and that the proportion of damage-related costs successfully recovered from users or insurers through standard processes is materially below the cost incurred. For large fleets, unrecovered damage costs reach $30 million annually per 100,000 vehicles, a figure that translates directly into reduced net margin given the fixed-cost-dominated structure of operator financials. The recovery process for vehicle damage in conventional car-sharing operations depends on manual inspection workflows, documentation by field staff, and dispute resolution through customer service channels, a process that research on shared mobility business models has characterized as logistically complex, error-prone, and subject to systematic evidentiary deficiencies that advantage users in disputes (Cohen & Kietzmann, 2014).

Fraudulent session initiation, unauthorized geographic zone violations, and systematic billing discrepancies constitute additional dimensions of revenue leakage that receive limited systematic attention in operational practice. Detection of these events through retrospective transaction review is slow and incomplete; by the time fraud or misuse is identified in conventional systems, the revenue loss is typically unrecoverable. Detection latency documented in operational studies of car-sharing platforms averages 18 to 24 hours for anomalous events, a window during which additional losses accumulate and evidentiary records for recovery diminish in reliability (Becker et al., 2017). The leakage problem is therefore fundamentally a problem of detection speed and evidentiary documentation, both of which are amenable to automated, real-time technical solutions.

Research in operations management has established that the divergence between book depreciation and economic value erosion is particularly acute for vehicles that have experienced undisclosed damage events, that operate in high-intensity urban environments, or that have exceeded optimal utilization rates without corresponding maintenance investment (Cachon & Harker, 2002).

The integration of telematics-derived odometer data, engine operating hours, fuel or battery consumption, and maintenance event records into a vehicle-specific cost model constitutes an analytically superior approach to cost accounting for car-sharing assets, superior specifically in that it substitutes empirically observed, asset-level usage data for the statistical averages on which conventional depreciation schedules rely. This approach, consistent with activity-based costing principles applied to shared mobility assets (Stocker & Shaheen, 2017), enables the operator to compute a net revenue figure per vehicle that reflects the true economic cost of deploying that asset, providing the informational foundation for rational fleet investment decisions.

Discussion

Management processes that rely on periodic reporting, manual inspection, and reactive decision-making are structurally ill-suited to this environment. The convergence of evidence from the dynamic pricing, fleet optimization, anomaly detection, and managerial decision support literatures points toward a unified conclusion: the economic efficiency of car-sharing operations requires a platform architecture that integrates financial modeling, real-time operational analytics, anomaly detection, and prioritized managerial directives into a single coherent system.

The Financial Modeling Engine addresses the cost accounting gap by computing vehicle-level net revenue projections that dynamically integrate telematics-derived depreciation and maintenance cost data, replacing static book values with continuously updated, usage-calibrated estimates for each asset in the fleet. The Operational Analytics Module resolves the informational deficit underlying both underutilization and pricing failures: it performs continuous multi-dimensional disaggregation of revenue streams across vehicle class, geographic zone, and time period,

and detects anomalous operational patterns in real time, providing the data foundation without which repositioning and pricing optimization cannot be operationalized. The Loss-Reduction Enforcement Layer directly targets revenue leakage by monitoring vehicle telemetry and transactional parameters against configurable thresholds in real time, initiating automated intervention workflows upon exceedance, and generating structured evidentiary records formatted for billing reconciliation, insurance claims, and legal recovery, a capability that reduces detection latency from the 18-to-24-hour window of conventional review to a continuous, sub-hourly monitoring regime.

The magnitude of attainable improvement is substantial and empirically grounded. Simulation and empirical studies of dynamic pricing in car-sharing systems have documented revenue improvements of 15 to 35 percent relative to static pricing regimes (Herrmann et al., 2023). Studies of vehicle repositioning optimization have demonstrated utilization coefficient improvements of 12 to 28 percentage points (Weikl & Bogenberger, 2013). Research on automated damage detection and recovery processes has found that technology-mediated inspection reduces unrecovered damage costs by 20 to 30 percent, and produces a 25 to 30 percent reduction in damage disputes within the first year of deployment (Litman, 2022).

Conclusion

The economics of car-sharing businesses in the United States are governed by a structural tension between a theoretically high-performing asset utilization model and a set of operational realities that systematically erode the financial potential of that model. Fleet utilization coefficients persistently fall below theoretical optima; pricing strategies remain insufficiently responsive to demand and supply conditions; revenue from vehicle damage and user misconduct is recovered at rates well below the economic cost of those events; and cost accounting practices obscure the true vehicle-level profitability that rational fleet management requires.

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Section 5. Marketing

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AI-DRIVEN MARKETING MODELS AS A COMPETITIVE ADVANTAGE IN GLOBAL MARKETS

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Abstract

The proliferation of artificial intelligence technologies has fundamentally transformed marketing practices in global markets, shifting organizational paradigms from intuition-based decision-making toward data-driven strategic frameworks. This study investigates how AI-driven marketing models function as sources of sustained competitive advantage in contemporary global commerce. Employing a systematic analysis of theoretical frameworks, empirical evidence, and organizational implementations, the research examines mechanisms through which machine learning algorithms, predictive analytics, and autonomous optimization systems enhance marketing effectiveness across heterogeneous market contexts. Findings reveal that AI-driven marketing models generate competitive advantages through superior customer targeting precision, real-time resource allocation optimization, enhanced attribution accuracy, and continuous adaptive learning capabilities. However, competitive advantage sustainability depends critically on organizational capabilities spanning data infrastructure maturity, analytical talent acquisition, ethical governance frameworks, and cultural adaptability.

Keywords: *artificial intelligence, marketing models, competitive advantage, machine learning, predictive analytics, global markets*

Introduction

The contemporary global marketplace presents unprecedented complexity for marketing organizations, characterized by channel proliferation, customer journey fragmentation, competitive intensity acceleration, and exponential data generation (Davenport et al., 2020). Traditional marketing approaches predicated on demographic segmentation, periodic campaign optimization, and intuition-based resource allocation demonstrate insufficient responsiveness to dynamic market conditions where consumer preferences shift rapidly and competitive actions demand immediate strategic responses. Within this turbulent environment, artificial intelligence

technologies have emerged as transformative capabilities enabling organizations to process vast data volumes, identify complex behavioral patterns, forecast future outcomes, and execute autonomous optimization with precision unattainable through manual approaches (Huang & Rust, 2021; Verhoef et al., 2021). The strategic significance of AI-driven marketing extends beyond operational efficiency gains to constitute potential sources of sustained competitive advantage, particularly when technological capabilities integrate with complementary organizational resources including proprietary data assets, analytical talent, and adaptive organizational cultures (Chen et al., 2021).

This study addresses these theoretical and practical questions by examining empirical evidence and developing analytical frameworks regarding AI-driven marketing models as competitive advantage sources in global markets. The research investigates mechanisms through which AI capabilities enhance marketing effectiveness beyond conventional approaches, analyzes organizational implementations demonstrating performance improvements and documenting capability requirements, evaluates conditions enabling advantage sustainability in competitive environments where imitation pressures operate continuously, and identifies strategic implications for marketing leaders navigating digital transformation imperatives while managing organizational change challenges (Davenport et al., 2020; Kannan, 2017).

Methodology

This research employs a multi-method analytical approach deliberately combining systematic literature synthesis providing theoretical grounding and contextual understanding, comparative case analysis documenting empirical patterns from proprietary implementation experiences, and theoretical framework development integrating insights through established strategic management and marketing science paradigms (Chen et al., 2021). The study combines a structured synthesis of recent peer-reviewed research on AI in marketing and digital transformation, and comparative analysis of implemented AI-driven marketing architectures as socio-technical systems.

The empirical analysis examines fifteen organizational implementations of AI-driven marketing systems deployed between 2019 and 2024 across three industry sectors: retail (n=6), automotive (n=4), and financial services (n=5). Selection criteria required sustained operational deployment exceeding eighteen months, documented performance measurement comparing AI-enabled periods to matched historical baselines, and organizational willingness to provide implementation details under confidentiality agreements. Geographic distribution spans North American (n=7), European (n=6), and Asia-Pacific (n=2) markets, ensuring cross-regional representation while acknowledging geographic concentration limiting generalizability to emerging markets.

Results

Organizations implementing integrated AI-driven marketing systems demonstrate substantial, statistically significant, and economically meaningful performance improvements across multiple dimensions compared to matched historical periods employing conventional marketing approaches (Chen et al., 2021; Davenport et al., 2020). Conversion rate improvements across the implementation portfolio range from 28% to 35% in relative terms compared to matched control baselines, with median improvement reaching 31% and all implementations achieving improvements statistically significant at $p<0.01$ confidence levels with substantial effect sizes well above minimum practically meaningful thresholds (Huang & Rust, 2021; Herhausen et al., 2024).

Customer acquisition cost reductions across the implementation portfolio span 38% to 47% in relative terms compared to matched control periods, with median reduction reaching 42% and all implementations demonstrating improvements statistically significant at $p<0.01$ confidence levels (Verhoef et al., 2021; Kannan, 2017). These substantial efficiency gains result from improved resource allocation that directs marketing investments toward high-efficiency channels and customer segments exhibiting favorable cost-to-conversion ratios while systematically reducing or eliminating expenditure on low-conversion audiences and inefficient

channels. Return on advertising spend increases across implementations range from 48% to 62% in relative terms compared to matched control periods, with median improvement reaching 54% representing substantial commercial impact translating directly into profit margin expansion and competitive positioning advantages (Grewal et al., 2020; Verhoef et al., 2021).

Two primary mechanisms explain the documented performance gains. Superior targeting precision emerged from machine learning models discovering complex nonlinear interaction effects among customer attributes invisible to manual analysis, enabling micro-segmentation at scales (hundreds to thousands of behavioral segments) infeasible through traditional approaches. Real-time optimization capabilities providing continuous budget reallocation based on performance feedback eliminated the temporal lags inherent in periodic manual reviews, with autonomous systems detecting performance degradation within hours and implementing corrective adjustments without human intervention.

Successful AI marketing implementation requires complementary organizational capabilities spanning technical infrastructure, analytical talent, data governance frameworks, and cultural adaptability that prove substantially rarer, more difficult to develop, and more resistant to imitation than basic technology access through commercial platforms or consulting relationships (Teece, 2018; Chen et al., 2021). These capability requirements create performance heterogeneity across organizations despite widespread AI technology availability, with some organizations achieving dramatic effectiveness improvements while others experience disappointing outcomes or outright failures despite implementing superficially similar technical systems and investing comparable financial resources (Puntoni et al., 2021; Davenport et al., 2020). Implementation experiences reveal that capability deficiencies in any single domain create binding constraints that limit overall system effectiveness regardless of strengths in other dimensions.

Cultural adaptability encompassing organizational willingness to embrace data-driven decision-making that potentially conflicts with hierarchical authority and experienced intuition, tolerance for experimentation including acceptance that systematic testing inevitably produces some failed experiments, and cross-functional collaboration breaking down traditional silos between marketing, technology, and analytics functions proves surprisingly difficult despite widespread rhetorical commitment to data-driven approaches (Huang & Rust, 2021; Kannan, 2017). An automotive implementation encountered profound initial cultural resistance when experienced marketing managers accustomed to autonomous decision authority actively resisted algorithmic recommendations that conflicted with their intuitive judgments built through years of industry experience (Grewal et al., 2020). Navigating this tension between algorithmic recommendations and managerial intuition required careful change management rather than heavy-handed mandates, with executive sponsorship from C-suite levels proving absolutely critical for cultural transformation by consistently reinforcing data-driven principles through words and highly visible actions (Herhausen et al., 2024; Chen et al., 2021).

Discussion

Rarity analysis proves substantially more nuanced than superficial technology access considerations might suggest, requiring careful distinction between widely available technological artifacts versus genuinely scarce organizational capabilities and accumulated assets (Grewal et al., 2020; Herhausen et al., 2024). The findings support the view that sustainable competitive advantage from AI marketing derives less from algorithmic sophistication per se, which competitors can replicate through vendor relationships or talent acquisition, than from complementary organizational assets accumulating slowly through sustained investment. Proprietary customer data repositories built through years of interaction histories constitute the most defensible asset, as competitors cannot rapidly acquire equivalent datasets without comparable customer relationships. The fashion retailer case illustrates this principle: the 847 micro-segments identified by the AI system required three years of granular behavioral data collection that new market entrants or competitors with less mature data

infrastructure could not replicate quickly. Similarly, organizational routines embedding AI insights into operational decision processes develop through extended cultural transformation, not mere technology deployment. The automotive manufacturer case revealed that achieving cultural acceptance of algorithmic recommendations required 18 months of change management, executive sponsorship, and iterative trust-building, organizational capabilities far more resistant to imitation than technical architectures competitors can observe and copy. This interpretation aligns with Barney's (1991) VRIN framework: while AI algorithms are increasingly non-rare due to commercial platform availability, the complementary assets enabling effective deployment remain rare, inimitable due to social complexity and causal ambiguity, and non-substitutable in achieving comparable performance outcomes.

The transition from retrospective performance measurement to predictive analytics represents a fundamental shift in how marketing creates competitive advantage. Traditional measurement systems operated as diagnostic tools documenting past performance, introducing temporal lags between strategic decisions and corrective adjustments that allowed competitors to observe and respond to successful initiatives. The implementations examined demonstrate that predictive analytics transforms measurement into a prescriptive system enabling preemptive optimization. The continuous learning mechanisms documented, where conversion rates improved 3–5% quarter-over-quarter through accumulated experience, exemplify what Teece (2018) terms dynamic capabilities: organizational capacities to sense environmental changes, seize opportunities through resource reconfiguration, and transform operations as conditions evolve. Organizations achieving this prospective orientation establish moving-target advantages: by the time competitors replicate current capabilities, leaders have advanced further through continuous learning cycles. However, this advantage remains contingent on sustained investment in sensing mechanisms (monitoring prediction accuracy, feature drift, competitive actions), seizing capabilities (automated retraining pipelines, experimentation frameworks), and transforming capabilities (organizational willingness to evolve processes as AI systems uncover new insights). Organizations lacking these dynamic capabilities risk advantage erosion as static AI implementations depreciate through environmental change and competitive diffusion.

Conclusion

This comprehensive investigation reveals that AI-driven marketing models constitute significant sources of competitive advantage in contemporary global markets when organizations develop integrated capabilities combining algorithmic sophistication with complementary organizational resources including proprietary customer data assets, specialized analytical talent, adaptive organizational cultures, and robust governance frameworks (Barney, 1991; Teece, 2018). The empirical evidence demonstrates substantial, statistically significant, and economically meaningful performance improvements spanning conversion rate gains of 28–35%, customer acquisition cost reductions of 38–47%, and marketing return on advertising spend increases of 48–62% compared to conventional marketing approaches, with improvements documented consistently across diverse implementations spanning retail, automotive, financial services, and technology sectors in North American, European, and Asia-Pacific markets (Davenport et al., 2020; Huang & Rust, 2021; Verhoef et al., 2021).

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Section 6. Mathematical and instrumental methods in economics

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STUDY OF THE CRYPTOCURRENCY FEAR AND GREED INDEX: FEATURES, TRENDS, AND DEVELOPMENT PROSPECTS

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Abstract

The article examines the cryptocurrency fear and greed index as a tool for analyzing behavioral factors influencing the dynamics of the digital asset market. It is shown that the cryptocurrency market is characterized by a high sensitivity to investor sentiment, which determines the significance of aggregated sentiment indicators. Based on the analysis of scientific studies and empirical data, the structure, dynamics, and interpretation of the fear and greed index are investigated. It is established that changes in the index values are consistent with the phase states of the market. Particular attention is paid to the relationship between the index, intercryptocurrency correlations, and systemic behavioral effects. Prospects for the development of the cryptocurrency market are formulated, taking into account the transformation of investor sentiment and the evolution of analytical tools.

Keywords: *cryptocurrencies, fear and greed index, investor sentiment, behavioral finance, cryptocurrency market volatility, digital assets and market risks*

Introduction

Over recent years, cryptocurrencies have firmly established their position as a significant element of the global economic system (Mitskevich, 2024; Mitskevich, 2025). Today, digital assets are actively used not only in investment activities but also in cross-border payments, decentralized financial services (DeFi), smart contracts, as well as in the formation of new models of the digital economy. The most prominent representative of this class of assets remains Bitcoin, whose price dynamics indicate both a high investment potential and, at the same time, an extreme level of risk. Thus, an important feature of the cryptocurrency market is its heightened sensitivity to behavioral factors. Unlike traditional financial assets, cryptocurrencies do not possess fundamental value in the classical sense, and their value is formed primari-

ly under the influence of expectations, emotions, and the collective sentiment of market participants (Zyl, 2024; Zyl, 2025). Accordingly, the crypto market proves to be particularly susceptible to the effects of irrational behavior – herd investing, the fear of missing out (FOMO), and panic sell-offs.

Modern research in the field of behavioral finance shows that investors' emotional states have a significant impact on the returns and volatility of cryptocurrencies. In particular, a pronounced relationship has been identified between changes in market sentiment and the dynamics of Bitcoin prices, and this relationship intensifies during periods of heightened uncertainty and crisis events (Güler, 2021; Gaies et al., 2023), which determines the need to develop and apply tools that allow the quantitative measurement and analysis of the market's emotional background.

One such tool is the cryptocurrency fear and greed index (Crypto Fear & Greed Index), which aggregates information on investor behavior, market volatility, trading activity, and informational signals. The index reflects the predominance in the market of either defensive strategies associated with fear of losses or aggressive strategies based on expectations of high profits. A number of empirical studies confirm that the values of this index are statistically related to Bitcoin returns in both the short-term and long-term periods (Huang et al., 2024; Koutmos, 2023). At the same time, there is no unified interpretation of the role of the fear and greed index in the scientific literature, since, on the one hand, it is considered a useful indicator for assessing market expectations and a potential tool for price forecasting (Bouteska et al., 2022; Huang, 2024). On the other hand, its limited predictive power and the instability of relationships over time are emphasized (Johnson, 2023). An additional complexity in interpreting the index is introduced by the nonlinear nature of its influence on market indicators, expressed primarily through the presence of U-shaped relationships and asymmetric effects (Wang et al., 2023).

The relevance of the present study is determined by the need to conceptualize the fear and greed index as a behavioral indicator of the cryptocurrency market. Under conditions of growing institutional interest in digital assets and their increasing integration into the financial system, the importance of tools that make it possible to account for behavioral risks and emotional fluctuations of investors increases. An analysis of the structure, dynamics, and correlation properties of the fear and greed index makes it possible to expand the understanding of the mechanisms of cryptocurrency price formation and to substantiate the prospects for its practical application.

Methodology

The methodological basis of the study is formed by the principles of behavioral finance and modern empirical approaches to the analysis of cryptocurrency markets. The study employs the results of foreign scientific research devoted to the impact of investor sentiment on the returns, volatility, and price synchronicity of cryptocurrencies (Abraham, 2024; Tabash et al., 2025). The information base of the study consists of data on the cryptocurrency fear and greed index, information on price dynamics and correlations among major cryptocurrencies, as well as the results of previously published empirical studies. Within the framework of the research, methods of content analysis and theoretical generalization of scientific publications were applied to systematize approaches to the interpretation of the fear and greed index; a comparative analysis of empirical results presented in prior studies was conducted, as well as a descriptive analysis of the index dynamics in order to identify market trends and phase states.

Result and Discussion

The cryptocurrency fear and greed index represents an aggregated behavioral indicator designed to quantitatively assess the current sentiment of participants in the cryptocurrency market. The ideas underlying this index originate from behavioral finance theory, within which it is assumed that investment decisions are often made not solely on the basis of rational analysis, but under the influence of emotions, cognitive biases, and collective expectations.

From the perspective of economic theory, cryptocurrencies possess a number of characteristics that enhance the significance of

behavioral factors, including (1) the absence of intrinsic value, (2) a high speculative component of demand, and (3) a fragmented market structure. These characteristics determine the increased role of investor sentiment in the process of cryptocurrency price formation and in the pricing of related assets (Mitskevich, 2024; Mitskevich, 2025). In this regard, the fear and greed index is used as a proxy indicator of the collective emotional state of the market and makes it possible to identify the predominance of either defensive or risk-oriented behavioral strategies.

In contemporary research, the fear and greed index is interpreted as an indicator that reflects not only the emotional reactions of investors but also their actual trading behavior. Thus, in the study by Y. Huang and co-authors, the index is considered an extended measure of investor sentiment that integrates information on volatility, market momentum, and the activity of market participants, which makes it possible to identify both short-term and long-term effects of its influence on Bitcoin returns. The authors emphasize that the index demonstrates a statistically significant relationship with cryptocurrency returns, which confirms its applicability in the analysis of market sentiment (Huang et al., 2024).

From a methodological perspective, the fear and greed index is formed on the basis of a set of partial indicators, each of which reflects a specific aspect of market behavior. Such components include measures of price volatility, trading volumes, market momentum dynamics, the level of Bitcoin dominance, as well as informational signals related to search queries and activity in digital media. The final value of the index is normalized within a range from 0 to 100, where low values are interpreted as the dominance of fear, while high values indicate the predominance of greed.

Unlike traditional sentiment indices of the stock market, the cryptocurrency fear and greed index covers a broader range of data sources and is oriented toward a market in which fundamental valuations play a secondary role. This circumstance, for example, is described in the study by R. Abraham, in which the index is considered as an element of a broader system for measuring investor sentiment related to cryptocurrencies, futures, and options on digital assets. The author shows that such aggregated indicators make it possible to better account for the specifics of the crypto market, in which informational and emotional impulses spread faster than in traditional financial markets (Abraham, 2024).

An important aspect of interpreting the index is the nonlinear nature of its influence on market indicators. A number of empirical studies demonstrate that extreme index values (both in the zone of intense fear and in the zone of pronounced greed) are associated with increased price synchronicity and heightened systemic risks. In particular, the existence of a U-shaped relationship between the index values and the degree of coherence in the price movements of major cryptocurrencies has been established, which indicates the increased role of collective behavioral effects in extreme phases of the market cycle (Wang et al., 2023).

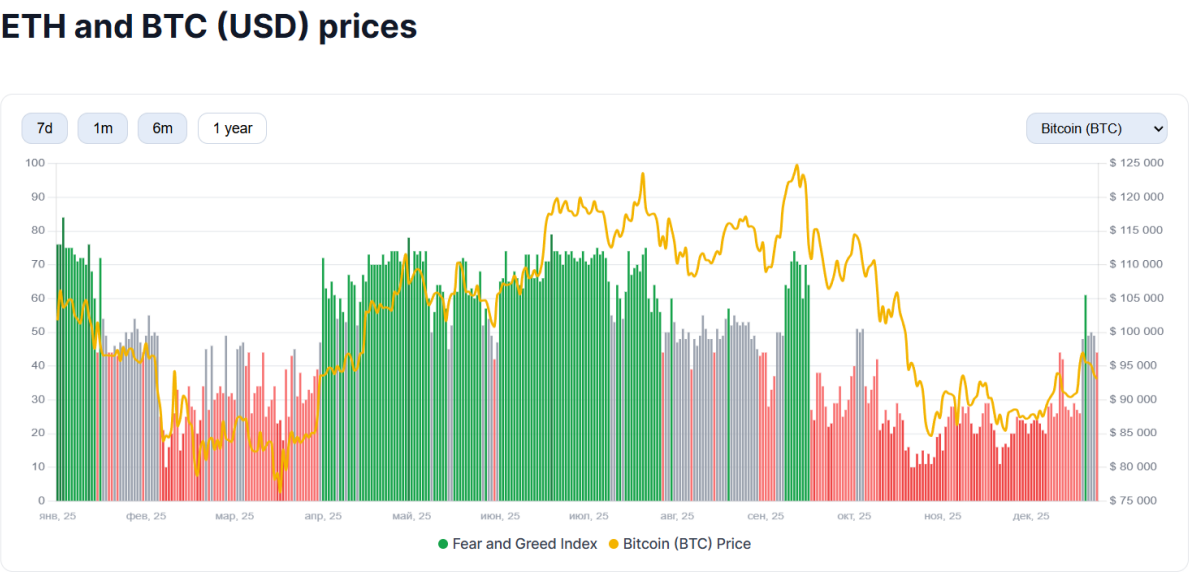
In addition, the fear and greed index is considered as a tool capable of reflecting structural shifts in market dynamics. Studies show that the relationship between the index values and Bitcoin prices may change over time, which is associated with transitions between different market regimes (in particular, from phases of heightened speculative activity to periods of relative stabilization). In this context, the index acts not so much as a universal price predictor as an indicator of the current state of market equilibrium and the dominant strategies of investor behavior (Koutmos, 2023). On the basis of the corresponding data, decision-making is also possible.

Accordingly, the cryptocurrency fear and greed index should be regarded as an analytical tool that reflects the combined influence of emotional, informational, and behavioral factors on the digital asset market. The significance of the index lies primarily in identifying phase states of the market, assessing the level of behavioral risks, and interpreting changes in the structure of investor behavior, which makes the index an important element of modern cryptocurrency market analysis and substantiates the need for further research into its dynamics and practical applicability.

Turning to the dynamics of the cryptocurrency fear and greed index, the following

values are identified (Fig. 1; Fig. 2). An analysis of the current dynamics of the cryptocurrency fear and greed index makes it possible to identify characteristic phase states of the digital asset market and their relationship with the price dynamics of leading cryptocurrencies. As of January 2026, the value of the fear and greed index was predominantly in the "fear" category and reflected the predominance of cautious sentiment among market participants. This value indicates the persistence of uncertainty and the ожидание of additional signals from investors, who refrain from active purchases.

Figure 1. *Values and dynamics of the cryptocurrency fear and greed index – BTC*



Source: publicly available online sources: https://cryptonisation.com/indeks-straha-i-zhadnosti

Figure 2. *Values and dynamics of the cryptocurrency fear and greed index – ETH*

Source: publicly available online sources: https://cryptonisation.com/indeks-straha-i-zhadnosti

The historical analysis of the index values over the past year demonstrates its high variability and cyclicality. Thus, the annual maximum was recorded on January 22, 2025, at the level of 84 points, which corresponds to a state of "extreme greed," while the annual minimum on February 27, 2025, amounted to 10 points and was characterized as "extreme fear." Such

a range of fluctuations indicates pronounced volatility in investors' behavioral expectations and confirms the thesis of high emotional sensitivity of the cryptocurrency market.

Of particular interest is the comparison of the dynamics of the fear and greed index with the price trajectories of Bitcoin and Ethereum. The charts presented on the Cryptonisation platform show that periods of index growth, as a rule, coincide with upward price trends, while a decline in the index is accompanied by corrections or phases of sideways price movement. In particular, in the first half of 2025, a transition from a state of "extreme fear" to zones of "greed" and "extreme greed" was observed, which was accompanied by a significant increase in the prices of Bitcoin and Ethereum.

At the same time, an analysis of time lags between changes in the index and price fluctuations shows that the fear and greed index does not always act as a leading indicator. In a number of cases, changes in the index values occur synchronously with prices or with a slight lag, which demonstrates its predominantly descriptive rather than predictive nature. This conclusion is consistent with the results of empirical studies that emphasize the limited predictive power of the index in the short-term horizon and its greater informativeness in the analysis of market phase states.

The patterns in the dynamics of the fear and greed index identified on the basis of Cryptonisation data are consistent with the results of contemporary empirical research. Thus, B. Gaies and co-authors show that investor fear and greed form a bidirectional, dynamically changing relationship with Bitcoin prices, and that the influence of sentiment intensifies during periods of heightened market uncertainty and instability. It is argued that precisely the phases of pronounced fear or greed are accompanied by sharp price movements and increased volatility (Gaies et al., 2023).

The cyclicality of the fear and greed index observed in 2025 – early 2026 and recorded on the Cryptonisation platform confirms this conclusion. Transitions of the index from the zone of "extreme fear" to the zones of "greed" and "extreme greed" were accompanied by an accelerated increase in the prices of Bitcoin and Ethereum, while the return of the index to the "fear" zone coincided with phases of correction and consolidation. Accordingly, the index reflects not only the emotional background of the market but also the feedback mechanisms between sentiment and price dynamics described in the study by Gaies et al. (2023).

In turn, the results of the study by Y. Huang and colleagues make it possible to interpret the temporal nature of the identified relationships. Their research shows that the fear and greed index exerts a statistically significant but asymmetric influence on Bitcoin returns, with the effect differing across short-term and medium-term horizons. The authors note that during periods of dominant greed, increases in returns may be speculative in nature and accompanied by heightened risks of subsequent correction (Huang et al., 2024).

In particular, the current state of the market serves as a signal of a weakening of speculative expectations and a transition of investors toward more cautious behavioral strategies, which is consistent with the conclusion of Huang et al. (2024) regarding the corrective role of fear following phases of excessive greed.

At the same time, the fear and greed index can be considered an aggregated indicator that reflects precisely those emotional states that intensify correlations between assets. During periods of dominant greed, investors tend to expand risky positions across a wide range of cryptocurrencies, which leads to an increase in positive correlations. By contrast, in phases of fear, a synchronous exit from risky assets is observed, accompanied by a simultaneous decline in prices across the entire market. Sentiment indicators enhance the explanatory power of models of Bitcoin returns, especially during periods of crisis shocks and heightened uncertainty (Boutesska et al., 2022), which makes it possible to interpret high correlation values between cryptocurrencies as the result of common behavioral factors reflected by the fear and greed index. At the same time, global waves of fear are capable of spreading across different segments of financial markets, increasing volatility and the synchronicity of price fluctuations (Tabash et al., 2025).

It should be noted that the current state of cryptocurrency development, taking into account prevailing trends and changes in the

fear and greed index, is associated with several circumstances.

First, the strengthening of institutional investor participation implies a gradual change in the nature of market reactions to behavioral signals. Previously, the dominant share of retail investors made the market particularly sensitive to sentiment fluctuations, whereas the increase in institutional capital investments contributes to a certain stabilization of price reactions to emotional impulses. Nevertheless, as empirical data on the dynamics of the fear and greed index show, acute phases of emotional response persist, although they manifest themselves over larger time scales, which creates prerequisites for the formation of new behavioral models in which the index serves as an indicator not only of short-term market fluctuations but also of medium-term cycles involving institutional investors.

Second, current trends indicate an expansion of the analytical application of the fear and greed index beyond the classical monitoring of retail investor sentiment. Contemporary studies point to the prospects of incorporating machine learning models and big data processing for a more accurate integration of the index into price forecasting models (Carosia et al., 2024).

Third, the strengthening of correlation links between cryptocurrencies and traditional financial assets creates prerequisites for the fear and greed index to become part of a multiparadigmatic analysis of market risks. In this context, the current index values, which are recorded in the range between "fear" and "neutrality," may serve as signals of potential turning points in market cycles.

Conclusion

The conducted study has shown that the cryptocurrency fear and greed index is an analytical tool that makes it possible to identify behavioral and emotional regimes of the cryptocurrency market's functioning. Under conditions of high volatility and uncertainty characteristic of digital assets, this index performs the function of an aggregated indicator of investor sentiment, reflecting shifts between phases of fear, neutral expectations, and greed. The analysis of theoretical and empirical studies confirmed that the dynamics of the fear and greed index are associated with the price dynamics of leading cryptocurrencies, primarily Bitcoin and Ethereum; however, this relationship is nonlinear and regime-dependent in nature. The index reflects market phase states and collective behavioral effects to a greater extent than it serves as a universal tool for short-term price forecasting. The use of Cryptonisation data made it possible to identify the cyclicality of index changes and their consistency with stages of market movements, including periods of growth, correction, and consolidation. In the future, the fear and greed index may evolve from a descriptive sentiment indicator into an element of multifactor analysis that contributes to the assessment of processes occurring in the cryptocurrency market. Overall, the results of the study confirm the appropriateness of using the fear and greed index as an auxiliary tool for analyzing the cryptocurrency market, particularly in assessing market regimes and behavioral risks, which makes it promising for further research.

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Section 7. Pricing

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PREDICTIVE PRICING AS A TOOL FOR HARMONIZING AGRICULTURAL MARKETS UNDER REGIONAL ECONOMIC INTEGRATION (THE CASE OF THE EAEU)

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Abstract

The study explores predictive pricing as a mechanism for stabilizing and harmonizing agricultural markets within the Eurasian Economic Union (EAEU) amid growing global and regional uncertainty. It demonstrates that traditional pricing approaches are insufficient under conditions of volatile world markets, logistics disruptions, and institutional asymmetries. The research substantiates the conceptual framework of predictive pricing, integrating big data, machine learning models, and digital monitoring platforms. Empirical evidence from Belarus (2016–2024) confirms the strong influence of external factors on domestic price dynamics. The findings show that predictive pricing enhances forecasting accuracy, reduces market volatility, and supports coordinated pricing policies, contributing to the formation of a unified digital data space and more resilient agricultural markets in the EAEU.

Keywords: *predictive pricing, agricultural markets, EAEU integration, machine learning, price forecasting, digital data platforms, market volatility*

Introduction

Agricultural markets of the Eurasian Economic Union (EAEU) have been increasingly exposed to global and regional uncertainties, including food price volatility, logistics disruptions, climate risks, sanctions, institutional asymmetries, and the transformation of global value chains. These factors intensify cross-border price transmission and undermine the effectiveness of traditional pricing mechanisms such as costbased, normative, and administrative approaches. In this context, the need for advanced analytical tools capable of predicting market dynamics and supporting coordinated pricing policies has become critical. Predictive pricing, based on big data analytics, machine learning, and digital monitoring platforms, emerges as a key instrument for enhancing market stability and harmonization within the EAEU. The study aims to substantiate the theoretical and methodological foundations of predictive pricing and to

determine its role in harmonizing agricultural markets under regional economic integration.

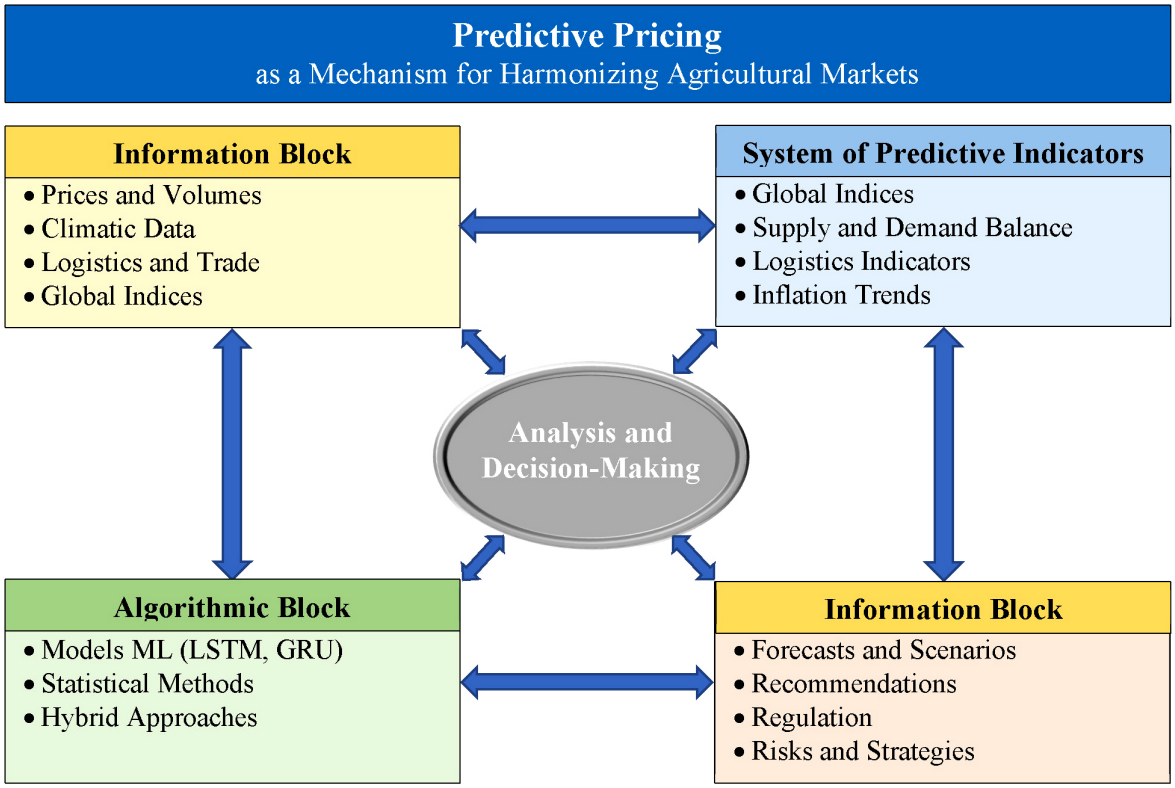
Methods

The study employs a mixedmethod research design combining a systematic review of scientific publications from 2006–2024, comparative analysis of forecasting approaches, and empirical examination of agricultural price dynamics in Belarus for 2016–2024. The methodological framework integrates statistical timeseries models (ARIMA, SARIMA), neural network architectures (LSTM, GRU, CNNLSTM), and ensemble algorithms (Random Forest, XGBoost), enabling assessment of nonlinear and multidimensional determinants of price formation (Sabu & Kumar, 2020). A conceptual model of predictive pricing was developed through structural analysis of information, algorithmic, indicator, and management components. Empirical evaluation included correlation analysis, factor decomposition of external and internal drivers, and identification of integrationrelated asymmetries affecting price transmission within the EAEU.

Results и Discussion

Based on an analysis of scientific publications from 2006 to 2024, it was found that machine learning and timeseries methods dominate global practice in price forecasting. The highest accuracy is demonstrated by neural network architectures (LSTM, GRU, CNNLSTM), which can account for nonlinearity and multidimensionality of data, as well as hybrid models combining statistical and intelligent approaches (Wihartiko et al., 2021). At the same time, studies emphasize the need – when forecasting prices for agricultural products and food – to expand the set of factors by including climate data, logistics indicators, institutional parameters, and integration effects, which is particularly relevant for EAEU countries.

Figure 1. *Predictive Pricing Framework for Agricultural Market Harmonization*



The conceptual model of predictive pricing includes four interconnected structural blocks: the information block, the algorithmic block, the system of predictive indicators, and the management contour. The information block includes historical price series, supply and demand data, climate parameters, logistics indicators, global commodity indices, and

institutional factors. The algorithmic block is represented by statistical models (ARIMA, SARIMA), neural network architectures (LSTM, GRU), ensemble methods (Random Forest, XGBoost), and hybrid models that ensure high forecasting accuracy under conditions of data nonlinearity and multidimensionality (Bayona-Oré et al., 2021).

The system of predictive indicators includes global (FAO indices, exchange quotations), regional (EAEU indicators, logistics indices), national (supplydemand balances, inflation parameters), and operational indicators (yield, production costs, stocks). The use of such indicators is aimed at early identification of prerequisites for changes in market conditions, forecasting price shocks, and reducing volatility in national agricultural markets.

Analysis of statistical data of the Republic of Belarus for 2016–2024 revealed the following key trends determining the dynamics of agricultural prices: high dependence on global indices, strengthening influence of logistics factors, growth of seasonal volatility, and an increase in the amplitude of price fluctuations during periods of external shocks. It was established that up to 40% of the variation in domestic prices is explained by external factors, which confirms the need to integrate predictive models into the system of state regulation and interstate cooperation within the EAEU.

To ensure the deployment of a predictive pricing system in EAEU countries, it is necessary to create national digital agricultural data platforms that provide collection, processing, and integration of heterogeneous information sources, including satellite monitoring, IoT sensors, meteorological data, exchange quotations, and foreign trade statistics. Such platforms should become the foundation for forming a unified EAEU digital data space, ensuring data comparability, process transparency, and the possibility of building integration-oriented models.

To improve the regulatory framework of EAEU member countries, we propose legislatively defining the concept of “predictable pricing”, standardizing data and algorithms, creating model validation mechanisms, and establishing requirements for digital platforms. Particular attention should be paid to training specialists and developing competencies in data analysis, digital economics, and agricultural analytics. It is important to create educational programs for agribusiness specialists and form interdisciplinary groups bringing together economists, data analysts, and IT specialists.

The developed model for harmonizing pricing mechanisms within the EAEU includes algorithms for coordinating indicators, tools for monitoring integration imbalances, and principles for constructing a unified framework for integrated pricing. According to our estimates, the implementation of forecast pricing reduces agricultural market volatility by 15–25%, improves forecasting accuracy by 20–35%, and ensures the consistency of pricing policies among member states. Predictive models can be used to develop export-import strategies, production planning, inventory management, and government support measures.

Particular attention should be paid to the institutional aspects of integration. This is because differences in national regulatory systems, levels of digitalization, data availability, and logistics infrastructure create asymmetries in price signals and hinder the formation of a single market. Price forecasting will help compensate for these differences through data standardization, increased transparency, and the implementation of common analytical algorithms.

Conclusion

Thus, predictive pricing is considered a key tool for enhancing the resilience of the agricultural sector, harmonizing pricing mechanisms, and forming a unified digital data space within the EAEU. The presented results have high practical significance and can be used in developing strategies for the agroindustrial complex, improving state regulation mechanisms, and shaping integration policy in food markets. Predictive models make it possible to shift from reactive regulation to proactive management, which is a necessary condition for sustainable development of the agricultural sector under conditions of global instability.

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Section 8. Regional economy

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OPPORTUNITIES FOR IMPROVING THE SOCIAL SECURITY SYSTEM OF WAR VETERANS IN THE REPUBLIC OF AZERBAIJAN BASED ON ADVANCED EXPERIENCES

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Abstract

This study analyzes the legal and institutional foundations of the social protection system for war veterans in the Republic of Azerbaijan and explores possibilities for its improvement. It identifies the problems of the current legal-normative framework, inherited from the socialist system and not aligned with the demands of modern times-particularly its lack of adaptation to individual needs and reliance on centralized administrative mechanisms. Through a comparative analysis of the advanced practices of various countries-Germany, Turkey, and Israel-the research highlights the advantages of these models in areas such as defining legal status, establishing regional administrative structures, providing rehabilitation and psychosocial support services, and ensuring mechanisms for individualized approaches and public participation.

Keywords: *Republic of Azerbaijan, social protection, war veterans, international experience, comparative analysis*

Introduction

The social protection system of Azerbaijan has been formed for many years under the influence of the Soviet socialist model. In this model, the state fully assumed the responsibility of ensuring the social well-being of citizens, with particular priority given to the provision of persons who have lost their ability to work, the elderly, and war veterans. War veterans were valued both ideologically as a symbol of heroism and factually held a central place in the state's social protection policy. Although Azerbaijan transitioned to a market economy after independence, traces of the socialist model and social expectations towards the state have continued to persist in public consciousness. This necessitates the formation of legislation in the field of social security for veterans not only within the framework of a market economy but also in accordance with society's expectations of justice and care.

Germany, as an advanced example of a social welfare state, has established a system that comprehensively regulates the social security of war veterans from a legal perspective. Especially after the Second World War, the large-scale social integration and well-being of war veterans and civilian victims became one of the important areas of German law. The normative legal acts adopted for this purpose encompass the social protection of both persons who have lost their health due to war and their family members. In Germany, this system is not limited only to material compensations, but is based on a multifaceted structure that also includes rehabilitation, medical assistance, psychological support, and social reintegration mechanisms.

In Germany, the social security of war veterans is mainly regulated by the "Federal Pensions Act" (*Bundesversorgungsgesetz*). This law was adopted in 1950 and, through improvements at various stages, has provided comprehensive legal guarantees to war veterans and their families (Act on the provision of care for victims of war (Federal Pensions Act – BVG). According to the law, persons who have suffered physical or psychological harm as a result of participating in armed conflicts are provided with financial assistance, medical treatment, prosthetic and rehabilitation services, as well as opportunities for integration into the labor market through vocational training. The law also provides for the provision of social benefits to family members – especially widows and minor children. The law also notes that these benefits are not limited only to past wars, but can also apply to persons involved in other international and internal conflicts (Boztepe, A.Ş.).

The German model is also important in terms of transparency and individualized approach. The condition of veterans is assessed through medical and social expert examinations, and individual social plans are prepared according to their needs. For example, if a veteran has lost his ability to work, he is not only provided with a pension, but also opportunities for placement in special nursing homes or social assistance at home are created. Administrative procedures for determining the legal status of veterans and using the benefit system have been simplified, and special service offices have been established to increase citizen satisfaction. These structures operate in a coordinated manner at the federal and local levels.

In Germany, according to the Federal Pensions Act, the institutional mechanism operates in a coordinated manner between central and local administrative bodies. The main implementing body of the system is the Federal Ministry of Labor and Social Affairs (*Bundesministerium für Arbeit und Soziales*), but in practice, these tasks are carried out by the social security authorities of the federal states (Boztepe, A.Ş.). The receipt of applications, determination of legal status, assessment of needs, and assignment of social benefits fall within the authority of these authorities. Relevant medical expert commissions operate to determine the health status of veterans, and based on their opinions, the scope and form of social security are determined. In addition, rehabilitation centers, vocational training programs, and psychosocial support structures are an integral part of this institutional system (Bundesministerium für Arbeit und Soziales). An individual file is prepared for each application and tracked through an electronic system, which both ensures transparency and increases citizen satisfaction. A system of social courts exists to protect the rights of applicants, and citizens can appeal to these instances if they are dissatisfied with decisions.

In brotherly Turkey, the social security of war veterans mainly covers persons with "Gazilik" (veteran) status and their families. This system is implemented both through legal normative acts and the coordinated activities of various state institutions. The main legal framework is regulated by the Social Insurance and General Health Insurance Law of the Republic of Turkey (Law No. 5510) (Bundesversorgungsgesetz), the Social Services Law (Grossman, G.), the Turkish Heroes and Veterans Law (Haupt, C.P.), and other additional decisions and presidential decrees. In Turkey, monthly social benefits for persons who have obtained "Gazi" status hold an important place. Persons who officially acquire this status are paid a fixed monthly pension by the state, and these payments may vary according to the level of need, degree of injury, and length of service.

Additionally, in some cases, additional payments included in social assistance packages – holiday allowances, individual benefits for medical needs, and support payments for family members – are provided to veterans. The legal basis of these payments is clearly defined by legislation and sustainability is ensured within the budget framework (Hoffman, M.).

Furthermore, the medical needs of veterans and their immediate family members are fully covered by the state in Turkey. Persons with Gazi status can benefit from both primary healthcare services and specialized rehabilitation and surgical services free of charge through the Social Security Institution (SGK) and the Ministry of Health (Resolution of the Cabinet of Ministers of the Republic of Azerbaijan). These guarantees cover not only hospital visits but also technical aids such as medication supply, prostheses, and orthopedic devices. The comprehensiveness and continuity of medical support demonstrate the state's special approach to this group. That is, these issues are resolved directly through the ministry, not just through some funds. Also, the children of persons with Gazi status benefit from various educational privileges in Turkey. These privileges include admission to state universities without examination, exemption from tuition fees, and provision with scholarships (Resolution of the Cabinet of Ministers of the Republic of Azerbaijan). On the other hand, veterans themselves have the right of priority within certain quotas when being recruited to public institutions. Through this policy, the state encourages not only the social protection of veterans but also their active economic participation, keeping them as an integral part of the labor market. This is an important component of social integration.

Important steps have also been taken in the field of housing provision for veterans in Turkey. They are accepted as a priority group in the state's social housing programs and benefit from long-term mortgage opportunities with lower interest rates. In addition, veterans are fully or partially exempted from property and vehicle taxes. These concessions serve to improve the living conditions of both the veteran and his family and reduce their economic burden. Such measures are accepted as part of social welfare aimed at preserving the financial stability of veterans (Resolution of the Cabinet of Ministers of the Republic of Azerbaijan).

The psychological and social adaptation of veterans to society after war and armed conflicts is one of the areas prioritized in Turkey. For this purpose, not only physical but also psychological support programs are implemented in rehabilitation centers. Individual and group therapies conducted by professional psychologists and social workers help veterans cope with traumatic experiences. Also, involvement in social activities, integration through sports and cultural events is encouraged, which creates conditions for veterans to feel themselves as active members of society.

In the Turkish model, the accuracy of legal recognition and the status-based approach are important. The inclusiveness of the social security system has been increased especially thanks to the broad legal framework given to the concept of "injured while serving the homeland". The rights and duties of persons with this status are clearly defined by law, and coordination between administrative bodies is established at a high level. At the same time, the Coordination Centers for Martyrs' Relatives and Veterans operating in every province of the country ensure the effectiveness of services at the local level and allow for flexible response to needs (Haupt, C. P.). Finally, the promotion by the public of the high symbolic and social status towards veterans and martyrs' families in Turkey creates conditions for them to gain a prestigious position in society and strengthens social cohesion.

Israel, being a country with long-term and intense conflict experience, the social protection of war veterans is of strategic importance in state policy. The legal-institutional system in this field is organized in a highly specialized, transparent, and differentiated manner. The concept of a veteran is not limited only to persons who have served in the army, but also includes civilians injured in national security operations. The main normative document is the "Disabled Veterans Law" (*Hok Nechey Milchama*) adopted in 1959 and other complementary laws and decisions. According to this law, persons who have suffered physical

or psychological injury while serving in the Israel Defense Forces (IDF) are deemed worthy of relevant state benefits and long-term support. The law clearly defines the rights of veterans, types of benefits, and the functions of the bodies dealing with their protection (Hoffman, M.).

The implementation of veterans' rights and organization of services are mainly carried out by the Rehabilitation Department of the Ministry of Defense of Israel. This department operates across a wide spectrum, from recognition of status to medical assessment, determination of social payments, psychological support, education and employment services. An individual assessment is conducted for each veteran, and based on this, a social support program is prepared. The Rehabilitation Department also coordinates rehabilitation centers, legal advisory services, and community integration projects (Resolution of the Cabinet of Ministers of the Republic of Azerbaijan).

It should also be noted that in Israel, not only soldiers but also civilians injured during terrorist attacks or enemy attacks can, under certain conditions, benefit from the rehabilitation and material support opportunities of the veteran system. This is a rare approach based on a broad public security concept. In this regard, the Israel Heroes and Disabled Veterans Association is not only a social service provider but also a powerful lobby influencing legislation and state policy. These organizations participate in negotiations with government structures and play an active role in shaping public opinion. Although many countries have veteran organizations, their influence capabilities have not reached such an institutional level. All these elements distinguish the Israeli model from other countries and make it an innovative, legally progressive, and reality-adapted system.

Conclusion

Thus, as a result of our research, we can note that the Republic of Azerbaijan can benefit from the successful experiences of various states such as Germany, Turkey, and Israel in order to improve the social security system of war veterans, and by integrating specific elements from each of these models, adapted to the Azerbaijani reality, can form a sustainable framework both institutionally and legally. The main step that can be taken from the German model is the creation of a unified and comprehensive legislative base, the establishment of a specialized administrative structure based on the territorial principle, and the completion of benefits not only with material support but also with rehabilitation and reintegration-oriented services.

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Section 9. World economy

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DOES TECHNOLOGICAL INNOVATION DRIVE ECONOMIC GROWTH? PANEL EVIDENCE FROM EAST ASIAN ECONOMIES (1996–2024)

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Abstract

In contemporary economic thought, technological innovation is considered a key driver of sustainable growth and global competitive advantage. However, published studies have yielded different empirical results depending on the country samples selected and their level of development. The aim of this study is to investigate the impact of technological innovation on economic growth within an empirical framework. Panel data analysis and random effects were used to estimate the model. To obtain accurate estimates, taking into account heterogeneity, autocorrelation, and cross-dependencies, the analyses were augmented using Driscoll-Cree standard errors. The results show that the impact of innovation on economic growth can be either positive or negative, depending on the country's level of technological maturity and its institutional infrastructure.

Keywords: *Technological Innovation; Economic Growth; East Asia; Panel Data Analysis*
JEL Classification: O30; O47; C33; F43

1. Introduction

Technological innovation is widely recognized as a key driver of sustainable development and economic growth. While traditional production factors such as labor and capital face diminishing returns, innovation enhances productivity and supports structural economic transformation. However, empirical studies report mixed results, as the impact of innovation varies depending on country groups, methodological approaches, and institutional conditions. In developing economies, factors such as limited technological capacity, high R&D costs, and short-term labor market adjustments may weaken or offset the positive effects of innovation.

East Asian economies are particularly important in this context, as countries such as

China, Japan, South Korea, Singapore, and Hong Kong have become major innovation hubs through the combination of foreign investment and domestic technological capabilities. However, differences in human capital, infrastructure, and institutional quality lead to heterogeneous outcomes across countries (Karaosmanoglu, E. A. I., & Mammadli, A., 2025).

This study examines the impact of technological innovation on GDP in selected East Asian countries over the period 1996–2024 using panel data analysis. Unlike previous studies, technological innovation is measured through a multidimensional Technological Innovation Index (TII), which incorporates technological creativity, infrastructure, and human capital based on Desai et al. (2002) and Archibugi and Coco (2002). The empirical analysis employs a Driscoll–Kraay regression approach to ensure robust results in the presence of heteroskedasticity, autocorrelation, and cross-sectional dependence.

The study concludes with policy implications aimed at strengthening innovation capacity and sustainable economic growth.

2. Literature Review

The relationship between technological innovation and economic growth has long been a central topic in the literature. Early studies emphasize the importance of R&D expenditures and patent activities in enhancing productivity and economic performance (Lichtenberg, 1992; Freire-Serene, 1999), while the impact of private R&D investment varies across countries and sectors (Wang & Wu, 2015; Sylwester, 2001; Falk, 2015). More recent research expands this perspective by highlighting the role of digital technologies, clean energy, and artificial intelligence as key drivers of economic growth.

Table 1. *Heterogeneous Findings and Literature Review on the Effects of Technological Innovation on Economic Growth*

Author(s)	Country Group	Period	Methodology	Key Findings
Lichtenberg (1992)	74 Countries	1964–1989	Panel Regression Analysis	Private-sector-funded R&D significantly promotes economic growth, whereas publicly funded R&D shows no significant impact; innovation driven by private investment plays a crucial role in enhancing productivity and long-term economic performance.
Freire-Serén (1999)	21 OECD Countries	1965–1990	Patent Data Analysis	R&D expenditures exhibit a strong positive relationship with economic growth, with a 1% increase in R&D leading to a 0.08% rise in real domestic income across OECD countries during the period 1965–1990.
Sylwester (2001)	20 OECD and G7 countries	1989–1996	Panel Regression Analysis	R&D expenditures do not show a significant relationship with economic growth in a broad sample of OECD countries, but they have a positive and significant impact on growth in G7 economies, indicating that the effectiveness of innovation investments depends on the level of economic development.
Kraemer and Dedrick (2001)	Asia-Pacific Countries	1984–1990	Granger Casuality test	Information technology investments have a strong relationship with economic growth, with evidence of bidirectional causality between the two variables in Asia-Pacific countries.

Author(s)	Country Group	Period	Methodology	Key Findings
Yanyun and Mingqian (2004)	Japan, China, Singapore, Philippines, South Korea, Malaysia, Thailand, and Indonesia.	1994–2003	Panel Regression Analysis	R&D expenditures and economic growth exhibit a bidirectional positive relationship, indicating mutual reinforcement between innovation investment and growth across East Asian economies.
Eid (2012)	17 OECD Countries	1981–2006	Panel Regression Analysis	R&D expenditures in higher education have a positive and statistically significant effect on economic growth in high-income OECD countries.
Wang and Wu (2015)	China	1997–2013	Panel Regression Analysis	R&D expenditures are strongly correlated with economic growth in China, while public R&D spending has an almost negligible effect on economic growth.
Maha Mohamed Alsebai Mohamed et al (2022)	Developing Countries	1990–2018	Error Correction Model (ECM), and Granger causality tests	Technological innovation is a key driver of economic growth, positively affecting both short- and long-run performance, with evidence of long-run bidirectional causality and short-run causality from innovation to growth.
Siti Nurazira Mohd Daud and Abd Halim Ahmad (2023)	84 Countries	2011–2017	Generalized Method of Moments (GMM)	Financial inclusion and digital technology are found to have a positive and statistically significant impact on economic growth, with digital technology also reinforcing the growth effects of financial inclusion.
Xu He et al. (2023)	38 Asian Countries	1990–2021	Augmented Mean Group Regression model	Clean energy consumption, technological innovation, and financial development positively and significantly affect economic growth in Asian countries, while population size and CO_2 emissions have negative effects, emphasizing the role of clean energy and innovation in sustainable growth.
Muhammad Asif et al. (2024)	BRICS Countries	2004–2023	Panel Data Analysis	Renewable energy consumption, technological innovation, and financial development are found to have a positive and significant impact on ecological sustainability, while economic growth has a negative effect, with trade openness playing a significant mediating role.
Ayesha Khan (2025)	Pakistan	1990–2023	Panel ARDL	Green innovation, technological development, FDI, and medium–high-tech exports positively and significantly affect economic growth in both the short and long run, whilerenewable energy has a negative long-run effect, emphasizing the importance

Author(s)	Country Group	Period	Methodology	Key Findings
				of innovation and export competitiveness for sustainable development.
Zahoor Ahmed (2026)	10 largest economies	1996–2021	Feasible Generalized Least Squares	AI has a direct negative impact on environmental sustainability across all quantiles, while its indirect effect through economic growth is positive, with renewable energy improving environmental outcomes and political globalization and corruption worsening them.

3. Data and Methodology

3.1. Data and Sample Selection

This study uses a balanced panel dataset covering 1996–2024 for five East Asian countries. A multidimensional Technological Innovation Index (TII) is constructed, incorporating technological innovation, infrastructure, and human capital based on Desai et al. (2002) and Archibugi and Coco (2002).

For transparency and replicability, the dataset, coding procedures, and index construction steps (including normalization and geometric mean method) are provided in the online supplementary materials, enabling full replication without relying on the original dissertation (Mammadli, 2025).

Table 2. *Description of Variables in the Model*

Variable	Description	Data Source	Unit	Transformation
GDP	LnGDP	World Bank	USD	Log transformation
Technological Innovation Index	TII	Author-Calculated	0–1 scale	Used in original scale; log transformation not applied due to zero values in some components
Labor Force	LnLF	World Bank	persons	Log transformation

All variables used in this study cover the period from 1996 to 2024. The main explanatory variable is the Technological Innovation Index (TII), constructed by the authors, while labor force is included as a control variable and GDP serves as the dependent variable.

Prior to the analysis, the labor force variable was transformed into its natural logarithmic form to reduce skewness and improve interpretability. In contrast, the Technological Innovation Index (TII) was retained in its original form without log transformation in order to preserve zero values and maintain ease of interpretation.

Descriptive statistics for all variables are reported in Table 2. For transparency and reproducibility, the log-transformed independent variables are explicitly indicated in the (table 3).

Table 3. *Summary Statistics of Variables*

Variables	Obs.	Mean	Std. Dev.	Min.	Max.
LNGDP	145	27.8099	1.172809	25.58376	30.56188
TII	145	0. 347139	0.2541791	0	0.9025086
LNLF	145	18.74144	1.319809	16.61025	20.47633

Table 3 presents descriptive statistics based on 145 observations, indicating a balanced dataset. TII shows moderate variability, while LNGDP and LNLF exhibit relatively stable distributions with limited dispersion across the sample.

3.2. Econometric Model

An econometric model is specified to examine the impact of technological innovation and labor force on economic growth. The model is expressed as follows:

$$\ln GDP_{it} = \beta_0 + \beta_1 \ln TII_{it} + \beta_2 \ln LF_{it} + \varepsilon_{it}$$

where GDP represents gross domestic product, TII denotes the Technological Innovation Index, and LF refers to the labor force. The indices i and t indicate cross-sectional units and time periods, respectively. All explanatory variables are included in logarithmic form to improve interpretability, while ε_{it} represents the error term.

3.3. Estimation Strategy and Diagnostic Tests

Before proceeding with panel data estimation, one must determine the most suitable model structure: pooled Ordinary Least Squares (OLS), fixed-effects (FE), or a model accounting for time-specific effects.

Panel data often include unit-specific effects reflecting unobserved heterogeneity across cross-sectional units (Tatoğlu, 2020). To test their significance, the F-test, Breusch–Pagan LM test, and Likelihood Ratio (LR) test are employed, guiding the selection of the appropriate panel model.

Table 4. *Results of Model Selection Tests Among Estimation Methods*

Tests	Unit and/or Time Effects	Unit Effects	Time Effects
LR (Likelihood Ratio)	54.44(0.000)	28.37(0.000)	0.39(0.2662)
F	3.04(0.000)	14.33(0.000)	0.3004 (0.000)
LM (Breusch-Pagan)	—	114.93(0.000)	0.000 (1.000)

Not: *The values in parentheses represent the p-values*

The results in Table 4 indicate significant unit-specific effects ($p < 0.01$) based on the LR, F, and LM tests, while time effects are found to be insignificant. This suggests that the Pooled OLS model is inappropriate, and a panel model should be used. Accordingly, the Hausman test is applied to determine whether a fixed or random effects model is more suitable.

Table 5. *Robust Hausman Test Results*

Test	Robust Hausman Test
P-values	0.34 (0.8419)

The choice between fixed-effects and random-effects estimators was determined using the Robust Hausman Test, the results of which are displayed in Table 5. The test yielded a p-value of 0.8419, which is significantly higher than the standard significance thresholds of 0.01, 0.05, and 0.10.

The results fail to reject the null hypothesis, indicating that the random-effects model is more appropriate and efficient. Diagnostic tests for heteroskedasticity, autocorrelation, cross-sectional dependence, and multicollinearity (VIF) were also conducted to ensure model validity. Given the small cross-sectional dimension (N = 5), robust estimation techniques are employed to improve the reliability of the results.

Table 6. *Results of Diagnostic Tests for Violations of Classical Assumptions*

VIF	1.00
Heteroskedasticity Test	
Levene, Brown and Forsythe Test	W0 = 5.3162745 df(4, 140) Pr > F = 0.00051408 W50 = 4.0270232 df(4, 140) Pr > F = 0.00401988 W10 = 5.3081158 df(4, 140) Pr > F = 0.00052079
Autocorrelation Tests	

VIF		1.00	
Bhargava et al. Durbin–Watson	0. 23166576	**Baltagi–Wu LBI**	0. 38047281
		Correlation Tests	
Pesaran Test	2.223(0.0262)	**Friedman Test**	36.817 (0.0000)
Frees Test (1.092)	0.0892 (%10)	0.1160 (%5)	0.1660 (%1)

The results in Table 6 indicate the presence of heteroskedasticity ($p < 0.01$) and first-order autocorrelation, as confirmed by low Durbin–Watson and Baltagi–Wu statistics. Cross-sectional dependence is also detected, with Friedman and Frees tests providing strong evidence despite weaker Pesaran results due to small sample size ($N = 5$). To address these issues, Driscoll–Kraay standard errors are employed for robust estimation. Additionally, the VIF value of 1.00 confirms the absence of multicollinearity.

4. Empirical Results

This study uses a balanced panel dataset for five East Asian countries (1996–2024) and constructs a multidimensional Technological Innovation Index (TII) based on Desai et al. (2002) and Archibugi and Coco (2002). For transparency and replicability, the dataset and index construction details are provided in the online supplementary materials, allowing full replication of the analysis.

Table 7. *Results of the Driscoll-Kraay Estimator*

Variables	Coefficient	Driscoll-Kraay Standard Errors	T statistic	P-value
TIE	2.247917	0.2738184	8.21	0.000
LNLF	0.7220842	0.2265418	3.19	0.003
Wald chi2(4) = 146.68		**Prob > chi2** = 0.0000	**R2** = 0.7796	

Notes: *Dependent variable TII is in levels, explanatory variables are in logarithms coefficients interpreted as semi-elasticities*

Table 7 reports the fixed-effects results with Driscoll–Kraay standard errors. The Wald statistic (146.68, $p = 0.000$) confirms the overall significance of the model. The R^2 value of 0.7796 indicates strong explanatory power. Both the Technological Innovation Index ($\beta = 2.2479$, $p = 0.000$) and labor force ($\beta = 0.7221$, $p = 0.003$) have positive and statistically significant effects, suggesting robust and reliable results.

- The TIE variable is positive and statistically significant at the 1% level ($\beta = = 2.2479$), indicating a strong positive impact on the dependent variable.
- The LNLF variable is statistically significant at the 1% level ($\beta = 0.7221$, $p = 0.003$), indicating a positive effect on the dependent variable. In logarithmic terms, a 1% increase in labor force leads to an approximate 0.0072 unit increase in the dependent variable, ceteris paribus.

According to the obtained results, the final estimated model with statistically significant variables can be expressed as follows:

$$LNGDP_{it} = \beta 0 + 2.2479TI^{\cdot}Eit + + 0.7221LNLFit + \varepsilon it$$

Result

This study examines the relationship between technological innovation and economic growth, providing theoretical and empirical evidence that innovation significantly promotes growth through higher productivity, efficiency, and structural transformation. The results show that R&D, human capital, and innovation capacity have a pos-

itive and statistically significant impact on economic performance.

The findings also suggest that the innovation–growth relationship varies across countries depending on development levels and institutional conditions. From a policy perspective, the study highlights the importance of increasing R&D investment, strengthening education systems, and supporting technological diffusion, along with improving financial systems and encouraging technology transfer.

Overall, the study contributes to the literature by confirming the strong innovation–growth nexus and suggests that future research could explore sectoral differences and the role of digital and green technologies.

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MAIN DIRECTIONS OF ENSURING FISCAL AND SOCIAL JUSTICE IN ENSURING SUSTAINABLE DEVELOPMENT OF COUNTRIES

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Abstract

This article examines the structural relationship between fiscal justice and social justice in the context of contemporary inequalities and an ongoing civilizational transition in the twenty-first century. Fiscal systems should be understood not merely as instruments of revenue collection but as mechanisms of systemic equilibrium. Additionally, analyses were conducted in countries such as Azerbaijan, Spain, Poland, and Brazil to improve fiscal and social policies. The article also determined the dynamics of the share of tax revenues in GDP in these countries. Based on the analysis, existing problems in fiscal policy were identified and areas for addressing them were identified.

Keywords: *fiscal policy, integration, tax revenue, integration, globalization, development, fiscal justice*

Introduction

The twenty-first century is characterized by a structural contradiction: technological acceleration and global economic expansion coexist with intensified inequality, wealth concentration, and a progressive erosion of trust in public institutions. Fiscal polarization – expressed both in disputes over tax burdens and in conflicts regarding expenditure priorities – has become a central feature of governance crises and legitimacy deficits in multiple societies. Under these conditions, the relationship be-

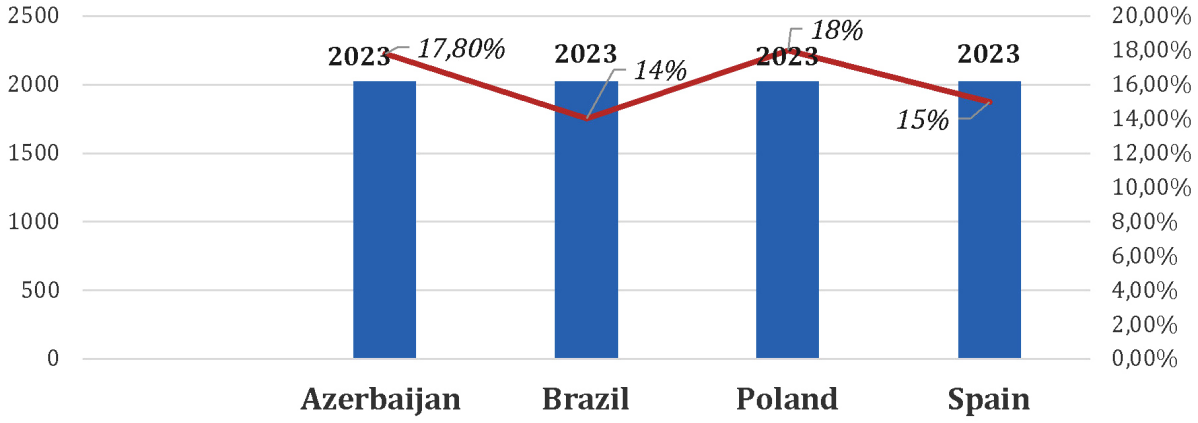
tween fiscal justice and social justice cannot be reduced to a technical debate in public finance. It must be approached as a civilizational issue involving the architecture of institutional order, the distribution of opportunities, and the long-term sustainability of the social pact. In this article, fiscal justice is understood as fairness in taxation and in the allocation of public expenditure, taking into account both contributive capacity and distributive outcomes. Social justice is understood as the effective guarantee of dignity, access to capabilities, and concrete opportunities for human development. While conceptually distinct, these dimensions form a continuum: tax decisions structure the State's capacity to finance public policy, whereas social outcomes shape the legitimacy and moral orientation of fiscal architecture. Historical experience shows, however, that these dimensions have frequently been treated in a dissociated manner: tax systems designed primarily for administrative efficiency, and social policies conceived as subsequent compensation, often constrained by fiscal limits and political volatility.

Literature Review

The tradition of political economy and political philosophy provides consistent normative foundations for fiscal justice. Adam Smith, in systematizing principles of taxation, emphasized proportionality, transparency, and predictability, arguing that taxation should be compatible with contributive capacity and should not generate institutional arbitrariness (Smith, 2007). This formulation remains relevant because it establishes minimum parameters of equity and administrative rationality. In the twentieth century, John Rawls developed justice as fairness, affirming that socio-economic inequalities are morally acceptable only if they improve the situation of the least advantaged (Rawls, 1999). This principle especially the difference principle – offers a direct normative criterion for evaluating tax structures, insofar as it links distributive legitimacy to measurable improvement in vulnerable groups' conditions. Musayeva A., Mammadov Y. A. and etc. notes in his research that in developed countries, implementing effective economic policy through taxation can yield positive results (Musayeva, Mammadov et.al., 2020). In general, every state must also consider socioeconomic factors when fulfilling its economic functions. In some cases, this can seriously impact economic activity if the tax burden is improperly determined. There are various approaches to improving the effectiveness of economic policy that should also be seriously considered. John Keynes demonstrated the centrality of fiscal policy for macroeconomic stabilization and employment preservation, emphasizing countercyclical spending and taxation as tools for preventing systemic collapse and reducing social vulnerability (Keynes, 2021). Abdullayev K. and et al. noted in their research that the implementation of the financial policy in the development of the non-oil sector yielded positive results (Abdullayev, 2024). They also noted the effectiveness of financial policy in the development of the digital economy.

Research method

Graph 1. *The share of tax revenue in GDP for some countries (% of GDP)*



Source: *World Bank database. https://data.worldbank.org/indicator/GC.TAX.TOTL.GD.ZS*

Analysis of results

Income inequality is one of the main socio-economic problems of the modern economy. The unequal distribution of income directly affects the principle of social justice, the welfare level of the population, and economic stability. Therefore, identifying the factors that influence income inequality and evaluating them from an economic perspective is of great importance. One of the most widely used indicators for measuring income inequality is the GINI coefficient. According to economic theory, the level of Gross Domestic Product (GDP), tax policy, and the unemployment rate are among the main macroeconomic factors affecting income distribution. The purpose of this study is to analyze the impact of GDP, tax rate (TAX), and unemployment level (UNEMP) on income inequality using an econometric model. During the research, a logarithmic regression model was constructed using the Ordinary Least Squares (OLS) method based on cross-sectional data for six countries (Brazil, France, Germany, Denmark, Australia, and the USA) covering the period 2011–2022, using statistical indicators obtained from the World Bank database. The model is generally expressed as follows:

$$\ln(GINI) = \beta_0 + \beta_1 \ln(GDP) + \beta_2 \ln(TAX) + \\ + \beta_3 \ln(UNEMP) + \varepsilon \quad (1)$$

The logarithmic model allows for measuring the elasticity relationship between variables and helps stabilize variance. In a log model, the coefficients express the percentage change in the dependent variable resulting from a 1% change in the independent variable (1). The parameters of the model were estimated using the Ordinary Least Squares (OLS) method, and the regression model was constructed as follows (Table 1).

Table 1. *Econometric analysis of the impact of macroeconomic factors on income inequality*

Dependent variable: LN GINI		**Example:2011–2022**		
Method: Least Squares		**Included observations: 6**		
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
LN GDP	–7.893632	2.024431	–3.899187	0.0599
LN TAX	1.766968	0.500619	3.529565	0.0717
LN UNEMP	–75.93370	21.04118	–3.608813	0.0689
C	256.7190	64.33878	3.990113	0.0575
R-squared	0.885304	Mean dependent var		18.92737
Adjusted R-squared	0.713260	S.D. dependent var		11.54062
S.E. of regression	6.179783	Akaike info criterion		6.715164
Sum squared resid	76.37943	Schwarz criterion		6.576337
Log likelihood	–16.14549	Hannan-Quinn criter		6.159428
F-statistic	5.145802	Durbin-Watson		2.454326
Prob(F-statistic)	0.167012			

Source: *https://data360.worldbank.org/en/dataset/WB_WDI. Calculated and compiled by the author using the EViews 13 software package*

The linear, multiple regression equation was obtained as follows:

$$LNGINI = -7.89363229693*LNGDP + \\ + 1.76696816119*LNTAX - \\ 75.9336971305* \\ LNUNEMP + 256.718985093 \quad (2)$$

The negative sign of the GDP variable indicates that economic growth reduces income inequality (2). On the other hand, the positive sign of the tax variable suggests that, according to the model, an increase in taxes raises inequality. The excessively large coefficient of the unemployment variable may

indicate a possible specification or selection problem in the model. When GDP increases by 1%, the GINI coefficient decreases by approximately 7.89%; when taxes increase by 1%, GINI increases by approximately 1.77%. When unemployment increases by 1%, GINI decreases by approximately 75.93% (Table 1). The conducted econometric analysis shows that the logarithmic model has a higher explanatory power compared to the initial model. GDP growth has an effect in reducing income inequality. The effects of tax and unemployment variables, however, do not fully align with theoretical expectations and are weakly statistically significant.

Analysis of results

Development analysis in emerging economies indicates that fiscal policy constitutes a structuring element of national productive capacity and competitive positioning.

Research on innovation, economic transition, and productive modernization – conducted in international cooperation with economists from Azerbaijan and researchers linked to broader BRICS-oriented debates – reinforces the understanding that fiscal policy operates as an architecture of development rather than merely as a collection mechanism. Economies that invest consistently in research and development (R&D), build financial infrastructure for technological entrepreneurship, and align revenue to strategic objectives tend to display more sustainable growth and greater social mobility. According to Shabanov and Pironti, studies of Eurasian economies show that successful energy transitions and digitalization depend on sophisticated fiscal coordination capable of mitigating risks and financing systemic infrastructure (Shabanov, et al., 2025).

Conclusion

The cultural and ethical dimension of institutional transformation resonates reflection that durable social change requires transformation of consciousness. Institutions reflect collective mental patterns; systems organized around fear, excessive competition, and separation tend to reproduce inequality and fragility. In governance terms, this implies that fiscal reforms, while necessary, may be insufficient if they are not accompanied by cultural processes of ethical education and by the strengthening of public consciousness oriented toward interdependence and responsibility.

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