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FROM THE EDITORIAL COMMITTEE

We are giving you the next 32nd 3 (2025) issue of the Scientific Journal of the Faculty of Management at the Rzeszow University of Technology entitled „Humanities and Social Sciences".

The aim of the Publisher is to raise the merits and the international position of the quarterly published by the Faculty of Management, that is why we are still developing the cooperation with foreign team of reviewers, as well as an international Scientific Council. The Editors have also attempted to apply for international databases; currently the quarterly HSS is indexed in **Index Copernicus Journal Master List, The Central European Journal of Social Sciences and Humanities (CEJSH) ERIH PLUS, DOAJ and EBSCO**.

The journal „Humanities and Social Sciences" participated in the „Support for scientific journals" program in 2019-2020, and in the „Development of scientific journals" program in 2023-2024, organized by the Ministry of Science and Higher Education.

The articles published in this publication are devoted to the broader issues of the humanities and social sciences. They are the result both of theoretical and empirical research. The subjects covered vary considerably and reflect the interdisciplinary nature of the Journal. We do hope that the papers published will meet your kind interest and will be an inspiration to further research and fruitful discussions.

On behalf of the Editorial Board of „Humanities and Social Sciences" we would like to thank the Authors for sending the outcomes of their research. We would like to express particular gratitude to the Reviewers for their valuable feedback that greatly contributed to increasing values of the scientific publications.

With compliments

Editorial Committee

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Nataliia BONDAR[1]
Kateryna HORIACHKO[2]

RESEARCH OF THE RELATIONSHIP BETWEEN THE EFFECTIVENESS OF THE STATE TRANSPORT POLICY AND INDICATORS OF SOCIO-ECONOMIC DEVELOPMENT OF THE EUROPEAN UNION COUNTRIES

The purpose of this article is to determine the relationship between the effectiveness of state transport policy and the socio-economic indicators of a country's development. The study was based on the application of correlation and cluster analysis. Gross value added in the transport sector per employee is proposed as an indicator of the effectiveness of state transport policy.
A correlation was found between GVA in the transport sector and socio-economic development indicators: industrial and agricultural growth indices, minimum wage and health care expenditure *per capita*. Based on a cluster analysis, three groups of EU countries were identified according to the level of transport policy effectiveness and the achieved indicators of socio-economic development. The directions and tasks that, when solved, will increase the effectiveness of transport policy and indirectly contribute to the improvement of the country's socio-economic development indicators were systematized.

Keywords: transport, transport policy, socio-economic development, efficiency, state regulation.

1. INTRODUCTION

An important prerequisite for the sustainable socio-economic development of any country's economy is the existence of a developed transport sector. It includes transport infrastructure (transport networks (roads and railways), sea and river ports and shipping channels, airports) and transport companies that transport goods and passengers.

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A developed transport sector is one of the most important factors not only for the stable and dynamic growth of a country's economy and the improvement of the population's standard of living, but also a basic prerequisite for national security and successful integration into the global economic space.

At the present stage, developed and developing countries are characterised by the transformation of transport from the material basis of the circulation process into an inter-sectoral complex. It determines not only the development of the country's entire economy and the standard of living of the population, but also the state's ability to achieve its foreign economic and political goals.

Most countries in the world today have a mixed economy. This involves the simultaneous functioning of state and private ownership of the means of production, with the state sector acting as a regulator. The state's task is to ensure market competitiveness, environmental and social security, innovation and compliance with social guarantees. At the same time, in any country, the development of the transport sector remains under special attention from the state for a number of reasons, in particular (Bondar, 2014):

1. Transport activities need to be regulated due to the need to ensure public (environmental, traffic safety) and national security;
2. Certain sectors of the transport industry are natural monopolies that ensure the integrity of the economic space (e.g. motorways, railways, seaports, airports, etc.). The activities of such natural monopolies are regulated by the state. In the absence of real competition for consumers and accountability to owners, the effectiveness of such management is often low;
3. Despite the diversity of the transport sector, two segments can be distinguished: transport services, which are directly provided by public or private entities, and transport infrastructure, which is used by transport service providers. Within the transport services segment, the state often relies entirely on market mechanisms, reserving for itself control and regulatory functions. Within the transport infrastructure segment, state ownership and management remain in most countries;
4. The transport system ensures the implementation of international trade agreements, influences the country's defence capability and the integration of the national transport system into the global transport system;
5. Transport is a component of the national economy's infrastructure and a tool for stimulating its development. At the same time, the industry has its own infrastructure, which is integrated with the infrastructure of the national economy as a whole. In other words, transport, as a complex functional system, also has an internal source of development;
6. Transport affects the final cost of the goods being transported. In order to curb the growth of prices for goods and influence the rate of inflation, the state controls the level of tariffs. At the same time, regulated tariffs reduce the efficiency and investment opportunities of carriers.

The above prompts us to study the impact of the effectiveness of state transport policy on the country's socio-economic development indicators, to identify groups of European Union countries according to the level of transport policy effectiveness achieved, and to determine the areas of state influence on improving the functioning of the transport sector.

2. LITERATURE REVIEW

Research devoted to studying the impact of transport efficiency on a country's economy is of scientific interest to many scholars. This is because the transport sector influences the formation of a country's human, social and cultural capital, creates conditions for the development of economic initiatives and the attraction of foreign investment, and provides opportunities for the modernization of agriculture and the improvement of living conditions for the population (Thacker, Adshead, Fay, 2019). For example, studies of the impact of transport infrastructure development in rural areas show a decrease in unemployment, especially among women, and an increase in education (Stringer, Clavel, Ricardo, 2024). Accessibility of transport infrastructure and transport services is also important for the development of other industries and territories (Thacker, Adshead, Fay, 2019).

In the case of insufficient inter-sectoral and inter-regional coordination of transport sector development, there is an irrational use of resources and an increase in costs. This leads to a decrease in the efficiency and competitiveness of the entire national economy.

The results of the study (Magazzino, Mele, 2021) show that transport directly or indirectly affects the achievement of all the Sustainable Development Goals. In particular, attention is drawn to the accessibility of all segments of the population to safe, affordable, accessible and sustainable transport systems, improving road safety, developing public transport, and meeting the needs of people in vulnerable situations, women, children, people with disabilities and the elderly.

The need for governments to take into account the impact of transport sector development on indicators such as economic growth, income, poverty, employment, equity and integration is emphasised (Quium, 2019).

At the same time, the development of the transport sector often leads to environmental degradation, increased air emissions, noise, climate change, etc. The results of the Ease of Moving Index India Report 2018, (Prus, Sikora, 2021) suggest that investment in transport infrastructure and the reasonableness of tariffs for the use of public transport reduces the number of private cars and encourages the use of public transport. This leads to a reduction in the negative effects of transport development.

Thus, a sound state policy for the development of the transport sector can solve not only the issue of accessibility of transport for all segments of the population, but also contribute to the country's economic development, health care and the fight against adverse climate change.

The purpose of the proposed article is to study the relationship between the effectiveness of transport policies of EU governments and the achieved indicators of socio-economic development, to identify groups of countries with more effective and less effective transport policies, to find out the common features of socio-economic development of groups of countries and to formulate directions for improving the state transport policy.

3. METHODOLOGY

During the study, various methods were used. The monographic method was used to study the opinions of scientists on the indicators of transport policy effectiveness, indicators of transport infrastructure development, and the composition of indicators of the country's socio-economic development. Comprehensive general scientific approaches such as analysis and synthesis were also used, as well as special scientific methods such as

correlation analysis and cluster analysis. The use of correlation analysis revealed a close relationship between the selected indicator of transport policy effectiveness (gross value added per transport sector employee) and indicators of a country's socio-economic development. Cluster analysis made it possible to group countries according to the level of effectiveness of their state transport policy and the socio-economic development indicators achieved.

The information sources for the study were official statistical publications and official data from the websites of statistical services of international organizations: the Statistical Division of the United Nations Economic Commission for Europe (UNECE) and the Statistical Office of the European Union (Eurostat).

4. RESULTS

The main instrument for implementing state policy in the transport sector is state regulation. The need to evaluate the effectiveness of state regulation in the transport sector is due to a number of circumstances, in particular:

1) the transport industry is strategic in nature, which determines not only national security but also creates preconditions for the uniform development of the economy of the country's regions and the standard of living of the population (Daskal, 2022);
2) the level of development and efficiency of the transport sector has a direct impact on the business activity of other material production sectors (Butkus, Mačiulytė-Šniukienė, Matuzevičiūtė, 2023; Elburz, Nijkamp, Pels, 2017; Xiushan et al., 2015);
3) investments in the development and maintenance of transport infrastructure are characterised by high capital intensity and are financed mainly from centralised funds of financial resources (state and local budgets) (Kyriacou et al., 2019; Thacker, Adshead, Fay, 2019);
4) the monopolistic nature of certain sectors of the transport industry (railways, roads, seaports, etc.) eliminates incentives for the state to improve economic efficiency, as there is no need to gain competitive advantages over other market participants (Mulder, 2023; de Palma, Monardo, 2021);
5) the losses incurred by society as a result of ill-considered policies in the transport sector cannot be compensated (lost resources, environmental pollution, etc.) (Magazzino, Mele, 2021; Thacker, Adshead, Fay, 2019);
6) uncontrolled or poorly regulated transport poses a threat to traffic safety, the environment, health and life of the population (Magazzino, Mele, 2021; Thacker, Adshead, Fay, 2019);
7) the level of tariffs, in particular for transport services for the population, requires control by the state over their affordability for the poor (Ghosh, Kanitkar, Srikanth, 2022; Kyriacou et al., 2019).
8) the consequences of state regulation of the transport sector development are embodied in the indicators of economic growth of the national economy as a whole, the activity of international economic cooperation, indicators of employment, changes in the standard of living and quality of life (Batool, Goldmann, 2021; Magazzino, Mele, 2021; Zhang, Cheng, 2023).

Government influence on economic and transport development, in particular, should be efficient and effective. The categories of effectiveness and efficiency are not identical. While the effectiveness of actions can be judged by the degree of achievement of the set

goals, efficiency reflects the ratio of the result (effect) to the resources and efforts expended.

There are different approaches to assessing the efficiency of the transport system in the modern scientific literature. Some of them consider performance indicators in the context of achieving sustainable development goals (Amekudzi-Kennedy et al., 2010), while others consider cost-benefit analysis (CBA) and cost-effectiveness analysis (CEA) (van Wee, Mouter, 2021).

The multi-criteria decision-making method (MCDM) is also used (Yannis, Kopsacheili, Dragomanovits, Petraki, 2020). There is also a Life Cycle Data Envelopment Analysis (LC-DEA) approach to measuring the atmospheric environmental efficiency (AEE) of the transport sector, including economic factors (gross regional product, capital, and labour) and environmental impacts (CO 2 and PM 2.5) (Yang, Choi, Lee, 2021).

The authors of this study propose to proceed from the scientific hypothesis that the effects of state transport policy are reflected in the performance indicators of the transport sector as a whole, which, in turn, determine the level of its development. Based on the close dialectical relationship between the effectiveness of the state transport policy, the efficiency of its operation and the level of transport development, it is possible to assess the effectiveness of the state transport policy by the indicators of the efficiency of transport operation.

The level of economic development of any state directly depends on the efficiency of its economic sectors. One of the main indicators of the socio-economic level of development of a country is the amount of gross domestic product (GDP) *per capita*.

According to the UNECE official website, a comparative diagram of GDP calculated at purchasing power parity *per capita* in the EU in 2021-2023 has been drawn up (Figure 1).

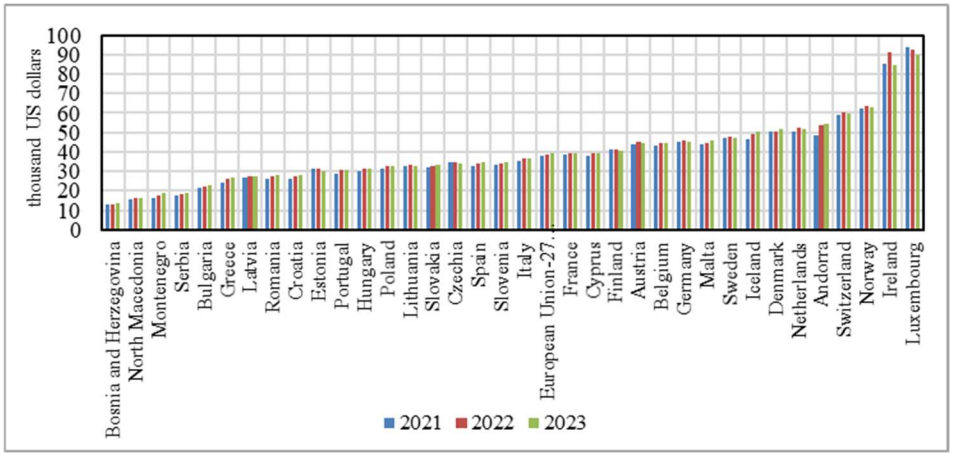

Figure 1. Comparative diagram of GDP at purchasing power parity *per capita* in current prices in 2021–2023, USD thousand

Source: created by the authors based on data from https://w3.unece.org and http://ec.europa.eu/eurostat.

We can see that the average level of GDP in purchasing power parity *per capita* in the EU countries in 2023 was about 38.9 thousand US dollars. The lowest level is observed in

such countries as Bosnia and Herzegovina, North Macedonia, Montenegro, Serbia, and Bulgaria (from 13.4 to 22.7 thousand US dollars). The highest level is in Luxembourg, Ireland, Norway and Switzerland (from 59.8 to 90 thousand US dollars).

Since a country's GDP is formed as a result of the activities of all sectors of its economy, it is advisable to focus on assessing the contribution of a particular industry to GDP formation - the gross value added (GVA) generated in the industry. At the same time, its absolute value does not provide information about the efficiency of the industry, since the same amount of GVA can be achieved using different amounts of resources. For a correct comparison of the efficiency of the industry, the authors propose to use a modified indicator of labour productivity in the industry - the value of GVA created in the industry per year per employee.

Within the national economy, it is impossible to determine the level of efficiency of a particular industry by this indicator, since the results of the functioning of each industry are formed under the influence of the specifics of the industry itself (the type of resources consumed in the industry; belonging (not belonging) to natural monopolies; existing technology and production mode; pricing procedure; state sectoral regulation, etc.) Therefore, determining the level of efficiency of a country's industry according to the proposed criterion is possible only by comparing the achieved indicators with the achieved indicators of the industry in other countries. The higher the performance indicators of the industry, the higher the level of its development and the effectiveness of the state sectoral policy. The use of the criterion proposed by the authors of the study makes it possible to objectively assess the effectiveness of the state sectoral policy of any country.

Figure 2 shows that there is a link between the value of GVA in the transport sector per employee per year and GDP *per capita*.

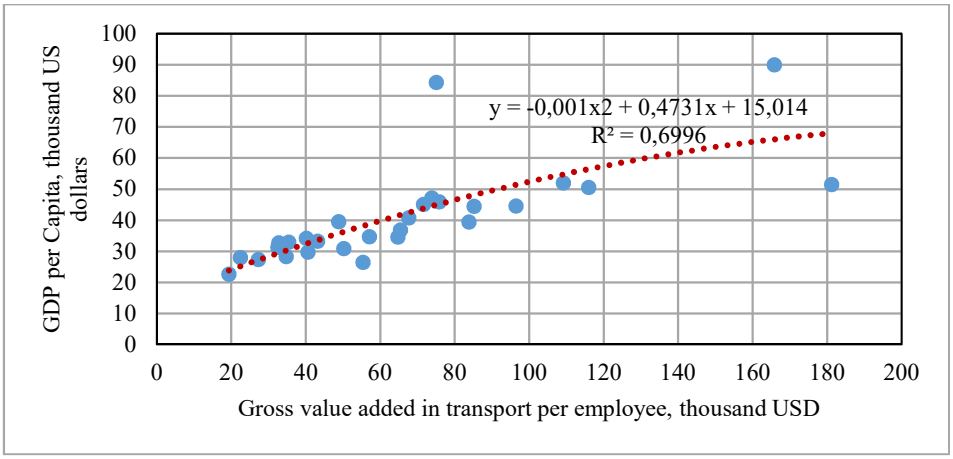

Figure 2. The relationship between the value of GVA generated in the transport sector per employee and GDP *per capita* (2023)

Source: created by the authors based on data from https://w3.unece.org and http://ec.europa.eu/eurostat.

To assess the impact of transport development on economic development, we consider data for countries for which all the indicators studied are available on the Eurostat website. In particular, the following components were taken into account: industrial output (index, 2021=100), agricultural output (index, 2015=100), construction output (Index, 2021=100). Social indicators include the following: minimum wage per month, percentage of unemployed people in the working age population, annual healthcare expenditures *per capit*a. The following indicators are considered as indicators of transport efficiency and development: GVA in the transport sector per transport worker, the value of fixed assets per transport worker, and the volume of cargo transported by air, rail and road.

Studies have shown that such indicators as construction volume growth and the percentage of unemployed among the working-age population do not have a significant relationship with other indicators. Table 1 shows the significant values of the correlation coefficients between the studied indicators.

Table 1. Values of correlation coefficients for the studied indicators (2023)

Variable	1	2	3	4	5	6	7	8	9
1	1,000000								
2	**0,8273**	1,0000							
3	**0,5213**	**0,5448**	1,0000						
4	**0,5211**	**0,4906**	0,4211	1,0000					
5	**0,9507**	**0,8543**	**-0,5288**	**-0,5928**	1,0000				
6	**0,9197**	**0,8523**	**-0,5279**	**-0,5998**	**0,9784**	1,0000			
7	0,4650	**0,5130**	-0,3390	-0,4239	**0,6839**	**0,7482**	1,0000		
8	0,0545	0,0446	**0,5246**	-0,3807	0,0765	0,1054	0,0899	1,0000	
9	0,1286	0,0679	-0,0634	**0,5491**	0,3487	0,3793	**0,8001**	0,0102	1,0000

Legend: 1 – Value added per employee – thousand euro; 2 – Investment per employee – tangible non-current assets – thousand euro; 3 – Production in industry, Index, 2021=100; 4 – Agricultural production output, Index, 2015=100; 5 – minimum monthly salary, euros; 6 – healthcare costs, euros *per capita*; 7 – Cargo transported by air, tonnes; 8 – Freight transported by rail, thousand tonnes; 9 – Freight transported by road, thousand tonnes

Source: created by the authors based on data from https://w3.unece.org and http://ec.europa.eu/eurostat

As we can see, the chosen indicator of the transport industry's efficiency - gross value added per employee – has a direct significant relationship (R=0.8273) with the indicator of transport development – the amount of capital invested in the industry per employee.

Also, the selected performance indicator has a significant relationship with the following indicators under study: Production in industry, Index, 2021=100 (R=0.5213), Agricultural production output, Index, 2015=100 (R=0.5211), Minimum monthly salary, euros (0.9507), healthcare costs, euros *per capita* (R=0.9197). Thus, the government, by implementing programmes of socio-economic development or transport development, creates preconditions for the overall socio-economic growth of the country as a whole.

Among the studied indicators of transport development, Investment per employee – tangible non-current assets – thousand euros has a significant impact on the socio-economic development of countries. There is a significant relationship between Production

in industry, Index, 2021=100 (R=0.5448), Agricultural production output, Index, 2015=100 (R=0.4906), Minimum monthly salary, euros (R=0.8544), Healthcare costs, euros *per capita* (R=0.8523). This indicator also contributes to the increase in air freight traffic (R=0.5130).

Other indicators of transport functioning also affect certain indicators of social and economic development: Cargo transported by air, tonnes and minimum monthly salary, euros (R=0.6839), healthcare costs, euros *per capita* (R=0.7482); Freight transported by rail, thousand tonnes nf Production in industry, Index, 2021=100 (R=0.5246); Freight transported by road, thousand tonnes and Agricultural production output, Index, 2015=100 (R=0.5491).

Figure 3 shows a dendrogram – a classification of countries into groups according to the level of the achieved values of these indicators. The classification of countries was carried out using the Ward method, which is considered by scientists to be the most correct when comparing multidimensional indicators (Majerova, Nevima, 2017; Topping, 2023, Vysala, Gomes, 2020).

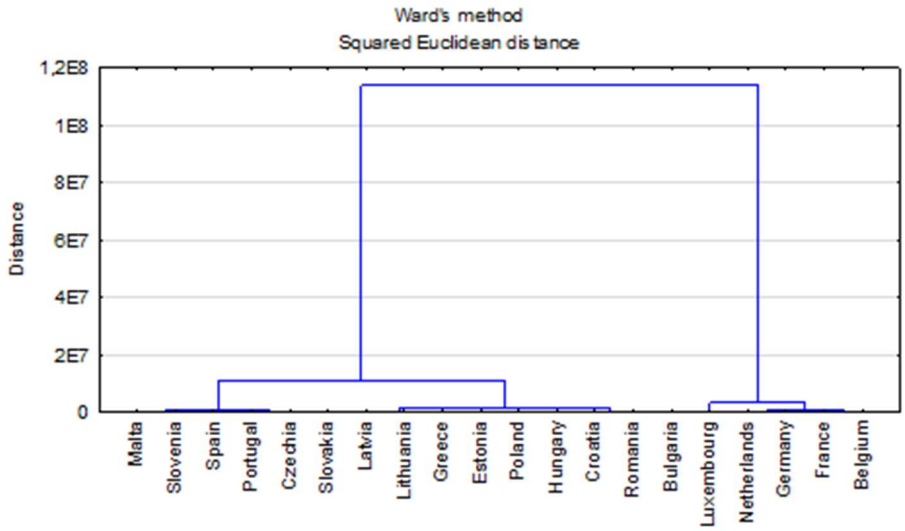

Figure 3. A dendrogram built according to Ward's method based on the investigated indicators that have a significant connection with the GVA in the transport per one of its employees (2023)

Source: created by the authors.

The table 2 below shows the list of countries included in the relevant classification groups and the corresponding statistical characteristics of the studied indicators.

Thus, there is a connection between the indicators of the effectiveness of the government's transport policy and transport development and the indicators of socio-economic development. The task of specifying the areas of government regulation that can be used by the state to improve the effectiveness of transport policy arises.

Table 2. Grouping of countries and statistical characteristics of grouping features

Indicators	Grouping of countries					
	1 group (6 countries)		2 group (5 countries)		3 group (10 countries)	
Countries	Belgium Germany Ireland France Luxembourg Netherlands		Czechia Spain Malta Portugal Slovenia		Bulgaria Estonia Greece Croatia Latvia Lithuania Hungary Poland Romania Slovakia	
Variable	Statistical characteristics					
	average value	standard deviation	average value	standard deviation	average value	standard deviation
Value added per employee - thousand euro	100,33	34,98	57,62	13,6131	34,38	10,45
Investment per employee - tangible non-current assets - thousand euro	21,89	4,61	12,75	3,44	8,73	3,68
Production in industry, Index, 2021=100	104,65	8,72	102,24	0,84	100,68	1,05
Agricultural production output, Index, 2015=100	144,96	15,84	132,98	18,25	112,2	19,94
Minimum monthly salary, euros	1845,16	238,01	902,14	211,68	600,83	133,53
Healthcare costs, euros *per capita*	5600,21	698,66	2635,82	324,28	1383,32	342,50

Source: created by the authors based on calculations.

5. DISCUSSION

The research conducted shows that the effectiveness of state transport policy has an impact on a number of socio-economic indicators of the country. These indicators include industrial and agricultural growth indices, minimum wage, and *per capita* health care expenditure. The European Union countries were divided into three groups according to the effectiveness of their transport policy and the achieved indicators of socio-economic development. The countries with the most effective state transport policy include Belgium, Germany, Ireland, France, Luxembourg, and the Netherlands. The second group includes countries with high TDI per transport sector employee but lower industrial and agricultural growth indices than other countries: Czechia, Spain, Malta, Portugal, and Slovenia. The third group includes countries with relatively lower GVA transport sector per employee, but with the highest or equal to the first group's industrial and agricultural growth indices. These are countries such as Bulgaria, Estonia, Greece, Croatia, Latvia, Lithuania, Hungary,

Poland, Romania, and Slovakia. At the same time, these countries have relatively high levels of pollutant emissions (CO_2 and PM 2.5).

This requires a review of approaches to the formation of state transport policy in these countries. In particular, attention should be focused on the development of transport infrastructure, the introduction of environmentally friendly modes of transport, and the reduction of harmful emissions. A developed transport infrastructure will contribute to an increase in transport volumes and, as a result, to an increase in the GVA per employee.

The results of the research show that the effectiveness of state transport policy is linked to the achievement of the country's socio-economic development goals. The development of state transport policy is directly linked to the formulation of institutional policy on the distribution of powers and responsibilities between public authorities and business; with the introduction of regulatory and legal regulations, licensing and control; industry development planning and investment policy; pricing policy, the level of cost recovery in the public sector, taxation and subsidies. This thesis is also confirmed by the results of research by other scientists (Amos, 2008; Budd, Ison, 2020; Enoch et al., 2020; Leviäkangas, 2021; Peralvo, Vanegas, Avila-Ordóñez, 2022; Reardon, Marsden, 2020; Whitelegg, 2021).

The main tasks of the government in the field of institutional policy making are:

- defining the role, limits and forms of participation of the government and the private sector in the development and operation of transport infrastructure and the provision of transport services;
- establishing the limits of competence of central state, regional and local authorities and other authorities to influence the development of transport and transport infrastructure;
- outlining the functions of the public sector (e.g., policy development, planning, regulation, investment, operation, etc.) and how they are organized.

In the area of regulation, licensing and control, the authorities need to:

- establish rules for regulating, licensing and governing the management of infrastructure and transport services;
- determine the areas where public and private services can compete and the acceptable level of competition;
- ensure the organisation of monitoring and control over the maintenance of the level of competition;
- identify ways to promote the development of transport services and infrastructure, address issues of urban transport development and eliminate congestion;
- establish ways and methods to protect public safety and the environment from the adverse impact of transport.

In the area of industry development planning and investment policy, the government needs to:

- select criteria for environmental safety, economic and/or financial efficiency that should be applied when planning public investment in the development of transport infrastructure, facilities and services;
- define the control mechanism (permits, requirements, restrictions on foreign investment, etc.) that should be applied to private sector investment.

In the area of pricing policy, cost recovery in the public sector, taxation and subsidies, the government should:

- to formulate principles for regulating tariffs for public transport services and the use of state-owned infrastructure and to define the levers of control for setting tariffs for services provided by the private sector and the conditions for their application;
- determine the acceptable level of cost recovery in the public sector of transport infrastructure;
- choose the method of building charges for cost recovery, establish sources of deficit coverage;
- determine the types of taxes and the level of taxation rates to be applied to public and private transport infrastructure and services;
- determine the conditions under which nationalisation and privatisation of the sector's facilities should be applied;
- determine the conditions for the use of government subsidies, the mechanism of their application and management.

In our opinion, a set of these measures will help countries in the group with lower performance indicators of the state transport policy to improve transport performance and indirectly contribute to the improvement of socio-economic development indicators.

Further research should be directed at developing specific recommendations in the areas of state regulation of transport policy.

6. CONCLUSIONS

A modern, well-developed transport sector is a key to a country's stable economic growth, balanced development of its territories, social and economic well-being of its residents, and active participation in global trade.

Due to its strategic importance, the monopolistic nature of certain types of transport, the need to ensure accessibility of transport services to all segments of the population, and the reduction of harmful emissions into the environment, governments intervene in the development of the transport sector through state regulation. The importance of such regulation is also underlined by the indirect impact of transport on the achievement of sustainable development goals.

A set of measures of state regulation of transport determines the transport policy of a country. The study proposes to evaluate the effectiveness of the state transport policy by the indicator of gross value added in the industry per employee. It is advisable to compare the effectiveness of transport policy with similar indicators achieved in other countries.

The article reveals a link between investments in the transport sector and the volume of gross value added in the sector per employee. The results of the study show that the effectiveness of the state transport policy is related to the achieved indicators of the country's socio-economic development. In particular, with industrial and agricultural growth indices; minimum monthly salary, euros; healthcare costs, euros *per capita*. Industrial development is facilitated by rail freight transport, and agricultural development by road freight transport. There is a link between investment in transport infrastructure and air freight. The latter has a significant relationship with the minimum wage and healthcare expenditures *per capita*.

Three groups of EU countries were identified by the level of efficiency of the state transport policy and the achieved indicators of socio-economic development. The average values of the achieved indicators and standard deviations for each group are presented.

Countries with lower indicators of socio-economic development are characterized by low values of investments in the transport sector per employee and low values of gross value added in the sector per employee.

The conducted research allowed us to identify the areas of regulation and tasks that the government should solve to ensure an effective transport policy.

All authors have read and agreed to the published version of the manuscript.

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REGIONAL AND ETHNIC VALUES, LANGUAGE AS A KEY FACTOR OF PRESERVING NATIONAL IDENTITY OF ETHNIC GROUPS, BASED ON THE TRADITIONS OF WESTERN GEORGIA – MARRIAGE

Ajara, a region in Georgia, is famous for its traditions and culture. The article explores the traditions of the Ajarian people that have mostly faded with time but still remain in some parts of Ajara. The work provides information about the marriage traditions and rituals of the Ajarians and the set of lexical units connected to that group of people, which are at risk unless they are documented. The paper aims to record them; it will be a treasure depicting and preserving the Ajarian cultural heritage. It can contribute to the creation of the ethnolinguistic dictionary. The dictionary will help to make the lexical units set in stone that may become the point of interest for future researchers and generally for linguists. The work will raise awareness about this ethnic group worldwide. It will enhance the popularization of national culture. The complex research methodology was applied in the study. The empirical method, the method of analysing scientific literature and the field research contributed a lot. Significant data were collected through observations and semi-structured interviews. This article, consequently, plays a considerable role in archiving specific elements from the history, culture, and language of the Ajarians.

Keywords: ethnolinguistics, culture, traditions, ethnic groups, language.

1. INTRODUCTION

Humans create culture through language. Cultural diversity is developed when people explore different nations, beliefs, norms, and lifestyles. The globalization processes with the modern cross-cultural communication drive us to focus on cultural diplomacy; thus, the relevance of the study of ethnocultural traditions is evident. It is becoming increasingly important to familiarize nations around the world with the national identity of different

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countries. It is not surprising that each country, especially regions, tries to promote its culture and traditions and publicize them throughout the world.

Georgia is a country with a long history and an ancient culture that has always been appealing to tourists visiting the country with its traditional folk dances, Georgian wine, dishes, and geographical and historical characteristics. It is well-known for its tourist resort area, mountainous regions, spectacular nature and heritage sites. It has always been the point of interest for ethnographers and linguists as well, as it has undergone many invasions that left their traces.

Adjara is a significant region of Georgia, with its diverse historical-cultural monuments, festivals and cultural events, it is the real find for those interested in cultural tourism. It has overcome numerous difficulties, including a three-hundred-year rule of the Ottoman Empire, the coerced conversion of the population to the Muslim religion, which led to many tragic situations and the mixture of two religions, Orthodoxy and Islam. Later, as a member of the Soviet Union, Russian culture affected the local traditions, but despite all these hardships, Ajara managed to preserve the culture of its ethnic group.

Some traditional norms and practices that have been associated with economic activities, spiritual culture, social and family lives of the Georgians at different stages of their lives have not changed for ages, hence making Ajarian ethnography exist. The persistence and energy of traditions keep storing vital information about the Ajarian ethnic peculiarities as well as the spirit, personality and cultural peculiarity of this nation. Traditions given in the work are important to convey and promote because it is in them that the universality of the ethnos is revealed.

Ethnolinguistics is a branch of linguistics that studies the relationship between language and culture, its cognitive foundations. It learns in what form and by what means the views of the language-carrying community - ethnos - are reflected in the language. Thus, ethnolinguistics studies language as a means of preserving the nation's culture and transmitting it from generation to generation. Ethnolinguistics is also known as anthropological linguistics or linguistic anthropology. “Many definitions of language have been given: “language is the bearer of culture”, “language is the vehicle of culture”, and like, but all of them point out its social significance” (Fuenzalida, 1949).

Ethnolinguistics is a relatively new branch of the humanities, as its tasks and object of study were only finally formulated in the 20th century. Modern ethnolinguistics may be defined as a complex discipline that combines linguistics, ethnology, folkloristics and mythology. It studies not only the language but also other forms of material that embody collective unconsciousness, people’s mentality, a map of the world formed by one or another ethnic group, together with their common cultural heritage in general, with its kinds, sorts and ways. This branch of linguistics aims to reconstruct cultural mentalities and mythologies in their diachronic movement, using linguistic materials as its foundation.

2. LITERATURE REVIEW

All of Georgia is beautiful in its way, but Adjara is a place that combines the sea, mountains, interesting traditions, and many other reasons why the region is special. The Ajarians are a subethnic group of Georgians. Adjara is part of ancient Colchis, a place where every monument preserves history, and if you are drawn to the study of history through monuments and artifacts, Adjara is a must-see in the world.

Adjara is one of those parts of Georgia where living folklore and ethnography are still preserved in everyday life. Thus, Adjara, especially its mountains, is interesting and

distinctive in this term. (Folklore State Center, 2015) Traditions and rituals were being created for centuries in Ajara, like in other regions of Georgia. They are still preserved but with changes. They depict empirical experience of not only agricultural and labour activities, but also many other traditions connected with people's lives, activities, numerous elements of spiritual culture: faith, beliefs, religious rituals and events, symbols, special dishes which are prepared almost at any holiday, and different aspects of folk religious thinking.

The uniqueness of the ethnographic heritage of Ajara is defined by the fact that, despite the three-hundred-year rule of the Turkish people, in diverse religious and cultural conditions, the Ajarians kept customs, cultural values, language and the old traditions formed in earlier centuries. But it is not surprising that the foreign religion left a trace on traditions and customs. They present the elements of three different religions: pre-Christianity, Christianity and Islam. The rich traditional lifestyle of the Ajarians has always attracted the attention of Georgian and foreign researchers. Many interesting customs are described in their works. Ajarian rituals and traditions were collected, observed and studied for centuries by different scientists who helped to restore and keep archaic forms of traditions. (Noghaideli, Lomtatidze, Loria, 2023).

The study of the characteristics of ethnic culture and the peculiarity of its linguistic expression is possible only if we consider the close relationship between language and culture. Language is a means to convey and preserve the cultural memory of a particular ethnic group. Linguistic analysis is essential in anthropological research, as it is key to decoding nation and their understanding and mentality.

In Eastern European tradition, ethnolinguistics is considered an interdisciplinary approach to language that joins several methods, in particular, methods of linguistic dialectology and comparative linguistics with the methods of Folklore Studies and Ethnography. As far as ethnolinguistics covers mythology, history of culture, and ethnic history, it can be perceived as a component of modern semiotics. The subject of ethnolinguistics studies is the connection between language and culture, language and mentality, language and folklore (Alyeksyeyeva, 2022).

Linguistic Area Studies explores culturally specific features integrated into a language. Particularly, lexical units that are peculiar only to a specific culture and cannot be found in other cultures, consequently, in other languages. It is evident that this type of finding can be examined only when the comparative method is followed by linguists and differences among languages are observed (Alyeksyeyeva, 2022).

Ethnolinguistics is a relatively new discipline and is located at the intersection of linguistics and ethnology. Undoubtedly, the judgment occurs in a circle of one nation since people in such a society speak the same language, have the same traditions and culture, and perceive another nation as a friend or enemy. However, in the modern world, people usually do not live in isolation, and any society consists of several people speaking different languages. On the one hand, the language is part of the people from where it came, but on the other hand, there are people in history who have adopted the language of another group of people and consider it their own. Thus, not only do people form a language, but language also forms people (Mirzayeva, 2007).

However, the roots of ethnolinguistics trace back to the outstanding linguist, philosopher W. von Humboldt, who studied various communities based on the spiritual organisation. He believed that different languages are different visions, not just a different designation of the same thing. W. von Humboldt connects the vision of the world with the language spoken by the individual. In his opinion, other languages are more than different

shells of human consciousness. They are different visions of the world. The researcher presents the nation as a circle of people to which it belongs, and, leaving it, he enters the process of another one **(**Mirzayeva, 2007).

To determine what is the object of ethnolinguistics, one should analyse the sciences from which it originated. Undoubtedly, the science of linguistics studies a language. E. Benveniste offers two subjects for the study of linguistics. According to him, linguistics is the science of language and languages. On the one hand, he considers language as the ability to speak, a universal characteristic of a person, as something unchanging. On the other hand, it implies separate languages that are constantly changing and in which this ability is realised (Mirzayeva, 2007).

The main objects of ethnolinguistics are ethnic mentality, ethnic stereotype, ethnic culture, ethnic processes and ethnogenesis. The term "ethnic mentality" refers to the mentality of a nation, which has developed over many years and sometimes centuries, mainly due to culture and lifestyle. An ethnic stereotype is the perception of representatives of a different ethnic community through the prism of their thinking. On the other hand, ethnic culture is a set of cultural values inherent in people. As a result of ethnic processes, the features of an ethnic group can change, which may be accompanied by a change in cultural values, the development of a language, or the loss or change in customs (Mirzayeva, 2007).

Steve Herbert, in his work "For Ethnography", offers a brief explanation: "ethnography is a uniquely useful method for uncovering the processes and meanings that undergird sociospatial life. Humans create their social and spatial worlds through processes that are symbolically encoded" (Herbert, 2000).

3. METHODOLOGY

The study is based on a qualitative ethnographic research methodology. The empirical method was utilized to gather information about the past of the ethnic group and its traces on the contemporary world; a method of analysing scientific literature and information was also applied. The field research was carried out in the spring of 2024, from March to May, and included two months of visits to different villages. The aim of which was to describe, interpret and analyse marriage-related traditions and rituals in the mountainous Ajara, considering the cultural-linguistic context.

Data were collected through observations of locals and semi-structured interviews. The researchers immersed themselves in the lifestyle of these people to explore preserved and old traditions of this ethnic group, to take part in some of the rituals and traditions themselves, and to gather information from the elderly about the past to convey it properly. The younger respondents were also included, who possessed knowledge through family traditions.

As a local Ajarian and researcher, it was a great advantage for me to receive and interpret the important information. My linguistic background and cultural proximity contributed a lot to a comprehensive understanding of linguistic nuances and symbolic actions.

At the same time, I applied an autoethnographic approach in the research, as I already had certain information about marriage rituals and traditions from relatives and family members since childhood.

Data was collected through audio and written formats. Notes were taken during interviews with the members of ethnic groups, who were observed within their socio-cultural context. Interpretive notes were described daily in a field diary.

4. RESULTS

The significant findings are revealed through the conducted research in the mountainous Ajara. The marriage traditions and lexical units connected with these traditions were explored through qualitative ethnographic research. We were given the opportunity to record and analyse the cultural aspects peculiar to that ethnic group through observations and interviews that are at risk of disappearing.

Our research confirmed that in traditional Ajarian society, marriage was an important event for the entire community and family, and not just for the bride and groom. We studied and described in detail a number of different wedding rituals and customs. Each of them had its own unique terminology, which regulated the entire marriage process.

5. MARRIAGE TRADITIONS OF AJARIAN PEOPLE

Marriage is the most important event in a family life. Traditionally, the marriage of young people in Ajara was considered important for the whole family and relatives. Usually, a bride was chosen during important events such as Nadi (helping each other in harvest); Shuamtoba (annual public festival), or other various holidays. Mother's brother Taya, along with his parents, had the right to select the couple to be married. The selection of the couples was based on the interests of the families. Of course, over time, the wedding rituals changed and only the memory of the people preserved them. We will try to recall some of the forgotten stages and traditional elements of the wedding cycle.

Match-making and engagement

Selecting a girl as a bride or a daughter-in-law was called "preserving", "keeping an eye" on a girl. If the selected woman was acceptable for the future groom and family, a matchmaker was responsible for arranging the marriage-related matters between the two families. Only one visit could not resolve the case. If the family did not want to marry their daughter to the proposed person, they would refuse. However, the matchmaker continued visiting, not giving up easily. After several visits and refusals, if the matchmaker still came, the table was no longer set. In some places, the final rejection was expressed with "breaking a stick" by the head of the family. After this Muravi (Mouravi, a matchmaker) could not dare to come back again. In case of agreement, they would say "the promise, the word has come out", "the case is tied up" (Kobuleti), "the case is settled" (Khelvachauri), and the matchmaker presented the gift to the family, a ring or something else, to give more power to the agreement. However, in most cases, "getting the word out" or a verbal promise was enough. After the positive resolution, engagement and presents (bokhcha) delivery day was fixed. Usually, for the engagement, Saturday or Friday of the full moon was chosen as they considered them lucky days. Bokhcha contained important presents for the bride, like jewellery and rings, which the betrothed woman wore; a silver belt was especially honourable. The betrothed's mother received a gift as well. If the girl was too young to marry or, for some reason, the wedding could not be held for a long time, she was also given clothes and other personal things. In Upper Adjara, during the engagement, the ceremony of promising (aghdi cutting) was frequently performed.

Official form of marriage (aghdi cutting)

Aghdi cutting is an official ceremony of marriage according to Muslim rules. At that time, a religious person, a mullah in the Arabic language, established the Nikakh – a marriage document, where the amount of money that the fiancé's family had to pay to the woman was determined, both at the time of marriage and in case of divorce. The couple themselves did not participate in this ceremony. Their consent was confirmed to the clergy by representatives of the fiancé and fiancée. After the ceremony, the marriage was considered officially concluded (Noghaideli, Lomtatidze, Loria, 2023).

Nishanloba and jackal wedding

There were cases when marriage was not accomplished for years, in this case, a groom was allowed to stay at a bride's house before the official marriage, which was called Nishanloba. The first appearance of a groom at the fiancée's house was officially celebrated; the ceremony was almost equal to a wedding. After that fiancé could stay in his fiancée's family; however, he avoided coming across with a father-in-law, and he often sneaked into the house through the window with the help of women close to his bride. This could last more than a year, and a woman could even have a child in her father's house and take a grown child to her husband's family. That was not considered shameful. The child born on that occasion was called Sasela. This tradition lasted for a long time in Upper Ajara. The wedding day was set by the betrothed (dasamokvrebeli) families after the engagement. All the rules were followed. Although, before the official wedding rather a small Jackal-wedding was held at the bride's house. This ceremony was attended by the best men (makrebi) – the groom's father, uncles, brothers, male relatives, and a groomsmaid (dade, who was responsible for taking the bride to the groom's house). However, the groom himself could not appear there. Musicians with their drum-zurna and chiboni (musical instruments) accompanied the party. At the end of the party, drummers used to place the drum in front of the groomsmaid and say – "The belt broke on the drum", this was the sign that the party was over, drummers received the gift from the groomsmaid. Before the bride was taken out of the house, she was covered with a wedding headdress – tvagh//duagh. The bride's mother was given the "shield for breast"// "milk shield" by the future father-in-law. The door from which the bride was to be taken was closed by the bride's grandfather, brother or cousin, and the future father-in-law or Dade paid money according to the tradition. The name of the ritual was door throwing or door locking (karis sadamkrelo//karsadamkrelo//karis sadamketo//kafikharji). After that, the song "Orira" was sung, which was called the "song of the road" (Noghaideli, Lomtatidze, Loria, 2023).

Muzhdebalishi (pillow for happy news)

"Mujde Pillow" was taken from the groom's house by Muldej/Mujduj, the bride's male relative. That was a special pillow sewn by the bride as a symbol of happy news. It had a small mirror sewn and embroidered in the middle. Mujde pillow, as a rule, was not used and was kept hanging for years in a groom's house, but the ceremony of gaining it was the following: when the herald arrived, the head of the family was waiting for him in the yard, after his arrival, he took the bridegroom out, who was hiding in the yard. The bridegroom had to catch the Mujde Pillow that was thrown to him by the herald. The last one started with tricks, and finally, when he threw the pillow, the bridegroom had to catch it, but if he could not, he was laughed at. The herald was offered sherbet by the host, then the host would tie a red bow around his shoulders and give him "shashlik" (meat roasted with the spit).

Changing enmity into friendly relation

In the past, if enmity was the case between families or clans, the elder members of the families attempted to reunion the friendly relationship. For that purpose and to avoid bloodshed, these families had to become relatives (betrothed/mokvrebi). "Let's bring mokvroba (betrothal) into enmity", they used to say and married the daughter and the son of these families or clans. That was the way to resolve the conflict between the two families. The bride was considered a respected woman by both sides. She used to be called "a woman given in blood".

Hosting a wedding for a bride

A "hosting wedding" was held in the groom's house, following the many rules that ensured the couple's future happiness. The bride, after entering the yard, kept sitting on a horse until the father-in-law gave her a so-called "stirrup gift". Then, mother-in-law waiting for a bride at the door would take her to the fireplace and fulfilled many rituals like putting the foot on the hearth, touching the hand on the chain of the firebox, taking maize pie from the clay pan, anoint the dough on the fireplace and putting honeyed finger on the hearth ensuring she would be "honey-handed".

Taking off the tvaghi/dwaghi

On the wedding day, before the bride left her parents' house, her father or brother put a wedding headdress on the bride's head, a red chador-tvaghi/dwuaghi covered over a cone-shaped cardboard hat, which was too long, even reaching the bride's ankles or knees. In the bridegroom's family when the wedding ceremony was held, the bride was taken into the separate room that was specially prepared for the ritual and the bride's brother or cousin would take off the Tvaghi from the bride's head utilizing the tip of the dagger, then put the khachapuri and boiled chicken on the same dagger and ran out. Traditions varied according to the places, in some areas Twaghi was sticked at the top of the door, while in other places it was handed over to the mother-in-law who was told to "hold it and crush well, so that not to be mocked" and the last one used any method to really fulfill the task, sometimes even sat on it. Sometimes the bride's relative would wrap the Tvaghi around the young girl's shoulders, signifying that he "had his eye" on her. The groom's relatives would see the bride after this ceremony and bring the "face-seeing" gift for the bride.

Taking dinner to the bride

Marriage didn't mean the end of the parents' care for their daughter. Among many rituals mentioned above, there was one left even after the marriage, which was taking the "Dinner" to the newly married daughter's family, which contained various types of sweets. Wholly cooked turkey and pies were of great importance to present. It was really the old tradition. According to the legend, in ancient times prophet Noah, who had three carpenters, promised to marry his daughter to them. When it was time to fulfill his word, he locked his daughter, a female dog and a female donkey in the room and asked God for help. The next day when he opened the door saw three beautiful women there, and he was happy to manage to accomplish his promise. In two weeks, after the wedding, Noah visited his daughters with a gift – dinner. The custom of taking dinner to the daughter's house has remained after that. That is what people believe in Ajara (Noghaideli, Lomtatidze, Loria, 2023).

Although folk traditions and rituals have transformed, some of them are still very relevant today and play an important role in Georgian society.

6. CONCLUSIONS

In the 21st century, when intercultural communications are so intense, knowledge of the traditional cultural and social visions of even some ethnic groups is essential, as it is a precondition of respectful communication between different nations.

Ethnolinguistics plays a crucial role in depicting and preserving detailed information about some ethnic groups. With the passage of time, everything alters and evolves, including traditions, some lexical units, and even parts of the culture. The work can be used as a document describing and preserving all that was sacred once in Ajara.

Ethnic-specific facts, words, terms, and phrases can be used to strengthen group identity and, perceive deep insights about the complex interactions between language, culture, and history. Ethnolinguistics contributes to gaining knowledge about human diversity and the depth of traditions by exploring the ways in which language encodes cultural knowledge and reflects historical processes. This discipline highlights the significance of comprehension of cultural and traditional facts in order to uphold historical narratives and cultural identities in the world that is constantly evolving.

By exploring and conveying this information, focusing on these areas, the work not only contributes to depicting and preserving the Ajarian culture but also is essential in terms of raising global awareness and appreciation for this unique ethnic group and the traditions they used to have, which are partially kept. Oral history and cultural practices are key areas for linguists, anthropologists, field specialists and ethnic groups as well. They show how cultural memories in fact support the continuity of identities, and keep them coherent, where cultures function to know their past.

The work conveys not only traditions and culture but also the words and phrases that carried enormous importance for the Ajarians in the past that might otherwise die. Time to time, they become obsolete and stay in the archaic lexis, but articles, works and a written language can keep them and pass them down to the next generation, or to those who are interested in them. Some of these words or terms are still utilized in upper Ajara, but in most cases, while recalling the past. These terms are facts of how the language reveals aspects of culture and history in a complex interaction.

The work perfectly reveals the facts concerning ethnic groups that are definitely unknown to most nations of the world. It is the source of spreading information about human variability, also aids in deciphering diversity as part of a shared past among humans.

This work will also be useful in further processing of ethnolinguistic terms and language functioning. It will be beneficial to raise awareness about the rituals and traditions of ethnic groups among people around the world. The work showcases the most important, interesting folk rituals and traditions, which will be especially interesting for both those interested in the field of tourism services and visitors. And for the field specialists as well.

All authors have read and agreed to the published version of the manuscript.

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POTENTIAL APPLICATIONS OF METAVERSE IN HUMAN RESOURCES MANAGEMENT

The Metaverse, an emerging technology built on virtual-reality space, offers transformative potential for human resource management (HRM). This study examines its feasibility and application within HRM, focusing on perspectives from Generation Z employees and HR professionals. Findings highlight significant opportunities for enhancing recruitment, onboarding, training, and performance appraisal through immersive and interactive solutions. However, challenges such as cost, data privacy, health concerns, and inclusivity remain significant barriers to its adoption. Surveys reveal that while respondents are optimistic about its potential to improve collaboration and efficiency, they emphasize the need for strategic planning, robust security measures, and ethical guidelines. Future efforts should focus on addressing these challenges to unlock the Metaverse's full potential in HRM.

Keywords: Metaverse, human resource management, generation Z, virtual reality, augmented reality.

1. INTRODUCTION

The rapid development of technology is seamlessly integrating into the daily lives of individuals, including their working environments. To stay competitive and align with modern demands, organizations must embrace technological advancements and incorporate cutting-edge solutions into their business processes. Cloud computing, artificial intelligence, process automation, the Internet of Things (IoT), and virtual/augmented reality are increasingly shaping our world. Among these, the Metaverse is emerging as a technology of significant interest.

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The term ”Metaverse”, as defined by the Oxford English Dictionary (2023), combines the Greek prefix meta, meaning change or transcendence, with universe, reflecting a digital space that transcends the physical world and redefines human interaction. At its core, the Metaverse is built upon mixed reality (MR) technology, which integrates augmented reality (AR) – overlaying digital content onto the real world – and virtual reality (VR), which immerses users in entirely virtual environments. This fusion enables users to interact with both virtual and physical elements simultaneously, creating a seamless, blended experience (Mystakidis, 2022). The European Parliament further conceptualizes the Metaverse as “a digital simulation of a multidimensional space” (Maciejewski, 2023), encompassing interconnected, three-dimensional virtual realms (Ritterbusch, Teichmann, 2023).

The Metaverse has the potential to revolutionize multiple facets of business, including human resource management (HRM). While its application in HRM remains in the early stages, research highlights its capacity to enhance employee experiences, collaboration, and training through immersive digital environments (Prakash et al., 2023; Hashash et al., 2024). The integration of information and communication technologies (ICT) into HRM is already transforming traditional workflows, driven by the demand for top talent, improved employee services, and enhanced engagement with organizational goals. Companies, particularly in the high-tech sector, are leveraging advanced IT tools to streamline processes such as recruitment, development, motivation, and talent management (Karasek, 2019). Notable examples include organizations like Google, Amazon, IBM, and SAP, which have embraced technology to optimize HRM functions (Aydin et al., 2023).

The aim of this paper is to examine the feasibility and potential applications of Metaverse technologies in HRM, focusing on perspectives from both employees and HR professionals. It seeks to identify the benefits and challenges associated with integrating these technologies into workplace processes, leveraging insights from the emerging use of Metaverse-related innovations. By exploring how the Metaverse can enhance remote collaboration, training, decision-making, and employee development, the paper seeks to provide a comprehensive understanding of its transformative potential in HRM practices.

2. LITERATURE REVIEW

Overview of the Metaverse

The rapid development of the Internet and new ICT technologies such as artificial intelligence, cloud computing, VR and AR, has laid the groundwork for the emergence of a complex virtual space known as the Metaverse. Although this concept has gained widespread recognition after the rebranding of Facebook to Meta in 2021, it is important to note that the idea has been around for much longer. In fact, the term Metaverse was first introduced in Neal Stephenson’s novel Snow Crash in 1992, describing a virtual world coexisting with the physical one, where individuals interacted through digital avatars. Despite its digital and synthetic nature, interactions within Stephenson’s Metaverse were depicted to have tangible effects on the physical self, highlighting the impact of virtual experiences on real-life dynamics (Ioannidis, Kontis, 2023).

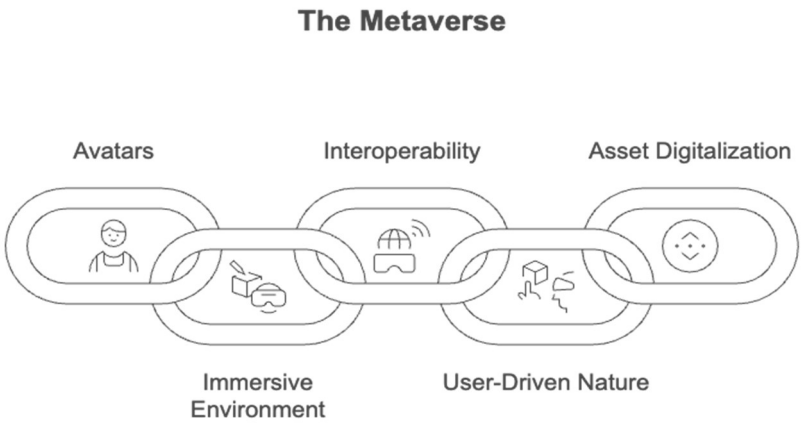

Figure 1. The characteristics of the Metaverse
Source: Own elaboration.

Avatars are a defining feature of the Metaverse, acting as digital representations that allow users to engage in social interaction, learning, and self-expression through customizable clothing and accessories. These avatars enhance user immersion and create a sense of identity and belonging in virtual communities (Salcini, Yerlikaya, 2022). The immersive 3D environment of the Metaverse provides a heightened sense of presence, allowing users to feel transported to synthetic worlds and fostering deeper engagement (Maciejewski, 2023). Interoperability is another cornerstone, enabling seamless transitions across interconnected virtual spaces and technologies, including AR and VR environments. This requires robust computing infrastructures and high-speed wireless networks to maintain smooth user experiences and support the continuity of the Metaverse (Mystakidis, 2022). The Metaverse's user-driven nature ensures that participants play an active role in shaping and contributing to the digital world by creating content, engaging socially, and influencing its governance and development. This dynamic ecosystem thrives on the input and creativity of its users, keeping it responsive and diverse (Ritterbusch, Teichmann, 2023). Asset digitization underpins the Metaverse's infrastructure, allowing physical objects, virtual properties, and experiences to be transformed into digital assets with unique ownership. These assets can be traded, managed, and showcased, fostering creativity, economic engagement, and a sense of community among users (Song et al., 2023). Blockchain technology is expected to further enhance decentralization, giving users greater control over their digital assets (Ritterbusch, Teichmann, 2023).

Though still in its infancy, the Metaverse is already transforming industries such as retail (Buzell et al., 2023), gaming (Ioannidis, Kontis, 2023), social interaction (Šímová et al., 2023), and remote learning (Logishetty et al., 2019; Mystakidis, 2022). It promises to redefine how we interact, work, and experience reality in the years to come.

Potential Applications of the Metaverse in HRM

The application of the Metaverse in HRM can be broadly categorized into three areas: employee training, virtual collaboration, and enhanced employee experiences (Lim et al., 2024; Ismail, Buyya, 2023; Hashash et al., 2024). However, the potential applications

include also more traditional processes like recruitment, onboarding, and performance management (Lim et al., 2024; Hashash et al., 2024).

As in today's competitive talent market, informed and efficient decision-making is crucial for successful recruitment and selection. Companies are increasingly turning to a range of new technologies to analyze vast amounts of data throughout the hiring process. From sophisticated Applicant Tracking Systems (ATS) to AI-powered tools for resume screening and candidate evaluation, these advancements enhance precision and efficiency in identifying and attracting top talent (Karasek, 2019). VR and the Metaverse offer new possibilities for talent acquisition. VR simulations provide immersive, realistic job previews and skill assessments, giving both the company and the candidate deeper insights into suitability (Muhanna, 2015). The Metaverse further expands opportunities with virtual job fairs and gamified experiences, attracting a wider pool of talent (Aydin et al., 2023).

Onboarding is a promising area for Metaverse application, offering substantial benefits. Effective onboarding improves employee engagement, satisfaction, and retention (Alpteki, Temmen, 2019). While personalized onboarding enhances new hires' perceptions of organizations, it can strain resources. Technologies like AR/VR address this by providing tailored onboarding experiences, such as virtual office tours. These tools help new employees familiarize themselves with the work environment before arrival, enhancing accessibility and flexibility, particularly in remote or hybrid setups (Aydin et al., 2023).

One of the more promising areas of potential implementation of the Metaverse in HRM is learning and development. The integration of VR and related technologies is transforming employee development and training by providing immersive, engaging, and risk-free learning environments. VR allows for the simulation of complex tasks, equipment handling, and safety procedures, facilitating rapid skill acquisition in realistic scenarios. Additionally, VR, particularly within the evolving Metaverse, enables geographically dispersed teams to collaborate and share knowledge in virtual spaces (Venkatesh, 2017; Bennett, 2009). While the potential of VR and digital learning platforms includes benefits like cost reduction, accessibility or higher employee experience (Karasek, 2019), their adoption in training is still in its early stages, requiring more research to fully understand their impact (Ferreira et al., 2021).

Performance appraisal in HRM can greatly benefit from emerging technologies. Traditional evaluations are often subjective, time-consuming, and lack real-time feedback (Dharmatti, 2020). AI-powered tools now enable data-driven assessments, capturing employee activity, offering actionable insights, and supporting equitable remuneration systems (Bondarouk, Brewster, 2016). These systems also help identify high-potential employees by analyzing performance and development metrics (Karasek, 2019). The Metaverse offers further potential by integrating AI to enhance appraisals and ensure fair compensation. AI systems analyze large datasets, assessing skills, experience, and contextual factors to reduce bias and promote pay equity (Sanyaolu, Atsaboghena, 2022; Jia et al., 2018). Additionally, real-time labor market trends monitored by AI enable proactive pay adjustments, fostering organizational appeal and talent retention.

Furthermore, the strategic integration of technologies has the potential to help create safer and healthier work environments. Technologies incorporating AR, VR, MR further refine hazard identification and promote accident prevention by enhancing worker perception and precision. For instance, AR can visualize potential hazards within their actual work environment, while VR can create fully immersive virtual environments where workers can practice responding to safety emergencies in a realistic yet controlled setting (Chihming et al., 2020).

3. METHODOLOGY AND RESEARCH DESIGN

The main aim of this research has been further specified into the following research questions:

- RQ1: How do HR department representatives view the potential of the Metaverse to transform HRM practices?
- RQ2: How do employees evaluate the potential impact of Metaverse implementation on HRM processes and workflow?
- RQ3: What challenges are associated with implementing Metaverse technologies in HRM, and how can they be addressed?

Two surveys were conducted to address the research questions. The first targeted Generation Z workers, born after 1997, who are entering the workforce and are known as "digital natives". This generation's familiarity with technology makes them an ideal group for exploring how the Metaverse can enhance workplace efficiency, communication, and overall work. The survey also gauged their readiness to use the Metaverse, along with their expectations, benefits, and concerns. A total of 41 participants were recruited through random sampling using various channels, including social media platforms (Instagram, Telegram, Facebook), student groups, survey exchange communities, and in-person outreach with a QR code linking to the questionnaire.

The second group comprised HRM professionals from various industries and countries, with different levels of experience. Their inclusion was essential due to their expertise in HR processes and their ability to evaluate the potential impact of the Metaverse on HRM and business operations. By analyzing perspectives from diverse economic and cultural contexts, the study aimed to understand how the Metaverse might be perceived globally. Participants were recruited through LinkedIn, ensuring accurate selection and verification based on their employment details. Despite inviting around 100 professionals, only 13 agreed to participate. The sample structure for both groups is summarized in Table 1.

Table 1. Structure of the sample

Employees		
Gender	Male	10
	Female	31
Age	18–20	5
	21–23	13
	24–27	23
	Total	41
Work experience	Less than 1 year	8
	1–3 years	24
	4–6 years	7
	7–10 years	2
Previous use of VR or AR	Yes	22
	No	19

Table 1 (cont.). Structure of the sample

HRM Specialists		
Gender	Male	0
	Female	13
Age	18–25	3
	26–30	4
	31–40	3
	41–50	2
	over 50 years old	1
Experience in HR	Less than 1 year	5
	1–3 years	4
	4–10 years	0
	more than 10 years	4
Size of the organization	1–9 employees	1
	10–49 employees	3
	50–249 employees	5
	more than 250 employees	4
Previous use of VR or AR	Yes	4
	No	9

Source: Own elaboration.

For the survey, two online questionnaires were developed to gather opinions from Generation Z employees and HR specialists. Each was tailored to its target audience with unique questions focusing on key research aspects. The surveys, created using Google Forms, utilized a 5-point Likert scale

4. RESULTS

The first research question was meant to explore how HR department representatives perceive the potential impact of the Metaverse on various HRM areas. The results have been presented in Table. 2.

Table 2. Descriptive statistics for perceived impact of Metaverse implementation on various HRM areas

HRM Area	N	Min.	Max.	Mean	Std. Deviation
Job analysis and design	13	2.00	5.00	3.8462	0.80064
Recruitment and selection	13	2.00	5.00	4.1538	0.89872
Onboarding and orientation	13	3.00	5.00	4.0769	0.75955
Performance appraisal	13	1.00	5.00	3.9231	1.11516
Training and development	13	2.00	5.00	4.2308	0.92681
Employee relations & engagement	13	1.00	5.00	3.5385	1.19829
Compensation and benefits	13	2.00	5.00	3.6154	0.96077
Health and safety	13	1.00	5.00	3.0000	1.29099

Source: Own elaboration.

The data shows a generally optimistic perspective on the potential benefits of Metaverse integration for HRM practices. The mean scores across most HRM functions hover around 4, suggesting anticipated positive impacts. Recruitment and selection (M=4.15) and training and development (M=4.23) emerged as the areas perceived to benefit most significantly from Metaverse adoption. Onboarding and orientation (M=4.08) and job analysis and design (M=3.85) also received favorable ratings, suggesting perceived value in utilizing Metaverse platforms for new employee integration and job redesign processes. Health and safety (M=3.00) received the lowest mean score, suggesting the least anticipation for transformative effects in this domain. This finding could reflect concerns about potential health risks associated with prolonged virtual presence within the Metaverse environment.

The second research question related to the employee's perception of the potential impact of Metaverse implementation on HRM processes and workflow. The data has been presented in Table 3.

Table 3. Descriptive statistics for perceived impact of Metaverse technologies on HR processes

Aspect	N	Min.	Max.	Mean	Std. Deviation
Recruitment experience	39	1.00	5.00	3.1795	1.09717
Onboarding experience	41	2.00	5.00	3.6341	0.69843
Training experience	40	2.00	5.00	3.8500	0.72678
Performance evaluation	41	2.00	5.00	3.5732	0.66672
Employee engagement	41	1.00	5.00	3.5610	1.00122
Work environment	41	2.00	5.00	3.8049	0.69712
Communication	41	1.00	5.00	3.2988	0.86822
Career growth opportunities	40	2.00	5.00	3.5300	0.81600
Workplace safety	41	1.00	5.00	3.3171	0.89970
* Data cleaning reduced the sample size (Valid N) by excluding uncertain responses.					

Source: Own elaboration.

Respondents generally perceive the impact of Metaverse technologies on various HRM processes positively, according to the established scale. Training experiences received the highest average rating (M=3.85), indicating strong support for Metaverse integration in enhancing employee skills. Similarly, enhancements to the work environment (M=3.80) and onboarding experiences (M=3.63) were also positively perceived, suggesting potential benefits in improving workplace atmosphere and facilitating new employee assimilation. While perceptions were generally favorable across other dimensions such as performance evaluation (M=3.57), employee engagement (M=3.56), and career growth opportunities (M=3.53), variability in responses was noted, particularly in areas like workplace safety (M=3.32) and communication (M=3.30), which were viewed more neutrally. Despite this variability, the findings underscore an optimistic outlook regarding the transformative potential of Metaverse technologies within HRM.

The third research question related to the challenges associated with implementing Metaverse in HRM. Generations Z perception of challenges has been presented in Table 4.

Table 4. Descriptive statistics for perceived challenges of the implementation of Metaverse technologies: Generation Z

Challange	N	Min.	Max.	Mean	Std. Deviation
Maintaining a healthy balance between virtual presence and personal life	40	1	5	2.93	1.141
Health issues associated with prolonged virtual presence	40	1	5	3.32	1.163
Ensuring diversity and inclusivity in virtual spaces	40	1	5	2.58	1.279
Authenticity and identity preservation	40	1	5	2.57	1.259
Building trust among team members	41	1	5	2.51	1.186
Ethical use of technology and digital citizenship	40	1	5	2.98	1.143
* Data cleaning reduced the sample size (Valid N) by excluding uncertain responses.					

Source: Own elaboration.

Based on the data in the table, young employees consider health concerns related to prolonged virtual presence to be the most significant challenge in integrating Metaverse technologies into HRM processes, as indicated by the highest average rating of 3.32. Another major concern is cyberbullying and online harassment, which received a high average rating of 3.29. These results highlight that Generation Z professionals are specifically worried about the impacts the technology may have on their health and negative social interactions within virtual environments. Conversely, challenges such as ensuring diversity and inclusivity in virtual spaces (M=2.58), maintaining authenticity and identity (M=2.57), and building trust among team members (M=2.51) were perceived as somewhat less challenging, although still significant. The ethical use of technology and digital citizenship received a moderate mean rating of 2.98, indicating an awareness of the importance of responsible digital behavior in virtual environments. It is important to highlight that none of the challenges received a low rating (all were rated above 2 on average). This fact suggests that the respondents recognize that each of the identified challenges poses significant potential obstacles or concerns in integrating Metaverse technologies into HRM processes.

Table 5 shows the perception of challenges of implementing Metaverse in HRM from the perspective of HR professionals. The findings reveal a diverse range of concerns with varying degrees of perceived significance, as measured by the provided mean scores. The highest mean score (4.15) corresponds to “Cost of implementation” indicating that participants view financial investment as the most significant challenge. Concerns about security and data privacy, along with employee acceptance and adoption, reflected by a mean score of 3.38, also emerge as prominent challenges. This highlights the importance of comprehensive security protocols and data protection measures when considering Metaverse adoption in HRM. Regulatory and ethical compliance within the Metaverse environment also presents a significant challenge, with a mean score of 3.31. This underscores the need for clear regulations and established ethical guidelines for Metaverse-based HRM practices.

Table 5. Descriptive statistics for perceived challenges of the implementation of Metaverse in HRM: HR representatives

Challenge	N	Min.	Max.	Mean	Std. Deviation
Integration with existing HR systems	13	1.00	5.00	3.1538	1.28103
Security and data privacy concerns	13	2.00	5.00	3.3846	1.12090
Employee acceptance and adoption	13	2.00	5.00	3.3846	0.96077
Technical infrastructure requirements (e.g. hardware. software)	13	1.00	5.00	3.0000	1.22474
Training and skill development for HR staff	13	1.00	4.00	2.7692	1.01274
Cost of implementation	13	3.00	5.00	4.1538	0.80064
Regulatory and ethical compliance within the Metaverse environment	13	2.00	5.00	3.3077	0.85485
Maintaining a sense of organizational culture and connection	13	2.00	5.00	3.0769	0.86232
Accessibility and inclusivity considerations	13	2.00	5.00	3.3077	1.03155
Health issues associated with prolonged virtual presence	13	0.00	5.00	2.7692	1.36344

Source: Own elaboration.

5. CONCLUSION

The integration of the Metaverse into HRM represents a transformative potential for reimagining workplace processes, from recruitment and onboarding to training and performance appraisal. The findings of this study reveal that both Generation Z employees and HR professionals perceive significant opportunities for enhancing HRM practices through immersive, interactive, and data-driven solutions. Specifically, areas such as training and development, recruitment, and onboarding are viewed as highly promising for leveraging Metaverse technologies to foster engagement, efficiency, and collaboration. Despite this optimism, several challenges emerge as critical considerations for successful implementation. Concerns related to cost, data privacy, health implications, and inclusivity underscore the need for strategic planning, robust security protocols, and ethical frameworks to guide the adoption of Metaverse technologies. Both employees and HR professionals emphasize the importance of ensuring accessibility and maintaining organizational culture while addressing technological and infrastructural requirements. Although the Metaverse remains in the early stages of societal and organizational integration, this research highlights its dual role as an innovative tool and a potential source of challenges. Successful adoption of Metaverse technologies requires organizations to balance the drive for innovation with addressing practical, ethical, and regulatory concerns. Future research should focus on examining long-term impacts, with particular attention to strategies for overcoming implementation barriers and optimizing user experiences.

All authors have read and agreed to the published version of the manuscript.

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THE CONCEPT OF KNOWLEDGE AND COGNITION IN ARTIFICIAL INTELLIGENCE MODELS – A PHILOSOPHICAL PERSPECTIVE

Artificial intelligence is a technology that has revolutionized numerous fields over recent decades. Its applications span scientific and engineering domains as well as everyday experiences, such as image recognition, autonomous vehicles, language translation, and medical diagnostic systems. AI systems, particularly those based on deep learning, exhibit capabilities comparable to human performance and, in some areas, even surpass it. This raises fundamental questions about their epistemic nature. Does AI genuinely generate knowledge? If so, what is the nature of this knowledge? Should we view its achievements as a form of novel cognition or merely as advanced processing of pre-existing data? A key issue thus emerges: do AI systems fulfill the criteria traditionally associated with human cognition, such as the capacity for justification, awareness of cognitive processes, or the creation of new epistemic content? This paper aims to address these questions by focusing on philosophical conceptions of knowledge and analyzing whether AI can be regarded as an autonomous cognitive agent. These considerations provide a perspective on AI not merely as a technology augmenting human cognitive processes but also as a potential step towards redefining knowledge in the technological era.

Keywords: artificial intelligence, knowledge, cognition, procedural knowledge, declarative knowledge.

1. INTRODUCTION

Artificial intelligence (AI) has become one of the most prominent topics in contemporary scientific and philosophical debates, opening new technological possibilities while simultaneously posing fundamental questions about the nature of knowledge and cognition. The development of technologies based on deep learning algorithms, such as neural networks, has led to significant advancements in areas like image recognition, language translation, and autonomous vehicles. The ability of machines to detect patterns and process vast amounts of data inspires awe, but it also invites reflection: do these systems truly create knowledge?

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Traditional conceptions of knowledge, such as Plato's classical definition, posit that knowledge is justified true belief (Plato, 2014; Fine, 2003). This concept ties the validity of cognition to its rational foundation. In the context of AI, a pressing question arises: can the capacity of machines to perform effectively be equated with the creation of knowledge? Is the generation of accurate outcomes based on enormous datasets equivalent to an epistemic capability that involves justification and conscious understanding? Contemporary researchers address similar concerns and questions. Coeckelbergh (2025) points to the problem of AI's epistemic agency, while Rivera-Novoa and Clark (2025) analyzes the role of generative systems in human cognitive processes. Humphreys (2025) draws attention to the epistemic threats associated with the "black box" nature of machine learning models, and Punziano (2025) and Magnani (2025) postulate the need to revise classical conceptions of knowledge in light of AI developments.

A particular challenge in considering AI lies in its dependence on input data and its lack of ability to reflect on its own decision-making processes. This introduces the issue of cognitive autonomy: is AI merely a tool in human hands, or does it hold the potential for independent cognition? The opacity of advanced algorithms, often referred to as the "black box" problem, further complicates this matter.

In this paper, I focus on the relationship between humans and AI in cognitive processes, analyzing the cognitive and epistemic limitations of AI systems. I focus on problems stemming from AI's inability to justify its actions, its dependence on external data, and the impact of these limitations on traditional philosophical notions of knowledge. In this way, I aim to answer the question of whether AI should be viewed as a tool supporting human cognition or as a harbinger of a new understanding of knowledge in an era of technological revolution.

In this context, it is worth revisiting the foundations of the philosophy of cognition, which have shaped our reflections on the nature of knowledge and the methods of its acquisition since antiquity. A particularly significant role is played here by Aristotelian logic – the first coherent attempt to define the principles of correct reasoning and inference. Aristotle not only developed formal tools for analysis but also sought to understand how deductive logic could serve the construction of scientific knowledge. His reflections on the role of intuition, induction, and syllogism in the process of cognition provide an important backdrop for contemporary analyses of the cognitive potential of AI.

2. ARISTOTELIAN LOGIC AND ARTIFICIAL INTELLIGENCE

Aristotelian logic, though crucial for later thought, was not treated as a fully-fledged field of knowledge but rather as a practical tool for correct reasoning and argumentation. The name *Organon* (tool), later attributed by Alexander of Aphrodisias, emphasized its supporting function for scientific inquiry rather than as a separate philosophical discipline (Czarnocka, 2023). Aristotle used the term *Analytics* for his logical works, in which he defined logic as the study of reasoning, analyzing how conclusions follow from premises and how arguments can be broken down into their fundamental elements. (Leśniak, 1989). According to Giovanni Reale, logic studies the structures of thought, forms of proof, and provides universal investigative tools. Through the translations of Aristotle's works into Arabic and Latin, his logic exerted a significant influence on medieval Europe, though its formal aspect came to dominate later thinking. Medieval critiques of intuitive knowledge of first principles laid the groundwork for empiricism, which shaped modern science and ways of thinking (Reale, 1999).

Aristotle reconstructed the procedures of rational cognition, combining normative aspects (how correct thinking should appear) with descriptive ones (based on established cognitive practices), thereby creating a theory of knowledge, including scientific knowledge. A key element of his logic was the theory of the syllogism – the first formal version of deductive logic. The syllogism focuses solely on the formal correctness of inference, describing the relationships between premises and conclusions. However, formal logic alone is insufficient for building scientific knowledge, as it does not address the truth of the premises – a necessary condition for a complete scientific theory.

In developing scientific knowledge, Aristotle devised the syllogism, which combines formal correctness with premises that are true, primary, and immediate – those that require no proof and are more evident than the conclusion itself. This type of syllogism differs from dialectical syllogisms, which rely on premises based on opinions or commonly accepted assertions, leading only to probable arguments (Reale, 1999). However, Aristotle's concept of the syllogism has its limitations. The principles of deductive logic alone do not suffice to achieve true knowledge – knowledge that would meet the standards of absolute truth demanded by ancient Greeks.

To ensure the fullness of cognition, Aristotle emphasized the need to base knowledge on first principles, which form the foundation of knowledge. The challenge lies in how these first principles can be known. Aristotle proposed two methods: intuition and induction. These are not equivalent elements of logic – they serve different roles, complementing deduction in the process of cognition. Thus, intuition and induction are necessary complements to deductive logic, enabling not only formal correctness but also the attainment of true understanding (Czarnocka, 2023). Aristotelian induction is not classical reasoning but a process of moving from particular to universal through intuition or direct apprehension (Reale, 1999). It is an unmediated form of cognition, which, in a sense, relies on the experience of individual cases. Induction, as a process of abstraction, engages rational intuition rather than inference in the strict sense. The similarity of Aristotelian induction to the modern understanding of the term is limited to a general principle – the transition from individual instances to general statements. However, the way Aristotle describes this process remains imprecise and differs from contemporary definitions. In antiquity, it operated within an anti-empirical context, making its comparison to modern theories difficult. Aristotle does not devote significant attention to induction – he treats it more as a useful tool in the initial stages of science without further consideration of its full meaning and applications (Leśniak, 1989).

Aristotle believed that the foundation of scientific knowledge lies in first principles, apprehended through intellectual intuition (*nous*), which he considered an innate capacity of the rational soul. This intuition allows for direct, certain, and absolutely true knowledge, independent of the senses and experience. Although experience plays a supportive (heuristic) role, the act of apprehending first principles is a priori and rational (Aristotle, 1960).

Intellectual intuition, as the key epistemic capacity of humans, enables access to immutable truths that constitute the basis of scientific knowledge. According to Aristotle, all science rests on these principles, and deductive logic (the theory of syllogisms) merely allows for formally correct, yet substantively empty, conclusions to be drawn from them. Thus, scientific syllogisms derive their value from the truth of their first premises, not from the process of reasoning itself (Czarnocka, 2023).

AI, based on algorithms and logical rules, operates within the framework of input data, which must be externally provided, most often by humans. Like deductive logic, AI

processes data according to predefined rules but lacks the ability to generate new content or autonomously discover fundamental principles. The input data that underpins AI's operation derives from human experience and knowledge, underscoring its dependence on external sources. This comparison highlights a critical similarity: neither Aristotle's deductive logic nor AI algorithms are independent means of cognition. In Aristotle's theory, the missing element is intellectual intuition, which allows for the apprehension of first principles. In the case of AI, the absence of such a capability means it cannot be considered an autonomous cognitive agent but merely a tool for transforming information within preprogrammed rules. Discussions about AI often focus on its potential consciousness or its ability to replace the human mind, diverting attention from a more fundamental issue: its lack of autonomy in the cognitive process. Autonomy in this context entails not only the ability to process data but also to independently discover and formulate first principles. AI lacks this capability, as it is devoid of both intellectual intuition and independent access to foundational truths. In Aristotle's thought, humans, through the rational soul's power, can achieve a priori knowledge, independent of sensory data. It is intellectual intuition that allows for the formation of knowledge about first principles, rendering the cognitive process autonomous. In the case of AI, this process is entirely dependent on external support – data provided by humans and rules programmed by them.

Ultimately, both in Aristotle's framework and in AI, cognitive tools (deductive logic or algorithms) serve only as means of organizing knowledge, not its source. The key difference lies in humans' ability to generate epistemic content through intellectual intuition, fully distinguishing them from AI, which remains a transformative tool rather than an autonomous cognitive agent.

3. THE PROBLEM OF COGNITIVE AUTONOMY IN AI

One of the key issues in the debate over AI is its cognitive autonomy. Colloquially, AI autonomy is often associated with the ability to make independent decisions based on data analysis. From an epistemological perspective, however, this issue is much more complex, requiring consideration of whether these systems can independently create their own cognitive frameworks, reflectively process information, and formulate new epistemic principles (Floridi, 2011; Bostrom, 2014). The literature often emphasizes that modern AI systems remain fully dependent on input data and algorithms provided by humans [e.g., deep learning models such as AlexNet or GPT chat operate on millions of parameters, the analysis of which is practically impossible for humans. The lack of transparency in decision-making has serious practical and ethical consequences, limiting trust in these systems (Sullivan, 2022)]. It is worth emphasizing that these data are not neutral – their selection and interpretation are determined by human decisions (Silver et al., 2018). As a result, AI also reproduces the limitations and biases contained in training data, which can lead to the reproduction of inequalities and systematic errors (Mitchell, 2019). However, the problem of bias does not stem from the algorithms themselves, but primarily from the quality and nature of the data, as well as from the training procedures. Importantly, the development of adaptive learning techniques suggests that future systems may gradually acquire the ability to detect and correct their own errors (Rahwan et al., 2019). On the other hand, practice shows that reducing AI to a mere tool devoid of autonomy would be an oversimplification. Systems such as AlphaZero and Go have developed original chess strategies unforeseen by their programmers (Silver et al., 2018). Large language models, on the other hand, generate content whose structure and meaning surprise even their

creators. These phenomena can be interpreted as a manifestation of emergent autonomy, understood as the ability to develop new heuristics and behaviors within the constraints set by data and architecture. At the same time, the "black box" problem – the opacity of deep network decision-making mechanisms – indicates the limited ability of even system creators to understand internal processes. This unpredictability can be interpreted as a sign of a certain operational independence, although it does not indicate the existence of reflective consciousness or intentionality.

At this point, it is worth noting the analogy with humans. Although it is emphasized that AI is not autonomous because it always depends on externally provided data and algorithms, in a similar sense, humans also function based on biological, environmental, and cultural "data". The fact that AI is a human creation does not necessarily preclude its recognition as a potential participant in cognitive processes in the future (Bryson, 2019).

It can therefore be said that current AI systems demonstrate only limited operational autonomy, understood as the emergence of new strategies and solutions, but do not meet the criteria for epistemic autonomy, which would require intentionality, self-awareness, and the ability to justify. It seems more appropriate to speak of a spectrum of cognitive autonomy – from complete dependence to various degrees of independence – than the dichotomy of "full autonomy" versus "complete lack thereof". Adopting this perspective opens the door to another issue: the nature of knowledge generated by artificial cognitive systems. To better understand the nature of their operation, it is worth invoking the distinction between procedural knowledge ("how") and declarative knowledge ("that"), which provides a starting point for further analysis.

4. PROCEDURAL KNOWLEDGE AND DECLARATIVE KNOWLEDGE

The distinction introduced by Gilbert Ryle between knowledge "how" (procedural knowledge) and knowledge "that" (declarative knowledge), presented in his articles from 1945–1946 and his book *The Concept of Mind* (1949), plays a fundamental role in the philosophy of knowledge and serves as a crucial reference point for analyzing the functioning of AI. Understanding this dichotomy is particularly important in the context of AI systems, especially neural networks, which represent some of the most advanced machine learning technologies.

Procedural knowledge refers to the ability to perform specific tasks in an intuitive and non-verbal manner. Its essence lies in practical skill, which does not require full awareness of the theoretical principles underlying the activity. For example, the ability to ride a bicycle enables balance, turning, or accelerating, even though the individual performing these actions typically cannot precisely explain the physical laws, such as angular momentum or centrifugal force, that make these actions possible. Procedural knowledge develops through experience and practice, and its defining feature is its manifestation in action rather than in the ability to verbally articulate rules.

Declarative knowledge, on the other hand, has a descriptive character and pertains to the understanding of facts, principles, and rules that can be verbally expressed and theoretically justified. This type of knowledge requires the ability to reason logically and comprehend the mechanisms governing a particular phenomenon. An example is the knowledge of Newton's laws of motion, which includes understanding specific principles and their application to the analysis of the movement of objects. Declarative knowledge forms the foundation of scientific understanding of the world and serves as the basis for systematic education and theoretical development.

In the case of AI, particularly neural networks, characteristics typical of procedural knowledge dominate. These systems can perform complex tasks such as image recognition, text translation, and autonomous vehicle operation. For instance, neural networks can accurately classify objects, recognize faces, or identify patterns in visual data. Similarly, translation systems like Google Translate effectively translate texts between languages, taking into account even subtle grammatical and semantic nuances.

Despite these capabilities, AI lacks declarative knowledge. Neural networks operate based on pattern recognition and weights learned during training, but they cannot explain the decisions they make. For example, in translation tasks, the system cannot justify why it chose a particular interpretation. The decisions generated by neural networks result from highly complex computations that are difficult to trace, leading to a situation in which AI's actions can be observed but not fully understood.

Similar limitations are evident in autonomous vehicle systems. These systems can independently drive vehicles, analyzing the environment and making real-time decisions. However, these decisions often remain opaque and difficult for humans to interpret. For instance, a user of such a system may not understand why the vehicle accelerated at a specific moment or turned in a particular direction. Despite the high effectiveness of these systems, the inability to justify decisions indicates that neural networks operate at the level of procedural knowledge but lack declarative knowledge.

These observations lead to a fundamental question: does a system that performs effectively but cannot justify its actions truly generate knowledge? Answering this question requires a deeper analysis of the relationship between procedural and declarative knowledge in the context of both human cognition and AI technologies. AI can be seen as a system possessing a limited form of procedural knowledge, but its inability to theoretically justify decisions remains one of the greatest challenges of contemporary technology. The distinction introduced by Gilbert Ryle, originally concerning human intelligence, is applicable to the analysis of AI, highlighting both its limitations and potential directions for development. In the face of contemporary technological challenges, integrating both types of knowledge seems essential for designing more comprehensible and responsible artificial intelligence systems (Ryle, 1949).

Understanding the differences between procedural and declarative knowledge provides the foundation for a broader discussion of cognitive processes from a cognitive science perspective. In this view, AI emerges as a system that redefines traditional concepts of knowledge.

5. KNOWLEDGE IN COGNITIVE SCIENCES

The views of cognitive scientists within the field of AI introduce a significant revision of traditional concepts of knowledge and cognition that have been present in philosophical tradition. Unlike classical perspectives, where cognition was closely tied to the human mind and its physical body, cognitive science offers a completely new approach. According to this perspective, cognitive processes and the ability to acquire knowledge can be realized not only by humans and other living organisms but also by artificial entities such as computer-based machines.

Cognitive scientists perceive intelligence as a trait not confined to a specific biological substrate, meaning it is not determined by the natural, physical properties of organisms. Intelligence can exist within any material system, whether it be the human body or a machine created by humans. In this view, knowledge and cognition are not limited to

traditional, embodied forms of perception and thinking but can be implemented by any systems capable of processing information in a manner appropriate to defined goals (Dennett, 1991).

This perspective radically transforms the classical understanding of the mind, which in traditional philosophy was perceived as being intrinsically linked to the body and the biological structure of organisms. Cognitive scientists, by dissociating intelligence from its material substrate, highlight its universal nature – it can function independently of whether it is encoded in a biological brain or in artificial computer systems. Thus, in the context of AI, cognition becomes a significantly more flexible process, unburdened by traditional constraints, leading to a new perspective on the role of knowledge and its processing in both humans and machines (Boden, 1990).

In AI, the rules governing information processing take the form of algorithms. Executing an algorithm involves transforming information according to specified principles (Turing, 1950). For AI, these principles are typically created by human cognitive agents who develop computer programs. Hence, at a basic level, it can be assumed that humans formulate the procedural rules that direct the actions of machines.

However, when it comes to the human mind, the situation is different. The “program” governing the functioning of the human mind, analogous to a computer program, is not consciously designed by humans or an external agent. It is, in a sense, “given” – transmitted in a way that cognitive scientists do not always fully explore (Chalmers, 1996). The rules of thought shaping cognitive processes and determining behavior in various situations are not the result of deliberate human action but are “encoded” within the human mind. According to this concept, these rules constitute *a priori* knowledge originating from something beyond individual consciousness – derived from the “logos of the world" (the understanding of reality) rather than directly from the actions of the subject.

These theoretical conclusions, arising from the lack of definitive proposals in cognitive science, remain conjectures and hypotheses. Although there is no comprehensive explanation for how these rules are “delivered” to the mind, cognitive scientists suggest that an external structure encodes knowledge and cognitive processes independently of the conscious participation of the cognitive subject.

Cognitive scientists in the field of AI argue that computational operations, which form the foundation of information processing, can be performed in various physical systems, regardless of the material they are made from. This means that the physical medium in which processing occurs is not crucial. What matters is the logical structure of the algorithm – the set of rules and principles that guide computational processes.

From this perspective, cognitive scientists reduce all cognitive processes to information processing at the syntactic level – that is, within the essential algorithmic structure. This implies that regardless of whether the cognitive process occurs in the human mind, a computer, or another system, the essence of information processing lies in adhering to the logical rules of the algorithm that governs operations on data. All cognition, including human thought processes, is understood by cognitive scientists as syntactic information processing, disengaged from deeper semantic aspects (such as meaning or understanding) associated with more complex forms of human reasoning.

Cognition in AI models is characterized by its inability to generate completely new knowledge, relying instead on the processing of information already produced and supplied by cognitive agents of a different nature. AI operates within the framework of input data, using the rules of deductive logic to transform it. Consequently, the knowledge obtained in

this way does not introduce new content compared to the original knowledge, as all its elements were already present in the initial premises (Floridi, 2011; Searle, 1980).

Although these transformations can reveal previously hidden or inaccessible aspects of the data and provide more efficient and useful representations for specific applications, they remain limited in nature. Deductive reasoning, upon which AI relies, is essentially content-neutral – it does not introduce new elements beyond those contained in the initial assumptions. Therefore, cognitive processes in AI can be viewed more as tools for organizing and optimizing knowledge rather than as sources of its creation.

In cognitive sciences, particularly in the context of cognitive science, the concept of information processing is understood in a much narrower sense than in everyday language. According to the cognitive science approach, information processing involves manipulating symbols according to specified algorithms without engaging the semantic layer – that is, without assigning meanings to these symbols. Symbols, in this context, are treated as syntactic signs that have no intrinsic meanings or references to reality – they are simply sequences of characters whose structure and operations are significant, but not their content.

Thus, in cognitive science, information processing does not involve understanding, assigning meanings to symbols, or navigating the realm of meanings. What matters is only the manipulation of symbols according to predefined transformation rules that operate solely at the syntactic level. The concept of information and its processing does not refer to anything beyond what is contained in the operational rules on the symbols – there is no place for interpreting these symbols or understanding them.

By adopting this approach, cognitive scientists disregard questions about the origin of algorithms, how they are created, or their ontological status. These questions, while potentially significant from a philosophical standpoint, are not central to the cognitive science approach to information processing. In this framework, algorithms are treated as given entities that simply exist to manipulate symbols without delving into their sources or ontology.

6. CONCLUSIONS

This article attempts a philosophical analysis of the nature of knowledge and cognition in the context of contemporary models of AI. It demonstrates that while AI achieves impressive results in information processing, pattern recognition, and complex problem-solving, its cognitive abilities are fundamentally limited. Similar to deductive logic in Aristotle's understanding, AI systems function as tools for organizing and transforming data, but do not generate new epistemic content or grasp the first principles of cognition. An analysis of the distinction between procedural and declarative knowledge indicates that AI operates primarily in the realm of "how" knowledge, lacking the ability to rationally justify actions or develop theories. From a cognitivist perspective, cognition performed by AI is reduced to syntactic symbol processing, devoid of semantic and interpretative aspects.

Consequently, AI, at its current stage of development, cannot be considered an autonomous cognitive entity. Rather, it serves as a tool supporting human epistemic processes, opening the door to reflection on a possible redefinition of the concept of knowledge in the technological era. Further development of transparent and explainable models of AI may lead to a revision of existing positions, but for now it remains valid to

claim that AI does not create knowledge in the philosophical sense, but merely reorganizes information provided by humans.

The author has read and agreed to the published version of the manuscript.

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USING EQUINE-BASED LEARNING TO FORM LEADERSHIP COMPETENCIES

The purpose of the paper is to identify the potential of the equine-based learning as a method of fostering leadership skills and competencies - communication, emotional intelligence, problem-solving and decision-making - among established leaders in community, corporate and military environment. Researchers used students' self-assessment survey and experts' observations during educational process at two military and one civilian university. Research showed that participants reported higher competency levels across all the investigated leadership domains. This proves that EBL curricula can be effectively incorporated into the management educational programs at universities. In addition, differences identified between self-assessment and experts' scoring suggest that for more accurate understanding of the acquired skills, EBL classes should be combined with the theoretical knowledge on leadership.

Keywords: equine-based learning, horse-assisted education, leadership competencies, experimental education.

1. INTRODUCTION

Leadership development is critical for personal and professional growth, as practical leadership skills are essential for success in various domains, including, corporate, community, and military settings. Traditional leadership training programs often focus on theoretical knowledge and classroom-based exercises, which may not fully capture the complexities of real-world leadership challenges. In recent years, there has been growing interest in alternative approaches to leadership training that incorporate experiential learning and non-traditional methods. One such approach is equine-based learning, which involves interactions between humans and horses to develop leadership and communication skills. Horses have a unique ability to provide immediate feedback and

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mirror human emotions and behaviours, making them ideal partners for leadership development.

Ongoing discussions on how best to develop leaders confirm that those who can harness the intellect of the body and brain have a unique advantage in today's complex and dynamic business environment (Cooper, 2000). Animals, horses especially, are excellent examples to guide the learning process that facilitates these human-horse experiences (Björnberg, 2015). They also offer the opportunity to develop lasting changes in individuals' awareness and actions regarding their leadership skills and authenticity (Gehrke et al., 2011). In this way, they differ from traditional training and leadership development programs.

This article explores the potential of equine-based learning as a novel approach to enhancing leadership competencies among leaders in community, corporate and military organizations. Reviewing existing literature on equine-based learning and its impact on the development of leadership competencies provides insights into the effectiveness of this approach for future leaders.

2. LITERATURE REVIEW

Equine-based learning (EBL): definition and prior research. Equine-based learning (EBL), (also called equine-assisted learning, equine-assisted education, horse-assisted education, horse-assisted learning) is an innovative method of human learning involving horses. It aims to develop the person broadly – self-awareness, leadership, psychological and social skills- and to help him/her change. The essence of this method is to create a space where we can experience ourselves in a relationship with a horse.

EBL 'means education through contact with the horse' (Burgon, 2014). EBL is a method of training leadership competencies based on experiences from observing horses and direct interaction with them. It is a facilitated, reflective discussion method based on the interpretation of equine behavior in a group experiential setting that has been used to improve confidence, self-assurance, verbal and nonverbal communication, focus, mindfulness, and coping strategies in populations of students, medical students, corporate groups, and career professionals (Hallberg, 2017).

Learning occurs during specially selected exercises, after which the learner's reflection plays a key role. Each participant can analyze their behavior and skills by watching themself (sessions with horses are recorded and monitored). This method is primarily used for management training. The inclusion of horses in the training process has developed in areas such as team building, group cooperation, problem-solving, decision-making, communication, self-awareness, and leadership.

People can learn through direct participation in the relationship during the workshops using EBL. There are no signposts, tried-and-tested rules, and techniques of behavior. Each step comes from taking responsibility, having courage, and making a decision. Learning is multi-level, involves the whole person, and occurs in an actual situation. The horse's behavior is authentic; thus, it is a real relationship, communication, and leadership. Such an experience is different from human-to-human role-playing. The world of horses, in this case, can be seen as a reflection of the world of humans. The animal environment, the horse herd, provides a reference point for the business environment.

Since the practice of incorporating Human-Animal Interaction (HAI) into therapeutic and educational settings has grown in popularity (Nimer, Lundahl, 2007), there has been a call to conduct evidence-based research on its effects on child physical and mental health, adult well-being (Esposito et al., 2011), and health issues in human medicine, social work,

and educational settings. Along with a call for clinical trials and examination of treatment effects in various populations, the importance of examining biobehavioral and physiological responses to HAI was emphasized (Esposito et al., 2011). Publications in EBL (horse-assisted education, equine-assisted learning) were sporadic until 2020 and mainly concerned veterinary science. During the COVID-19 pandemic, work and human relationships changed to a virtual environment, to which new methods of teaching communicative competence can be attributed (Davis, 2023). Still, according to our analysis, 63% of all publications are in veterinary and agricultural sciences, but publications in health sciences (8.8%) and social sciences (13.6%) have emerged.

EBL and Leadership Competencies. Leadership competencies play a crucial role in determining the success of individuals in leadership positions. In today's dynamic and complex business environment, possessing a suitable set of competencies is essential for leaders to navigate challenges, inspire their teams, and drive organisational growth. Main leadership competencies have been explored by researchers and many academic articles and books have been devoted to this topic (Bolden et al., 2023; Bowser, 2018; Beehner, 2019).

Leadership competencies are the specific knowledge, skills, and behaviours that enable individuals to effectively lead and influence others towards achieving organisational goals. These competencies include among others cognitive abilities, emotional intelligence, communication skills, and strategic thinking. They are not innate qualities but can be developed and enhanced through training, experience, and self-reflection. Gigliotti (2019) details the most essential skills and competencies of a good leader: enhancing decision-making, inspiring and motivating others, driving change and innovation; building and developing high-performing teams. According to Northouse (2013), there are four key leadership competencies: emotional intelligence, communication skills, strategic thinking, and resilience.

As noted earlier, EBL is an experiential learning method to improve leadership competencies. Kendall and colleagues (2015) describe EBL as a program which involves innovative, underutilized, and motivating techniques and strategies that provide a dynamic process of building and developing leadership skills through horse-human interactions. Due to the specific nature of this type of training, the method in question cannot be applied to the entire leadership education. Researchers have attempted to modify the method to apply it to each leadership competence trait discussed, but working with a horse may only produce the expected results in some areas. Rajfura and Karaszewski (2018) prove the efficiency of EBL for teaching emotional intelligence, while Bilginoğlu (2021) analyses the theoretical background of the EBL's overall impact on leadership skills. Kohanov (2015) emphasized how horse behavior in herds can be used to demonstrate the power of consensual leadership.

Several studies have explored the impact of EBL on communication competencies in various settings, including leadership development programs and team-building exercises. These studies consistently demonstrate positive outcomes in communication skills development among participants. Kummer and colleagues (2013) examined the effects of equine-assisted leadership training on communication competencies among managers in a corporate setting. The participants engaged in activities such as leading horses through obstacle courses and non-verbal communication exercises. The findings revealed significant improvements in active listening, non-verbal communication, empathy, and assertiveness among the participants. The experiential nature of the training allowed managers to practice and refine their communication skills in a dynamic and engaging

environment. Perkins and colleagues (2018) explored the impact of EBL on enhancing managerial competencies in a team-building context. The findings showed that the participants developed stronger communication skills, including effective teamwork, clear and concise communication, motivation, decision making, and adaptability. Artz and her team (2021) published a study on improving the well-being of students with burnout based on EBL exercises. She describes the participants' positive reception of the training, who rated the impact the activities would have on their further development. The small group of participants created limitations, but the positive outcome of the study encouraged continued research.

Publications based on research in organizations among managers are scarce. Serot and Bresciani (2021) evaluated the impact of training through EBL conducted in different equine facilitated learning (EFL) centers. The results show that all participants of different ages evaluated the positive impact of working with horses one year after the conducted training, both at the level of individual and group development.

Based on the literature review the main benefits of the EBL for training the key leadership competencies can be outlined as follows:

Emotional Intelligence (EI): Horses, highly attuned to human emotions, mirror individuals' emotional states, offering immediate feedback. Through EBL, leaders enhance EI by recognizing and regulating emotions, improving self-awareness, empathy, and emotional management skills in real-time interactions.

Communication (COM): Horses rely on non-verbal cues, requiring leaders to communicate clearly through body language and energy. EBL helps leaders refine posture, gestures, and intentions, enhancing non-verbal communication skills transferable to team interactions.

Creativity/Problem-Solving (CBS): EBL challenges leaders to analyze situations, adapt strategies, and solve problems based on horses' feedback. This fosters critical thinking, creativity, and adaptability, essential for workplace problem-solving.

Decision-Making (DM): EBL requires leaders to make real-time decisions based on horses' behavior and needs, offering immediate feedback. This helps develop confidence, decisiveness, and informed decision-making under pressure.

3. METHODOLOGY

This research aims to identify the impact of EBL on a set of leadership competencies: communication, emotional intelligence, problem-solving and decision-making. In particular, the following questions were addressed:

RQ 1. Does taking an EBL course increase students' perceived level of leadership competencies?

RQ 2. Is the increase of the self-assessment score significant for military and civilian students across leadership skills?

RQ 3. Does students' perception of leadership competencies differ from experts' evaluation?

A combination of research methods was used to obtain qualitative and quantitative data through surveys, interviews, personal diaries and observations. Current paper will focus on presenting the results of the students' self-assessment surveys and experts' observations.

The current research was a part of the educational process delivered at the two military and one civilian universities. The research was designed as a pre-test/post-test exploratory experiment without the control group. Prior to EBL, students were given identical

self-assessment sheets to assess their leadership competencies regarding emotional intelligence, communication, problem-solving and decision-making. The participants' leadership skills were assessed through self-assessment and expert assessment questionnaires. All the participants then took the education and training in three courses "Non-Verbal Leadership", "Leadership in Communication" and "Leadership's motivation and decision-making" which covered two weeks of every day 8-hour classes (depending on the university, these were either 2 weeks intensive or classes every week for 3 months). At the end of the course the assessment was repeated. The questionnaires were distributed among 104 participants of the international education courses: delivered at the different universities in Wroclaw (Military University of Land Forces), Lisbon (Academia Militar and Lusofona University). 54 respondents came from the military universities, while 50 were civilians. This distribution of the participants allows us for military/civilian comparison of the obtained results.

To differentiate participants in terms of their familiarity with equine interactions, the survey incorporated a nuanced categorization based on experience levels. Participants were stratified into two primary groups: those with no prior experience with horses and those with 1 to 5 years of experience. This categorization facilitated a nuanced analysis of the impact of varying degrees of exposure to equine activities on the reported assessments of the leadership competencies. 82% of participants did not have any prior experience with horses, while among the remaining group 13% of participants had a four-year prior practice, 3% had three-year practice and 2% had five-year practice.

4. RESULTS

Competencies' self-assessment. In this section, we present the key findings of the study, focusing on how students rated their competencies before and after the course across four leadership competencies: emotional intelligence (EI), communication (COM), creativity/problem solving (CPS), and decision making (DM). The self-assessment, conducted both prior to and following the course, serves as a valuable metric for gauging the impact of the educational intervention on the students' perceived proficiency in these targeted competencies, excluding the influence of other possible factors (see Figure 1).

Following the completion of the course, an upward trend emerged in the self-assessment EI scores, suggesting a positive influence on EI. This shift may be indicative of the course's effectiveness in enhancing the participants' capabilities in this competency. The results for COM showed an initially high variability in perceived proficiency among participants. Post-course evaluations, however, demonstrated a discernible improvement across the cohort. The data suggests that the course contributed positively to the enhancement of communication competency. Findings vividly showcases the transformative impact of the course on participants' self-perceived proficiency in CPS. A remarkable shift occurred, emphasizing improved confidence and competence. The minimal change in the count of 5 points suggests consistent mastery. The post-course results also demonstrate a significant improvement in DM scores, particularly in the higher proficiency levels.

Overall, prior to taking the EBL course, the participants were the least confident in their ability to be creative and find the ways to solve problems and they felt most comfortable in leadership communication. Course content and activities were helpful in improving throughout all leadership competencies, as measured by their self-perception.

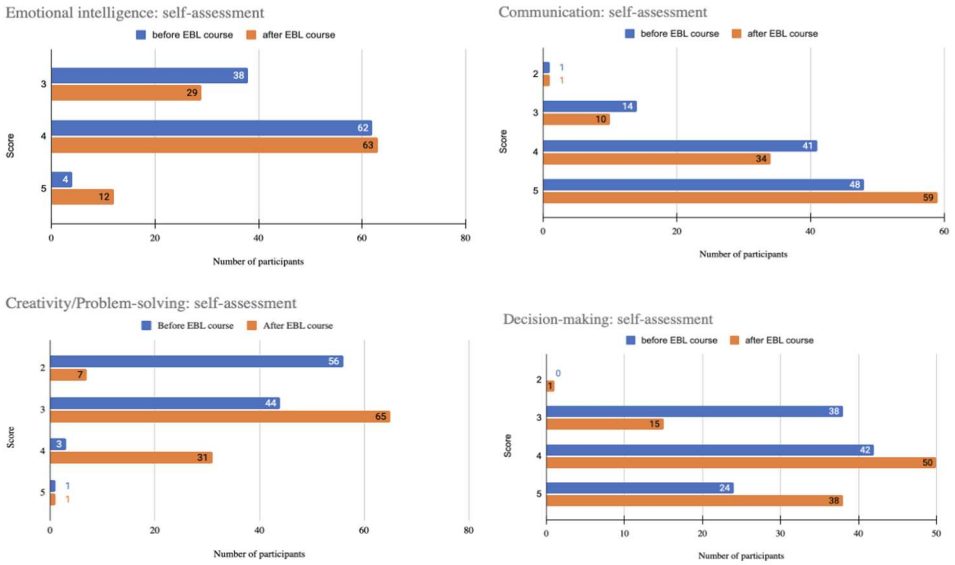

Figure 1. Self-assessment scores for leadership competencies

Source: Own calculations.

Military and Civilian Participants: Comparison. As the participants of the described EBL course almost equally represent military and civilian universities, it allows for comparison between these two groups. Therefore, we checked whether there is a significant difference between their perception of leadership competencies before and after taking the EBL course.

Results show that before taking the course military and civilian participants perceived their Emotional Intelligence and Communication competencies equally. As for the Creativity/Problem-solving and Decision-making competencies, their perceptions differed significantly. After the course the two groups of students did not reveal a significantly different level of assessing their leadership competencies. Given that the course was very intensive, we can attribute this change to the fact that participants got a more unified understanding of the corresponding leadership competencies and their evaluation.

To check whether the suggested EBL curriculum had a positive effect on student's self-perception of the related management competencies and to compare whether these changes are different for military and civilian students, we used one-tail paired-samples t-test. All participants acknowledge that after taking the EBL course their leadership competencies improve. t-test results (Table 1) demonstrate that for communication, creativity/problem-solving and decision-making competencies the difference between self-assessment scores before and after the course are significant for both groups, that is students really find the course effective and beneficial for their competencies improvement. As for the emotional intelligence level, the difference in scores is significant only for the civilian participants.

Table 1. Results of paired-sample t-test for differences between self-assessment before and after the EBL course

Competencies	Military		Civilian	
	t-value	P-value	t-value	P-value
EI	-1,54	0,065	**-1,83**	**0,037**
COM	**-2,81***	**0,003**	**-2,06**	**0,022**
CPS	**-7,88**	**0,000**	**-11,43**	**0,000**
DM	**-4,10**	**0,000**	**-5,75**	**0,000**

**Bold indicates tests, where the H0 hypothesis about equal means was rejected.*

Source: Own calculations.

Competencies' experts' assessment. During the study we also conducted an expert assessment of students' leadership competencies before the course started and at its end. Table 2 shows clear differences between the score levels for the competencies as they were perceived by the participants and as they were identified by the experts.

Table 2. Mean (SD) self-assessment and experts assessment scores across leadership competencies.

Competencies	Before the course		After the course	
	Self-assessment	Experts' assessment	Self-assessment	Experts' assessment
EI	3,7 (0,5)	2,9 (0,8)	3,8 (0,6)	3,9 (0,6)
COM	4,3 (0,7)	3,3 (0,5)	4,5 (0,8)	4,0 (0,7)
CPS	2,5 (0,6)	2,3 (0,7)	3,3 (0,6)	2,7 (0,8)
DM	3,9 (0,8)	3,2 (1,0)	4,2 (0,7)	3,7 (0,9)

Source: Own calculations.

Paired-sample t-test, proved that self-assessment and experts-assessment scores provided before the course differ significantly for all four leadership competencies (Table 3). Participants were more confident in their proficiency than the experts. The picture remained the same after taking the course for all competencies except Emotional Intelligence. In this case students' perception showed insignificantly lower scores than those provided by the experts.

Table 3. Results of paired-sample t-test for differences between self-assessment and experts' assessment before and after the EBL course

Competencies	Before the course		After the course	
	t-value	P-value	t-value	P-value
EI	**7,91***	**0,000**	-1,27	0,207
COM	**9,29**	**0,000**	**4,24**	**0,000**
CPS	**2,70**	**0,008**	**5,9**	**0,000**
DM	**4,97**	**0,000**	**4,67**	**0,000**

**Bold indicates tests, where the H0 hypothesis about equal means was rejected.*

Source: Own calculations.

Such a difference means that there existed a gap between leadership competencies' understanding among experts and leaders themselves. And this gap remains after taking the EBL course.

5. DISCUSSION

Our research showed that before enrolling in the EBL course, participants had the lowest confidence in their creativity and problem-solving competencies, while feeling most at ease with leadership communication. The course content and activities turned out to be helpful in enhancing their proficiency in all aspects of leadership in question, as indicated by their self-perceived abilities. Other studies also outline the positive long-term effects of EBL for emotional intelligence and communication (Almeras, Bresciani, 2024; Kelly, 2013), problem solving skills (Murphy et al., 2017; Walsh, Blakeney, 2013), and communication (Mikulec, McKinney, 2014; Murphy et al., 2017; Perkins, 2018).

The findings show that both civilians and military representatives perceived their competencies levels equally before and after the course. The only significant difference between these two groups was identified for their self-assessment of problem-related competencies prior to the course: Creativity/Problem-solving and Decision-making. This difference is no longer identified for after the course self-assessment which allows us to conclude that the curriculum was efficient for both groups of students and treated them equally, without any specific emphasis on the military-related tasks and challenges.

Course participants tend to exaggerate their leadership competencies compared to experts' scores. These findings are in line with previous research, which prove that such types of non-technical competencies are often inaccurately assessed by people (Aarora et al., 2011; Murthy et al., 2006, Dunning et al. 2004), while for the technical skills the accuracy is higher (Moorthy et al., 2006). The results also post a question of whether the facilitators' experience with leadership or with horses matters more for the accuracy of expert assessment. Stock and Kolb (2021) highlight that a facilitator should be horse-experienced, while Rentko et al. (2023) emphasize that the facilitators also learn through EBL. At the same time, experts acknowledge that the EBL course is more beneficial for the participants than it is perceived by them in terms of the improved self- and expert assessment.

6. CONCLUSIONS

Incorporating EBL into leadership and management training programs can offer several benefits for organizations. Firstly, it provides a unique and engaging learning experience that breaks away from traditional classroom settings. The hands-on nature of EBL allows managers to apply their leadership competencies in a real-world context, making the training more practical and impactful. EBL also promotes self-awareness, as managers must reflect on their communication style and its impact on the horse's response. Managers can then adjust and refine their competencies by gaining insights into their leadership patterns and receiving immediate feedback from the horse.

Secondly, EBL fosters a sense of teamwork and collaboration. Managers often participate in group activities and exercises with horses, requiring effective communication and coordination among team members. These activities promote a sense of unity and shared purpose, enhancing team dynamics and communication within the organization.

Furthermore, EBL can help managers develop a more empathetic and understanding approach to communication. By interacting with horses, managers learn to read non-verbal cues and respond appropriately, which improves empathy and understanding of their employees' non-verbal communication, which influences their leadership competencies.

EBL curricula prove to be effective in improving emotional intelligence, communication, problem-solving and decision-making skills. At the same time, considering a significant difference in scoring between self-assessment and experts' assessment, which remains even after the EBL education, it might be sufficient to complement the practical course with some theory on leadership competencies. That would ensure a more accurate understanding of such competencies by the students.

Within further research, country-specific analyses could be conducted to explore potential regional variations in students' response to the course. A larger-scale study could be carried out to determine whether so-called national characteristics play an essential role in leadership competence.

All authors have read and agreed to the published version of the manuscript.

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ECONOMIC POWER OF THE BRICS GROUP AND PARTNER COUNTRIES

The aim of this paper is to characterize the BRICS+ Group and its partner countries in terms of economic power and other derived categories (global shares in GDP, population, and area). The USA, as the BRICS+ Group's main competitor, is also described for comparison. The countries associated with the Group, known as partner countries, are also described. The main research tool in this article is the Sułek model, which was used to calculate state power. The subject of the study is the changes in economic power between 1991 and 2024 for both the BRICS+ Group countries, their partner countries, and the USA. Statistical data for calculating power were obtained from the World Bank, the IMF, and economic portals. The subject of this article falls within the scope of security/geopolitics, particularly powermetrics. China's power peaked before the Covid-19 pandemic in 2020, and since then, a reverse trend has been observed in subsequent years, with China's relative weakening and the United States' economic recovery concurrent. This trend appears to be continuing, with India assuming the role of the most dynamically developing country in the BRICS group over the coming decades. Research shows that over the past three decades, the share of BRICS+ and partner countries in terms of economic power has doubled relative to the United States, from 16% to 33%. China has increased its share of global economic power from 3.6% in 1991 to 16% in 2024.

Keywords: BRICS+, powermetric, security, power.

1. INTRODUCTION

The end of the Cold War in 1991 transformed the world around us. One of the main players in the bipolar balance of power that emerged after World War II, the Union of Soviet Socialist Republics (USSR), collapsed, and the newly formed Russian Federation, despite adopting its traditions and ambitions, plunged into economic crisis, remaining a military power throughout. The second superpower, the USA, became the world's leading power for the next decade after 1991, and the de facto maintainer of world order (Sułek, 2008/09). The 21st century, thanks largely to globalization and its benefits, brought with it

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a new international balance of power. China joined the USA in the competition for global leadership. India, Brazil, and Russia are also gaining a growing say. There is also talk of the West's position being undermined by new powers, primarily Asian ones. The current geopolitical transformation is characterized by a decline in global power and share in GDP and population, particularly for Japan, as well as for the older and wealthier European countries: Germany, Italy, France, and Spain.

The aim of this paper is to characterize the BRICS+ Group and its partner countries in terms of economic power and other derived categories (global GDP shares, population, and area). The main research tool in this paper is the Sułek's model, which was used to calculate the economic power of the studied countries. The study examines changes in economic power between 1991 and 2024 for the BRICS+ Group countries, their partner countries, and the United States. The statistical basis for this paper is based on data from the World Bank and the International Monetary Fund (IMF), as well as economic portals. The topic of this publication was initiated as a result of the considerable interest in the development of BRICS+ countries and their rivalry with, among others, the United States. The article falls within the scope of security/geopolitics, particularly power metrics. Based on calculations of global power and shares, changes in the geopolitical structure of the world are also presented.

In the last two decades, a term has emerged in academic and journalistic circles, describing BRICS as the anti-West or non-West, due to its frequent criticism of Western policies on numerous international issues. According to Jakub Zajączkowski, discord within the Group at the World Trade Organization (WTO), the G20, and the UN resulted in a lack of a common, coordinated policy. Their actions also failed to undermine alternatives to Western dominance in the international arena (Zajączkowski, 2014). According to C. Roberts, BRICS is an *"improbable coalition"* due to the numerous differences in potential, policies, and vision among its members, which contribute to its weakness (Roberts, 2010). The loose alliance of the Group's countries is also noted, and this is expected to remain so for the coming years, with no real alternative to the West. According to E. Seiwert, BRICS+ cannot be treated as one pole of bilateral geopolitical rivalry with the West (Seiwert, 2024).

2. POWER AND POWERMETRIC MODEL BY MIROSŁAW SUŁEK

The power of states is a fundamental property of states. The science of powermetrics characterizes the measurement and modeling of power (energy, power, potential) in international relations. Powernomics, on the other hand, is the study of the power of a state as a political entity. The equivalents of the Polish term "might" are the international terms "potestas," "power," "might," "Macht," "puissance," and "moszcz." State power is also characterized by terms such as political potential, geopolitical potential, strength, potential force, and power (Sprout, 1966). This term is also related to the concepts of interest and authority. According to R. Aron, power is "the ability to do, create, or destroy. […] By power on the international stage, I mean the ability of a political entity to impose its will on other political entities" (Aron, 1995). R. Dahl believed that "power is the ability to induce others to do something they would not otherwise do" (Dahl, 1957). According to J.G. Stoessinger, "power in international relations is the ability of a state to use its material and immaterial resources in a way that will influence the behavior of other states" (Stoessinger, 1969). Bertrand Russell defined authority/power as "the ability to produce intended effects" (Russell, 1992). It is also appropriate to agree with another thesis of this

eminent philosopher, according to which "power is the fundamental concept of social sciences, in the same sense that energy is the fundamental concept of physics" (Russell, 2011). This energy, or power, manifests itself in the form of authority in domestic relations and in the form of power in the science of international relations. Another equally important thesis of R. Aron is that: "The most important feature of every international system is the balance of power" (Aron, 1995). It consists of smaller "powers" that are subject to powermetric studies. Power studies consist of quantitative components that are objectively measurable or qualitative, depending largely on the researcher. Another problem is the selection of appropriate categories and their significance. These issues are addressed by the so-called Sułek's model, which is easy to calculate and, with improvements, creates an objective picture of state power. It is based on a necessary number of *constant factors* throughout history, including people, space, time, and the results of collective human action. It is a formal model, easy to understand and apply, and deductive in nature. Economic power is composed of economic results (gross domestic product), demographic factors (population), and spatial factors (territorial area). Military power is composed of military-economic factors (military expenditures, which are part of GDP), demographic-military factors (the number of active-duty soldiers), and spatial factors (territorial area). Geopolitical power is the resultant of civilian and military power and is calculated as the arithmetic mean of civilian power and tripled military power (Sułek, Szymala, 2025). The power of individual states is a fraction of this value. Research results will be presented in millimirs (mM), i.e., thousandths of the world's power – world power = 1000. Sułek's model is as follows[3]:

- $P_e = PKB^{0,652} \times L^{0,217} \times a^{0,109}$
- $P_w = W^{0,652} \times S^{0,217} \times a^{0,109}$
- $P_g = \frac{Pe + (2*Pw)}{3}$

Symbols: P_e – economic power, P_w – military power, P_g – geopolitical power, PKB – gross domestic product, L – population, a – territory, W – military expenditure, S – number of soldiers in active service.

Relations of power and interests, which shape the balance of power regionally and globally, are an inherent element of the international system. The importance of power is particularly emphasized by the realist paradigm. As Hans Morgenthau wrote, "the guiding light that helps political realism navigate the thicket of international politics is the concept of interest defined in terms of power" (Morgenthau, 2010). States compete for power in a world of limited resources; it is a zero-sum game. The pursuit of maximizing one's own power is intended to satisfy the security needs of states. The growth of one state causes a corresponding decline in the others. This article presents the economic power of the BRICS+ Group and its partner states, compared to the United States, as the most important factor in presenting the balance of power in the world. This balance has changed since the end of the Cold War in 1991. Over the past 34 years since the fall of the USSR, the United States has maintained its relative economic power, but has been overtaken by China in this regard. As a result of globalization, many countries, led by China, have experienced significant economic growth and increased economic power. Their cooperation, for example, within BRICS+, could significantly reduce the US's global clout.

[3] For more on power models, see (Sułek, 2001; Sułek, 2013; Höhn, 2011).

3. BRICS+ GROUP AND PARTNER COUNTRIES

The BRICS+ intergovernmental bloc/organization/group included in June 2025, Brazil, Russia, India, China, South Africa, Egypt, Ethiopia, Indonesia, Iran, and the United Arab Emirates. In 2024, at the 16th BRICS+ summit in Kazan, a new category of state integration was introduced, known as partner states. These include Belarus, Bolivia, Cuba, Kazakhstan, Malaysia, Nigeria, Thailand, Uganda, Uzbekistan, and Vietnam. The origins of this organization were linked to the initiative of Russian Foreign Minister Yevgeny Primakov and meetings between the leaders of Russia, China, India, Brazil, and South Africa. The term BRIC itself was coined in 2011 and is associated with economist Jim O'Neill. The first BRICS summit took place in 2009. A year later, South Africa joined, and the bloc's name was officially changed to BRICS. Due to the new members, the informal acronym BRICS+ was coined in 2024. Analysts describe the BRICS+ member states as competitors and a counterweight to the Group of Seven (G7), particularly the United States (Stewart, 2024). Others emphasize the desire to coordinate economic expansion within the bloc in Africa and South America (Johnson, 2024). The organization's development is supported by institutions such as the New Development Bank, the BRICS Contingent Reserve Arrangement, BRICS PAY (a competitor to SWIFT, a platform enabling exchange in national currencies, a decentralized payment system), and the BRICS Joint Statistical Publication.

4. DYNAMICS OF CHANGES IN POWER INDICES IN BRICS+, PARTNER COUNTRIES AND THE US

This section will present the dynamics of the parameters needed to calculate state power, i.e., GDP, population, and area, as of 2024, assuming its stability after the Cold War. The territorial gains of the Russian Federation during Vladimir Putin's rule were not included due to their non-recognition by almost all countries worldwide. These indicators were converted into global shares, as this is the only way to demonstrate the actual increases and decreases in parameters and power. Next, the results regarding the increases and decreases in the economic power of the BRICS+ countries and their partner countries will be presented. The economic power of the United States and the overall power of the BRICS+ and partner countries will be presented for comparison. Gross domestic product (GDP), as a parameter, indirectly reflects the level of productivity, i.e., the scale of economic development. This indicator, used to calculate economic power, has been in use for many years, despite criticism. In Professor Sułek's synthetic power model, GDP serves as the "OUTCOME" of human social activity (Sułek, Szymala, 2025).

Table 1 presents the global GDP shares of BRICS+, partner countries, and the USA from 1991 to 2024. To illustrate the state of competition with the USA in individual years, the twenty BRICS+ countries as a whole are also included.

After the end of the Cold War, significant changes occurred in countries' shares of global GDP, taking into account the period up to 2024. At the time of the collapse of the USSR, the US share of global GDP reached 25.8%, or one-quarter. After a decade, the US share rose to one-third of global GDP, but began to decline around 2003. This was due to unsuccessful and costly interventions in Afghanistan and Iraq, the war on terrorism, and the global economic turmoil, culminating in COVID-19 and the war in Ukraine in February 2022.

Despite declines and fluctuations in global GDP, the United States has increased its share again in recent years. In 2024, it reached 26.4% of GDP, improving its position in this respect from 1991. Looking at the GDP shares of the countries that currently constitute BRICS+, together with their partner countries, it can be seen that since 1991, when they collectively held only 9.6% of global GDP, the twenty countries have significantly increased their share, mainly thanks to China, overtaking the USA in 2010 (BRICS+ 22.8%, USA 22.6%). In 2024, the BRICS+ and partner countries increased their lead over the USA by 3.0%, reaching a 29.4% share of global GDP. The increase in the GDP shares of the BRICS+ countries reached 205% between 1991 and 2024. Among the fastest-growing countries over these three decades was China, which increased its share of global GDP from 1.6% in 1991 to 16.9% in 2024, a staggering 953%. India also improved its share by 216%; Ethiopia by 131%; Indonesia by 163%; Egypt by 131%; Uganda by 271%; and Vietnam by 953%. However, the shares of some countries declined. These include Russia, a smaller heir to the pre-1991 USSR, South Africa, Iran, Belarus, and Nigeria. Russia's share declined particularly noticeably, reaching its peak in 2000, when it accounted for only 0.8% of global GDP.

Table 1. Global GDP shares of BRICS+, partner countries and the USA in 1991–2024 (in %, world = 100)

Country	1991	1995	2000	2005	2010	2015	2020	2024[4]
China	1.60	2.36	3.58	4.78	9.14	14.66	17.13	16.87
India	1.13	1.16	1.38	1.72	2.52	2.79	3.12	3.58
Brazil	1.43	2.47	1.94	1.87	3.32	2.39	1.72	2.01
Russia	2.17	1.27	0.77	1.60	2.29	1.81	1.74	1.80
South Africa	0.57	0.55	0.45	0.60	0.63	0.46	0.39	0.37
Iran	0.55	0.31	0.32	0.47	0.73	0.54	0.31	0.40
Ethiopia	0.06	0.03	0.02	0.03	0.05	0.09	0.13	0.13
Indonesia	0.49	0.65	0.49	0.60	1.13	1.14	1.24	1.29
UAE[5]	0.22	0.21	0.31	0.38	0.45	0.49	0.41	0.50
Egypt	0.16	0.19	0.30	0.19	0.33	0.44	0.45	0.36
Belarus	0.08	0.05	0.04	0.06	0.09	0.08	0.07	0.06
Bolivia	0.02	0.02	0.03	0.02	0.03	0.04	0.04	0.05
Cuba	0.10	0.10	0.09	0.09	0.09	0.12	0.13	-[6]
Kazakhstan	0.10	0.07	0.05	0.12	0.22	0.24	0.20	0.27
Malaysia	0.21	0.29	0.28	0.30	0.38	0.40	0.39	0.41
Nigeria	0.25	0.45	0.20	0.37	0.55	0.65	0.50	0.23
Thailand	0.41	0.54	0.37	0.40	0.51	0.53	0.58	0.50
Uganda	0.01	0.02	0.02	0.02	0.04	0.04	0.04	0.05
Uzbekistan	0.06	0.04	0.04	0.03	0.08	0.11	0.08	0.11
Vietnam	0.04	0.07	0.09	0.12	0.22	0.32	0.40	0.42
BRICS+	9.65	10.83	10.76	13.75	22.79	27.33	29.07	29.41
The USA	25.75	24.53	30.28	27.27	22.59	24.24	24.90	26.40

Source: own calculations based on data from the World Bank, IMF.

[4] Data for 2024 are based on calculations from April 2025 (Statista, Trading Economics).
[5] The United Arab Emirates.
[6] No GDP data for 2024.

The BRICS+ group and its ten affiliated countries have a huge advantage in terms of global population share. From the end of the Cold War until 2024, this indicator never fell below 50% of the global population share. The highest share was 57% in 1995, and 55% in 2024. The United States, among the world's most populous countries, only had a share above 4% of the global population during the analyzed period. Due to demographic problems, including those of China and Russia, the bloc's share began to decline after 1995. It is worth noting that Table 1 shows a decline in China's share of the global population after the Cold War. From 21.4% in 1991, China's share decreased to 17.4% in 2024. This represents a decline of 18.3% in just three decades. Declines in global population shares were primarily recorded by China, but also by Brazil, Russia, Belarus, Cuba, Kazakhstan, and Thailand. Shares also increased in India (5%), Ethiopia (73%), the UAE (259%), Egypt (27%), Nigeria (52%), and Uganda (79%).

Table 2 shows the population of BRICS+, partner countries, and the United States after the Cold War.

Table 2. Population of BRICS+, partner countries and the USA in 1991–2024 (in %, world = 100)

Country	1991	1995	2000	2005	2010	2015	2020	2024[7]
China	21.36	21.00	20.49	19.83	19.11	18.54	17.96	17.44
India	16.40	16.74	17.17	17.56	17.76	17.85	17.85	17.25
Brazil	2.82	2.82	2.82	2.81	2.77	2.71	2.66	2.59
Russia	2.75	2.59	2.38	2.18	2.04	1.94	1.85	1.78
South Africa	0.77	0.78	0.77	0.75	0.75	0.76	0.77	0.78
Iran	1.11	1.08	1.08	1.09	1.11	1.11	1.12	1.12
Ethiopia	0.92	1.00	1.09	1.19	1.29	1.40	1.51	1.60
Indonesia	3.47	3.48	3.51	3.51	3.52	3.52	3.50	3.46
The UAE[8]	0.04	0.04	0.06	0.07	0.10	0.11	0.12	0.13
Egypt	1.11	1.14	1.19	1.23	1.27	1.34	1.39	1.42
Belarus	0.19	0.18	0.16	0.15	0.14	0.13	0.12	0.11
Bolivia	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15
Cuba	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.14
Kazakhstan	0.32	0.29	0.25	0.24	0.24	0.24	0.25	0.25
Malaysia	0.34	0.35	0.37	0.39	0.41	0.42	0.43	0.43
Nigeria	1.85	1.93	2.05	2.21	2.38	2.56	2.72	2.82
Thailand	1.03	1.03	1.02	1.00	0.98	0.95	0.91	0.88
Uganda	0.34	0.36	0.39	0.43	0.46	0.50	0.57	0.60
Uzbekistan	0.39	0.40	0.40	0.40	0.41	0.41	0.43	0.44
Vietnam	1.24	1.26	1.25	1.23	1.25	1.25	1.25	1.24
BRICS+	56.79	56.81	56.77	56.59	56.28	56.05	55.70	54.63
The USA	4.70	4.64	4.58	4.49	4.42	4.31	4.22	4.22

Source: own calculations based on data from the World Bank.

The territory of the countries presented in this paper has not changed since the Cold War. Russia's gains in Ukraine (Crimea, Donbas) have not yet been recognized by the

[7] Data for 2024 are based on calculations from April 2025 (Statista, Trading Economics).
[8] The United Arab Emirates.

international community, so the calculations were based on the country's area after the collapse of the USSR. Together, the BRICS+ group and its partner countries occupy 39% of the world's total land area. The USA, on the other hand, 7.3%.

Table 3 presents the area of the BRICS+ group, its partner countries, and the USA from 1991 to 2024. Although territory today no longer determines superpower status to the same extent as it did in the 19th or early 20th centuries, it still holds strategic significance and is also home to raw material resources. Most BRICS+ countries and the USA possess vast mineral resources, including rare earth elements, which plays a significant role in the modern economy. Russia is one of the BRICS+ countries, accounting for 12.7% of the global land area. China (7.1%), Brazil (6.3%), India (2.4%), Kazakhstan (2%), Indonesia (1.4%) and Iran (1.3%) also have large shares in this respect.

Table 3. Area of BRICS+, partner countries and the USA in 1991–2024 (in %, world = 100)

Country	Global shares
China	7.10
India	2.44
Brazil	6.32
Russia	12.69
South Africa	0.91
Iran	1.30
Ethiopia	0.84
Indonesia	1.42
The UAE[9]	0.07
Egypt	0.74
Belarus	0.15
Bolivia	0.82
Cuba	0.08
Kazakhstan	2.02
Malaysia	0.25
Nigeria	0.69
Thailand	0.38
Uganda	0.18
Uzbekistan	0.33
Vietnam	0.25
BRICS+	38.97
The USA	7.30

Source: own calculations based on data from the World Bank.

Estimation of power indicators, particularly economic ones, is crucial for determining the international balance of power. Table 4 presents the economic power of the BRICS+ countries and their partner countries compared to the United States from 1991 to 2024 in millimirs (mM) (world = 1000).

Taking into account their contemporary interdependencies, the BRICS+ countries and their partner countries have had an advantage in terms of economic power since the beginning of the period under review, i.e., since 1991. The advantage of the twenty

[9] United Arab Emirates.

countries under review increased in subsequent decades, despite significant changes in the power of the United States as well. However, even the peak of US power in 2001 did not lead to catching up with the countries currently in the BRICS+ orbit. Looking back on the post-Cold War period, the BRICS+ and partner countries increased their economic power by over 100% – from 163.57 mM in 1991 to 333.28 mM in 2024. During this time, due to various fluctuations, the US power reached a level of 158 million in 2024, the same as in 1991. The BRICS+ advantage is based primarily on China's position, whose economic power has increased by 344% over the past three decades, from 3.6% in 1991 to a 16% global share in 2024. China surpassed the US in this respect in 2017 and retains its advantage in economic power to this day. India ranks second in terms of economic power within the BRICS+, with power increases of over 100%, from 2.4% to 5.2% of the global share.

Table 4. Economic power of BRICS+ countries, partner countries and the USA in 1991–2024 (in mM, world = 1000)

Country	1991	1995	2000	2005	2010	2015	2020	2024
China	36.08	46.22	60.34	72.37	109.52	148.00	162.68	160.09
India	24.13	24.62	27.82	32.17	41.38	44.27	47.64	51.69
Brazil	21.33	30.43	25.97	25.31	36.71	29.50	23.72	26.12
Russia	29.98	20.88	14.76	23.38	29.12	24.69	23.83	24.15
South Africa	7.11	7.00	6.10	7.38	7.55	6.19	5.61	5.40
Iran	7.86	5.37	5.52	7.07	9.45	7.78	5.36	6.37
Ethiopia	1.67	0.98	0.98	1.04	1.51	2.34	3.06	3.22
Indonesia	9.39	11.32	9.41	10.75	16.32	16.39	17.24	17.65
The UAE[10]	1.49	1.51	2.06	2.47	2.98	3.25	2.91	3.40
Egypt	3.26	3.76	4.99	3.75	5.44	6.62	6.78	5.88
Belarus	1.18	0.82	0.71	0.98	1.18	1.06	1.01	0.92
Bolivia	0.59	0.57	0.63	0.55	0.71	0.92	0.91	0.95
Cuba	1.33	1.28	1.21	1.18	1.17	1.36	1.42	b. d.
Kazakhstan	2.13	1.54	1.32	2.19	3.28	3.49	3.07	3.77
Malaysia	2.67	3.33	3.31	3.52	4.17	4.30	4.29	4.40
Nigeria	4.88	7.28	4.39	6.54	8.65	9.82	8.41	5.10
Thailand	5.59	6.71	5.24	5.43	6.38	6.49	6.84	6.16
Uganda	0.44	0.54	0.55	0.58	0.95	1.01	1.05	1.19
Uzbekistan	1.24	1.03	0.99	0.81	1.48	1.96	1.53	1.15
Vietnam	1.22	1.71	2.11	2.50	3.72	4.71	5.52	5.67
BRICS+	**163.57**	**176.9**	**178.41**	**209.97**	**291.67**	**324.15**	**332.88**	**333.28**
The USA	**158.85**	**153.49**	**175.58**	**163.33**	**144.24**	**150.16**	**152.09**	**158.01**

Source: own calculations.

Despite its population and vast territory, India has only one-third the economic power of China (Surowiec, 2023). Among other BRICS+ countries, Brazil had 26 mM (2.6%) of global economic power in 2024. Despite its considerable potential, this country has not significantly improved its power since 1991. Russia, after peaking in power in 2010, also began to lose it due to subsequent aggressions and the COVID-19 pandemic, reaching 2.4%

[10] The United Arab Emirates.

of its economic power in 2024 (Sułek, Białoskórski, 2018). Declines in economic power between 1991 and 2024 were recorded by Russia, South Africa, Iran, Belarus, and Uzbekistan. Meanwhile, positive balances over the past three decades have been achieved by: China (344%), India (114%), Brazil (22%), Ethiopia (93%), Indonesia (88%), the UAE (128%), Egypt (80%), Bolivia (61%), Kazakhstan (77%), Malaysia (65%), Nigeria (5%), Thailand (10%), Uganda (170%), and Vietnam (365%). The BRICS+ and partner countries combined have achieved an increase in economic power of 104%.

Chart 1 presents the economic power of the three strongest BRICS+ countries and the sum of the power of all BRICS+ and partner countries compared to the United States from 1991 to 2024.

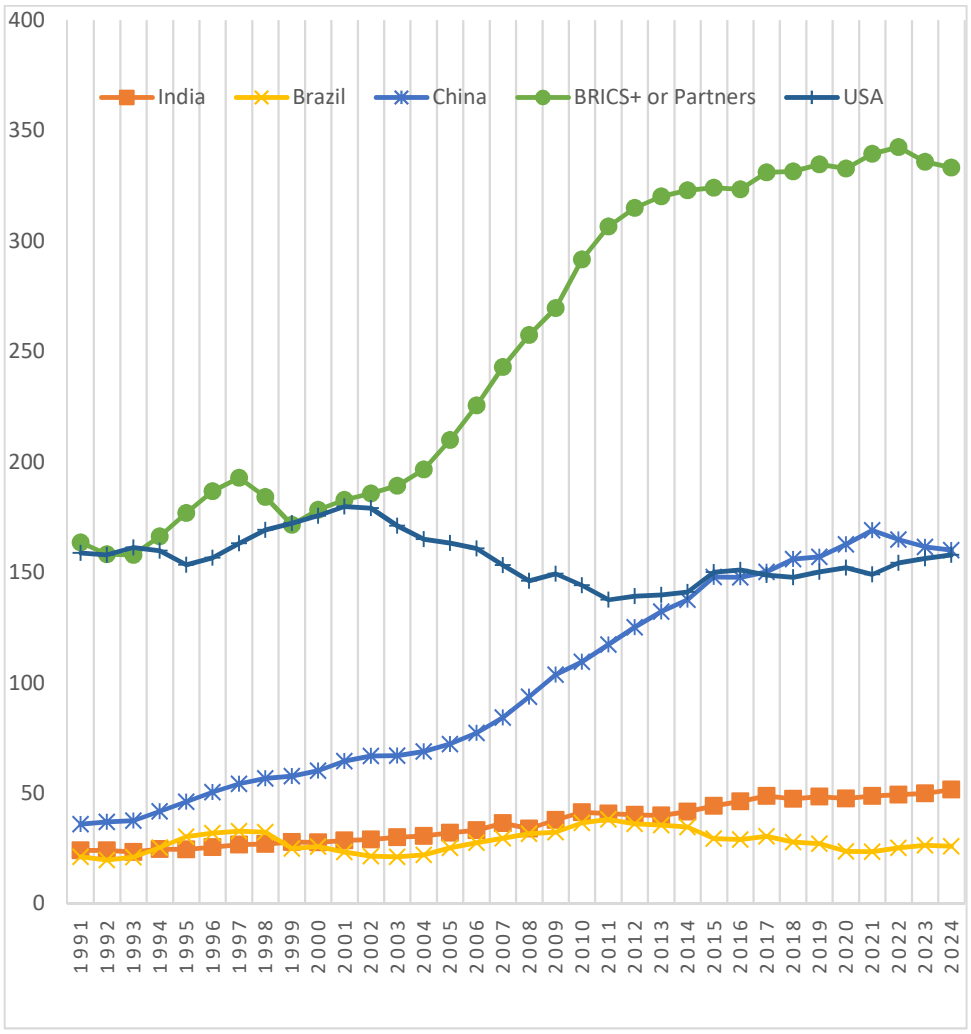

Figure 1. Economic power of the largest BRICS+ countries and the USA, 1991–2024 (in mM, world = 1000)

Source: own calculations.

To compare the economic power of the BRICS+ countries and the United States, the Virmani model, also known as the Indian model, was chosen. It uses the term "global state power," which is composed of "potential power" and "military capability." The Virmani model reduces the power of populous states like China and India, and overestimates the power of wealthy but sparsely populated states. *The Virmani Index of Power Potential* (VIPP) is defined as the product of the size of the economy (measured by GDP, calculated at purchasing power parity, and its technological capacity, measured by GDP per capita) and its population. The final result is:

$$VIPP = (PKB)^{1,5} \times L^{-0,5}$$

The Virmani's model is considered misleading because it places great emphasis on GDP per capita and fails to take into account the role of population size. The Indian scientist's calculations are not globally corresponding, and compare countries only to the United States, whose power is equal to 1. This is misleading since a given country can grow relative to the United States and decline relative to the world, or vice versa. The values calculated and forecasted using Virmani's model (Sułek, 2013; Virmani, 2023), which cover only some of the BRICS+ countries compared to the United States, suggest a massive rise in China and India's power, a significant decline in Japan's power relative to the United States, and a slow recovery in Russia's power. This article uses the Virmani's model to illustrate the differences between it and Sułek's model. The human factor used by the Indian researcher is a parameter that diminishes the power of states, favoring wealthy but sparsely populated states.

5. CONCLUSIONS

The article presents the concept of powermetrics and Professor Sułek's model for calculating economic power. The BRICS+ member states and the ten partner countries that may officially join the organization in the near future are also characterized. The article also presents the dynamics of the parameters needed to calculate state power, i.e., GDP, population, and state area, assuming its stability after the Cold War. Based on these parameters, economic power was calculated for the years 1991–2024.

The formal model of economic power used in this article is objective. Several other models exist, although some are outdated and more difficult, and therefore not used in this publication. For a more complete picture of the BRICS+ countries, it would be worthwhile to compare them not only with the United States but also with the European Union and the G7 over several decades.

Looking at the development of the BRICS+ Group and its partner countries not only since 2009, but also since the end of the Cold War, a steady upward trend in the global share of most of these countries can be observed, both in terms of GDP, population, and economic power. In terms of GDP, the BRICS+ countries (29.4%) overtook the United States, which held 26.4% in 2024. China made a particularly significant contribution, with a 17% share. In terms of global population, the broadly defined BRICS+ group has a 55% share, while China and India alone account for 34%. This enormous advantage opens up new and significant opportunities for trade within BRICS+ and facilitates economic expansion. It is worth noting that the countries of the intergovernmental organization under review account for 39% of the world's total territorial area, while the United States accounts

for 7.2%. This also offers significant opportunities for resource extraction, trade development and transportation.

Research on the economic power of twenty BRICS-affiliated countries and the USA has shown that:

- The countries currently affiliated with BRICS, as of 1991, were collectively at a similar level of economic power to the USA.
- Over the past thirty years, the share of BRICS+ and partner countries in economic power has doubled relative to the USA, from 16% to 33%.
- The USA's share of economic power has ranged between 14% and 18% in the years studied.
- As many as 15 of the 20 BRICS-affiliated countries have increased their share of global economic power since the Cold War.
- China has achieved significant increases in its global share, from 3.6% in 1991 to 16% of economic power in 2024.
- Five of the twenty BRICS-affiliated countries have improved their share of economic power above 100%.

The BRICS+ group and its partner states, taken together, pose a real threat to the United States in its struggle for global leadership. Russia is experiencing both an economic and population crisis, and with each decade, its international standing will diminish. The BRICS+ group's increased importance could be achieved through de-dollarization of global reserves and foreign exchange. This could further strengthen the Group's economic power.

The political cohesion of this group is significantly weaker than that of the G7, as evidenced by its stance on Russia's aggression against Ukraine and the fact that individual BRICS countries engaged in armed border conflicts during the Cold War (e.g., the group's main hegemon, China, with India in 1962, the Soviet Union in 1969, and Vietnam in 1979), as well as the growing economic competition for China from the world's new demographic leader, India (and, to a lesser extent, Southeast Asian countries). Therefore, it seems unrealistic for the BRICS+ to undertake coordinated action against Western influence.

China's power peaked before the Covid-19 pandemic in 2020, and since then, a reverse trend has been observed in subsequent years, with China's relative weakening and the United States' parallel economic recovery. Despite many important factors, such as Donald Trump's unpredictable policies, it appears that this new trend will continue, with India taking over as the most dynamically developing country in the BRICS group.

There are also limitations to economic power as an indicator of geopolitical influence. The imposition of economic sanctions on Russia, for example during the recent war in Ukraine, embargoes, tariffs, and market access restrictions, as in the case of the US-China relationship, have all contributed to the decline in the economic power of the BRICS+ countries and the geopolitical influence of this group.

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STATUTORY LIMITATIONS AS A POTENTIAL SOURCE OF INEFFICIENCY IN EMPLOYEE CAPITAL PLANS (PPK) IN POLAND

The growing importance of pension funds and the changing demographic and market conditions in Poland require an assessment of the investment efficiency to ensure the financial security of future retirees. The aim of the study is to determine the investment efficiency of pension funds, considering portfolio management, composition and synchronization with stock market indices. The study examines whether the requirement to invest part of the funds in companies listed in the WIG20 and related instruments leads to inefficiency. This quantitative research evaluates PPK funds in comparison with other pension funds, focusing on portfolio management strategies. Key market indicators, including WIG, WIG20, 10-year treasury bonds and inflation, were analysed. Synchronization with indices was assessed using the correlation coefficient of return rates. The results indicate that during the analysed period, OFE funds achieved higher average returns, while PPK funds exhibited lower volatility, as measured by the standard deviation of returns. These results provide insights and offer recommendations for improving the effectiveness of PPK in ensuring financial security amid capital market fluctuations and demographic challenges.

Keywords: pension system, pension funds, Employee Capital Plans (PPK), stock market indices, investment efficiency, investment management.

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1. INTRODUCTION

Traditional pension system models, primarily based on the pay-as-you-go financing, although effective in the past, are increasingly criticised nowadays due to the difficulty in maintaining a balance between the number of working individuals and retirees (Kotowska, 2015). The Polish pension system has evolved from the initial pay-as-you-go model to the introduction of a mixed pay-as-you-go and funded model. Despite these changes, it has long faced challenges related to an ageing population, demographic shifts and the future value of pensions. Consequently, in recent years, special attention has been given to the introduction of new savings instruments that can supplement traditional pension benefits. One of the key elements of this transformation is the introduction of Employee Capital Plans (Polish: PPK).

In the face of dynamic changes in the labour market, the pension gap and insufficient knowledge among Poles about saving, PPK has become a popular and much-needed tool for building financial security. They represent an important pillar in constructing a secure retirement for employees. Although PPK brings numerous benefits, there are also challenges and limitations that can affect their effectiveness. This article focuses on the statutory limitations regarding the investment limit of funds in foreign assets and the requirement to invest mainly in the Polish stock index WIG20. The authors aim to answer the research question:

Q: *How might the requirement to invest part of the funds in shares of companies in the WIG20 index and financial instruments related to companies in the WIG20 index influence investment efficiency?*

The research problem is associated with the long-term sideways trend of the WIG20 index. Over the last 20 years, the WIG20 index has increased in value by 34% (as of 03.04.2024), while the WIG index has gained 237% in the same period. Considering the cyclical nature of the capital market, the key success factor is the appropriate timing of entry and exit from investments; however, it is easier to invest in growing markets than in sideways markets, especially since pension funds are aimed at long-term value building. Given these observations, the main research objectives are as follows:

1. *Determine the investment efficiency of pension funds concerning the portfolio composition.*
2. *Determine the synchronisation of pension fund quotations with selected financial market indicators.*

The article presents a fresh perspective on the issue of pension fund investments in Poland, with particular emphasis on the statutory requirements imposed by the PPK Act. This is significant in the context of dynamic changes in the labour market, an ageing society and the increasing need to ensure stable pension benefits. As PPK is a relatively new programme, it has not yet been extensively researched. Previous studies have mainly focused on the general aspects of the pension system in Poland. This article thoroughly examines the specific investment limitations of PPK funds in an international context and offers practical recommendations that may guide decision-makers.

The subsequent sections of the article provide a literature review, detailing a brief history of the pension system in Poland and its current structure. It discusses the approach of Poles to investing before the introduction of PPK and lists other pension programmes operating within the third pillar. The assumptions of PPK are described in detail, and a discussion is opened on the effectiveness of this programme due to statutory limitations. The research methodology is then presented, specifying which funds and indicators were

analysed. The following sections present the research findings and discuss them, highlighting the consequences of PPK's strong dependence on the Polish stock market.

Based on a literature review and in consideration of the study's issues and objectives, two research hypotheses have been formulated:

H1: *Statutory requirements regarding the composition of PPK pension fund portfolios are a potential source of investment inefficiency.*

H2: *The performance of PPK pension funds is strongly synchronized with overall stock market trends.*

2. LITERATURE REVIEW

The Polish Pension System – Three Pillars

The international discussion on contemporary pension system models has been ongoing for over 30 years, originating in Latin American countries that initiated extensive pension reforms. The financial model (also known as capital-based) gained many proponents during that time, prompting pension systems to evolve from pure non-financial models (pay-as-you-go) through mixed non-financial-financial models (pay-as-you-go and funded), to purely financial models (such as the pension system in Chile) (Chybalski, Marcinkiewicz, 2013; OECD, 1998). Reforms towards hybrid pension systems were also undertaken by countries in Central and Eastern Europe (Chybalski, Marcinkiewicz, 2013). The shape of the pension system in Poland also underwent changes in the 1990s with the implementation of pension reform (Wykowska, 2014). Instead of the system based solely on pensions from the Polish Social Insurance Institution (ZUS), a three-pillar system (mixed model) was proposed, where pension benefits could be obtained from three sources – ZUS, Open Pension Funds (OFE) and institutions where additional pension savings could be voluntarily accumulated (Malinowska-Misiąg, 2022) (Table 1).

Table 1. Structure of the pension system in Poland

I PILLAR	**II PILLAR**	**III PILLAR**
Pay-as-you-go	Capital-based	
Mandatory		Voluntary
ZUS	**OFE**	**IKE/IKZE/PPE/PPK/OIPE**

Source: own study based on: (Mikołajek, 2018).

PPE – Employee Pension Schemes (since 1999), IKE – Individual Retirement Account (since 2005), IKZE – Individual Retirement Protection Account (since 2012), PPK – Employee Capital Plans (since 2019) and OIPE – Pan-European Personal Pension Product (since 2023) are forms of supplementary retirement savings belonging to the third pillar of the pension system (Rutecka-Góra, Pieńkowska-Kamieniecka, 2023). Participation in these programs is voluntary and the funds belong to the participant. Participants have the option to opt out of these programs and withdraw their accumulated capital (Szczepańska, 2022). The amount accumulated depends mainly on the effectiveness of investment of funds in the chosen fund and the contribution levels. Third pillar pension products are offered by various financial institutions, including general pension societies (PTEs), investment fund management companies (TFIs), employee pension funds, brokerage

houses, insurance companies and banks. TFIs lead in the market with the most extensive range of products (KNF, 2022).

From a citizen's perspective, the most important goal of any pension system is to ensure an adequate level of non-earned income after the end of professional activity. The assessment of the degree to which this goal is achieved involves measuring the income adequacy of the pension system. In pension economics, income adequacy is defined as "the ability of the pension system to provide benefits that allow for the maintenance of the previous standard of living after retirement" (Jedynak, 2018; Jedynak, 2017). Currently, the most popular measure of adequacy is the replacement rate (Dudel, Schmied, 2019). The replacement rate is commonly defined as the ratio of retirement income to pre-retirement earnings (MacDonald & Moore). According to the forecasts presented in Table 2, the average replacement rate in Poland is expected to be significantly below the optimal value of 70% (Dudel et al., 2016).

Table 2. Forecasts of replacement rates in Poland

Source (year)	Forecast horizon	Replacement rate
Aviva (2016)	2047	37.0%
OECD (2015)	2049	52.8%
Góra, Rutecka (2013)	Approx. 2050	34.2%
European Commission (2018)	2060	23.0%

Source: own study based on: (European Commission, 2018; Góra, Rutecka 2013; Aviva, 2016; OECD, 2015; Jedynak, 2018).

However, forecasts about the size of the pension gap published regularly over the past several years have not led to adequate and long-term actions to accumulate additional funds for old age (Cichowicz, Rutecka-Góra, 2017). Research indicates that Poles are reluctant to think about savings:

1. In a TNS Polska (2016) survey for Nationale-Nederlanden, 86% of Poles aged 25 to 45 admitted that they did not save additionally for old age, with 62% citing low earnings, 25% considering it too distant a goal, 10% not knowing how to save and 9% believing that ZUS contributions would suffice.
2. In a study by J. Czapiński and M. Góra (2016), only 21.5% of the population took any actions to prevent a decline in their material standard of living in retirement.
3. According to ZUS (2016) research, as many as 75% of Poles do not save for retirement, mainly due to low or insufficient income. Additionally, 13% of those not saving reported that they do not accumulate extra funds because they believe the pension from ZUS will be sufficient, while 4% of non-saving respondents stated that they do not know how to do so.

Alongside the pension gap and the low level of savings, there has been little interest in third-pillar programmes. The lack of popularity of solutions dedicated to individual retirement savings may stem from public ignorance about the forms of additional pension savings. Only 18% of respondents in a 2012 survey (Deutsche Bank, 2012) could expand the abbreviation "IKE" and about 3% knew the meaning of "IKZE". According to a 2015 survey (TNS Polska, 2016), most respondents could not independently name any form of third-pillar savings and were also unaware of the characteristics of various forms of additional retirement savings.

In analysing alarming information about forecasts of the pension gap, the negligible level of retirement savings and the low interest in third-pillar programmes, the government identified the need to stimulate the development of an additional part of the pension security system. The aim was to build an effective, voluntary, capital-based pension system as one of the main objectives of the Responsible Development Plan adopted in February 2016 (Jedynak, 2018). A tangible result of this goal is the PPK Act, enacted in 2018 (PPK Act).

Employee Capital Plans (PPK) – Main Assumptions

Participation in PPK is voluntary but automatic for employees, meaning that if they do not wish to join the programme, they must submit an appropriate declaration within a specified period and renew it every four years. If this declaration is not submitted, they are automatically enrolled in the programme. For employers, participation in PPK is mandatory. A PPK participant receives funds from three sources (Pogonowski, 2023):

- at least 2% of their gross monthly salary from themselves,
- 1.5% of their salary from their employer,
- additional contributions from the state in the form of a welcome payment of PLN 250 and an annual supplement of PLN 240.

There is an option to increase the contribution limits for both the employer and the employee to 4% of the gross salary. An employee can opt out of PPK at any time, which will stop the contributions, but the participant's account remains active and the accumulated funds will continue to "work". In principle, it is most advantageous to withdraw the accumulated funds after reaching the age of 60. Withdrawals can be made in instalments or in full, noting that this method of withdrawal does not allow for exemption from capital gains tax, which is undoubtedly one of the programme's greatest advantages. There is also the possibility of withdrawing funds before the age of 60, but one should be aware of the deductions that will be applied. Importantly, the accumulated funds are inheritable (www1).

A common advantage highlighted in discussions about PPK is the lack of need for knowledge about the functioning of capital markets – participants have minimal influence over the choice of the financial institution, and thus the investment policy (Prusik, 2021).

Regardless of which institution is responsible for managing PPK, the funds are accumulated within target-date funds (TDF). This means that each person joining the programme will be assigned to a specific TDF, depending on their year of birth (www1).

In the PPK Act, the legislator imposed very strict requirements regarding the asset classes from which participants' portfolios must be built. These consist of an equity part (risky) and a bond part (safer). The closer the participant is to reaching the age of 60, the higher the proportion of the bond part in the portfolio (Szafrański, 2023).

The limits mentioned pertain to the equity portion of target-date funds and, according to the PPK Act, must include (PPK Act):

- no less than 40% in WIG20 index stocks,
- no more than 20% in mWIG40 index stocks,
- no more than 10% in other Warsaw Stock Exchange (GPW) stocks,
- no less than 20% in foreign stocks, ETFs, or derivatives on them.

The bond portion of target-date funds must include:

- no less than 70% in debt securities with a European Central Bank rating (thus, in effect, European or Polish government bonds) or deposits with a maturity of no more than 180 days,
- no less than 10% in debt instruments that do not have an investment-grade rating assigned by a rating agency recognized by the European Central Bank.

Additionally:

- the total share of foreign stocks (and other ETFs and instruments on foreign stocks) must not exceed 30% of the entire fund,
- the total share of instruments denominated in foreign currencies must not exceed 30% of the entire fund.

As a result, PPK fund managers are legally obliged to invest the vast majority of the portfolio in Polish stocks, bonds and deposits, leading to the so-called home bias phenomenon, which is the lack of adequate exposure to foreign markets. This can consequently affect long-term investment performance (Afanador et al., 2021).

A similar situation affected the OFE funds, which primarily invested their assets in Polish government bonds and stocks listed on GPW. At the end of 2010, OFE funds managed assets worth approximately PLN 221 billion, with about 40% invested in equities. By the first quarter of 2011, OFE holdings accounted for nearly 10% of the Warsaw Stock Exchange's total market capitalization, highlighting the significant scale of their influence on the Polish capital market (Bolisęga, 2013). This contributed significantly to the development of the exchange, as the OFE ensured a constant demand for newly offered shares in public offerings. The exchange flourished in the early years of the 21st century, with stock prices continuously rising, which in turn raised hopes for good investment returns from the OFE. The optimistic picture was not marred by the reflection that this steady stream of funds flowing into the GPW from the OFE was not natural due to the administratively imposed investment limits and that it should gradually be redirected to broader markets to expose the funds to real competition (Błaszczyk, 2020).

The lack of geographical diversification of pension funds contributes to the concentration of capital in domestic markets, which can support the development of the national economy in various ways. Primarily, investments in local enterprises can help them grow and expand, which can positively impact the labour market. Additionally, investments in infrastructure can improve living and working conditions for citizens while stimulating economic growth. Concentrating capital in local markets can also provide greater economic stability by reducing exposure to global market fluctuations (Morina, Grima, 2022). This topic has gained attention among policymakers worldwide, particularly in the context of rebuilding economies after the COVID-19 pandemic (OECD, 2022). Unfortunately, such a portfolio-building strategy contradicts the idea of passive, low-cost, and well-diversified investing (Szafrański, 2023; Gopwani, 2019). Investment restrictions (limits) on foreign markets, as seen with the PPK, are not present in any other part of the capital-based pension system in any European Union country (Afandor et al., 2021). Regulatory limits are present, for example, in Latin American countries (Myrvoda, 2017), while in India, Egypt, Pakistan and Indonesia, exposure to foreign investments is completely prohibited (Kumara, Pfau, 2011).

Research indicates that geographical diversification represents an opportunity for pension funds to enhance profits and reduce risk associated with concentrating investments in one market (Afandor et al., 2021; PWC, 2016; Dailey, 1992; Reisen, 1997). This allows

pension funds to mitigate the impact of regional economic, political and market changes on participant portfolios, ensuring stability and protection. In volatile market conditions, diversification can help protect pension funds from sharp declines in asset values (Myrvoda, 2017). Furthermore, according to Kumara and Pfau (2011), on average, over half of the value of pension fund portfolios in emerging markets should be allocated to international assets to maximise the expected utility of moderate and conservative fund participants.

3. METHODOLOGICAL APPROACH

The conducted research is primarily a quantitative project, as statistical description tools were used to assess the performance of PPK pension funds and conduct comparative analysis with other types of funds and capital market indices. The factors influencing the obtained results were analyzed in the context of the statutory limitations governing PPK.

In the empirical chapter, the assessment of the net asset value formation in pension funds was conducted based on monthly data. The monthly frequency of observations allowed for determining the impact of inflation, thereby providing real results. The analysed data are publicly available data published by relevant statistical institutions and financial entities: Statistics Poland (GUS), Warsaw Stock Exchange (GPW), PPK managing institutions and other funds. The research on the investment efficiency of funds was divided into five parts:

1. Formation of values: Based on observations of unit participation values in pension funds and the formation of financial market indicators, the direction of trends was identified and a discussion on the cyclicality of changes was conducted;
2. Determination of descriptive statistics for return rates — mean, standard deviation, minimum, maximum, and coefficient of variation. These statistics enabled the comparison of individual funds based on average monthly investment performance and volatility of unit values. Using the coefficient of variation allowed for determining the risk relationship understood as the volatility of returns relative to income;
3. Evaluation of synchronization — correlational linkage of return rates in time series of investment funds with financial market indicators. Using time series of return rates in correlation assessment helped avoid spurious correlations;
4. In light of the results from point 3, an examination was conducted on the correlation of return rates of a selected fund (PZU) with both stock market indicators (WIG or WIG20 index) and the money market indicator (bonds). PZU funds, managed by one of Poland's largest state-owned financial institutions, reflect diverse market trends, attract numerous retail investors, and serve as a representative benchmark for analyzing investment behavior in the context of economic policy and financial stability.
5. Evaluation of value formation and return rates conducted in points 1–4 was a classic comparative assessment of time series. This assessment was supplemented by simulation results involving the hypothetical investment performance assuming monthly savings of a fixed amount. The result obtained for each fund was adjusted for inflation, thus determining the real outcome over the entire analysed period.

The analysis covered:

1. Investment funds:
   - PPK funds:
     - PPK type 2030: Allianz 2030, PZU 2030, Skarbiec 2030,
     - PPK type 2050: Allianz 2050, PZU 2050, Skarbiec 2050,
   - comperative:
     - OFE funds: Allianz OFE, PZU OFE, Generali OFE,
     - other funds: Skarbiec III Filar, PZU Santander (SGF), Investor Pension Funds Kat. A.
2. Market indicators:
   - stock market indices: WIG and WIG20,
   - 10-year government bonds,
   - Inflation.

The aforementioned funds and indicators are simultaneously variables applied in calculations.

4. RESULTS AND DISCUSSION

The examined period is quite short, as the PPK Act came into force on January 1, 2019. Nevertheless, certain regularities can be observed. All funds develop cyclically and these cycles correlate with the cyclicality of the WIG stock market index (Figure 1).

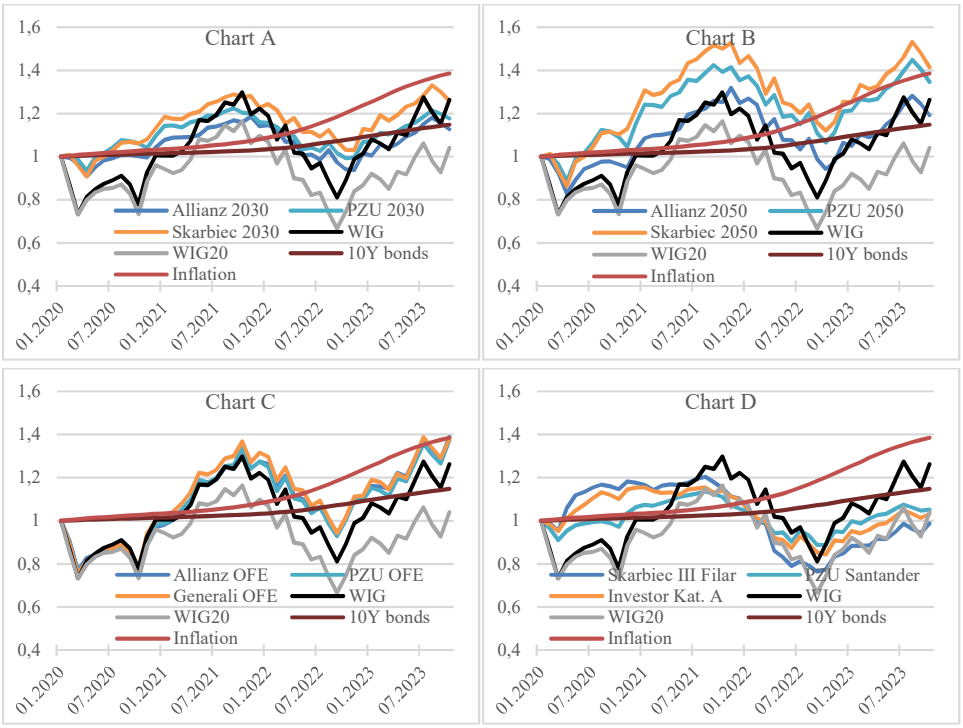

Figure 1. Pension funds against to market indicators

Source: own study based on data from PPK and OFE funds, GUS and GPW.

When considering PPK funds, greater consistency in unit values can be observed for type 2030 funds (Chart A) compared to type 2050 funds (Chart B). Type 2050 funds have more investment freedom, hence greater differences in their unit value formations. Pension funds (OFE) exhibit very high consistency in unit values (Chart C); the differences between their values are minimal despite their considerable investment freedom. Other selected funds also exhibit relatively high investment freedom (Chart D), but their performance is notably weaker.

Since mid-2021, a period of elevated inflation has begun. This is an atypical period because the relatively low interest rates during this time have resulted in a relatively weaker growth in the value of bonds. As a result, most of the funds were unable to achieve returns higher than inflation. The main issue concerns the significance of investing in companies from the WIG20 index. It turns out that the quotations of all PPK and OFE funds are above the WIG20 index. The crux of the question is whether departing from the requirement to invest in WIG20 stocks could lead to even better performance. Exploring the answer to this question will be conducted by analogy (Table 3).

Table 3. Statistics of time series of return rates

Series	Statistics				
	Mean	Minimum	Maximum	Std. dev.	Cv
WIG	0.79%	-15.5%	19.4%	0.0736	9.37
WIG20	0.41%	-14.5%	20.7%	0.0807	19.84
10Y bonds	0.31%	0.1%	0.7%	0.0019	0.62
Inflation	0.73%	0.2%	1.5%	0.0046	0.63
Allianz 2030	0.40%	-5.7%	7.3%	0.0302	7.58
PZU 2030	0.44%	-5.0%	6.7%	0.0277	6.26
Skarbiec 2030	0.63%	-5.9%	9.0%	0.0343	5.48
Allianz 2050	0.65%	-8.2%	9.3%	0.0452	6.92
PZU 2050	0.86%	-6.7%	11.5%	0.0459	5.36
Skarbiec 2050	0.94%	-9.1%	12.8%	0.0478	5.08
Allianz OFE	0.91%	-14.9%	16.3%	0.0605	6.63
PZU OFE	0.91%	-14.9%	19.0%	0.0648	7.12
Generali OFE	0.93%	-15.7%	20.5%	0.0665	7.15
Skarbiec III Filar	0.05%	-12.8%	11.0%	0.0383	81.87
PZU Santander	0.16%	-5.6%	6.9%	0.0294	18.91
Investor Kat. A	0.12%	-7.8%	7.7%	0.0315	26.09

Source: own study based on data from PPK and OFE funds, GUS and GPW.

Time series statistics of selected fund returns confirm observed properties. Firstly, relatively high average returns can be noted for PZU 2050, Skarbiec 2050 funds and OFE funds (approximately 0.9% monthly), which exceeded the average return of the WIG index, with lower volatility. All PPK and OFE funds achieved higher average returns than the WIG20 index.

OFE funds exhibited considerable volatility, reflected in significantly higher standard deviations of returns compared to PPK funds. However, their high averages partially compensated for this high risk, as their volatility coefficients were not at average levels.

Other funds showed very weak average results, indicating a sideways trend rather than sustainable value growth.

During the study period, there was relatively high inflation, averaging 0.73% monthly. Most funds struggled to cope with this level of inflation. This inflation also exceeded the returns from investments in 10-year government bonds. Therefore, it was a challenging period for funds that naturally allocate part of their assets to safe securities. The results achieved by OFE and PPK type 2050 funds can be considered very good in this context.

The WIG20 index performed relatively poorly during the study period, with a monthly average return of only 0.41%. The reasons for this phenomenon are diverse, but the requirement for PPK funds to invest part of their assets in stocks and financial instruments related to companies in this index naturally raises controversies and questions about whether this requirement undermines the investment performance of the funds.

Table 4. Correlation links of time series of returns

Series	Return rates		
	WIG	WIG20	Bonds
Allianz 2030	0.8722	0.8563	0.0221
PZU 2030	0.8695	0.8477	0.0291
Skarbiec 2030	0.8496	0.8332	-0.0071
Allianz 2050	0.9545	0.9401	-0.0386
PZU 2050	0.9322	0.9147	-0.0524
Skarbiec 2050	0.8973	0.8769	-0.0806
Allianz OFE	0.9841	0.9686	-0.0114
PZU OFE	0.9858	0.9736	-0.0192
Generali OFE	0.9841	0.9678	-0.0395
Skarbiec III Filar	0.7126	0.7029	0.0607
PZU Santander	0.8232	0.7917	0.0473
Investor Kat. A	0.7172	0.6947	0.0463

Source: own study based on data from PPK and OFE funds, GUS and GPW.

The requirement to invest in WIG20 index stocks is reflected in high correlation coefficients between PPK funds and this index, with all correlation coefficients above 0.83, even up to 0.94. Generally, the returns of PPK funds are strongly correlated with the stock market, both with the WIG and WIG20 indices. This correlation is even stronger for OFE funds, for which correlation coefficients above 0.96 were obtained.

Other funds show significantly weaker correlation of returns with the WIG and WIG20 indices, ranging from 0.69 to 0.82. All funds are weakly correlated with bonds yields.

The direction and strength of the relationship between fund returns are presented in Figure 2. The research analysis focuses on PZU funds but accurately reflects general properties.

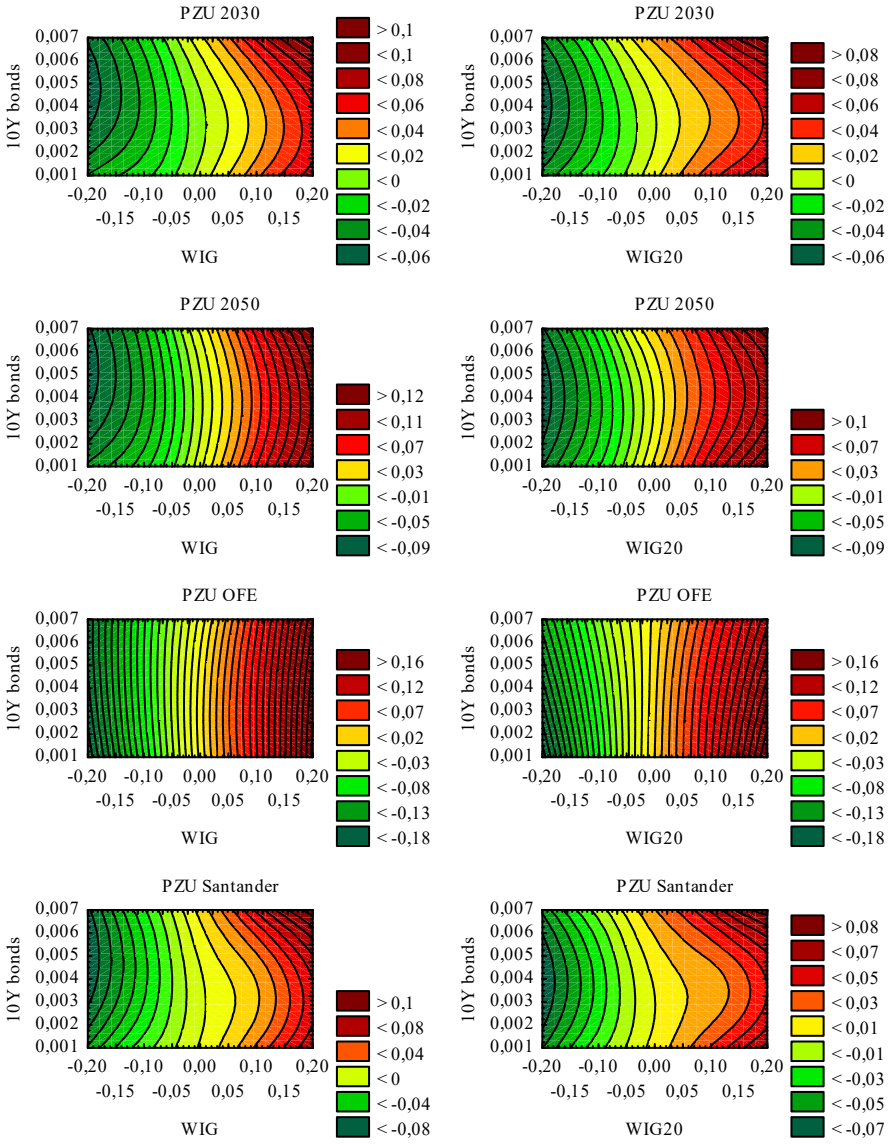

Figure 2. Dependency of fund returns on market indicators – the case of PZU funds

Source: own study based on data from PZU funds and GPW.

It can be observed that stock market conditions exert a particularly strong influence, as the returns of the WIG and WIG20 indices on OFE funds show an almost perfectly linear and closely fitting dependency. A strong dependency on the WIG and WIG20 indices can also be observed for PPK 2050 funds. This dependency is slightly weaker for PPK 2030 funds and other funds, where a weaker influence of bonds starts to appear, especially at higher returns, though it is not significant.

The above research concerns the performance of returns. In practice, the outcome of systematic savings simulations is also important. The assumption of saving fixed amounts at the end of each month was adopted. The results obtained relative to the WIG index are presented in Figure 3. It turns out that the WIG index results during the study period were at the inflation level. Only OFE type funds managed to achieve better results. Each PPK fund yielded a worse result than WIG, close to the level of WIG20. The remaining funds showed very poor results, which is a consequence of their low average value.

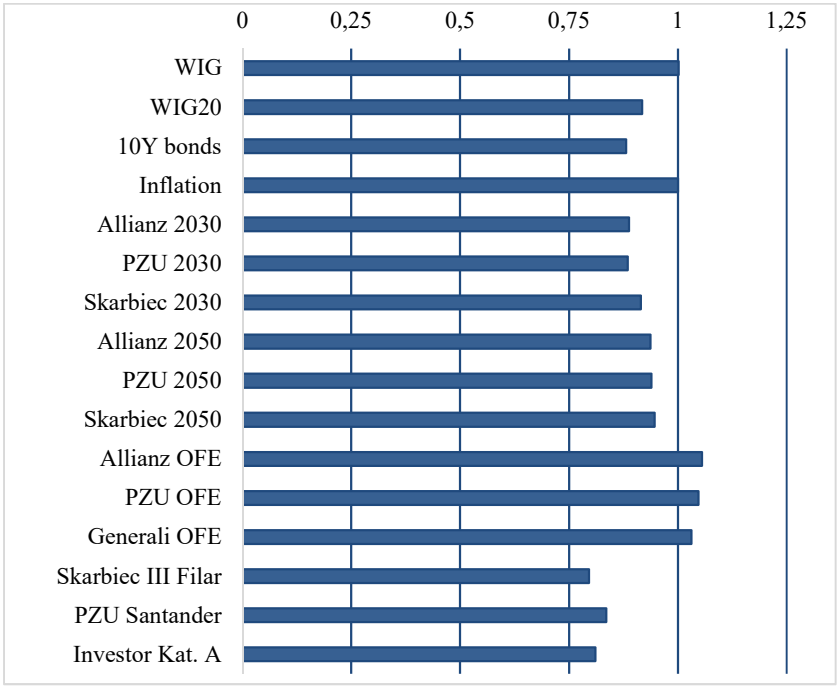

Figure 3. Simulations of systematic savings in relation to the WIG index

Source: own study based on data from PPK and OFE funds, GUS and GPW.

Another important aspect is the review of investment portfolio structures. Since OFE funds achieved better results than PPK funds, the problem revolves around the issue of investing in WIG20 index stocks. Conversely, the other funds, which achieved weaker results, cannot serve as a reliable benchmark. Their portfolios primarily consist of shares of Polish companies with a fairly variable share range. These funds are relatively flexible, but their performance has been below expectations.

The investment policy of PPK funds considers the goal of reducing investment risk depending on the age of participants and adjusts accordingly over time. As the fund's operating period progresses, the equity participation gradually decreases. PPK 2050 funds are target-date funds designed for individuals born between 1988–1992, where equity participation currently ranges from 60% to 80%. Meanwhile, PPK 2030 funds are intended for individuals born between 1968-1972, with current equity participation ranging from 25% to 50%. Over 40% of the equity structure must be invested in instruments related to WIG20 index companies. OFE funds, which also serve as benchmarks for PPK funds, have

detailed investment limits in the stock market, but these limits do not include a requirement to invest in WIG20 index stocks. In practice, OFEs also invest in stocks of these companies, but without imposed limits.

5. CONCLUSIONS

General Remarks

PPK funds have a relatively short history, just over 4 years. In contrast, OFE funds have a much longer history, spanning about 25 years. The ups and downs of the OFE system suggest that caution should be exercised with revolutionary changes to the capital part of the pension system, as this could lead to a lack of social trust and system destabilisation. However, implementing adjustments, especially those that can make investments more attractive, should not raise major concerns and may even contribute to increasing the popularity of such saving systems.

Hypothesis H1

Hypothesis H1 has been positively verified. It has been demonstrated that statutory limitations do not favour achieving above-average returns but do help limit investment risk. Over the study period, OFEs investment results have been more favourable than those of PPKs, as indicated primarily by average return rates and cumulative investment results. The only advantage PPK funds have is lower volatility measured by the standard deviation of return rates. This raises the dilemma of whether it is worth limiting the potential to generate higher rates of return at the cost of lower risk, especially since this higher risk is partly offset by greater returns. The study also indicates that investment results of individual PPK funds show short-term differences in income and risk, but the trends are consistent.

Hypothesis H2

Addressing the main research question, it is important to note the relatively short history of PPK funds and the dependence of results on the observation start time. One solution to verify whether these research limitations affect the validity of results is to determine the correlational relationship between the return rates of pension funds and stock market indices. As expected, this relationship should be strong or very strong; any weak correlation would be unexpected and could potentially be caused by choosing a specific rather than a typical time period. Strong and very strong correlations between the return rates of pension funds and stock market indices also allow a positive stance on the second research hypothesis (H2): that pension fund prices are strongly synchronized with overall market trends.

Primary Research Question and Implications

Research of this kind is definitely worth continuing and an important issue to resolve may be the impact of demographic trends and changes in social structure on the long-term investment results of PPK funds. Their relatively short history does not yet warrant far-reaching conclusions. However, discussing their operation is necessary and can address many issues. One of the fundamental issues is the abolition (or relaxation) of the requirement to invest to such a large extent in entities listed on the GPW. The Polish stock exchange is not among the largest in the world – in terms of capitalization in 2022, it ranked only 38th worldwide (www2). Moreover, Poland's geopolitical position and conflicts on

its eastern border also do not contribute to its stable growth. Even minor incidents of a military nature cause relatively large fluctuations in both the exchange rate of the złoty and GPW prices. Therefore, a deeper discussion on increasing the freedom of fund managers and "opening up" PPK funds to foreign markets seems necessary, although this could lead to increased risk. An argument in favour of maintaining restrictions is the place where money works. Certainly, it is more beneficial for the national economy if money works for it, but it should work in dispersion, as its excessive concentration can disrupt the natural functioning of the stock market. Such considerations could be a precursor to legislative changes aimed at broadening the geographic exposure of PPK funds.

This research has important implications not only for Poland, but also for other countries that are considering reforms to their pension systems or introducing new forms of retirement savings. In an international context, they can provide valuable insights into how different pension fund "models" affect pension system efficiency. In an era of globalization, investment flexibility and skillful risk balancing at the national and international levels are key to sustainable pension systems. Findings from the research provide policymakers with tools to better design pension systems that can better address the demographic challenges facing both developed and developing countries.

All authors have read and agreed to the published version of the manuscript.

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SAFETY CULTURE IN ARTIFICIAL ENVIRONMENTS VS. SOZOLOGICAL ASPECTS OF WIND ENERGY

The term “environment” is commonly used since it is a concept conveying multiple meanings. When used with an appropriate quantifier, it defines its specificity and character. In this article, the authors will focus their scientific inquiries on two basic issues. First of all, they will propose to “broaden” the artificial environment to include the marine environment. Secondly, an answer to the question of what safety culture should humans introduce to the environments being explored will be presented on the basis of the pilot studies on the construction approval and then operation of wind turbines in artificial environments: rural, urban, industrial, military, and maritime. These environments, along with dynamic technical and technological progress, are evolving and becoming a separate entity, the decision to explore them is complex and requires considering the potential benefits compared to the associated costs and ethical aspects.

Keywords: safety culture, marine environment, ecosystem, sozology.

1. INTRODUCTION

Issues of the broadly understood marine environment have so far been identified mainly with natural sciences. The commonly accessible knowledge asserting that seas and oceans occupy 71% of the Earth's surface is not without significance. In the second half of the 20th century, humanity realized that it was getting too "crowded" on land and there was a rapid interest in the Universe Ocean which affects about 90% of biological life on Earth. The quality of the marine environment is influenced by anthropogenic pressure both on land and in the marine environment itself. These interrelationships and influences are not only

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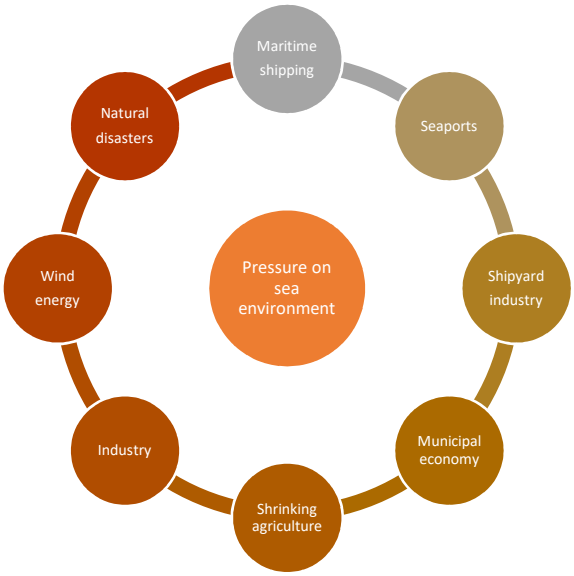
the cause of the emerging climate change – in general, environmental change. Diagram 1 presents the main factors exerting pressure on the marine environment.



Graph 1. Pressure on sea environment

Source: Authors' own research.

Interdisciplinary groups of scientists specialising in sozology study the impact of the development of civilization on the human environment (Sommer, Zakrzewski, 2017b), with their main subject of research, analysis, and inquiry being the "economic exploitation" of the natural environment with minimal input of disruption. The development and conduct of any human economic activity is defined and takes place on the basis and within the limits of the law. The literature on the subject provides several definitions of maritime economy. For the purpose of the article, the authors presented/selected one of them:

> Maritime economy, according to maritime law, is defined as an activity undertaken in the marine environment. The marine environment includes sea waters, waters connected to the sea, air space over the sea and areas classified as marine waters, the seabed and the interior of the earth beneath the seabed, the coastal strip which includes, among others, ports and seaports, shipyards, hydro-technical infrastructure and ensuring coastal safety (http://eregion.wzp.pl/obszary/gospodarka-morska).

The development of science and technology affects the nature of our civilisation and dramatically changes its reality. Today, no one can imagine life without unlimited access to electricity. Its production from fossil fuels is becoming deadly to the environment. That is why humankind is reaching for renewable energy resources. Its acquisition, as well as the operation of devices producing it in the natural environment, raises a lot of controversy and emotions.

2. MARINE ENVIRONMENTS ARE AN UNDISCOVERED GOOD FOR HUMANKIND

Seas and oceans, covering 71% of the surface of our planet, offer numerous benefits and provide a source of hope for solving many key challenges that may affect the future of humanity on Earth (Fabisiak, 2019).

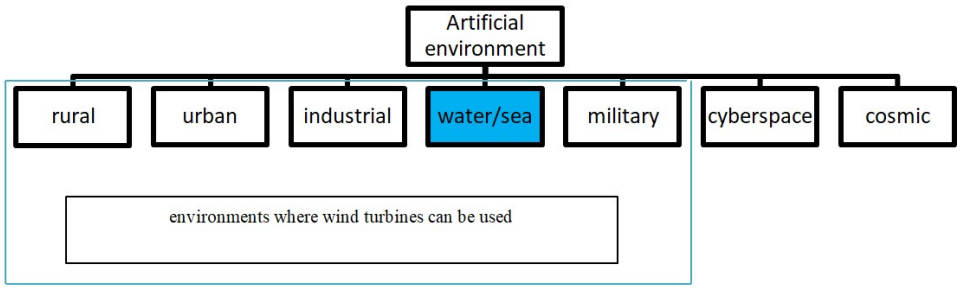
Research on the transformation of the natural environment into artificial ones has been conducted by H. Sommer, and G. Zakrzewski since 2017. In the introductory article, they state:

> The relationship of humans to nature should be one of partnership, i.e., people must coexist and cooperate with nature. The consequence of this conclusion is respect for nature and refraining from or limiting actions that cause devastation or degradation of nature. By destroying nature as a partner, humans harm themselves (Sommer, Zakrzewski, 2017a).

The criteria used to characterise the natural human environment can be used to describe the space of the new artificial environments, where the essential bonding element is the relationship between the biocenosis and the habitat, which is part of the flow of energy and matter. H. Sommer, T. Kostecki, G. Zakrzewski state:

> A turning point in the development of ecology took place with the introduction of the concept of "ecosystem" in 1935 by Tansey, as the basic, functional and spatial ecological unit. The ecosystem is an area of relatively homogenous abiotic conditions (biotope), occupied by a corresponding set of species linked by trophic and paratrophic relationships, through which energy and matter flow. A technically developed area can also be considered an ecosystem, provided it meets the aforementioned conditions (Sommer, Kostecki, Zakrzewski, 2024). According to this definition, an ecosystem consists of two closely related components:
> – an abiotic one (a biotope, also called a habitat), which consists of soil, water and air with their physicochemical properties and climate that exists independently of biocenosis;
> – a biotic one (biocenosis), consisting of a combination of species typical for a given biotope under specific geographical conditions. From the classical definition of habitat, one can easily derive the definition of a technicised habitat, that is, a habitat created through human thought and engineering achievements, designed for human habitation. Extreme cases of a technically developed ecosystem include an orbital station or a nuclear-powered submarine (Sommer, Zakrzewski, 2023a).

Since humanity began to subdue the Earth, it has been transforming natural environments into their technologically adapted versions. The authors propose that the division presented in Diagram 2 be introduced into the scientific lexicon as the current classification of technicised environments.



Graph 2. Division of artificial environment in particular environments where wind turbines can be used

Source: Own research based on (Sommer, Kostecki, Zakrzewski, 2024).

The artificial environment suitable for the use of wind turbines includes various areas, such as coastal/marine, terrestrial, urban and agricultural areas. In coastal areas, turbines installed offshore utilise stronger winds but require advanced technology. In inland areas, such as plains or mountains, turbines utilise available wind power to produce energy. In urban environments, turbines can be used in cities, although this presents noise-related challenges. In agricultural areas, turbines can be installed on farms where they do not interfere with crops, enabling simultaneous energy production. Each of these areas requires adapting the technology and taking into account specific conditions.

3. METHODOLOGY AND RESULTS OF THE RESEARCH CONDUCTED

Research methodology is a set of principles and techniques used for planning, conducting and analysing scientific research. It includes selection of appropriate tools, methods of data collection and ways of their interpretation in the context of the hypotheses and research objectives formulated. The survey was conducted in October 2024 among 124 students of the Subcarpathian region (Podkarpacie) who declared that they had stayed at the Polish seaside. The survey consisted of 10 closed-end questions. Their objective was to analyse the impact of the safety culture in artificial environments on the sozological aspects of wind energy development, with particular emphasis on social attitudes, social acceptance and the effective management of risks related to wind power installations. The study aims to examine how these factors influence the perception and implementation of projects in the wind energy sector.

The research problem is a specific question or issue that the researcher seeks to explore and solve during scientific research (Frankfort-Nachmias, Nachmias, 2001). For the purposes of this article, the research problem was formulated as follows: “How does the safety culture in artificial environments affect the sozological aspects of wind energy development, taking into account social attitudes, social acceptance and the management of risks related to wind power installations?”

The hypothesis, i.e., the assumption or preliminary assumption that the researcher formulates at the beginning of the study, which aims to verify whether it holds true in light of the data collected, was aligned with the research problem. It reads as follows: “The safety culture in artificial environments positively affects the social acceptance of wind energy, improving risk management and shaping positive social attitudes towards wind power installations”.

The results of the survey presented below are aimed at analysing the respondents' opinions on selected aspects related to wind energy, such as social acceptance, attitudes and concerns regarding this technology.

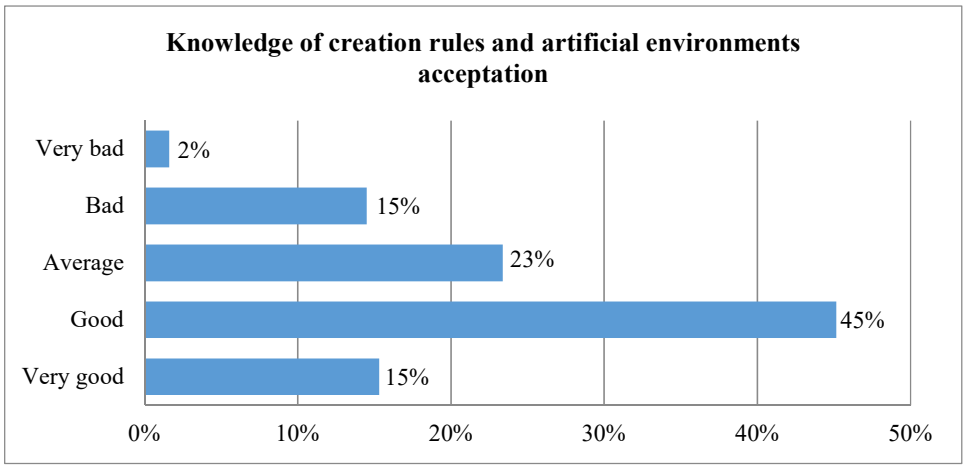


Chart 1. How do you assess your knowledge of the principles of creating and accepting artificial human environments (e.g., wind power plants)?

Source: authors' own research.

The vast majority of respondents assess their knowledge of the principles of creating and accepting artificial environments as either good (45%) or average (23%), with only 2% rating it as very poor. The results obtained may be influenced by the fact that the creation and acceptance of artificial environments is a complicated process that requires taking into account various factors, such as sustainable development, user needs, compliance with legal standards, safety, aesthetics and social acceptance.

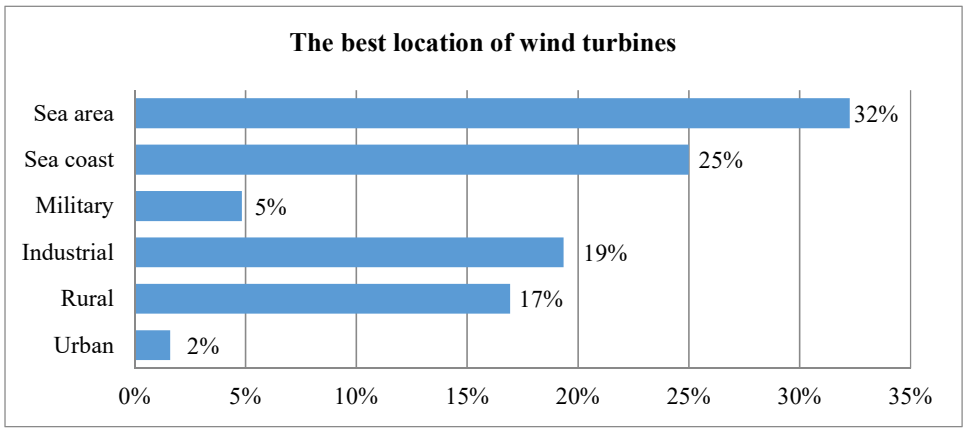


Chart 2. Which environment do you think is the most suitable for the construction of wind farms?

Source: authors' own research.

The most convenient location for building wind turbines, as indicated by the respondents, is a marine area (32%) and its coastline (25%). The urban environment (2%) and military areas (5%) obtained the lowest percentage values. These outcomes are likely influenced by the preference for locations characterized by strong, stable, and relatively regular winds, alongside avoidance of built-up areas as such site selection ensures optimal energy efficiency while reducing adverse effects on the environment and local communities.

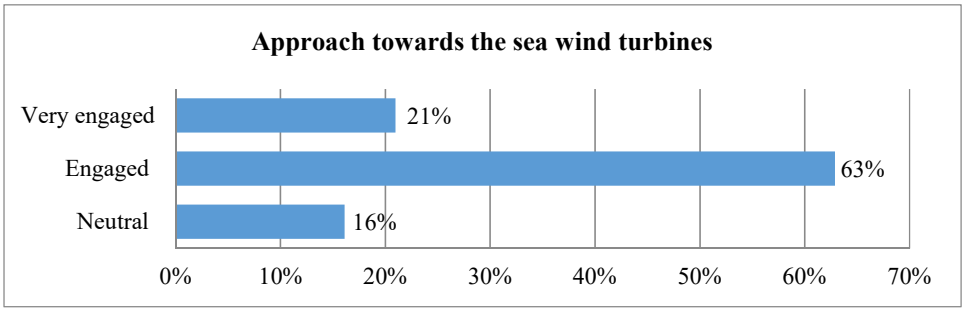


Chart 3. What is your attitude towards offshore wind energy?

Source: authors' own research.

Most respondents emphasized their positive attitude towards offshore wind energy (63%). 21% of the respondents are very involved in this process and 16% display an indifferent attitude. It can be said that the attitude towards offshore wind energy is generally positive. This favourable perception may be attributed to the potential for generating clean energy and reducing CO_2 emissions. Although the technology is expensive and involves technological challenges and the impact on the marine environment, offshore wind farms are becoming increasingly competitive. Many countries, especially in Western Europe, are investing heavily in the development of this technology, recognizing it as crucial for the energy transition and the fight against climate change.

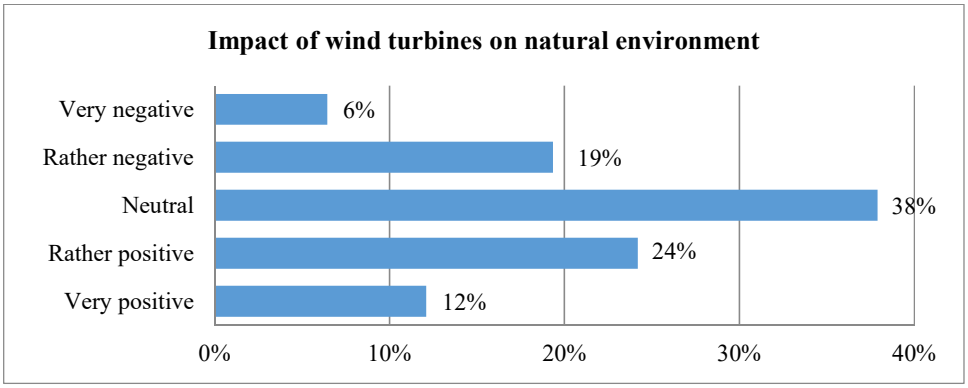


Chart 4. How do you assess the impact of wind farms on the environment?

Source: authors' own research.

The vast majority of the respondents claimed that wind farms do not affect the environment (38%). A large share of the respondents stated that they have a rather positive

(24%) and a very positive impact (12%). Only 19% consider this impact to be rather negative or very negative (6%). The fact is that wind farms have little impact on the environment. They may threaten birds or change the landscape and generate noise. Offshore wind farms can affect marine ecosystems. However, compared to traditional energy sources, wind farms are eco-friendly because they do not emit greenhouse gases.

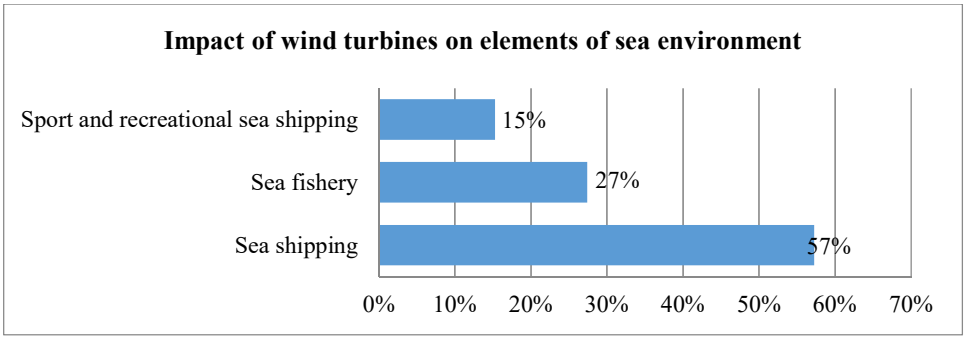


Chart 5. Are you able to assess how the operation of an offshore wind farm might affect sea life?

Source: authors' own research.

Respondents most often paid attention to the impact of a wind farm on sea navigation (57%), sea fishing (27%) and 19% on maritime sports and recreational shipping. The fact is that offshore wind farms can affect the marine environment, changing benthic habitats and disrupting marine animal migration due to noise. They can also affect fishing by changing the availability of fisheries but also create artificial reefs that support biodiversity. They also change water flow patterns, which may affect local ecosystems. The fact is that offshore wind farms have both potential negative and positive effects on the marine environment, depending on the location and technology used in their construction and operation.

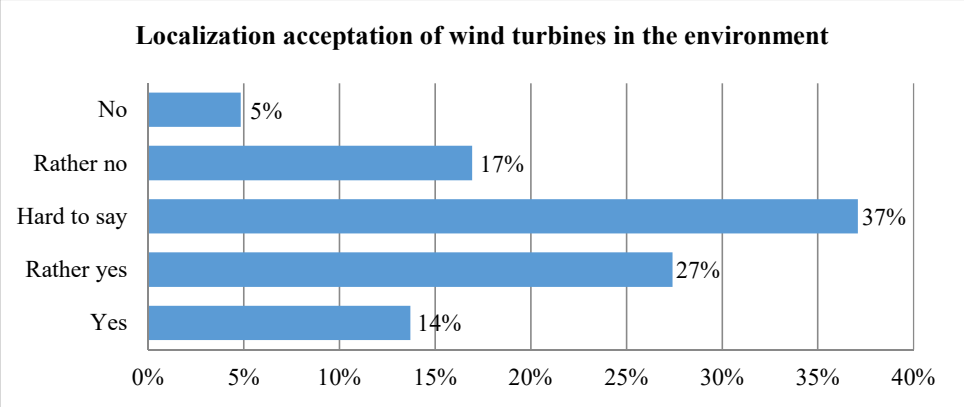


Chart 6. In your opinion, are the wind power installations properly arranged to minimize the negative impact on nature and the landscape?

Source: authors' own research.

As many as 37% of respondents are unable to take a stance on the acceptance of the location for wind power installations in the environment. On the other hand, 41% of the respondents accept certain locations and 22% do not. Undoubtedly, the acceptance of the location of wind power installations depends on the environmental effects, such as biodiversity, landscape or noise. Cooperation with local communities, public consultations and compliance with environmental protection regulations are also important. Acceptance increases when the ecological benefits (e.g.CO_2 reduction) outweigh the potential negative effects, and the project minimizes nuisances for residents. Transparency of the decision-making process is crucial to ensure a positive attitude towards such investments.

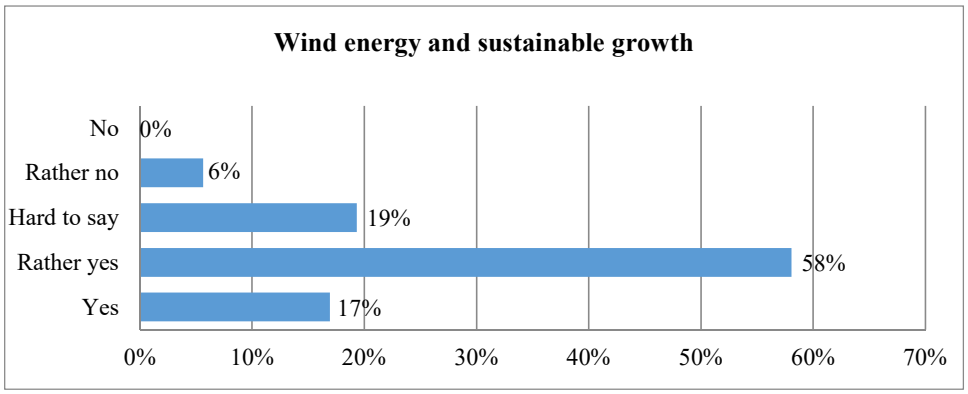


Chart 7. In your opinion, is wind energy crucial for achieving sustainable development?

Source: authors' own research.

The vast majority of respondents (75%) considered wind energy to be crucial for achieving sustainable development, 19% did not take a stance on this issue, and only 6% have a different opinion on the subject. The fact is that wind energy supports sustainable development, because it produces clean energy and reduces CO_2 emissions and reduces dependence on fossil fuels. It is a renewable energy source. It also supports the creation of workplaces as well as minimizes the negative impact on the environment, with appropriate planning.

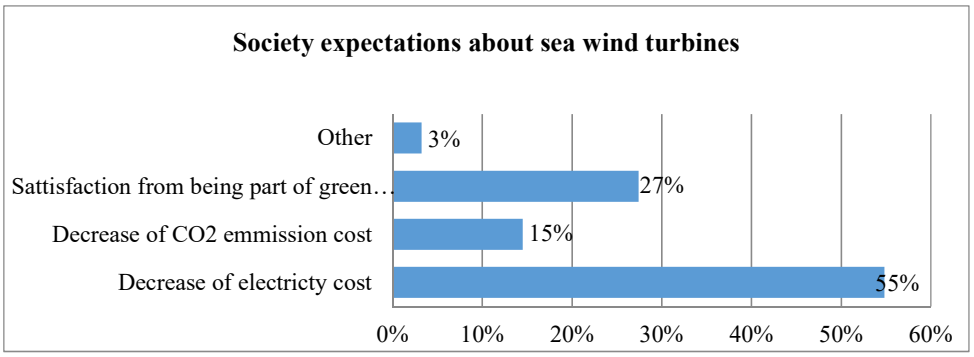


Chart 8. What do you expect after an offshore wind farm is launched?

Source: authors' own research.

As many as 55% of respondents have a pragmatic approach and expect lower electricity bills from the operation of a wind farm. It is an expectation based on real needs, not on idealistic or abstract goals. However, for 27% of respondents, joining the green economies of Europe will be satisfactory, and 15% believe that the charges for CO_2 emissions will decrease. Only 3% have different expectations. It can be said that social expectations towards an offshore wind farm focus on individual and environmental benefits.

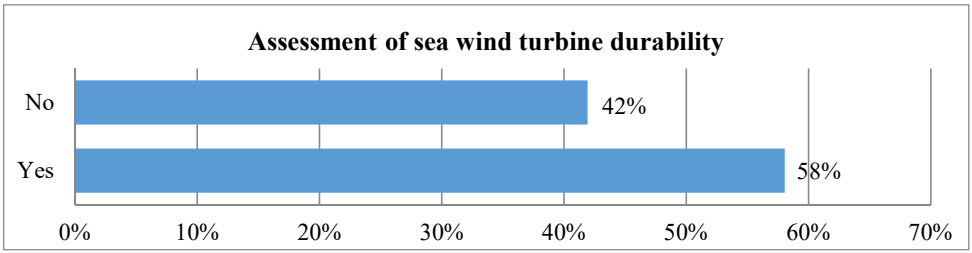


Chart 9. Are you able to assess the ageing processes affecting the structure of the offshore wind farm (longevity)?

Source: authors' own research.

More than half (58%) of the respondents are able to determine the ageing processes of an offshore wind farm, while 42% do not have such knowledge and skills. It might be assumed that the respondents who could assess the longevity of the operation of such farms base their judgement on the available data. Such an assessment consists of multiple factors. The durability of an offshore wind farm depends on the quality of materials used, effective maintenance management, resistance to difficult marine conditions and the ability to adapt to the changing climate and technology (Łońska, 2017).

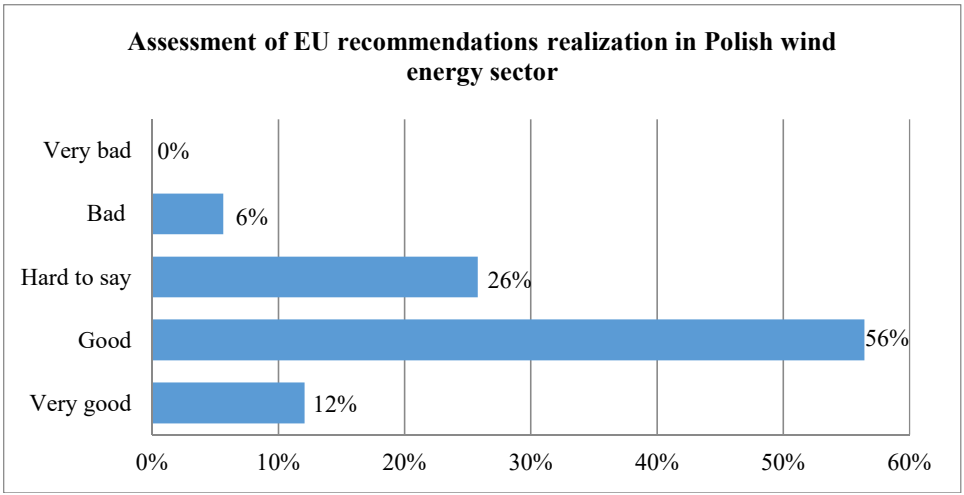


Chart 10. How do you assess the implementation of the EU recommendations in Poland in the field of renewable energy?

Source: authors' own research.

More than half of the respondents assess the implementation of the EU recommendations on renewable energy in Poland well (56%) and very well (12%). However, as many as 26% are unable to assess these actions, and 6% believe that the EU recommendations pertaining to the surveyed issue are poorly implemented. Such an assessment may be due to the fact that Poland is implementing EU recommendations in the field of wind energy, but it faces challenges related to legal regulations, investments or the energy transition, which require further attention.

A similar issue was investigated in 2022 by H. Sommer, G. Zakrzewski (Sommer, Zakrzewski, 2023b). The current results of research conducted on a similar population clearly indicate an upward trend in the implementation of the EU recommendations in Poland.

4. CONCLUSION

Summing up the results of the research conducted, it can be concluded that the vast majority of the respondents assess their knowledge of the principles for creating and accepting artificial environments well. The most convenient location for building wind turbines indicated by the respondents is the offshore area. Most respondents emphasize their positive attitude towards offshore wind energy and believe that wind farms do not have a negative impact on the environment. The respondents most often pay attention to the impact of a wind farm on sea navigation, sea fishing and maritime sports and recreational shipping. A significant number of the respondents are unable to take a stance on the acceptance of wind farm locations in the environment. On the other hand, the vast majority of respondents considered wind energy to be crucial for achieving sustainable development. More than half of the respondents have a pragmatic approach and expect lower electricity charges from the operation of the wind farm. A large part of the respondents are also able to determine the aging processes of an offshore wind farm. The vast majority of the respondents hold a positive view of the implementation of the EU recommendations regarding renewable energy in Poland.

Confirmation of the hypothesis can be based on the analysis of studies that indicate that the introduction of an effective safety culture in artificial environments, such as wind farms, contributes to increasing public trust in renewable energy technologies. The safety culture, including appropriate procedures, education and communication with local communities, can reduce concerns about risks such as noise or environmental impact. Research shows that transparency of safety-related measures and active involvement of residents in decision-making processes lead to higher social acceptance and greater openness to wind power installations. Improving risk management, e.g. by monitoring the impact of turbines on fauna and flora, may result in less resistance to the development of wind farms. This approach promotes the development of positive social attitudes, which are crucial for the continued growth of wind energy.

The development of offshore wind energy is becoming a key element in the global pursuit of sustainable energy production. Owing to stronger and more stable offshore wind, wind farms offer significant energy potential which might meet the growing demand for renewable energy. Although these technologies are expensive and require state-of-the-art technical solutions, the progress in the field of turbines, installations and logistics makes offshore wind power plants increasingly profitable. From an environmental perspective, offshore wind farms have less impact on terrestrial ecosystems, but they involve the need to monitor the impact on marine fauna. The increase in investments, the development of

infrastructure and the growing political support indicate that offshore wind power plants are an important element of the future of renewable energy. An effective safety culture lays the foundation for minimizing social concerns and promoting positive attitudes towards renewable energy sources, which is essential for a further development of the industry.

All authors have read and agreed to the published version of the manuscript.

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CHANGING DRIVERS OF ONLINE SHOPPING INTENTIONS: A LONGITUDINAL STUDY BASED ON THE THEORY OF REASONED ACTION (2012–2023)

This article examines key factors influencing online purchase intentions in line with the theory of reasoned action (TRA), comparing their strength and nature over a decade. A two-wave study (2012 and 2023) on representative samples of Polish e-consumers (N=148 and N=637) employed survey research and a path analysis to investigate the relationships between attitude, subjective norm, satisfaction, shopping experience, and purchase intention. Findings confirm the enduring influence of attitude on intention, while the role of satisfaction weakened, and the importance of shopping experience increased. The subjective norm significantly shaped attitude and satisfaction but had only a weak direct effect on intention. The study's main contribution lies in its longitudinal, methodologically consistent design, enabling robust comparisons over time. The results enhance understanding of the evolving dynamics of digital consumer behavior and inform marketing strategies by highlighting the need to focus on enhancing shopping experience and managing social influence rather than relying solely on transaction satisfaction.

Keywords: theory reasoned action, purchase intention, online shopping, consumer attitudes, e-commerce.

1. INTRODUCTION

E-commerce has been constantly gaining popularity among consumers. The number and value of online transactions are on the rise. In Poland, the frequency of using e-commerce went up from the average of 15.3 times in 2020 to 17.7 times in 2023. Simultaneously, over the same period, the value of the market basket increased by 9% (PWC, 2024). The group of consumers to buy online is still growing. In all EU countries combined, 77% of consumers aged 16–74 made at least one online purchase in 2024, up from 59% in 2014. If compared to the entire EU, the increase in Poland was even more dynamic: the percentage of consumers using online sales increased from 48% in 2014 to 75% in 2024 (Eurostat, 2025). Consequently, the turnover of e-commerce has been growing, to reach in Poland, in 2024, PLN 86 billion, a 5% increase year-to-year. The share

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of e-commerce has thus amounted to 10.2% of the total retail turnover in Poland (Euromonitor, 2025).

Many researchers are wondering about the current and future role of online commerce and whether its share will continue to grow, and if so, what level it may reach in the future. These considerations in turn lead to the questions of why consumers use online shopping, what motivates them to do so, what do they value in online offers, and what prevents them from using the online shopping channel even more intensively?

Understanding the behavior of consumers buying online is of fundamental importance from both a theoretical and practical point of view. In the theoretical area, it is extremely important to deepen the understanding of the decision-making processes that people who buy online go through, and especially the drivers that encourage consumers to buy online. In the practical dimension, questions about how to shape online offers and what methods of action to use to better understand buyers and respond to their needs are still relevant.

Online consumer purchasing behavior has been studied for years using various theories and methodological approaches (Szmigielska, Wolski, Jaszczak, 2012), including attitude theory (Brand, Schwanen, Anable, 2020), decision-making theory (Silverman, Bachann, Al-Akharas, 2001; Jothimani et al., 2023), technology acceptance theory (Koufaris, 2002; Ruiz-Herrera, et al., 2023), the theory of innovation diffusion (Wu, Wang, 2005), Venkatesh's generalized theory of acceptance and use of technology the so-called UTAUT and UTAUT2 models (Lai Lai, Jordan, 2009; Trojanowski, Kułak, 2019), the Bayesian approach (Dakduk et al., 2017) and other constructs.

One of the theories used in this area is also *the theory of reasoned action* (TRA) by Aisen and Fishbein (Fishbein, 1979; Hale, Householder, Greene, 2002) along with its subsequent modifications, such as the theory of deliberate action (Limayem, Khalifa, Frini, 2000; George, 2004; Pelling, White, 2009). Studies of e-consumer behavior based on the theory of reasoned action provide varied results, sometimes ambiguous, and there are certainly few longitudinal studies conducted on the basis of the same methodology and showing the studied variables in a longer perspective of several or even a dozen or so years.

Theory of Reasoned Action TRA provides a sound theoretical framework for analyzing and predicting consumer behavior. A meta-analysis (Sheppard, Hartwick, Warshaw, 1988) demonstrated positive relationships among the model variables, including a positive relationship between attitude and behavioral intention, subjective norm and intention, and between intention and actual behavior, and, as a result, the predictive utility of the theory in predicting consumer behavior related to various objects (Vallerand et al., 1992). In view of the above, the theory of reasoned action was chosen to plan a study in 1998 of consumer attitudes towards distance sales and its various formats, such as sales through paper catalogs, teleshopping traditional mail and online sales. Based on the TRA, an attempt was made to determine the factors determining online shopping. The first wave of the study was conducted in 1998, using a survey method on a sample of 986 people representative of Polish society. It turned out then that the percentage of consumers using online shopping was so small that it was impossible to conduct any analyses concerning online sales. Then, the study was repeated two more times, at intervals of about a decade, also on large, representative samples, in 2012 on a sample of 972 people, and in 2023 on a sample of 1161 respondents. In these two periods, the situation changed, as the number of consumers buying online increased, which is particularly visible in the last wave of the study. It was therefore possible to conduct appropriate analyses and attempt to determine the drivers of consumers' use of online shopping.

In the course of the conducted research, a research model based on TRA was built, research hypotheses were formulated, and the obtained results of the study from 2012-2023 allowed to verify the hypotheses and draw conclusions regarding the factors determining the use of online shopping by buyers and to capture the dynamics of their formation over the decade.

2. LITERATURE REVIEW

2.1. Theory of Reasoned Action

The Theory of Reasoned Action grew out of the theory of attitudes and is an answer to an important question about the relationship between people's attitudes towards a specific object and their future behavior towards that object. For years, scientific research in this area has shown that although the relationship between attitudes and behavior exists (Kraus, 1995) and the average correlation is 0.39 (Wojciszke, 2011), it is ambiguous and conditioned by the occurrence of specific variables (Wicker, 1969). Glasman and Albarracín (2006) conducted a meta-analysis of 128 experimental conditions involving a total of 4,598 participants and showed that attitudes are effective in predicting future behavior when they are easily conscious, stable, based on direct experience, and maintained with high certainty.

The relationship between attitude and future behavior is organized by *the Theory of Reasoned Action*. The central assumption of this theory developed in the 1970s by I. Ajzen and M. Fishbein is the statement that the most important predictor of actual *behavior* is the *intention* to undertake it. Behavioral intention reflects the motivation of an individual and their readiness to engage in a specific action. The creators of the theory proved that intention is a particularly good predictor of behavior if people do not have time to think about how to behave. Intentions are shaped by two main factors: *attitude* towards behavior and *subjective norm* (Figure 1). Therefore, by measuring a person's attitude and subjective norm, it is possible to determine their intention to behave, which then allows predicting the behavior itself. This theory is the foundation of many studies on the decision-making processes of individuals in a social context.

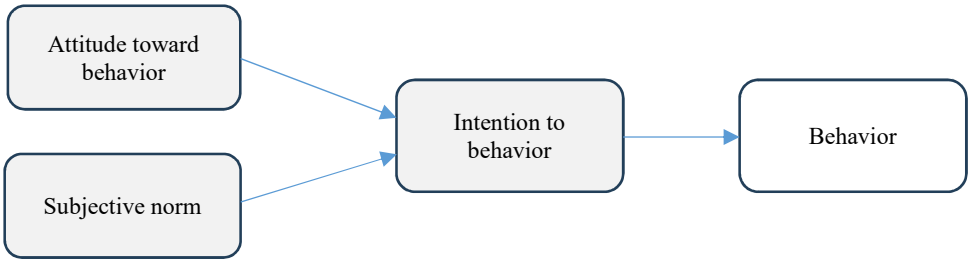

Figure 1. I. Ajzen's Theory of Reasoned Action and M. Fishbein

Source: (Ajzen, Fishbein, 1980a).

Attitude according to concepts derived from social psychology, is understood as a "permanently favorable or unfavorable evaluation, emotional feeling and inclinations related to a specific object or idea" (Ajzen, 1980; Kotler, Keller, 2012), or simply, as a "positive or negative emotional attitude of a consumer towards an object" (Schiffman, Kanuk, 1983; Engel, Blackwell, Miniard, 1986). When talking about the attitude object,

it should be noted that people usually do not perceive objects as homogeneous wholes. They rather perceive specific attributes of the object. They evaluate some of them positively, and others negatively. As a result, general beliefs towards an object are the resultant of partial evaluations of this object (Mowen, 1990). Ajzen and Fishbein in their model of perfectly rational attitude assumed that emotional attitude is a generalized result of diverse beliefs about the object (Fishbein, Ajzen, 1975).

Subjective norm is the perceived social pressure by an individual to perform or refrain from a specific behavior (Ajzen, 1980). It consists of normative beliefs, i.e. beliefs about the expectations of other people or social groups, and the motivation to conform to these expectations. Motivation is greater the more a person takes into account how others might evaluate his or her actions. If a person believes that other people approve of a given behavior and is motivated to meet these expectations, the subjective norm will be stronger. In general, people tend to care a lot about what others think and do. A meta-analysis of studies on the relationship between subjective norm and behavioral intentions showed an average correlation of r=0.53 (Sheppard, Hartwick, Warshaw, 1988).

Intention refers to an individual's conscious, subjective intention to perform a specific action. Intentions are a key step in the decision-making process because they link the cognitive and social factors that motivate an individual to the actual action. It is a key predictor of actual behavior in the theory of reasoned action (Sheppard, Hartwick, Warshaw, 1988).

Ultimately, a person's *behavior* is a direct result of their intention to take a specific action. TRA assumes that if someone intends to do something, they will probably do it, provided they do not encounter external obstacles.

It should be emphasized that each variable in the I. Ajzen and M. Fishbein model is measured separately and is used to predict the next variable.

TRA is not without its limitations (Hansen, Jensen, Solgaard, 2004). Among other things, it assumes that e-customers have full control over the technology, which may be limited by the buyers' insufficient technical competence. TRA does not take into account the perceived ease or difficulty of performing a given behavior which may also undermine the relationship between attitude and future behavior. Therefore, the reasoned action model has been supplemented with another variable over time, which is the person's sense of control over their own behavior (Babin, Harris, 2023). This is how the theory of planned action (TPB) was created.

2.2. The Application of the Theory of Reasoned Action in the Study of Consumer Behavior in Online Commerce

The theory of reasoned action by Ajzen and Fishbein is widely used in the study of consumer purchasing behavior in the Internet world. Studies by various researchers have shown its usefulness in predicting purchase intentions and acceptance of the online environment as a shopping channel. Cheung, Chan, Limayem (2005) claim that TRA and its related theories, although they have their limitations, are leading in research on explaining consumer purchasing behavior on the Internet. This is confirmed by the study by Abumalloh et al. (2018), in which it was shown that the TRA theory is the third most commonly used theory to describe consumer behavior in the digital world. A review of 203 scientific papers showed that among the 17 theories taken into account, the TRA theory was used in 17 papers, and was overtaken only by the TPB theory (used in 18 papers), and the TAM theory (20 papers).

In the context of TRA theory, **the relationship between customer attitude, subjective norm and intention** has been the subject of many studies, although their results are mixed. For example, a survey conducted on 100 regular online shoppers showed a positive effect of both attitude and subjective norm on intention to shop again (Vignesh, Karthik, 2017). The results of the study showed a strong effect of both attitude and subjective norm on intention and that the influence of subjective norm was particularly high in the case of consumers who were new to online shopping. Similar results were obtained in a survey conducted on 350 Turkish e-consumers (Turan, 2012). The data analysis conducted using structural equation modeling (SEM) revealed that both attitude and subjective norm were significant drivers of purchase intention in the context of e-commerce.

In a comparative study conducted on two groups – 1222 Danish and 1038 Swedish consumers – Hansen, Jensen and Sofgaard (2004) compared the usefulness of different models in predicting buyers' intentions to buy groceries online. The study was conducted using self-administered questionnaires. The relationships examined were based on two theories – TRA and TPB. The researchers tested the influence of attitude on intention and the influence of subjective norm on intention. The researchers also added the path of dependence proposed by Chang (1998), namely the influence of subjective norm on attitude. They confirmed all these relationships. The regression coefficients showing the influence of attitude on intention were: 0.88 in the Danish group of consumers and 0.75 in the Swedish group, while the coefficients showing the influence of subjective norm on intention were 0.57 and 0.24, respectively. In turn, the regression indices showing the influence of the subjective norm on attitude were relatively the highest and amounted to 0.90 and 0.89. An interesting result of the study was that the best fit of the model to the data was obtained using the planned action model, but when the relationship between the subjective norm and attitude was added.

In another study conducted in India using a questionnaire survey on a non-random sample of 400 consumers based on the theory of reasoned action (Ashokkumar, Nagarajan, 2021) regarding consumers' choice of online shopping channel, the hypotheses were put forward that attitude influences purchase intention and subjective norm influences purchase intention. These hypotheses were confirmed. The relationship between subjective norm and attitude was also confirmed. Analysis of the collected data conducted using structural equations (SEM) showed the strength of the relationship at the level of 0.378 and was higher than the indicators obtained for the two previous hypotheses.

The relationships included in the TRA theory have been confirmed in the context of e-commerce in many other studies (Hasbullah et al., 2016; Ashokkumar, Nagarajan, 2021; Siddiqui, 2022). Many researchers have additionally pointed out that attitude and subjective norm are not independent of each other. It has been repeatedly found that the subjective norm influences attitude (Shimp, Kavas, 1984; Vallerand et al., 1992; Suandewi, Maradona, 2023).

In summary, the results of many studies confirm that the relationships included in the reasoned action model relate to consumer behavior in the digital world, and at the same time that there is an additional relationship showing the influence of the subjective norm on attitude. The results of the studies show the varied strength of the relationships.

The research results cited above allow us to formulate the following hypotheses:

H1. Attitude toward online shopping has a direct positive influence on online purchase intention.

H2. The subjective norm expressed by other people's opinions about online shopping has a direct positive influence on online purchase intention.
H3. Subjective norm has a positive influence on attitude towards online shopping.

2.3. Consumer satisfaction with online shopping

Customer satisfaction with a specific object or event describes the degree of satisfaction resulting from the experience with a given object. It is a subjective assessment that results from a comparison of the customer's expectations with the actual experience (Oliver, 1980). It can apply to various objects. In this case, it is about satisfaction with the shopping channel used, i.e. the Internet channel.

In a situation where the customer's experience exceeds his or her expectations, the customer is usually satisfied. And the greater the difference, the greater his or her satisfaction. Conversely, when the experience is lower than the expectation, the customer will be dissatisfied, and the degree of dissatisfaction will be determined by the size of the difference, this time by how much the experience is lower than the expectation (Kotler, Keller, 2012).

In scientific research on consumer online shopping behavior **the impact of satisfaction on intention** has been repeatedly tested. Sakesi (2023) collected responses from 120 Indonesian online consumers using a survey method and then conducted structural equation analysis and on this basis showed the direct impact of *satisfaction* with purchases on the *intention* to repeat them in the future. The correlation coefficient between the studied variables in this case was 0.463. The researcher also showed that satisfaction was a mediating variable between variables such as perceived trust, perceived value and quality of the website and the intention to make online purchases in the future.

In another study conducted by Rehman, Bano and Bhatti (2019) on a sample of 398 Pakistani online shoppers, satisfaction with online shopping had a direct impact on online purchase intention and it was shown that satisfaction also played a moderating role between variables such as celebrity endorsement brand equity and corporate social responsibility and the intention to buy online. Similarly, in a study of 200 representatives of Generation X and Y (Cut Nurvajri, Yunus, Chan, 2022), it was shown that satisfaction with online shopping had, on the one hand, a direct impact on the intention and at the same time mediated the influence of other variables on the intention.

To sum up the above results, it can be stated that in the context of online shopping, there is, firstly, a direct effect of satisfaction with shopping on the intention to buy online and, secondly, that satisfaction with shopping mediates the effect of other variables on the intention to buy online, including the possibility of mediating the effect of attitude on intention. The effect of attitude on intention moderated by the satisfaction variable was checked in a survey conducted among 253 customers using the Pinduoduo shopping platform. It was shown that **attitude** towards the online shopping platform **affects satisfaction** with the product and **satisfaction, in turn, affects the intention** to reuse this platform (Yoon, Tan, 2022). On the other hand, there is research evidence for the reverse relationship, i.e. that satisfaction with online shopping affects attitude towards these purchases (Abdul-Muhmin, 2010). The conclusion is that the relationships between satisfaction and attitude are diverse. Nevertheless, it can be assumed that satisfaction with online shopping may be a mediator in the relationship between attitude and intention to buy online.

It is worth adding that the relationships between satisfaction and intention, similarly to satisfaction and attitude, are also not clear, which means, among other things, that there is

an influence of intention on satisfaction with a product purchased online (Abin, Mandagi, Pasuhuk, 2022). Another study, referring to e-commerce in developing countries, even showed that the influence of satisfaction with online shopping on the intention to continue shopping does not have to occur (Zihan, 2023). Therefore, formulating research hypotheses in the context of Polish conditions, in which the experience of using online commerce is lower than in developed countries, seems interesting.

Satisfaction is directly dependent on the customer's expectations, which may depend on both their own beliefs and opinions – i.e. attitudes towards online purchases – as discussed above, and on the opinions of others they have heard, i.e. the subjective norm. Therefore, it seems interesting to additionally check whether there is a relationship between the subjective norm and satisfaction.

The relationship between **subjective norm and satisfaction** was examined, among others, in a survey of 350 customers using travel agencies in Egypt (Elgarhy, Abou-Shouk, 2024). The respondents' responses were collected using a survey questionnaire, and then the data were analyzed using structural equations (SEM). The results of the study showed that subjective norms have a significant positive effect on customer satisfaction. The correlation coefficient between variables was 0.7. In the study conducted among 632 students in Iran, the aim was to understand how various psychosocial factors affect life satisfaction (Tavakoly, Sany et al.., 2023). It showed a significant impact subjective norm on life satisfaction. The variable *satisfaction* can mean general satisfaction with online shopping or satisfaction with the last online purchase. In both cases, the influence of satisfaction on the intention to buy in the future has been proven (Cao, Ajjan, Hong, 2018; Jaya, William, 2022).

Based on the above studies, the following research hypotheses can be formulated:

H4. Satisfaction with the last online purchase has a direct positive influence on online purchase intention.

H5. Attitude toward online shopping has a positive influence on satisfaction with the last online purchase.

H6. Subjective norm has a positive influence on satisfaction with the last online purchase.

2.4. Customer experience in online shopping measured by transaction frequency

The evaluation and critique of the theory of reasoned action conducted by many researchers indicates, among other things, that this theory works in the case of systematic behaviors (Chang, 1998). In the case of online shopping, systematic behaviors can be said to occur when they are repeated with a certain regularity. That is, when consumers have a certain experience with this form of shopping expressed by the frequency of purchases made. On the other hand, when buyers are at the initial stage of using online sales, one may wonder whether the relationships between variables in the reasoned action model will be disrupted.

It is known from various studies that **experience customers' purchases are affected on their intention** to use online shopping in the future (Saha et al., 2023). As Ling, Chai and Piew (2010) argue, consumers with more experience in online shopping are able to better assess the benefits and risks associated with products than those with less experience. This, in turn, translates into their greater intention to buy online. The researchers also noted that since online shopping is new to consumers, it further strengthens the interest in studying the experience of online shoppers and the impact of experience on intentions.

Research also proves that **experience shapes attitude** (Vignesh, Karthik, 2017). The relationship between e-shopping experience and attitudes towards online shopping are multi-faceted, with various studies highlighting how prior experiences shape consumer perceptions and behaviors. Positive online shopping experiences tend to foster attitudes towards online shopping, which in turn increases customer engagement (Al- khateeb et al., 2023). Furthermore, the level of prior online shopping experience moderates the relationship between attitudes and repurchase intentions, indicating that experienced shoppers may respond differently than novices (Chiagouris, Ray, 2010). Soopramanien (2011) conducted a survey of 705 British online shoppers. They found that online shopper experience, measured by the length of time a consumer has been shopping online, has an impact on that customer's attitudes towards online shopping. Experienced shoppers are less skeptical and risk averse, increasing their intention to shop online. Bhattacharjee and Kumar et al. (2024) in a survey conducted on a group of 583 respondents also obtained confirmation of the influence of consumer experience on their attitudes towards online shopping. Sexton Johnson and Hignite (2002) report that e-commerce consumers with more than three years of experience in using the Internet were almost twice as likely to make online purchases than those with limited experience in using the Internet. Opreana (2013) proved that there is a relationship between customer experience and the number of online purchases made during the year.

The relationship between the number of online purchases and attitudes toward shopping can be explained by the positive reinforcement loop. According to this concept, frequent transactions can improve attitudes. As consumers engage in more online transactions, positive experiences can improve their attitudes toward online shopping. An increased frequency of successful transactions builds trust and comfort, reinforcing positive attitudes. Repeated online shopping experiences help consumers become more familiar with the process, reducing perceived risk and increasing confidence, which can positively shape their attitudes.

It is worth noting that so far, researchers have not paid attention to the intensity of online shopping and the experience gathered by customers in this way, by checking the number of purchases made. Most often, consumers' experience in online shopping has been measured qualitatively, e.g. by self-assessment of the experience on a point scale (Chiagouris, Ray, 2010), how familiar they are with online shopping, etc. (Saha et al., 2023).

Due to this element and the varied reports regarding the relationship between experience measured by the number of online purchases and attitudes and intentions, it was decided to verify the possible impact of the number of online purchases on the consumer's attitude towards the online form of shopping and to examine the direct impact of the number of purchases on the intention to use this form.

Hence, the following hypotheses were formulated:

H7. The number of online purchases has a positive influence on attitude towards online shopping.

H8. The number of online purchases made has a direct positive influence on online purchase intention.

2.5. Research Gap Summary

The literature review conducted on the drivers of consumers' use of e-commerce shows that the relationships included in the theory of reasoned action are clearly confirmed in various studies. The influence of attitudes on the intentions to use e-commerce and

subjective norms on intentions are proven. Similarly, most scientific reports confirm the influence of subjective norms on attitudes towards e-commerce. There is also no doubt about the influence of e-consumers' satisfaction with their purchases on the intentions to repeat online purchases. However, in all the relationships mentioned, the results of various studies show different strengths of relationships.

The relationships between the remaining variables, namely between attitude and satisfaction, subjective norm and satisfaction, and between e-customer experience measured by the number of transactions and attitude and intention, are much less frequently studied in the literature, and when they are studied, the results are even more diverse. It can be assumed that this is partly due to the different measurement approaches of individual researchers.

Most importantly, the analysis of the literature shows that there is a clear gap in research when it comes to showing the relationships in a dynamic approach – i.e. checking the analyzed relationships over a longer period of time using the same research methodology. Only such an approach allows for a real check of the dynamics of the phenomenon and determining which drivers of consumers' use of e-commerce gain and which lose their importance over time.

Based on the literature review, eight hypotheses were formulated. The formulated research hypotheses were reflected in the designed research model, which is based on the Theory of Reasoned Action by I. Ajzen and M. Fishbein (Figure 2).

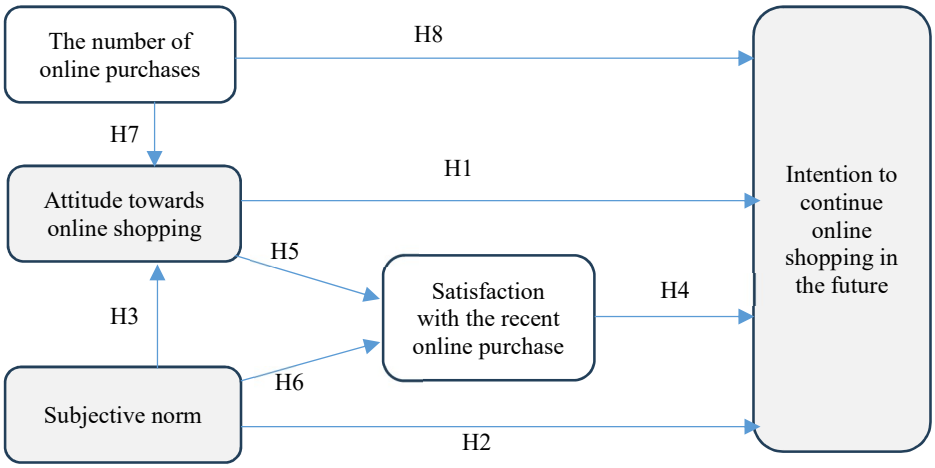

Figure 2. Research model

Source: Own elaboration.

The adopted research model included four variables related to online shopping explaining consumers' intention to buy online (in short: *intention*, i.e.: consumer attitude towards online shopping (*attitude*, *subjective norm* understood as other people's opinions on online shopping, *number of purchases* made and *satisfaction* with the last purchase.

3. METHODOLOGY

3.1. Measurement variables in the model

The questions measuring the individual variables included in the research model (Figure 1) were part of a questionnaire designed in 1998 to examine consumer attitudes and behaviors toward distance selling. The questions were developed based on the recommendations of competent judges (independent experts) and are supported by the literature on the subject. The group of independent judges consisted of 10 eminent scientists, each of whom has research experience in consumer behavior. The experts represented universities such as the Academies (now Universities) of Economics in Katowice, Poznań, and Wrocław, the Lodz University of Technology, the Warsaw School of Economics, the University of Gdańsk, the University of Lodz, and the University of Warsaw (Faculty of Psychology, Faculty of Management) (Trojanowski, 2002). The survey among the independent judges was conducted in 1998 using a structured interview method in two stages. The experts' responses from the first stage allowed for the formulation of preliminary questions and response scales for measuring the studied variables. In the second stage, the experts identified the most appropriate question formulations, and these questions, along with their response scales, were ultimately approved.

The need to utilize the expertise of independent judges stemmed from the fact that at the time the study concept, including the measurement questionnaire, was developed in 1998, the publication record in this area was significantly smaller. Therefore, the knowledge and experience of consumer research specialists provided valuable support. The developed questionnaire contained a total of 22 closed-ended questions, designed to assess the scale of remote commerce development, products purchased, amounts spent, and the assessment of the advantages and disadvantages of mail-order commerce. From this set of questions, five key questions were selected – in accordance with the formulated research model and hypotheses presented in this article (Fig. 1) – to measure the variables in the adopted model.

According to independent judges, consumers' *attitudes* toward online shopping were assessed through a question regarding the extent to which they like distance (online) shopping. Responses were collected using a 5-point Likert scale, from "1 – I definitely like it" to 5 – "I definitely don't like it".

The subjective norm variable was measured by a question about the opinions about mail order (internet) sales heard by a given consumer. Respondents using a 5-point scale indicated that the opinions they encountered ranged from "1 – Definitely positive" to "5 – Definitely negative".

Satisfaction with the most recent purchase was measured by asking how satisfied or dissatisfied the consumer was with the purchase, with responses given on a 5-point scale from "1 – Very satisfied" to "5 – Very dissatisfied".

Experience variable was defined by the number of purchases made by the respondents in the period from the beginning of the year to the moment of measurement, which meant a similar period of 10 months in each wave of the study.

The intention to use online sales in the future was measured by a question asking about the consumer's willingness to use mail order (internet) shopping in the future by indicating the answer on a 4-point scale from "1 – Definitely yes" to "4 – Definitely no".

3.2. Organization of the study

The study was conducted in three time waves, i.e. in 1998, 2012 and 2023. In each of the above years, measurements were taken in October and early November of the given year. Due to the fact that in 1998 there were no consumers buying online in the general study sample, this article contains the results of the analysis from 2012 and 2023.

The research method was a survey made available to respondents by research agencies established for this purpose. In 2012, it was the SMG-KRC research agency conducting a CAPI survey in respondents' homes, and in 2023, the Ariadna internet panel, in which respondents filled in questionnaires made available to them online.

3.3. Test sample

The study was conducted in Poland on nationally representative samples of 972 people in 2012 and 1,161 people in 2023. The structure of the study sample is presented in Table 1.

Table 1. Structure of the sample of people surveyed in 2012 and 2023

	Year of study			
	2012		**2023**	
	Reference sample* N = 972	**Including online buyers N=148**	**Reference sample* N = 1161**	**Including online buyers N=637**
Sex				
Man	48.6%	55.4%	47.0%	44.4%
Woman	51.4%	44.6%	53.0%	55.6%
Age				
15–24 years old	18.3%	27.0%	14.0%	9.9%
25–39 years old	31.7%	48.6%	27.2%	27.7%
40–59 years old	35.5%	20.3%	35.1%	36.7%
60 or more	14.5%	4.1%	23.6%	25.7%
Size of the town				
Village	37.9%	27.7%	37.6%	36.0%
Cities up to 50 thousand	24.6%	24.3%	23.5%	23.0%
Cities 50 – 200 thousand	16.8%	24.3%	17.2%	17.6%
Cities 200 – 500 thousand	9.2%	9.5%	9.8%	11.0%
Cities with an area of 500 th.	11.6%	14.2%	11.8%	12.5%

* The reference sample is the total sample of persons surveyed in a given period.

Source: Own Research.

The selection of people for the sample was stratified in 2012. The stratification took into account the size of the town, province, as well as the gender and age of the selected people. In 2023, the sample was random-quota. The quotas were selected according to the representation of the population for variables such as: gender, age and size of the town of residence.

The study sample of 1,161 people in 2023 is a weighted group. Data on online panels distorts the actual population towards people using the Internet, therefore the study group was weighted in accordance with the population structure of Polish society due to the main demographic variables, i.e. gender and age.

When all respondents were asked whether they had used online shopping in the last year, 148 people responded positively in 2012 and 637 in 2023. In this way, the final study samples were selected, consisting of consumers who bought online in 2012 and 2023, and their answers were analyzed in the context of the constructed research model.

4. RESULTS

Path analysis was used in the construction and verification of the model. The results of the path analyses and the indicators illustrating the data fit are presented in Tables 2.1 and 2.2 and 3.1 and 3.2 for the individual survey waves in 2012 and 2023.

Table 2.1. Statistical Parameters of the Research Model Based on the 2012 Dataset

rhs	lhs	pvalue	std.all
Attitude	Intention	0.00	**0.43**
Subjective norm	Intention	0.20	**0.09**
Subjective norm	Attitude	0.00	**0.47**
Satisfaction	Intention	0.00	**0.30**
Attitude	Satisfaction	0.00	**0.39**
Subjective norm	Satisfaction	0.03	**0.17**
Number of Purchases	Attitude	0.86	**0.01**
Number of Purchases	Intention	0.24	**0.07**

Source: Own Research.

Table 2.2. Model Fit Statistics Based on the 2012 Dataset

chisq	df	pvalue	rmsea	rmsea lower	rmsea upper
0.27800177	1	0.598013928	0	0	0.17555072

Source: Own Research.

Table 3.1. Statistical Parameters of the Research Model Based on the 2023 Dataset

rhs	lhs	pvalue	std.all
Attitude	Intention	0.00	**0.44**
Subjective norm	Intention	0.00	**0.11**
Subjective norm	Attitude	0.00	**0.43**
Satisfaction	Intention	0.00	**0.11**
Attitude	Satisfaction	0.00	**0.29**
Subjective norm	Satisfaction	0.00	**0.24**
Number of Purchases	Attitude	0.00	**0.29**
Number of Purchases	Intention	0.00	**0.19**

Source: Own Research.

Table 3.2. Model Fit Statistics Based on the 2023 Dataset

chisq	df	pvalue	rmsea	rmsea lower	rmsea upper
0.084036301	1	0.771900275	0	0	0.06810156

Source: Own Research.

The model consisting of three path equations between variables was tested on the basis of information collected twice in a decade, i.e. in 2012 and 2023. To analyze the relationships between variables, path analysis was used using the lavaan package in the R program, using maximum likelihood estimation. The model fit was assessed using the chi-square test and the RMSEA index, while standardized path coefficients (β) were used to assess the strength and direction of individual relationships between the studied variables. Only people with a full set of responses on the variables included in the model were qualified for the analyses.

The study results in relation to the relationships included in the research hypotheses are presented in Figure 3. The relationships between the individual variables are represented by arrows and the standardized path indices are given for both measurements conducted.

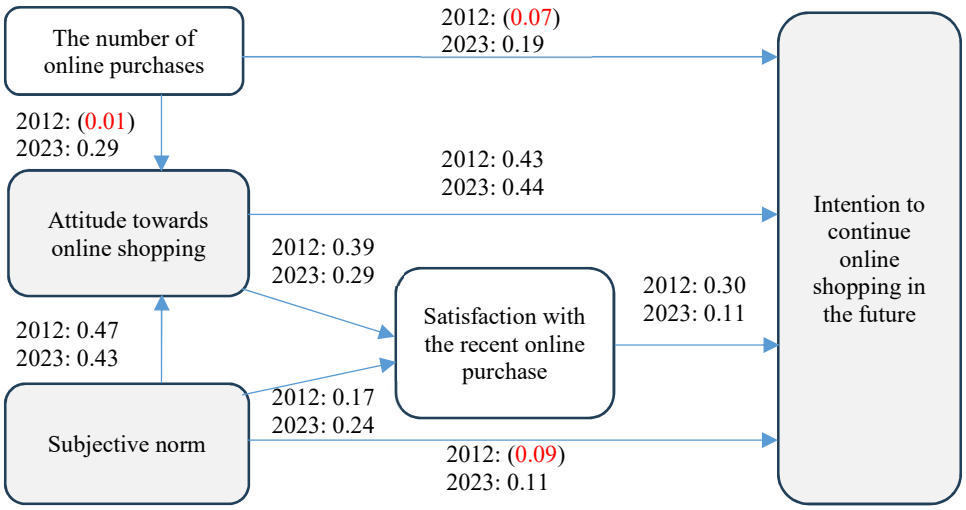

Fig. 3. Path model of relationships between attitudes, opinions, satisfaction with the recent purchase, the number of online purchases, and the intention to engage in online shopping in the future. Measurements conducted in 2012 and 2023 (2012: N=148; 2023: N=637).

In parentheses, non-statistically significant path coefficients are indicated in red. All other path coefficients are statistically significant.

Source: Own research.

Based on the path analysis, the general postulated model and eight research hypotheses were verified as adequate. In the case of both waves, the theoretical model describes the data sufficiently well. Additionally, most of the hypotheses for the first wave of the study in 2012 were confirmed, i.e. hypotheses H1 and hypotheses from H4 to H6, while hypotheses H2, H7 and H8 were rejected, because the relationships included in these

hypotheses turned out to be statistically insignificant. In the second wave in 2023, all hypotheses were confirmed (Table 4).

Table 4. Result research – confirmed and not-confirmed hypotheses research

Hypothesis	Variable independent	Variable dependent	2012	2023
H1	Attitude	Intention	Confirmed	Confirmed
H2	Subjective norm	Intention	Not-confirmed	Confirmed
H3	Subjective norm	Attitude	Confirmed	Confirmed
H4	Satisfaction	Intention	Confirmed	Confirmed
H5	Attitude	Satisfaction	Confirmed	Confirmed
H6	Subjective norm	Satisfaction	Confirmed	Confirmed
H7	Number of Purchases	Attitude	Not-confirmed	Confirmed
H8	Number of Purchases	Intention	Not-confirmed	Confirmed

Source: Own Research.

5. DISCUSSION

The aim of this study was to analyze the drivers of consumers' intention to use online shopping in the light of the theory of reasoned action (TRA) and to compare changes in this area between 2012 and 2023. The obtained results provide interesting observations on the stability and evolution of mechanisms shaping consumer behavior in the digital environment.

First of all, it should be emphasized that in both periods studied, consumers' attitude towards online shopping remains the most important predictor of purchase intentions. The high value of the weight for the path between these variables (r=0.43 in 2012 and r=0.44 in 2023) is consistent with many previous findings, including the results of the meta-analyses by Abumalloh et al. (2018) and Glasman and Albarracín (2006), confirming the central role of attitude in shaping behavioral intentions.

It is significant, however, that despite the stability of the importance of attitude, there is a clear decrease in the importance of satisfaction with the last purchase as a predictor of repurchase intentions (a decrease in the weight value for the path from r = 0.30 to r = 0.11). This result indicates a decreasing role of the classic model based on the "satisfaction-loyalty" principle, which was already signaled in the studies of Cao, Ajjan and Hong (2018) and Tata, Prashar and Parsad (2021).

On the other hand, the result obtained in this study is interesting due to the significant role of shopping satisfaction in strengthening the intention to buy online, which has been emphasized in many other studies (Rehman Bano, Bhatti, 2019; Sukesi, 2023. The diversity of the obtained results may indicate a change in consumer behavior towards a more pragmatic approach to shopping. Contemporary consumer behavior seems to be increasingly determined by shopping automatisms and the functional value of the offer, and not directly by the emotional evaluation of recent transactions.

Another important phenomenon is the growing importance of shopping experience, measured by the number of online purchases, both as a predictor of attitude (r=0.29 in 2023 vs. r=0.01 in 2012) and intention (r=0.19 vs. r=0.07). This result is in line with the concept of positive reinforcement loop described by Boakes (2021), indicating the role of positive conditioning – both instrumental and classical. The above result is also consistent with the

observations of Chiagouris and Ray (2010), according to which increasing shopping experience leads to the reinforcement of positive attitudes and an increase in the probability of future purchases.

The analysis of the relationship between social opinions (subjective norm) and attitude and satisfaction shows interesting dynamics. The persistently high correlation of the subjective norm with attitude (r=0.47 in 2012 and r=0.43 in 2023) indicates that social determinants of behavior still have a fundamental significance in building consumer attitudes towards e-commerce. At the same time, the growing importance of opinions in predicting satisfaction with purchases (r=0.17 to r=0.24) suggests that consumers increasingly feel satisfaction not only based on their own experiences, but also through the prism of social ratings and opinions, which is consistent with the growing role of online recommendations indicated by Suandewi and Maradona (2023). On the other hand, the above result is quite novel, as previous studies have mainly emphasized the direct influence of subjective norms on attitude and intention, omitting the aspect of satisfaction (Turan, 2012; Hansen, Jensen, Solgaard, 2004).

In turn, the direct impact of opinions on purchase intention remains low and relatively unchanged over time (r=0.09 in 2012 and r=0.11 in 2023). This result suggests that although social norms shape attitudes, purchase intentions are the result of a more complex decision-making process, including one's own preferences and assessment of shopping experiences, which was also observed in the research by Hasbullah et al. (2016). At the same time, it cannot be ignored that the obtained results are somewhat contrary to the results of other studies, which found a clear impact of subjective norms on e-customers' purchase intentions (Hasbullah et al., 2016; Suandewi, Maradona, 2023). The current results indicate a possible change in the way consumers use social opinions – rather as a tool for building a general attitude and satisfaction, than as a direct impulse to action.

In summary, the obtained results of the study confirm the high durability of the key mechanisms predicted by the theory of reasoned action, but also indicate the evolution of the importance of individual factors: the decreasing role of satisfaction with the last purchase and the increasing importance of shopping experience and social opinions. These results have important implications for managing customer relationships in e-commerce, suggesting the need for a more nuanced approach to building digital repurchase intentions and loyalty by reinforcing positive shopping experiences and managing online opinions.

6. CONCLUSIONS

The conducted study allowed for the assessment of drivers of consumer purchase intentions in the context of online shopping, based on the theory of reasoned action (TRA). Comparative analysis of data from 2012 and 2023 allowed for capturing significant trends and changes in the dynamics of shaping purchasing behavior in the digital environment.

The most important conclusion from the conducted study is the stability and key role of consumers' attitudes towards online shopping as a determinant of purchase intention in both analyzed periods. This confirms previous studies, emphasizing the importance of consumers' positive attitudes towards online shopping as a basic factor influencing their future purchase decisions.

At the same time, it was observed that the importance of satisfaction with the last purchase as a predictor of purchase intention significantly weakened in 2023 compared to 2012. This may indicate a change in consumers' approach to online shopping from the

focus on satisfaction and emotional loyalty to a pragmatic approach, focused more on convenience, availability and other practical aspects of online shopping.

An important new finding is the growing importance of shopping experience, as measured by the number of online transactions. This finding indicates the growing role of automatic shopping behaviors and habits, which is consistent with positive reinforcement theory, suggesting the increasing importance of positive experiences in shaping shopping intentions and attitudes towards e-commerce.

In addition, the study revealed interesting dynamics in the influence of social norms (the opinions of others). Subjective norms currently have a stronger impact on shopping satisfaction than directly on purchase intention. This indicates an evolution in the importance of social recommendations, which are now more important in building the overall evaluation of online shopping than as a direct stimulus to make a transaction.

In summary, the conducted study provides important conclusions on the evolution of drivers of consumer purchase intention in the digital space. These results are important both for further scientific research and for e-commerce management practice, emphasizing the need to take into account changing consumer preferences, especially in the context of customer experience management and the influence of social recommendations.

Despite the cognitive and practical value of the study, several significant limitations should be indicated, which should be taken into account when interpreting the results and planning further research. First, the measurement of variables was based on respondents' declarations, which may be associated with the self-declaration effect and the risk of compliance with social expectations. Additionally, the limited number of measurement items for each variable could have affected the sensitivity of the measurement and the precision of capturing subtle differences. Second, although the applied path analysis allows for simultaneous testing of the system of dependencies and goes beyond simple correlation analysis, it is still based on cross-sectional data, which limits the possibility of unambiguous conclusions about the direction of causality between the variables studied. Although the model design is based on solid theoretical foundations (TRA), the relationships between variables should also be confirmed in experimental or longitudinal studies with a larger number of measurement points. Third, the comparison of data from 2012 and 2023, despite the use of an identical research tool, does not eliminate the influence of contextual differences, such as changes in technological, social and economic conditions. E-commerce in 2012 was at a different stage of development than in 2023, which could have influenced different ways of understanding the questions and assessing their own experiences by respondents.

In the context of the above limitations, recommendations for future research include the need to supplement analyses with qualitative research (e.g. in-depth interviews), which will enable a better understanding of the psychological mechanisms underlying the analysed phenomena. It is also necessary to include additional moderating and mediating variables, such as the level of trust in the platform, digital competences, emotional components of purchase decisions or the impact of offer personalization. It is interesting to conduct further longitudinal (panel) studies, which will enable more precise tracking of changes in attitudes and intentions over time, especially in the context of dynamic technological development and changing consumer preferences. It is also worth expanding the study samples to other countries in order to analyze cultural and transnational differences in the drivers of online purchase intentions, which will allow for assessing the universality or specificity of the obtained results.

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PERSONAL BRAND VALUE CATEGORIES. COMMERCIALIZATION OR DEHUMANIZATION?

The article presents the research results on personal brand value categories. No systematized compilation of personal brand values has yet been identified that considers both marketing and humanistic perspective. Therefore, the questions are: what categories of personal brand values can be distinguished, and what connections exist between them? Personal brand (PB) is one of the knowledge commercialization tools. The instrumentality associated with it can lead not only to economic value production but also to dehumanization. A systematic literature review relating to PB values was carried out. The research conducted organizes the current knowledge of PB value categories. It also provides a basis for developing a proposal for a minimum set of value categories that should accompany analyses of concepts and practices related to PB building. Therefore, the results of the presented research complement the way of understanding the personal brand concept with a humanistic context, which should inextricably accompany it.

Keywords: personal brand value, personal brand value categories, personal brand.

1. INTRODUCTION

Personal brand (PB) is a concept used in practice by people in a wide variety of professions, not only influencers (Brewster, Sklar, 2022; Levesque, Pons, 2020) or entrepreneurs (Gandini, 2016), but also engineers, scientists and other intellectual workers (González-Solar, 2018; Kucharska, 2022). Contemporary labor market requirements are driving activities to build a PB. The cyclical changes from the employer's market to the employee's market do not weaken this tendency at all, not least because an identifiable and strong PB increases the probability that an individual will manage in this market regardless of external circumstances (Fugate et al., 2021; Gorbatov et al., 2023). PB can be perceived from many perspectives:

- a tool supporting the commercialization of an individual's knowledge and skills,
- a set of communication tactics and tools,
- professional development strategy,
- development and communication strategy of the organization,

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- a tool for building authority and transferring role models,
- strategies, tactics, and tools that influence both the person building the PB and its audience.

However, these ways of approaching the PB concept are not mutually exclusive; rather, they function simultaneously as practice dimensions with different intensities at a given time. Undoubtedly, PB serves to generate market value, for example, by facilitating knowledge commercialization. However, if the only or main category analyzed and emphasized in the building PB context is economic value, there is a risk that PB will also become a tool for dehumanization (Smoleń-Wawrzusiszyn, 2019). Systematizing the relevant PB value categories seen from different perspectives is the first step to building personal brands in a genuinely human way. Therefore, the questions are: what PB value categories are analyzed in the literature today, are they all sufficiently represented, and what connections exist between them?

The most common ways of recognizing value today (beyond purely mathematical definitions) can be divided into three categories (Hostyński, 1998):

1. Quantitative approach, where value means how much something is worth compared to something else, most often expressed numerically – the usual approach in economics.
2. Object approach, where value can mean both the feature of an object and the thing or person to which this feature is attributed.
3. Axiological approach, where value means some idea determining whether a thing, person, or situation is valuable or not.

Value in marketing is understood as a motivating final state that an individual aspires to (Custers, Aarts, 2005), and decisions to use a product or service are made based on an attribute that can produce an effect desired by the recipient or avoid an undesired effect (Gutman, 1982; Gutman, 1997). And while consumer decisions are a widely researched area and the view on them is much more nuanced today, the perception of value to the consumer itself has not changed significantly, including in the PB case. Referring to Erik Erikson's thoughts (Erikson, 1956) Wioletta Kucharska argues that “expressing personal identity, and in particular personal values, has a strong influence on personal brand recognition” (Kucharska, 2017). Adopting the perspective of the *extended self* to analyze the PB concept (Belk, 2013) it should also be assumed that elements relevant to personal identity, and therefore personal values, will be a significant component of the PB construct. Personal values are also sometimes considered a differentiator when interacting with audiences (Cedeño Bravo et al., 2020; Kucharska, 2017). The political candidates' actions are also analyzed concerning the PB concept. However, this is where mercantilization seems to go even further. The literature uses the term “brandidates” (Kaneva, Klemmer, 2016) meaning the creation of targeted candidate brand personalities for specific voter groups. Therefore, the question can be asked at this point: is it just another term for selective communication to particular groups, which is a natural process even if the individual (person) does not use the PB instrumentality or rather a complete negation of the idea of authenticity and subjectivity of the person building this brand? Researchers also address issues related to celebrity influence in areas such as the behaviors, values, and decisions of their audiences (Choi, Rifon, 2007).

The PB concept is worth looking at critically. The actions of influencers, celebrities, experts, entrepreneurs, and personal brands operating in other areas have a major impact on the various decisions made by their audiences. The PB recipients, on the other hand,

depending on the researcher's perspective, are consumers, employees, partners, or simply the general public. Previous systematic literature reviews in the PB area (Gorbatov et al., 2018; Levesque, Pons, 2020; Scheidt et al., 2020; Szántó, 2023) have shown that the PB value issue has not been among the important threads addressed in the literature, and so far there has been no attempt to systematize the PB value categories.

2. METHODOLOGY

Previous systematic literature reviews have covered the entire spectrum of topics related to PB. The issue of PB's value has been minimally addressed. Considering that the subject undergoing brand-creating processes is the human being, the question was formulated: What categories of PB values are analyzed in the literature? Additionally – are all PB value categories similarly represented in the literature and what connections exist between them? Therefore, the research aimed to systematize knowledge of relevant PB value categories seen from different perspectives.

A systematic literature review regarding the PB value was conducted to identify and organize the current themes in the literature regarding the PB value. A systematic approach to the literature review allows for minimizing the subjectivity of selecting topics (Czakon, 2020). An initial search on Web of Science TM on October 1, 2024 returned 1134 results after applying the following restrictions: TOPIC OR TITLE: (personal brand value), Refined by: Research Domains: (Social Sciences OR Arts Humanities) AND Document Types: (Article OR Review) AND Research Areas: (Business Economics OR Psychology OR Communication OR Social Sciences Other Topics OR Anthropology OR Cultural Studies OR Philosophy), Timespan: All Years, Search Language=Auto. A large number of articles in the subject search were related to marketing research on product or corporate brands, and were therefore excluded from further analysis - they were not related to PB or more to the PB's value. Individual works for which full-text versions could not be obtained were also excluded. After removing duplicates and preliminary analysis of abstracts, 50 articles were submitted for full-text analysis. Open coding targeting different contexts of the value concept's emergence was performed and then categorized.

3. RESULTS

The textual analysis focused on the value concept concerning the PB. The main categories that emerged from the analysis were:

- PB's value in market and marketing terms,
- value delivered to PB recipients,
- PB's personal values,
- PB authenticity.

Several texts contained references to more than one of the above categories. In each category, the leading themes addressed by the analyzed texts were highlighted. A detailed summary of categories and threads is presented in Table 1.

Table 1. Personal brand value categories in the literature

Value category	Detailing	Reference to literature
PB value	PB economic value, market value	Hearn, 2008; Green, 2016; Kucharska et al., 2020; Fitrianti et al., 2020; Dumont, Ots, 2020; 11/7/2025 9:09:00 AMEng, Jarvis, 2020;Osorio et al., 2020; Hernando, Campo, 2017; Vallas, Cummins, 2015; Kunkel et al., 2021; Shieh, Lin, 2023; Astner, Gaddefors, 2024; Barney-McNamara et al., 2021; Pérez-Serrano et al., 2020
	PB effectiveness (professional performance and relationship sentiment)	Rangarajan et al., 2017
	PB as an added (business) value to a product or organizational brand	Cortsen, 2013; Bendisch et al., 2013; Gürel et al., 2023
Value delivered to customers by PB	Values (e.g. self-fulfilment, relationships with others) as a recipient's need that can be addressed by PB	Harrison et al., 2023
	Values provided to the recipients (without specifying what those values are), a kind of utility that can be distinguished by the PB	Kucharska, Mikołajczak, 2018; Edmiston, 2019; Astner, Gaddefors, 2024
	Cultural value delivered to recipients	Zhou et al., 2021
	PB's personal values as a value delivered to recipients	Green, 2016; Fresco, 2020
PB's personal values	Values promoted by PB (from a position of authority with their behavior and words): women's empowerment, equality/liberalism, community, friendship, health, self-esteem, the ideal of thinness, materialism, family, aesthetics, enjoying life, celebrity/adoration	Eyal et al., 2020
	Personal values as a PB differentiator (without detailing what these values could be)	Kucharska, 2017; Kucharska, Mikołajczak, 2018; Hamby et al., 2019
	Relationship between PB's personal values (e.g., CEO) and the organization's values	Scheidt et al., 2018; Astner, Gaddefors, 2024; Hamby et al., 2019; Pérez-Serrano et al., 2020
	Defining personal values as the PB work stage, personal values as part of the PB strategic management process	Górska, 2021; Osorio et al., 2020; Persis Murray, 2015; Borman-Shoap et al., 2019; Manai, Holmlund, 2015

Table 1 (cont.). Personal brand value categories in the literature

Value category	Detailing	Reference to literature
PB's personal values	Ethics as a PB distinguishing feature (personal ethics understood as being a good person)	Cedeño Bravo et al., 2020
	PB-hero with clear personal values and an agent of social change	Jun et al., 2014
	The discrepancy between values traditionally associated with a profession of public trust (e.g. journalism) and becoming a "valuable" PB	Hedman, Djerf-Pierre, 2013; Brems et al., 2017
	Relationship between reputation and PB (reputation as a tool)	Mauri et al., 2018; Eigler, Azarpour, 2020
	Presenting personal values and defending them as the only relevant sense of PB self-promotion activities	Sobande et al., 2023
	Incorporating personal values into the PB narrative simply because they are important to the individual building the PB (in this case, motherhood)	Johnson et al., 2023
PB authenticity	Authenticity (without specifying the meaning of the term)	Harrison et al., 2023
	"calculated authenticity" (Pooley, 2010), which is a balancing act between expressing oneself authentically and engaging the audience in discussion, using authenticity to make PB more sellable	Pruchniewska, 2018
	Authenticity as a tool, economic value of authenticity	Kucharska et al., 2020; Khedher, 2019; Cortsen, 2013; Ünalmış et al., 2024; Kowalczyk, Pounders, 2016
	Criticism of authenticity use as PB tool	Whitmer, 2019
	Authenticity as the correspondence between who the person building the PB is/feels and what he or she says and does in public	Audrezet et al., 2020; Górska, 2021
	Authenticity as an identity transparency, content and PB's interaction with the audience	Liu, 2024

Table 1 (cont.). Personal brand value categories in the literature

Value category	Detailing	Reference to literature
PB authenticity	The challenge between achieving PB authenticity and self-presentation appreciated by the audience, PB authenticity in opposition to creating an image adapted to current market expectations, seeking a balance in this sphere	Thompson-Whiteside et al., 2018; Whitmer, 2021; Heriberta et al., 2024; Toffoletti, Thorpe, 2018
	Authenticity as an ethical requirement	Ünalmış et al., 2024

Source: own elaboration based on own research.

4. DISCUSSION

The first research conclusion is the small number of texts that address the PB values issue. The 50 texts identified in this analysis represent only a small percentage of the literature on PB, and even among them, only a few are devoted entirely to the PB value issue. Most of them feature the PB value issue as a side thread. PB values in the literature are primarily analyzed from a marketing, management, and economic perspective, that is, from the point of view of a certain kind of utility provided by a personal brand. However, PB is a concept "practiced on a person", so its analysis cannot be limited to a marketing perspective only. The PB's value is most often described today:

- in quantitative terms – building PB derives from marketing practices to increase recognition, stimulate demand and increase sales or price premiums at a certain sales volume,
- in object-oriented terms – researchers emphasize that the person building PB provides some (usually unspecified) value to their recipients, and this value is preferred by them enough that they are willing to pay for it with their attention, time, money (purchase of products, services or employment).

Personal values (in axiological terms) presented by the person building PB are not widely analyzed in the literature. One of the few named or highlighted values emerging in relation to personal brand is authenticity. PB authenticity is usually not analyzed in an ethical context, by far more often it is approached object-oriented or even instrumental approach – authenticity is analyzed as one of the factors serving to achieve mercantile goals.

The concept of authenticity concerning PB seems to have escaped all previous approaches. Perhaps, then, it requires a redefinition (Eyal et al., 2020; Marwick, Boyd, 2011). While it might be that authenticity should remain intact and defined as selective and at the same time sincere in terms of both intent and message, PB communications today need new terms. Presenting authenticity, which is an important topic of philosophical considerations, as an instrument for the realization of mercantile goals can lead to the devaluation of the authenticity concept, and consequently the loss of its original meaning. Lack of reference to PB values in axiological terms can lead to the dehumanization of processes so strongly linked to personal development, professional improvement, social influence, and building authority. Considering the full spectrum of PB value categories and relating it to an ethical perspective can help build more responsible personal brands, which can be an important practical implication of this article.

Today, the PB concept is often used as a set of tools to support the processes of building authority or gaining the support of specific groups. This is undoubtedly also a different concept from the branding of product and organizational brands, here our humanity may be involved, even if it sounds high-flying. Therefore, when analyzing this concept, isn't it worth looking at PB's broader set of value categories each time? The minimum set of value categories to consider each time in analyses are:

- PB value – market value, including the economic value that can be generated for the PB, as well as for the organization or other market entities related to it,
- values delivered to the audience – it seems insufficient to merely state that PB delivers some values, it is necessary to name what those values are, not least because it is not uncommon for patostreamers to reach huge crowds of watchers by delivering content that promotes harmful and often downright inhumane behavior; it seems necessary here to impose a responsibility filter on the language we use in both scientific analysis and social discourse about such phenomena,
- perceived authenticity: declared personal values vs. personal values in action,
- ethics.

This approach's essence is not to analyze them in a fragmentary way, as is usually done today, but due to the specific PB nature, it seems important each time to analyze all of the above value categories and their interrelationships. Whether PB achieves a high market value should not be analyzed in isolation from the values that PB promotes among its recipients.

The present paper did not cover all journal databases, monographs, and texts in Polish, which is undoubtedly its limitation, characteristic of systematic literature reviews (Czakon, 2020). The proposed minimum set of PB value categories is only the beginning of the discussion in this area.

5. CONCLUSIONS

Without engaging in a discussion about what values are conveyed by PB today and the way they communicate them, it can lead to a situation where *beauty* becomes its caricature leading to a situation where young adults face unrealistic expectations created by the idealized Instagram world (Lin et al., 2016). It may also happen that *knowledge* becomes something that cannot be distinguished from simplifications and abuses, which is already happening in the field of psychological knowledge today (Gutral, Kowalczyk, 2023). PB is increasingly replacing authority concepts today, without carrying the same seriousness and responsibility required of authorities. Social changes, and consequently changes in the conceptual apparatus we use in various discussion spaces, are inevitable. This makes it all the more important to verify what lies behind the terms we use. The research presented here is a response to the appeal for greater accountability of the social sciences presented by Prof. Anna Giza-Poleszczuk in her book "The Sorcerer's Apprentice, or the Social History of Marketing" (Giza-Poleszczuk, 2017). Brands are no longer just abstract creations used to generate profits for individual large corporations. We live in a world of brands, and they are becoming an important element in forming personal identity. The PB concept goes even further. The marketing practices analyzed by Giza-Poleszczuk are a pretext to present the processes that underlie the creation of modern societies, lacking an open discussion about the moral dimension of the world we are building.

The author has read and agreed to the published version of the manuscript.

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SECURITY AND RELIABILITY IN DIGITAL DIPLOMACY – REVIEW OF SELECTED LITERATURE

This study addresses the importance of cybersecurity and trustworthiness in digital diplomacy in the digital age, where the need to ensure digital security in international relations is increasing, especially as cyberattacks and disinformation threaten the stability of virtual diplomacy. The study aims to analyse the role of technologies such as artificial intelligence in improving digital security and enhancing trust between states. It also seeks to identify the main challenges facing digital diplomacy, such as the threats of cyberattacks and disinformation, and the importance of international standards to ensure data protection. The main issue is how to keep information secure and protected in the digital space and integrate AI into cyber negotiation processes to facilitate relations between states. The study used a comparative analysis approach to examine international cybersecurity policies and analyse AI's role in supporting digital diplomacy. Among the key findings, the study highlighted that combating disinformation requires integrated strategies between countries and using AI to analyse data and detect fake news. Integrating AI into cyber negotiation enhanced states' ability to make more strategic decisions on digital issues. In light of this, it was recommended that unified international standards for cybersecurity be developed and that cooperation between countries should be increased to use modern technologies to improve digital diplomacy.

Keywords: cybersecurity, digital diplomacy, disinformation, artificial intelligence, cyber negotiation, international standards.

1. INTRODUCTION

In today's digital age, the concept of security and reliability in the digital space has become critical in the context of interstate relations. Information technology plays a pivotal role in enhancing communication between countries, but this communication requires reliable security guarantees to protect the sensitive data and information that is exchanged. Digital security and data protection is not only about preventing cyber-attacks, but also about ensuring the integrity of information and protecting it from manipulation or alteration.

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Digital diplomacy is the integration of digital technologies into the practice of diplomacy. It is not only about the use of social media platforms, but encompasses a wider range of technologies and their impact on diplomatic processes (Barman, 2024). Digital diplomacy is defined as the strategic use of digital tools and social media platforms by diplomatic actors (such as governments, diplomats, and international organizations) to conduct a wide range of diplomatic activities. This form of diplomacy involves using platforms such as Twitter, Facebook, and Instagram to communicate policies, engage with foreign audiences, and manage a country's image and influence globally. Its primary focus is on communication and public engagement, leveraging these digital platforms to influence public opinion, engage in public diplomacy, and facilitate interactive communication between countries and audiences around the world. The scope of digital diplomacy is broad, covering various aspects of diplomacy, including public diplomacy, cultural diplomacy, and crisis communication, thus harnessing digital platforms for a variety of diplomatic objectives (Frey, 2024).

Digital diplomacy faces significant challenges as a result of ongoing cyberattacks, which can disrupt government work and negatively impact international relations. Such threats reflect the urgent need to develop defense strategies and advanced technologies to counter digital risks, as well as the importance of strategic analysis that can help detect threats before they occur.

On the other hand, new technologies such as AI offer great opportunities to improve the security and reliability of digital systems. AI applications can detect cyberthreats faster, enhancing trust between states in cyberspace. As these technologies evolve, digital diplomacy is expected to see more challenges and opportunities in the future. New tools may emerge that improve international cooperation, while at the same time, the risks associated with advanced digital threats increase. Therefore, future challenges related to digital technology developments need a coordinated response from all states to ensure the maintenance of a safe and reliable international environment. The close relationship between technology and international politics is evident here, as the impact of technological innovations on state-to-state relations in the digital age is pivotal in shaping the future of digital diplomacy.

Importance of the study

The importance of this study lies in understanding the growing relationship between cybersecurity and digital diplomacy in the digital age. With the increasing reliance on digital technologies in political and diplomatic dealings between states, the protection of sovereign information and data becomes essential to maintain the security and stability of international relations. This topic reflects the need for a deeper understanding of the threats facing states in the digital space, in addition to clarifying how the evolution of these technologies affects the interactions of international politics. This study aims to enhance awareness of the importance of global digital security standards and assess the role of modern technologies in improving cybersecurity in the diplomatic sphere.

Objectives of the study

Analyze the importance of security and reliability in digital diplomacy and examine how the concepts of security and data protection can build trust between countries and facilitate international cooperation. Identify the main challenges facing digital diplomacy, such as ongoing cyberattacks and growing digital threats. Explore the role of artificial

intelligence and new technologies and examine how technologies such as artificial intelligence can improve data security in digital diplomacy.

Study hypothesis

This study hypothesizes that improving cybersecurity in digital diplomacy relies heavily on international cooperation and the development of global security standards, and that technological advances in areas such as artificial intelligence can contribute to enhancing reliability and digital security among states. It also hypothesizes that persistent cyber threats pose a significant challenge, but can be mitigated through thoughtful security strategies and sophisticated tools.

Problematic

The main issue is how to ensure the security and reliability of data exchanged between countries in light of the increasing challenges of cyber attacks and rapid technological developments, which led us to pose the following question: How can states cooperate effectively in the digital space without jeopardizing their sovereignty and digital security?

Methodology

This study adopts a comparative analytical approach, analyzing the existing literature on cybersecurity and digital diplomacy, and comparing the applications of digital security and reliability in digital diplomacy across different countries or regimes. Furthermore, the study will include a discussion of recent technological developments of artificial intelligence to determine their impact on digital security in international diplomacy.

Division of the study

In order to answer the question, we divide the study into the following sections:
First: Disinformation and its impact on virtual diplomacy.
Second: Integrating Artificial Intelligence in Cyber Negotiation.
Third: The effectiveness of AI-supported digital diplomacy.

2. DISINFORMATION AND ITS IMPACT ON VIRTUAL DIPLOMACY

The logic of internationalization, which has been evident for many years in the global expansion of physical infrastructures, markets, cultures and ideologies, is also visible in information and communication technologies (ICTs) Large AI solution providers are expanding their international reach mostly through cloud computing solutions. Resources for processing data for AI services are available in this cloud.

The multiplicity of actors and their enormous capacity for intervention and influence pose significant challenges to traditional diplomatic actors; virtual activists can create fake social media accounts to spread disinformation, perhaps in the name of political or diplomatic officials. Even worse, hackers can hack into a diplomatic website, spread the message they want and even reveal confidential or dangerous data of a particular state (Mohammed, 2021).

Some theorists of digital diplomacy view it as a cost-effective form of diplomacy that is much cheaper than traditional diplomacy. Marcus Holmes argues that identifying and managing two types of change in the international system - top-down structural external shocks and bottom-up internal transformations - through digital diplomacy is the main goal of diplomacy nowadays. On the other hand, the application of digital tools in diplomacy is able to bypass the hierarchical structure of diplomatic communication and make the voice

of ordinary people or professional alliances heard, and diplomats can communicate with the public and promote specific views and ideas to enlighten them (Kurumchina, 2019).

Recent advances in automated decision-making have highlighted the pervasive issues of bias and discrimination inherent in AI models trained on large datasets. These models often encode and perpetuate human biases, as seen in fields as diverse as criminal justice, finance, employment, education, and healthcare. However, little attention has been paid to understanding biases and discrimination when AI models trained on unconventional data are used for diplomatic decision-making during crises (Varela, 2024b).

The proliferation of misinformation and the speed at which it can spread has made crisis communication more difficult. The spread of misinformation and fake news can complicate crisis response efforts and hinder effective communication with the public. Social media can amplify negative sentiment and cause rumors and unverified information to spread quickly, fueling public anger and distrust. The pressure to respond quickly to crisis situations on social media can lead to hasty and inaccurate communication, undermining the effectiveness of crisis response efforts. However, the decentralized nature of social media means that crisis responders have limited control over the dissemination and receipt of information, making it difficult to manage public perceptions and expectations (Fasinu et al., 2024).

The impact of misinformation and disinformation is particularly evident in diplomatic crises, where distorted narratives can escalate conflicts or impede peaceful solutions. In international conflicts, actors may use digital platforms to spread propaganda or distort the facts surrounding the conflict to influence public opinion or gain support for their cause. This manipulation of information can lead to increased polarization and mistrust between countries, making it difficult to reach consensus on key issues such as trade agreements, security arrangements, or climate change negotiations(Yousaf, Zishan, 2024).

The EU Foreign Affairs Council expressed concern

> about the growing scope and sophistication of disinformation and foreign information manipulation and interference (FIMI) in the digital space, which can erode public trust in democratic processes and institutions, undermine public initiatives, reinforce stereotypes, and incite discrimination, xenophobia, intolerance and violence. The Council invites the High Representative, the Commission and the Member States to address disinformation and foreign information manipulation and interference (FIMI) while ensuring an open, free, global, stable and secure Internet and fully respecting human rights, democracy and the rule of law (Council of the European Union, 18 July 2022).

The rise of deepfake technology has become a growing concern in international diplomacy as disinformation campaigns have gained widespread use in information warfare. Information warfare encompasses both the disruption of enemy communications functions, now part of cyber operations, and the manipulation of information for deceptive purposes, also known as psychological warfare. This has gained momentum with the ability to manipulate audio and visual imagery, allowing the creation and dissemination of fake videos on social media platforms. In the United States, psychological operations are integral to influencing enemy decision-making through various information-related capabilities, including disinformation (Ikenga, Nwador, 2024).

Unfortunately, three major issues arise in the digital public sphere when it comes to political communication: 1) Resource-rich individuals or states often have too much power and undue influence over the public sphere or foreign audiences; 2) Fake news that misleads public perception; and 3) The unregulated aspect of online platforms that inadvertently allow for harassment and abuse (Williams, Otto, 2022).

State-sponsored cyberattacks, hacking, and data breaches are now commonplace, and these risks undermine both the security and integrity of diplomatic operations. As more sensitive information is exchanged through digital channels, ensuring the security of diplomatic communications has become a critical issue. Cyberattacks targeting diplomatic organizations, foreign ministries and embassies have raised alarms about the vulnerability of sensitive government data. In recent years, several high-profile cyber incidents have revealed weaknesses in the cybersecurity frameworks of diplomatic entities. For example, the hacking of email servers, such as the 2016 attack on the Democratic National Committee (DNC) in the United States, showed the potential for cyber actors to influence diplomatic affairs, elections, and international relations. Cyber espionage, where adversaries steal sensitive government data, has become an increasingly prevalent threat, with national security jeopardized by the compromise of confidential diplomatic materials. The widespread spread of fake news and deepfakes also complicates the diplomatic process, making it difficult for policymakers to distinguish between credible information and malicious content (Yousaf, Zishan, 2024).

AI systems are expanding the space for phishing attacks from email to other areas of communication, such as phone calls and video conferencing. This illustrates how it is difficult for diplomats and states to verify the credibility of information and its sources before making a decision. Where AI systems are being exploited today against international psychological security; it affects political decisions and international relations (Fatima, 2021).

3. INTEGRATING ARTIFICIAL INTELLIGENCE INTO CYBER NEGOTIATION

AI is a technology with distinct security and defense applications. States are under pressure to protect their citizens, interests at home and abroad, and political stability in the face of potentially malicious or fraudulent uses of AI. Thus, the foundations of the argument in favor of techno-nationalism already exist and are rapidly gaining support. Diplomatic AI bargaining would endlessly save time in multilateral negotiations such as the Paris Climate Change Agreement, and push many stalled political processes into a range of solutions. This does not mean removing the human touch from bilateralism or politics, as personality and individual skill would still matter. Instead, AI-based negotiations envision a diplomatic future where diplomatic bargaining is more streamlined, with redundant or time-consuming tasks assigned to bots (Akın Ünver, 2017).

A diplomatic mission based on artificial intelligence technology will require experts who are not only well-versed in traditional foreign policy but also in technology and its implications for business, society, and nations. These employees may not be readily available through a conventional civil service selection process. Their tasks include, among other things: (1) drafting relevant national policies and the government's position in areas where artificial intelligence intersects with international relations within the local security and ethical framework; (2) creating an environment to accept such contextual policies for artificial intelligence through appropriate communication and discussions at various levels

involving a diverse range of stakeholders, such as civil society, academia, and the media; (3) working with bilateral and multilateral agencies, reviewing various agendas, and developing acceptable standards of conduct and review processes for transnational systems based on artificial intelligence; and (4) coordinating the implementation of these standards through formal mechanisms such as agreements and treaties as well as informal mechanisms, such as confidence-building measures (Feijóo et al., 2020).

Imagine high-stakes peace talks driven by AI-powered conflict simulations, or complex trade negotiations where sophisticated economic models are analyzed in real time. In both bilateral and multinational talks, AI offers this unique perspective. One example of this possibility is the Negotiation Support System for International Treaties, an ongoing initiative of the European Union. AI makes linguistic suggestions and detects any ambiguities by examining past treaties and legal documents; this can facilitate conversations and increase clarity. Initiatives such as the UN's Global Early Warning System use AI to evaluate large data sets of social media, conflict indicators and news stories in order to predict potential outbreaks of violence. This opens the door to preventive diplomacy in conflict resolution (Shah Hussain, 2024).

Artificial intelligence in cyber diplomacy involves the use of machine learning, natural language processing and other AI techniques to analyze complex data sets and make predictions. Deep fakes are digital audio or video content that has been intentionally manipulated to falsely portray an object, environment, or individual and may take the form of facial replacement, re-enactment, generation, or speech synthesis. The Congressional Research Service report (2019) states that with artificial intelligence, deepfakes are becoming increasingly real and are often used as a tool by individuals or insurgent groups against the United States and its allies to inflame public perception, manipulate diplomats, and destroy public trust (Williams & Otto, 2022).

As a result of emerging technologies such as social media, optimized search engines, and artificial intelligence, diplomatic negotiations have seen a shift towards greater transparency through data-driven techniques. While this shift has allowed the general public to more effectively hold their representatives abroad accountable, we must ask whether these shifts are contributing to or diminishing the ability of diplomats to compromise and maintain healthy international relations (Hibben, 2021).

New technology diplomacy will allow both general aspects of AI and sector-specific applications to be addressed. Since much of AI and IT technologies are dual-use and versatile, it will also allow for engagement with civilian and security concerns. In joint efforts to build international collaborative governance, leading stakeholders may begin with informal and modest governance-building initiatives. However, these diplomatic efforts should be particularly focused on fostering the determinants of effectiveness, including a willingness to cooperate with a shared understanding of what collective efforts can achieve: Trust, communication, mutual respect, and leadership (Feijóo et al., 2020).

Countries are beginning to integrate AI into foreign policy and international relations, using autonomous weapon systems for international security and military power. While governments are recognizing the power that AI has and countries are trying to lead their AI capabilities, Russia has expressed that AI will one day rule the world. On the other hand, China has applied advanced technology to foreign policy decision-making, as evidenced by China's application of AI to decision-making in the BRI strategy (Williams, Otto, 2022).

AI has become a pivotal element in cyber diplomacy, affecting various aspects, from threat detection to international negotiations. AI's ability to quickly analyze huge data sets is instrumental in identifying potential cyber threats and aiding diplomatic efforts in the

field of cybersecurity. IoT devices contribute to an interconnected global network, raising concerns about cross-border data flows and international standards for device security (Radanliev, 2025).

AI-based simulation models offer the possibility of testing different negotiation strategies and predicting the possible outcomes of complex international negotiations. This can provide diplomats with a deeper understanding of other parties' positions, which can lead to more effective and peaceful solutions to a conflict. AI systems can provide new avenues for conflict resolution, by simulating negotiation scenarios and proposing optimal solutions based on predictive analysis. This could transform international mediation, making peace processes more efficient and effective (Varela, 2024a).

AI's prowess goes beyond prediction; imagine a high-stakes UN summit where diplomats from around the world speak seamlessly, their words instantly and accurately translated by AI. This technology transcends language barriers, ensuring that every nuance of diplomatic dialog is understood as intended. AI is like a master chess player in the field of diplomatic strategy; it can analyze multifaceted scenarios, taking into account many variables that the human mind may overlook. AI simulates a peace negotiation scenario, providing diplomats and decision-makers with insights into the possible outcomes of different negotiation strategies. This predictive modeling is invaluable during sensitive negotiations, providing clarity on red lines, possible reactions, and the positions of the opposing party. A real-life example of this is the United Nations' use of AI in peacekeeping missions, where AI algorithms help predict conflict zones, contributing to timely and effective decision-making. Another example is the European Union's use of AI to analyze economic trends to help its member states formulate policies and ensure more coherent and informed economic strategies (Frey, 2024).

International cooperation in cyber diplomacy is promoted to mitigate mutual threats and challenges. Countries cooperate in developing cyber standards, guidelines, and agreements that support a safe and secure online environment. This is particularly focused on AI, because AI is simply software, and we have long-standing concerns regarding AI methods of attack and defense via distributed denial of service (Radanliev, 2025).

AI's potential in diplomacy to anticipate and avoid war is among its most exciting uses. Potential flashpoints, such as rising political tensions or resource constraints, can be recognized through early warning systems based on historical data and real-time intelligence. AI can warn diplomats of approaching crises by monitoring social media discussion, troop movements, and economic indicators. This allows diplomats to take proactive action or launch diplomatic interventions on time (Shah Hussain, 2024).

One technique that has become popular is the use of verbatim reporting, which involves the use of transcription software to translate verbal interactions into text. In addition to providing other diplomats with a detailed transcript of their counterparts' speech that can be analyzed, validated and understood through automated processes, these transcripts are also posted online. Diplomats thus find themselves accountable to a larger audience, leading them to make non-controversial statements and avoid conflict. This new reality seems desirable because it prevents diplomats from falsely representing their country and allows diplomatic negotiations to move beyond the Track 1 level. However, one of the fundamental principles of diplomacy, the principle of cooperation, may be at risk. How to reconcile the desire for increased transparency while maintaining diplomatic confidentiality will prove to be a major hurdle as diplomats increasingly utilize electronic means of diplomacy (Hibben, 2021).

The competition for AI supremacy has a direct and indirect impact on diplomacy. Diplomats are directly involved in the preparation of negotiation topics, but they are also involved in negotiations between intergovernmental organizations and international organizations. Participating in negotiations or engaging diplomats requires diplomats to be competent in dealing with AI issues. In order to ensure proper qualifications in AI matters, the Ministry of Foreign Affairs or international organizations choose to hire specialists or better train and prepare diplomats. The constant competition in the field of AI also requires diplomats to develop new and in-depth forms of cooperation with new entities such as specialized think tanks or research centers focused on AI (Kļaviņš, 2021).

4. THE EFFECTIVENESS OF AI-ENABLED DIGITAL DIPLOMACY

Cyber diplomacy is concerned with the need for actors to cooperate, exchange views, coordinate collective action, compete, and confront each other in a cross-border environment regarding the consequences of the digitization we are experiencing in social, economic, security, and political life. This digitization is in fits and starts, advancing faster in some areas and in some countries than others, affecting people/entities differently, but its transformative impact is undeniable in the long run (Caba-Maria, 2024).

Disparities in technological access and capabilities can lead to imbalances in diplomatic engagements, limiting participation and representation. Diplomatic negotiations and communications conducted digitally may face challenges in maintaining confidentiality and privacy, which could lead to leaks or unauthorized access. Digital platforms can be used for propaganda purposes, influencing public opinion in other countries, distorting narratives, and affecting diplomatic relations. The rapid development of digital diplomacy often bypasses regulatory frameworks, leading to ambiguity in legal guidelines and ethical considerations surrounding online interactions (Barman, 2024).

Micro-negotiators-bots that manage multiple rounds of negotiations based on massive data sets-can be vital to multilateral negotiations and save significant time in reaching agreements. When the issue being negotiated is data-heavy, micro-negotiators can do a much better and faster job than human negotiators. These junior negotiators can either reach an agreement on their own, or help senior negotiators define the political aspects of a settlement. In multilateral and multinational summits, junior negotiators can be even more valuable as the parties can focus on more human-centered aspects of the negotiations. For example, in discussing the amount of foreign aid and disaster relief, junior negotiators can quickly identify key aid areas by analyzing geospatial imagery and real-time social media posts from the region, greatly facilitating and streamlining aid negotiations (Akın Ünver, 2017).

The risks of AI in diplomacy include the potential misinterpretation of information, leading to misunderstandings and escalating tensions, which could lead to conflicts. In addition, the biases inherent in AI algorithms are a concern, as discriminatory results can appear in diplomatic decisions, undermining trust and cooperation. The introduction of AI into diplomacy also brings security risks, as malicious actors target AI systems to undermine sensitive diplomatic information or manipulate negotiations, affecting international relations (Sadiq et al., 2024).

World leaders and diplomats are becoming more vulnerable to cyberattacks as a result of their increasing use of digital technologies. These risks are posed not only by traditional state enemies but also by non-state actors who want to sabotage government communications and steal private data for their own purposes. The risk of hacking has been

around since the development of the internet. It has been seen as the primary risk of digital diplomacy because it has often led to career-threatening situations for many heads of state, heads of government, and diplomats around the world (Sharma, 2023).

In times of crisis, AI systems can be of great benefit to diplomats by supporting them in understanding the situation (descriptive analytics) and recognizing potential patterns (predictive analytics). It helps diplomats and other foreign policy experts analyze internal and external text documents, analyze speech and content, frame inputs, detect hate speech, and prevent the spread of terrorism-related information on social media platforms (Tamunomiegbam, Kia, 2022).

Artificial intelligence systems can provide better information faster than humans. However, assessing the quality of this information and integrating it with the practical knowledge of practitioners remains a task for humans. Therefore, countries need to be bold in experimenting and exploring further:

1. Current AI systems have significant limitations. However, they show potential that encourages further practical exploration. AI models trained with the help of large amounts of text—aimed at capturing "all the knowledge in the world" – hold potential for new forms of automated scenario building for strategy formation, and thus can provide concrete guidance for conducting negotiations. These possibilities should be actively and extensively explored.
2. AI-based analyses of public sources in negotiation texts represent a more modest approach. However, the potential of this type of analysis also warrants further exploration. By examining publicly available data – from "signals" such as voting behavior in international organizations and state visits to public states in various media – it should be possible to draw strategic "maps" of the sentiments and opinions of states directly or indirectly involved in negotiations. These, in turn, can be used on the logic that guides decision-making in states in preparing for and conducting negotiations. Here, close cooperation should be sought with institutions that already work in a similar way, for example in the context of early crisis detection (Stanzel, Voelsen, 2022).

International cooperation and diplomatic efforts are needed to establish cybersecurity standards and procedures to secure IoT systems. The IoT operates globally, with devices and networks frequently crossing national borders. Because of this interconnectedness, countries must cooperate to address cross-border cyber threats and implement joint cybersecurity measures. User privacy is often compromised when IoT devices capture vast amounts of personal data. Cyber diplomacy is critical in negotiating international agreements and legislation to protect user data and establish cross-border data privacy standards (Radanliev, 2025).

Artificial intelligence profoundly enhances the strategic dimensions of cyber diplomacy, providing essential tools that simplify complex decision-making processes, enhance threat intelligence, and refine diplomatic strategies in real time. AI's ability to quickly process and analyze large amounts of data translates into a more accurate understanding of global cyber trends and potential threats, allowing diplomats to anticipate challenges and seize opportunities in the digital realm. AI excels at predictive analytics, which involves using algorithms to analyze comprehensive data sets, from cybersecurity alerts to global political shifts, to predict potential security threats and geopolitical events (Michael, 2024).

AI systems support real-time decision-making in cyber diplomacy by integrating dynamic data streams, such as cyberattack maps and diplomatic communications, which

are vital during high-stakes negotiations or cyber incidents. This integration allows diplomats to make informed decisions quickly, a critical capability in fast-paced environments where delays can lead to escalating vulnerabilities (Michael, 2024).

Strategies for enhancing the effectiveness of digital diplomacy focus on fact-checking and information verification, building capacities and skills in digital communications and data analysis, and strengthening coordination and cooperation among stakeholders. Effective digital diplomacy requires the ability to communicate with diverse audiences, navigate geopolitical tensions, and build partnerships with other countries and organizations. Strategies to enhance international engagement should focus on cultural awareness, strategic messaging, and data-driven analysis (Fasinu, Olaniyan, Afolaranmi, 2024).

Cyber diplomacy faces many challenges and barriers that can hinder successful international cooperation and the development of a secure and stable cyberspace. Cyber diplomacy is a challenging field due to several factors. One of these factors is the international nature of cyber threats. Since cyberattacks can originate anywhere in the world, tracking and prosecuting hackers is difficult. The second factor is the lack of a unified international agreement defining what constitutes a cyberattack or how to respond to it. This makes international cooperation on cybersecurity issues more difficult. The third factor is that cyberattacks can be used for political purposes. Cyberattacks can achieve political goals such as disrupting elections or inciting social unrest. This makes it difficult to distinguish between cyberattacks motivated by criminal intent and those motivated by political intent (Radanliev, 2025).

Artificial intelligence may prove to be an important tool in international diplomacy for building trust among key stakeholders in resolving or settling disputes through the use of impartial procedures that are both verifiable and transparent. However, AI is not objective, as developers of automated tools inevitably introduce biases into the code that favor certain actors. Nevertheless, the use of AI-based tools offers a level of transparency that, when applied in the context of diplomatic negotiations, can contribute to increasing trust and thus reaching a compromise between the negotiating parties (Hibben, 2021).

With the use of artificial intelligence, traditional diplomatic behaviors have changed. For example, artificial intelligence can predict the outcome of negotiations by calculating algorithms, and calculations and analysis are faster, cheaper, and more accurate. Therefore, the task of diplomats is only to continue to improve results and outputs, adding ethical and moral perspectives to these scenarios. This is one way in which AI can improve diplomacy, especially if it is used only to provide assistance. Diplomats need accurate decisions based on clear and stable procedures that they can rely on. This is done by researching data and technologies that organize results and make it possible to identify patterns and relationships that cannot be predicted in any other way.

So now, instead of diplomats doing all the work, it is done through digital platforms that can be used as tools for diplomatic crisis management, decision-making, crisis resolution, and so on. However, it should be noted that artificial intelligence tools and digital platforms must be used with care because they can hinder their purpose and be biased in making certain decisions, which means that they are still capable of making mistakes. Artificial intelligence should be viewed as a diplomatic tool and a factor that shapes the diplomatic environment. As a diplomatic tool, it is capable of supporting the functions and tasks of diplomats and, as such, will have the potential to reshape the international system (Tilovska-Kechedji, Kolakovic, 2022).

Society needs to rethink its foreign policy, diplomacy, and international cooperation in light of the new problems posed by the malicious use of artificial intelligence in a variety of sectors, most notably global psychological security. This threat is a key element of the new Cold War, which is characterized by competition to develop artificial intelligence. The emergence of new technological and economic powers is giving rise to a new international order, which in turn requires new participants and new rules governing international interactions. On the other hand, the harmful use of artificial intelligence raises new issues for governments as the main actors in international relations. This is due to the creation of new concepts such as artificial diplomacy, data sovereignty, cybersecurity, and cyberwarfare, all of which are intertwined with artificial intelligence (Tamunomiegbam, Kia, 2022).

We must take into account that artificial intelligence algorithms use large amounts of data without distinguishing between borders, so how should this cooperation between countries be formulated, given that national sensitivities and regulations regarding data privacy must be considered? Therefore, national foreign policy and diplomatic approaches must address the new tools and elements used by technological diplomacy. For many countries, there will be a need to reshape foreign policy as well as human resources in order to understand the emerging implications of AI. Tech diplomacy will require going beyond treaties, as AI covers different areas (Tilovska-Kechedji, Kolakovic, 2022).

5. DISCUSSION

1. Combating misinformation: Countries and international organizations must adopt effective strategies to combat misinformation, including the use of artificial intelligence technologies to analyze data and detect fake news. Cooperation between countries in this area should also be strengthened to ensure that trust between the public and decision-makers is restored.

2. Promoting the integration of AI in cyber negotiations: It is necessary to promote the use of AI in cyber negotiations by providing the necessary training and resources to negotiation teams. States should invest in the development of AI-supported negotiation platforms to ensure greater efficiency and effectiveness in negotiating sensitive global issues.

3. Develop international standards for digital security: Countries should work together to develop unified international standards for cybersecurity in the context of digital diplomacy. International organizations such as the United Nations should participate in the formulation of these standards to provide a framework that ensures the protection of data and information between countries.

4. Investing in artificial intelligence technologies to enhance digital diplomacy: Countries should continue to invest in modern technologies such as artificial intelligence to improve the ability of digital systems to protect information and facilitate cooperation between countries. Artificial intelligence can be key to improving diplomatic performance by automating many processes and analyzing data more accurately.

5. Establishment of specialized digital diplomacy teams: It is important for countries to establish specialized digital diplomacy teams, supported by expertise in cybersecurity and artificial intelligence. These teams will be able to deal with growing digital challenges and ensure that countries are prepared to face future threats in this area.

6. Cybersecurity and digital diplomacy are areas of strategic importance in international relations. With the continuous development of technology, the challenge of ensuring the

security of information and digital negotiations is increasing. However, the trend toward leveraging artificial intelligence and modern technologies in this field offers great opportunities for developing digital diplomacy and enhancing international cooperation in the digital age.

6. CONCLUSIONS

Digital diplomacy is currently one of the cornerstones of international relations, with increasing reliance on digital technologies and artificial intelligence to enhance communication between countries and resolve global issues. With the rise of cyber threats, it has become necessary to focus on cybersecurity and digital reliability to ensure the continuity of international cooperation and protect it from risks that threaten its stability.

This study highlighted several important issues in this context, starting with misinformation and its impact on virtual diplomacy, showing the negative effects of this phenomenon on the integrity of political and economic interaction between countries. Misinformation plays a major role in distorting facts and disrupting decision-making processes, leading to the deterioration of diplomatic relations. In this context, it becomes necessary to adopt more effective strategies to detect and combat misinformation and ensure the integrity of information across all digital channels.

On the other hand, the study addressed the integration of artificial intelligence in cyber negotiation, noting the great potential that artificial intelligence offers to improve the effectiveness of negotiation in sensitive matters. AI helps analyze data quickly and accurately and provides strategic insights to enable negotiators to make informed decisions, enhancing the ability of countries to negotiate more effectively in a complex digital environment.

As for the effectiveness of AI-supported digital diplomacy, the study showed that AI is a powerful tool for improving the performance of digital diplomacy. AI provides advanced analytics tools that can be used to improve communication and interaction strategies between countries, as well as helping to address the challenges countries face in the field of cybersecurity. With the advancement of these technologies, it has become possible to enhance digital security and increase reliability in virtual diplomatic operations.

The author has read and agreed to the published version of the manuscript.

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