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Development of the welfare economy and the economy of impressions on the basis of inclusion and social innovation

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Abstract. The relevance of this study lies in the increasing number of countries worldwide that are prioritising population welfare as a key policy objective. In the post-war period, Ukraine should focus on fostering inclusiveness and cultivating an equitable culture that takes into account the interests of all members of society. This research aimed to examine the components of inclusive development within the national economy, based on social innovations, and to identify the relationship between the welfare economy and the experience economy. The primary outcomes of the study included the justification and exploration of the elements of inclusive economic development grounded in social innovations that seek to enhance the population's welfare. Particular attention was given to social innovations that promote the creation of a barrier-free environment within Ukrainian society. Data on the compound annual growth rate of the global segmented entertainment and media market for 2024-2028 were analysed, indicating the dynamic evolution of the experience economy. The author's perspective on the interrelationship between the welfare economy and the experience economy in the context of inclusive development was presented. An overview of existing concepts and approaches to the formation and advancement of the welfare economy was provided. The First and Second Welfare Theorems were examined, along with the foundational ideas introduced by the pioneering scholars of welfare theory. The practical value of the study lies in substantiating the influence of social innovations, digital technologies, inclusion, and accessibility on consumption patterns within both the welfare and experience economies

Keywords: experience economy; inclusive development; barrier-free; accessibility; virtual world; inequality

Introduction

The welfare of the population is of growing importance to nation-states. Governments across various of different countries are demonstrating increasing interest in the spiritual and physical well-being state of each member of society. Welfare can be enhanced through the combined efforts of individuals, public bodies, and governmental organisations, utilising the potential of institutional and organisational approaches. "The economics of welfare is becoming even more relevant, as the economic approach is rapidly being implemented in artificial intelligence (AI) and machine learning (ML) systems" (Coyle *et al.*, 2023).

Achieving a high level of welfare in Ukraine is challenging due to existing inequality, financial and economic crises, and the imposition of martial law. Nevertheless, both authorities and society must make every effort to improve the indicators of the welfare economy (WE) and promote the development of the experience economy (EE). In the post-war period, emphasis should be placed on fostering inclusiveness and

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cultivating an equitable culture that respects the interests of all Ukrainians, taking into account physical and psychological characteristics, social status, religion, age, and gender.

Leading nations in the progressive advancement of the WE include Singapore (7 trillion USD), South Korea, and Japan. In terms of EE, the United States holds the leading position (6.5 trillion USD), followed by the United Kingdom and Germany (Drzeniek *et al.*, 2024). The strengths behind the development in these countries include coordinated collaboration between government and industry, as well as strong potential in the fields of culture, entertainment, and, notably, sports. Researchers D. Coyle *et al.* (2023) raised the issue of a potential reconfiguration of the WE. They supported this argument concerning present concerns such as moral principles, human behaviour under the influence of digital technologies, the climate crisis, debates surrounding economic inequality, the pandemic, racial and gender issues, and the emerging theoretical and empirical foundations of the welfare economy in the 21st century.

C. Carbonnier (2023) explored the question of intergenerational justice grounded in well-being. The author noted that, within a typical society, increased purchasing power over time generally contributes to greater well-being; however, this relationship became significantly more complex across generations. Additionally, Y.-K. Ng (2023) examined the impact of changes in the tax system on well-being – arguing that higher taxes on the wealthy could benefit the less affluent. On the other hand, such measures "may lead to the rich and poor having less incentive to earn higher incomes". In examining the EE, researchers F. Şeker & K. Unur (2022) concluded that the quality of entertainment and the level of satisfaction derived from it have a direct impact on the EE. They also investigated the influence of the tourism sector, highlighting that perceptions of entertainment, traveller satisfaction, behavioural intentions, and recommendations from acquaintances and travel agencies play a significant role in shaping this economy.

General aspects of the formation and development of the WE through the prism of social innovations have been explored in the research of K. Kraus *et al.* (2022), while V.L. Osetskyi *et al.* (2020) have examined various aspects of the EE in the context of the digital transformation of business models. However, numerous issues – such as models for shaping the experience economy through the lens of inclusion and accessibility and the development of the WE through novel applications of social innovations – remain underexplored. Moreover, there was a lack of clear understanding regarding the specific relationship between the WE and the EE within the framework of inclusivity and barrier-free environments.

This research aimed to examine the components of inclusive development in the national economy, explore the economic benefits and future potential of both the experience economy and well-being, and identify their interconnections. Research objectives: 1) to propose, characterise, and present the relevance of the components of inclusive national economic development based on social innovations aimed at enhancing population welfare; 2) to outline the potential economic benefits, prospects, and value that the EE and WE may offer in the near future; 3) to examine the interrelationship between the WE and the EE in conditions of inclusive development and to analyse existing concepts and approaches to the formation and advancement of the WE, including the First and Second Welfare Theorems.

Materials and Methods

The theoretical basis of this study drawn on academic materials by researchers from the United Kingdom, the USA, Canada, Turkey, Greece, China, and Ukraine, which enabled the evaluation and comparison of diverse approaches, perspectives, and theories concerning the nature and importance of the WE and EE in promoting national economic prosperity and improving quality of life. The time frame for the bibliographic review and analytical assessment was sufficiently broad to allow for a comprehensive academic investigation, covering the periods before, during, and after the COVID-19 pandemic, military conflicts, economic instability, and political tensions.

The source of statistical data for the present study was the reporting materials of the International Monetary Fund, which contained country-level rankings based on GDP (Gross domestic product) per capita, the consumer price index (inflation), and the employment index (GDP per capita, current prices, 2025; Inflation rate, average consumer prices, 2025; Unemployment rate, 2025). This dataset enabled a comprehensive and qualitative cross-country comparison of economic strength and social stability, facilitating the identification of factors contributing to either leadership or underperformance in the ranking. The Human Development Report 2023/2024, prepared by P. Conceição *et al.* (2024) within the framework of the United Nations Development Programme (UNDP), formed another foundational element of the research. It provided country-level data on the Human Development Index (HDI), a key indicator factor in assessing national well-being. In addition, the study drew on statistical data from the international audit and consulting firm PwC (PricewaterhouseCoopers), which monitored the state of the entertainment and media market in 2024 and offered forecasts up to 2028. This analysis considered rising public interest in digital technologies, leisure, education, and daily activities (Global entertainment & media outlook 2024-2028..., 2024). Accordingly, the data used in this study offered insights into both the current state of the WE and the entertainment economy and enabled a methodologically grounded scientific investigation.

To achieve the research objectives, the following scientific methods were applied: the structural-logical

method used to establish the relationship between the WE and the EE and to identify and assess components of inclusive national economic development based on social innovations. The grouping method was employed to present indicators describing population welfare in three groups of countries, classified by GDP per capita. This facilitated the identification of socio-economic development trends and the underlying causes of disparities. The comparative method supported the academic review of various concepts and approaches related to the formation and development of the WE. The method of scientific facts enabled a clear presentation of the key ideas underlying the First and Second Welfare Theorems. Methods of analysis and synthesis were employed to examine the impact of social innovations, digital technologies, inclusion, and accessibility on consumption structures within the WE and EE. Finally, the method of concretisation was used to identify and evaluate the specific elements linking the WE and EE in inclusive settings.

Results and Discussion

When considering well-being, associations typically arise with a certain level of human prosperity, character, and an improvement in social status. In parallel, one may also speak of wealth, happiness, welfare, and good health, all of which are influenced by prosperity.

I.K. Tsara *et al.* (2024) argued that it was necessary to revise the traditional understanding of a population's welfare. In addition to GDP, other indicators that reflect economic well-being and prosperity should be identified and considered. The efficient allocation of available resources was of particular significance, further emphasising the indispensable role of financial resources in ensuring social security and the welfare of society's members (Liu *et al.*, 2024). Indicators commonly used to assess population welfare include GDP per capita, the consumer price index, the unemployment rate, and HDI. Table 1 presented three groups of countries, categorised by indicators that defined high, medium, and low WE.

Table 1. *Indicators of population welfare in selected countries*

Countries	GDP per capita in January 2025, thousands of USD	Consumer price index in January 2025, %	Unemployment rate in January 2025, %	HDI in 2022, value
Luxemburg	141.08	2.6	5.9	0.927
Switzerland	111.72	1.0	2.5	0.967
Ireland	107.24	1.8	4.4	0.950
Singapore	93.96	2.2	1.9	0.949
Norway	90.32	2.4	3.8	0.966
Italy	41.71	2.1	7.2	0.906
Cyprus	40.55	2.0	5.1	0.907
Spain	37.36	1.9	11.2	0.911
Slovenia	36.5	2.7	3.5	0.926
Japan	35.61	2.0	2.5	0.920
Georgia	9.61	2.6	14.5	0.814
Moldova	8.16	5.0	3.5	0.763
Ukraine	5.76	9.0	12.7	0.734
Indonesia	5.25	2.5	5.1	0.713
Vietnam	4.99	3.5	2.0	0.726

Source: *based on P. Conceição et al. (2024), GDP per capita, current prices (2025), Inflation rate, average consumer prices (2025), Unemployment rate (2025)*

As of January 2025, the highest welfare indicators were observed in Luxembourg, Switzerland, Ireland, Singapore, and Norway. Ukraine exhibited a low level of population welfare, with GDP per capita amounting to 5.79 thousand USD at the beginning of 2025 (Table 1). Ukraine's consumer price index was 6.4% higher than that of Luxembourg. The unemployment rate in Ukraine was 2.15 times higher than in Luxembourg, and its HDI was 0.193 points lower. The WE was projected to reach approximately 9 trillion USD by 2030. Among the priorities of this economy were holistic health and personal development, alongside a global shift towards proactive wellness strategies (Drzeniek *et al.*, 2024). However, the development of the WE continued to be hindered by a general lack of genuine awareness among individuals regarding their own preferences. It was essential to shape these preferences rather than merely generalise (Coyle *et al.*, 2023).

The economic understanding of improving life and welfare, that was, some prosperity, can often be achieved at the expense of spiritual prosperity. By spending more time at work to improve one's economic situation, a person sacrifices their spiritual development as they work excessive hours. More time spent in the

workplace negatively affected a person's health and consumes time that could otherwise be dedicated to achieving personal happiness.

The desire to strengthen physical condition, psychological well-being and spiritual enrichment has led people to adopt an active lifestyle. They visited museums, engaged in active recreation such as skiing, and turned to "green" tourism during the summer months. In the 21st century, the welfare of the population has been reflected in the possibility of combining physical and mental development, while simultaneously existing within several realities – namely: virtual, augmented, enriched, improved, expanded and mixed. A.M. Feldman (1987) noted that the most effective government policy for increasing a nation's wealth was one that involved minimal intervention. Researcher P.J. Hammond (1997) argued that the virtual reference of perfect competition was considered efficient. N. Kraus (2014) presented organised logical diagrams, tables and visual illustrations that helped clarify the development and progression of concepts, theories, and perspectives on economic processes. N.V. Tomchuk-Ponomarenko (2020) examined the main scientific directions of the theory of welfare economics and its characteristics. The existing concepts and approaches to the formation and development of the welfare economy were summarised in Table 2.

Table 2. *Concepts and approaches to the formation and development of the WE and EE*

Scientists	Content and general characteristics of scientific views and concepts
A. Pigou	Prosperity increases when the national product is distributed more equitably across the population. In turn, income volatility decreases when income is stable and business cycles stabilise
T.J. Besley	WE provides a framework for assessing the achievements of the market and the responsibilities of political decision-makers
V. Pareto	A Pareto-efficient state of affairs can only arise if certain criteria are met, namely: – at the MRS (Marginal Rate of Substitution), consumption of any two goods is the same for all individuals; – MRT (Marginal Rate of Transformation) in production for any two goods is the same for all producers; – the MP (Marginal Product) of an input factor (e.g., labour) must be the same for all producers of the good; – MRS in consumption equals MRT in production for any pair of goods
V. Pareto, A. Marshall, G. Sidgwick, F. Edgeworth	The cardinalist concept assumes that the consumer quantifies the extent of their satisfaction; additional consumption yields diminishing marginal utility, and all individuals commensurable utility functions
J. Hicks, N. Kaldor, P. Samuelson	The ordinalist approach stated that if a consumer was unable to quantitatively measure the satisfaction of needs, then in such circumstances, an ordinal level of utility measurement was used
G. Hotelling	A scientist investigated the problem of the optimal use of exhaustible resources, showing that the optimal strategy for using such resources should be aimed at preserving them for future generations. This became known as "Hotelling's rule"
B.J. Pine & J.H. Gilmore	For the first time, researchers provided an interpretation of the EE, noting that its product was the impressions that companies should provide to consumers by organising interesting and memorable events. These impressions will remain in the memory as a product. Impressions can have both a positive and negative impact on an individual's life. The researchers suggested combining goods and services in a qualitative manner so that impressions became possible and positive. For the impression economy, it was experience that the product be of high quality and necessity, and the service be of a high standard

Source: *based on M. Blaug (2007), B.J. Pine & J.H. Gilmore (2011), S. Drakopoulos & I. Katselidis (2023)*

The WE in the 21st century was studied both through the prism of maximising population welfare at the macro level – by optimising production efficiency within and between companies – and through the prism of individual welfare (Carbonnier, 2023). The author Y.-K. Ng (2023) noted that welfare economics can be defined as a field of study that formulates propositions by which one can determine whether social welfare in one economic situation was higher or lower than in another. Welfare was defined as individual happiness. This branch of economics studies welfare from the perspective of individuals' economic behaviour as they seek to optimise and enhance their well-being. WE enabled the measurement of societal welfare levels and allowed for the identification of the most appropriate economic policy to optimise efficiency and achieve a general optimum.

Scholars A.R. Vining & D.L. Weimer (1992) examined WE as a framework for analysing public policy. While based on utilitarianism, which they viewed as fundamentally flawed as an ethical theory and inadequate as a foundation for governance, they argued that "the focus of welfare economics on market failures can create a bias in favour of state intervention in private choices... so the conceptual framework of policy analysis should include comparative attention to general problems inherent in collective action".

Modern studies of the characteristics of the functioning of welfare economics were grounded in the First and Second Theorems of WE. The economist K.J. Arrow (1951) indicated that the welfare economics theorem can be applied to scenarios in which social optima take the form of corner maxima and where the preference sets of

society's members include saturation points. W.D.A. Bryant (1994) clarified the Second Fundamental Theorem of WE, stating that any preferred Pareto optimum can be realised through market pricing. V. Horyn (2020) examined the current situation and the challenges in shaping social welfare using resources from the non-governmental sector of the economy. M. Johnson (2024) pointed out that some of the original forces shaping economics were those concerned with social choice and the political economy of governance. Their interpretations, ideas, and the scholars, who defended them over the past two centuries, were presented in Table 3.

Table 3. *The essence and general characteristics of the First and Second Theorems of WE*

Name of the theorem and its proponents	Interpretation of the theorem	Main idea of the theorem
The First Theorem of WE L. Walras, K. Menger, F. von Hayek, W.S. Jevons	In a competitive economy, the allocation of resources through market mechanisms leads to an efficient equilibrium, where no party can improve their position without making others worse off	Markets lead to a social optimum, and therefore, government intervention is unnecessary. The government should only implement minimal policies to protect individuals and their property, ensure national security, and provide a limited number of public goods, such as roads
The Second Theorem of WE A. Pigou, L. Walras, V. Pareto, E. Barone, O. Lange, A. Bergson, P. Samuelson, J. Stiglitz, B. Greenwald	An increase in welfare from the efficient allocation of resources is greater than the increase in welfare resulting solely from an increase in the total quantity of resources. In other words, if inequality in resource distribution is reduced, this has a more positive impact on welfare than a simple increase in total resources without redistribution	According to this theorem, under ideal competitive conditions and rational allocation of all resources, it is impossible to increase one individual's welfare without reducing another's. The theorem highlights the limitations of redistributing resources and income within society

Source: *based on A. Pigou (1932), E. Crampton (2007), A. Atakan et al. (2023), Y.-K. Ng (2023)*

The WE had a tangible impact on individual consumer decisions regarding the choice of form, content, and lifestyle. In particular, this applied to the decision whether to purchase a home on credit or to rent, whether to live in a prestigious urban area or to rent a home outside the city in a relatively unpolluted environment. This economic framework also influenced housing preferences, including interior design style – for example, loft or Provence; modern minimalism or classic; high-tech, modern, Scandinavian, eco-eclectic, art deco, or boho. The WE affected consumer behaviour, shaped by income level, financial capacity, and personal values prioritised at a specific stage of life. In contrast, the EE was projected to reach 17 trillion USD by 2030. The progressive development of this economy has been enabled by virtual reality, 3D printing, and tourism. The EE goes beyond traditional concepts of consumption, offering individuals immersive and memorable experiences that redefine the value of products and services (Drzeniek *et al.*, 2024). Studying the experience economy involved analysing the commercialisation of memorable experiences and the emotional engagement they generate. AI-based chatbots increasingly offer personalised services, while 3D printing was expanding opportunities for product customisation. As a result, people seek experiences, not merely consumption (Drzeniek *et al.*, 2024). The EE delivers products and services within the entertainment and media (E&M) sector. The projected distribution between virtual and real spaces across various segments for the period 2024-2028 was presented in Figure 1.

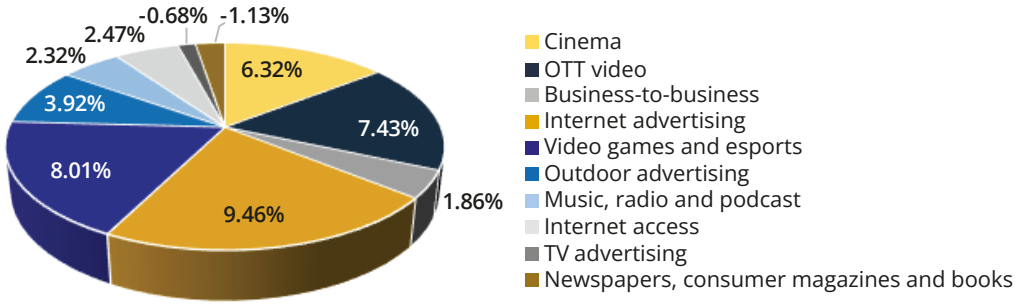

Figure 1. *CAGR (Compound Annual Growth Rate) of the global E&M market for 2024-2028, %*
Source*: Global entertainment & media outlook 2024-2028: Hong Kong summary (2024)*

It was worth noting that in 2023, the E&M industry regained its equilibrium, with total global revenue increasing by 5% to 2.8 trillion USD. By 2028, the E&M sector was forecast to grow by approximately 3.9%, reaching 3.4 trillion USD (Global entertainment & media outlook 2024-2028..., 2024). The successful development of the EE has been closely linked to the exabyte economy through innovative digital opportunities that manifest in the virtual dimension of society. It was crucial that members of society possess digital skills and competencies to effectively engage with innovative tools within the virtual reality framework of the experience economy (Drzeniek *et al.*, 2024). The actual and forecast values of E&M revenue from digital products between 2018 and 2027 were presented in Figure 2. From the figure, it was evident that E&M revenue from digital services and products was projected to continue growing until 2027.

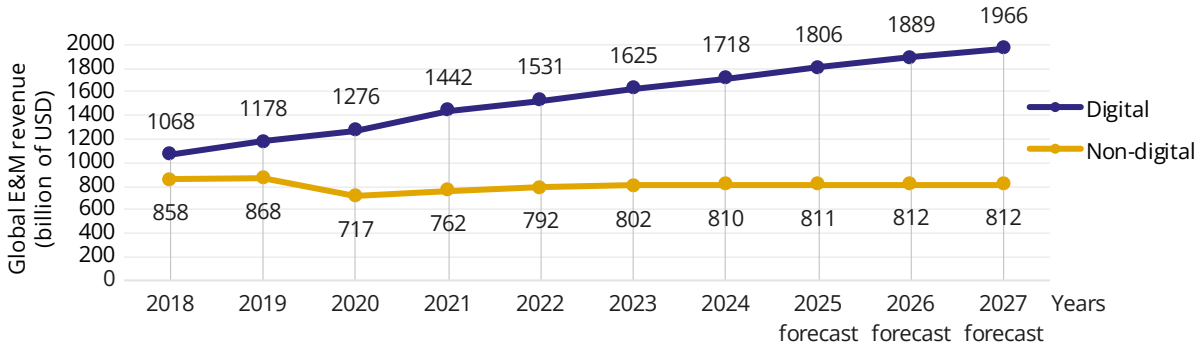

Figure 2. *Actual and forecast value of E&M revenue from digital products and services, 2018-2027*
Source*: based on R. Makarchuk (2024)*

Social innovations and access to specific benefits play a key role in enhancing well-being and the capacity to have positive experiences. Scholar O.O. Nabatova (2011) argued that social innovations should be understood as innovations "that break tradition and open the way to the new, and new ideas that rebuild society, and project activities of management entities that create new goals and structures; they form an innovative environment that promotes technological innovations, ensures their diffusion, increases the efficiency of use, reduces innovation costs and negative side effects", ultimately contributing to the improvement of societal welfare. V. Cherviakova & T. Cherviakova (2024) observed that, amid geopolitical tensions, the global economy was experiencing rising inflation, slower economic growth, and significant declines in public welfare.

The academic perspective of V.M. Heyets (2020) was also noteworthy. The scholar contended that from the perspective of the state – particularly within the framework of the welfare state – social innovations were developed primarily to address major societal challenges such as poverty and inequality. Under martial law, the accessibility of basic services for disadvantaged groups – including people with disabilities, and war veterans – and the promotion of inclusive societal development and overall welfare in Ukraine had become a pressing issue. Figure 3 illustrated the components of inclusive development in the national economy, which aim to enhance the well-being of the population.

The accessibility dimension in business should be characterised by an individual approach, contactless services, recreational areas, convenience, and safety within the business environment (Fig. 3). As a result of military operations on the territory of Ukraine, a significant number of people with physical and mental disabilities has emerged. It was encouraging that the government supported each member of society through various forms of assistance, including financial aid and mental health support. Providing appropriate living conditions for individuals with different types of disabilities remains the responsibility of government authorities. The educational component required strengthening to enable individuals to "find themselves", adapt to life, and achieve economic selfsufficiency without relying on external assistance. V.M. Heyets (2020) observed that, based on social quality policy, there exists an opportunity to address the contradictions of the so-called new reality, in which individuals have decreasing chances of securing employment that would at least sustain their current standard of living. Consequently, disparities in individuals' quality of life continue to deepen. People with disabilities should be able to live in comfort and dignity in their own country. For these reasons, the authorities should establish an inclusive infrastructure for innovative and digital socio-economic development in the new format of the WE and the EE. The creation of barrierfree spaces should go hand in hand with the establishment of social and psychological rehabilitation hubs. Entertainment, nature, and convenient infrastructure create the necessary conditions for restoring physical strength, enhancing mental health, and improving overall welfare, which, in turn, reflect the inclusive aspect of the development of the WE and the EE (Fig. 4).

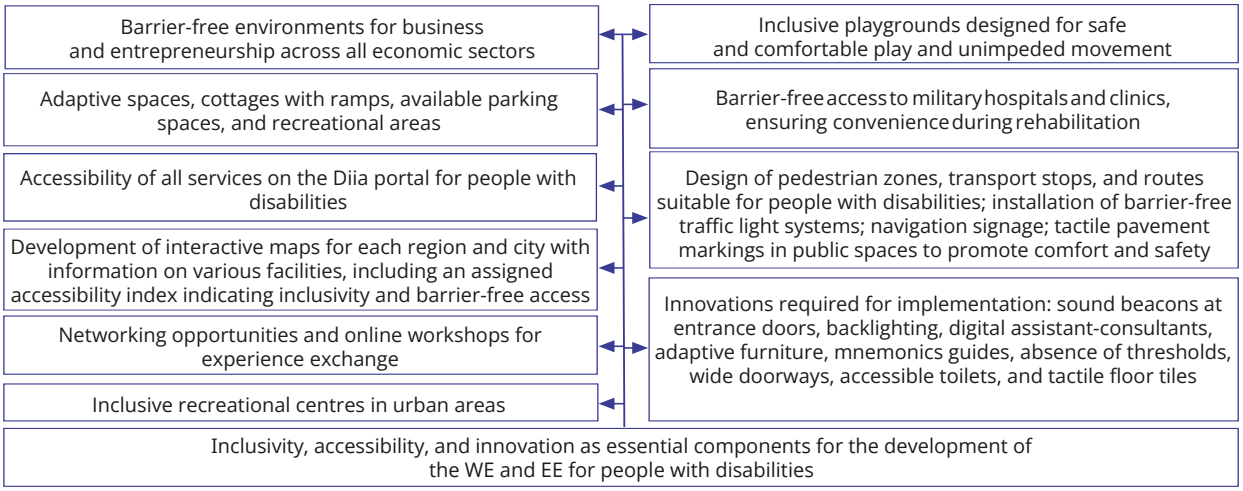

Figure 3. *Characteristic components of inclusive development of the national economy aimed at improving the population welfare*

Source*: developed by the authors*

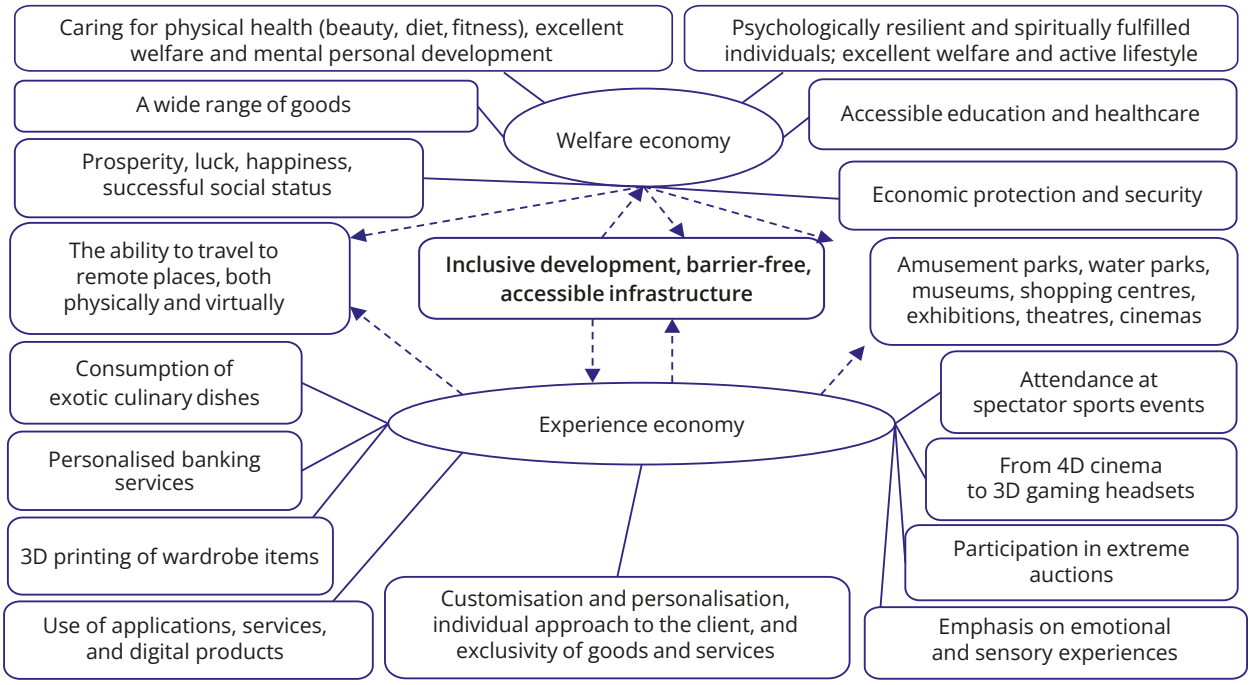

Figure 4. *The relationship between WE and EE in the context of inclusive development*

Source*: developed by the authors*

An important aspect of the development of both economies was the production of new social innovations, a well-functioning ecosystem of digital entrepreneurship, and government support for private businesses in research and development. Institutional support was essential for the WE. The health sector had a significant influence on the formation of the EE, as it concerned the moral and mental well-being of the nation and the capacity of the workforce to return to productive activity after rest (Fig. 4).

Over the next ten years, the development of the WE and the EE will depend heavily on mobile technologies, the level of economic intellectualisation, the production of new eco-innovations and breakthrough technologies to deliver high-quality goods and services, the employment rate, and the level of unemployment. The standard of healthcare will also played a critical role in both welfare and the ability to allocate disposable income to entertainment. Shifting the focus from reactive treatment to ongoing preventive care will enhance welfare and, in turn, positively influence individual well-being. There was evidence that the latest generation of intelligent medicines, e-medical records, and virtual reality hospitals was having a significant impact on both the

overall level of welfare and the population's interest in entertainment.

Conclusions

Social innovations, digital technologies, inclusiveness, and accessibility can significantly influence the structure of consumption in the WE and the EE. Breakthrough innovations and eco-innovations have improved the level of welfare in the country and helped shape its circular development trajectory. In order for the economy to acquire characteristics of inclusiveness, it was essential to adopt a partnership-based approach in interactions between the state, business, and society. Social innovations should be applied locally, but scaled effectively to support the creation of high-quality digital infrastructure.

The development of the WE and the EE had been driven by an effective combination of highquality new products, digital technologies, business model digitisation, and the creation of hybrid virtual-real ecosystems for business and everyday life. Social innovations should focus on promoting barrier-free development, synchronisation through network time protocols, economic growth, environmental sustainability, digitalisation, and innovation. People were increasingly willing to pay more for emotions and experiences and less inclined to pay for material goods. As technologies have increased exponentially, it was logical that they have became more affordable and, therefore, more widely accessible, enabling greater personalisation of products and services. The growing desire to experience vivid impressions had motivated people to engage more actively with services and digital products.

Further scientific research should focus on identifying ways to use limited resources more rationally in efforts to enhance population welfare. It is worthwhile to conduct an in-depth study of the potential applications of existing digital capabilities for developing a nationally tailored experience economy that aligns with the population's mentality, spiritual values, moral outlook, and physical condition.

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References

[1] Arrow, K.J. (1951). An extension of the basic theorems of classical welfare economics. In *Proceedings of the Second Berkeley symposium on mathematical statistics and probability* (Vol. 2, pp. 507-532). Oakland: University of California Press.

[2] Atakan, A., Richter, M., & Tsur, M. (2023). *A Second Welfare Theorem for economies with search, matching, and investments*. The Pennsylvania State University, USA.

[3] Blaug, M. (2007). The fundamental theorems of modern welfare economics, historically contemplated. *History of Political Economy*, 39(2), 185-207. doi: 10.1215/00182702-2007-001.

[4] Bryant, W.D.A. (1994). Misrepresentations of the Second Fundamental Theorem of welfare economics: Barriers to better economic education. *The Journal of Economic Education*, 25(1), 75-80. doi: 10.1080/00220485.1994.10844816.

[5] Carbonnier, C. (2023). Welfare economics and neoliberalism: Interpreting the ideal type of perfect competition general equilibrium. *LIEPP Working Paper No. 143*.

[6] Cherviakova, V., & Cherviakova, T. (2024). Organisational support for the functioning of enterprises in the context of geopolitical turbulence. *Economics, Entrepreneurship, Management*, 11(2), 19-33. doi: 10.56318/eem2024.02.019.

[7] Conceição, P., *et al.* (2024). *Human development report 2023/2024*. New York: United Nations Development Programme, One United Nations Plaza.

[8] Coyle, D., Fabian, M., Beinhocker, E., Besley, T., & Stevens, M. (2023). Is it time to reboot welfare economics? Overview. *Fiscal Studies*, 44(2), 109-121. doi: 10.1111/1475-5890.12334.

[9] Crampton, E. (2007). Market failure. *Encyclopedia*, 983-985.

[10] Drakopoulos, S., & Katselidis, I. (Eds.). (2023). *Economic policy and the history of economic thought*. London: Routledge.

[11] Drzeniek, M., Hurst, L., & Holloway, N. (2024). *Future possibilities Index 2024*. Geneva, New York: Horizon Group and Vantage Research.

[12] Feldman, A.M. (1987). Welfare economics. In *The new Palgrave dictionary of economics* (pp. 1-11). London: Palgrave Macmillan. doi: 10.1057/978-1-349-95121-5_1417-1.

[13] GDP per capita, current prices. (2025). *International Monetary Fund.* Retrieved from https://surl.li/fksvou.

[14] Global entertainment & media outlook 2024-2028: Hong Kong summary. (2024). *PWC*. Retrieved from https://www.pwchk.com/en/tmt/entertainment-and-media-outlook-2024-2028.pdf.

[15] Hammond, P.J. (1997). The efficiency theorems and market failure. In A. Kirman (Ed.), *Elements of general equilibrium analysis*. Stanford: Stanford University.

[16] Heyets, V.M. (2020). Socialization, social innovations, and social interaction of business and state. *Ukrainian Society*, 3, 9-23. doi: 10.15407/socium2020.03.009.
[17] Horyn, V. (2020). *Financial mechanism for ensuring social welfare: Theoretical conceptualization and problems of functioning*. Ternopil: TNEU.
[18] Inflation rate, average consumer prices. (2025). *International Monetary Fund.* Retrieved from https://www.imf.org/external/datamapper/PCPIPCH@WEO/OEMDC/ADVEC/WEOWORLD.
[19] Johnson, M. (2024). The history of the history of economics society. *Journal of the History of Economic Thought*, 46(4), 498-508. doi: 10.1017/S105383722400049X.
[20] Kraus, K., Kraus, N., & Pochenchuk, G. (2022). Institutional aspects and digitalization of financial inclusion in the national economy. *Innovation and Sustainability*, 2, 18-28. doi: 10.31649/ins.2022.2.18.28.
[21] Kraus, N. (2014). *History of economics and economic thought: Structural and logical diagrams, tables, figures*. Kyiv: Educational Literature Center.
[22] Liu, G., Zhao, L., Wang, X., & Liao, M. (2024). Impact of social welfare finance on institutional financial performance: Cross-country evidence. *Research in International Business and Finance*, 70, article number 102385. doi: 10.1016/j.ribaf.2024.102385.
[23] Makarchuk, R. (2024). 2025 media & entertainment industry outlook + key trends. *Intellias.* Retrieved from https://intellias.com/media-entertainment-industry-trends/.
[24] Nabatova, O.O. (2011). Social innovation: Definition, types, subjects. *Bulletin of Yaroslav Mudryi National Law Academy of Ukraine*, 6, 58-66.
[25] Ng, Y.-K. (2023). An economic analysis of social welfare. *Open Access Government*, 38(1), 372-373. doi: 10.56367/OAG-038-10711.
[26] Osetskyi, V.L., Kraus, N.M., Kraus, K.M., & Osetska, D.V. (2020). Social innovations of the entrepreneurial university in the information-digital space. *Review of Transport Economics and Management*, 3, 221-232. doi: 10.15802/rtem.v0i3(19).210872.
[27] Pigou, A.C. (1932). *The economics of welfare*. (4th ed.). London: Macmillan.
[28] Pine, B.J., & Gilmore, J.H. (2011). *The experience economy*. Brighton: Harvard Business Review Press.
[29] Şeker, F., & Unur, K. (2022). The experience economy analysis of distinct destinations. *Journal of Multidisciplinary Academic Tourism*, 7(2), 31-43. doi: 10.31822/jomat.2022-7-2-31.
[30] Tomchuk-Ponomarenko, N.V. (2020). *Welfare economics*. Kyiv: Lira-K.
[31] Tsara, I.K., Vortelinos, D.I., & Menegaki, A.N. (2024). The index of sustainable economic welfare (ISEW) as a proxy for sustainable GDP: Revisited and recapitulated. *Discover Sustainability*, 5, article number 158. doi: 10.1007/s43621-024-00357-5.
[32] Unemployment rate. (2025). *International Monetary Fund.* Retrieved from https://www.imf.org/external/datamapper/LUR@WEO/OEMDC/ADVEC/WEOWORLD.
[33] Vining, A.R., & Weimer, D.L. (1992). Welfare economics as the foundation for public policy analysis: Incomplete and flawed but nevertheless desirable. *The Journal of Socio-Economics*, 21(1), 25-37. doi: 10.1016/1053-5357(92)90023-Z.

Розвиток економіки добробуту та економіки вражень на засадах інклюзії та соціальних інновацій

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Анотація. Актуальність цього дослідження зумовлена зростаючою кількістю країн світу, які визначають добробут населення як пріоритетну мету державної політики. У повоєнний період Україні варто зосередитися на сприянні інклюзивності та формуванні справедливої культури, яка враховуватиме інтереси всіх членів суспільства. Метою цього дослідження став аналіз складових інклюзивного розвитку національної економіки на основі соціальних інновацій, а також виявлення взаємозв'язку між економікою добробуту та економікою вражень. Основними результатами дослідження стали обґрунтування та розкриття елементів інклюзивного економічного розвитку, заснованого на соціальних інноваціях, що спрямовані на підвищення добробуту населення. Особливу увагу приділено соціальним інноваціям, які сприяють створенню безбар'єрного середовища в українському суспільстві. Було проаналізовано дані щодо середньорічного темпу зростання світового сегментованого ринку розваг та медіа на 2024-2028 роки, що свідчило про динамічний розвиток економіки вражень. Представлено авторське бачення взаємозв'язку між економікою добробуту та економікою вражень у контексті інклюзивного розвитку. Надано огляд наявних концепцій і підходів до формування та розвитку економіки добробуту. Розглянуто Першу та Другу теореми добробуту, а також основні ідеї, висунуті провідними теоретиками цієї галузі. Практичне значення дослідження полягає в обґрунтуванні впливу соціальних інновацій, цифрових технологій, інклюзії та доступності на споживчі моделі в межах як економіки добробуту, так і економіки вражень

Ключові слова: економіка досвіду; інклюзивний розвиток; безбар'єрність; доступність; віртуальний світ; нерівність

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Gaining customer insights in big data for SMEs market segmentation decisions in emerging markets

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Abstract. Small and medium enterprises around the world, and especially in emerging markets, face challenges when it comes to market segmentation. They have limited knowledge of the importance of big data customer insights for making concrete market segmentation decisions. The purpose of this study was to assess gaining customer insights in big data for market segmentation decisions of SMEs in emerging markets. The results of the study indicated that customer behaviour analysis strongly affects market segmentation decisions of among small and medium scale enterprises. A beta-value of 0.344 was shown to indicate that a unit change in customer behaviour analysis will lead to a unit change in market segmentation decisions among small and medium scale enterprises with the t-statistics of 4.608 and p-value of 0.001. It was specified that customer preference analysis strongly affected market segmentation decisions of among small and medium scale enterprises. The results showed that the beta-value was 0.379, indicating that a unit change in customer preference analysis will lead to a unit change in market segmentation decisions of among small and medium scale enterprises with the t-statistics of 6.654 and p-value of 0.001. It was revealed that customer feedback analysis strongly affected market segmentation decisions of among small and medium scale enterprises, the results showed that the beta-value was 0.215 also indicated that a unit change in customer feedback analysis will lead to a unit change in market segmentation decisions of among small and medium scale enterprises with the t-statistics of 3.155 and p-value of 0.002. It was concluded that gaining customer insight in big data was essential for small and medium enterprises in emerging economy to make effective market segmentation decisions

Keywords: complex data; customer behaviour analysis; customer feedback analysis; customer perspective; customer preference analysis

Introduction

Market segmentation is important as it helps companies to allocate resources better, improve customer engagement, and thereby increase overall profitability. However, T. Tavor *et al.* (2023) criticised market

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segmentation for being dated, when it relied on generalised or partitioned models, since they do not cater to the needs of different customer groups in an age that was rapidly changing and filling up with competition. Treating customers as a single group generally results in very wide markets that overlook crucial intelligence on consumers, which, in turn, backfired on marketing strategies, which then do not turn up high profits. This problem was aggravated for SMEs (Small and Medium Enterprise), in the case of emerging markets as they have low amounts of data and cannot pull together sophisticated analytical tools.

When compared on a global scale, especially against emerging markets, SMEs were certainly up against a challenge while trying to divide their market during their segmentation process. Limited resources force them to cut back on their expenditures for market research tools, which results in relying on instincts or incomplete data. On top of that, S. Oduro (2020) posited that SMEs, especially in African and Asian countries, have low exposure to the digital world and unsteady market conditions, which rendered the basic segmentation methods useless. The researcher stated that this mismatch between the tools that SMEs have access to and it immensely caters to a place, where improvement was needed. Unlike other studies that focused primarily on customer demographics, this research emphasised behavioural and preference data to provide more actionable insights.

There were efforts at the global level to improve market segmentation for SMEs, including digital transformation and capacity building in data analytics. Various programmes by governments and international organisations aim at increasing access to big data technologies and market intelligence tools for SMEs. Moreover, Z. Samira *et al.* (2024) agreed that larger corporations and tech firms have started offering scalable solutions that allowed SMEs to perform more granular segmentation using customer insights from digital channels. However, these efforts often remained fragmented and failed to reach the most resource-constrained SMEs, limiting their overall effectiveness.

These programmes have had a sporadic impact on SMEs. Whereas the digital transformation programmes have given some the capacity to enhance their market segmentation using better data capture and analytics, many still fall into bad or wrong segmentation decisions due to inconsistency or inaccuracies due to the absence of a coordinated strategy for customer insight. All this exacerbates the limited application of data-driven approaches, given that consumer behaviour in diverse markets – whether they were rural or underserved – was generally not well comprehended. According to O. Abdul-Azeez *et al.* (2024), SMEs mostly failed to optimise market opportunities. With big data promising many changes in almost every other operational aspect, the research gap on how SMEs in emerging markets can take full advantage of customer insights towards effective market segmentation still remains significant. Most literature involved large enterprises with abundant resources, hence leaving SMEs underrepresented, especially those in resource-constrained settings. Moreover, O. Abdul-Azeez *et al.* (2024) noted about the specific scenarios of SMEs in emerging markets; this may includ e infrastructure limitations and differences in consumer behaviour across regions. It was important to point out these gaps to create solutions that can be scaled up and implemented for practicality by SMEs. This research will seek to propose a new framework that will integrate customer behaviour analysis, customer preference analysis, and customer feedback analysis into market segmentation decisions for SMEs in emerging markets. Emphasising these three core areas, the study will provide a comprehensive perspective on how SMEs might make use of big data in refining segmentation strategies.

By using customer insights with big data, SMEs will significantly enhance their market segmentation decisions. Big data technologies provided enterprises with the capacity to collect large volumes of information on customer behaviours, preferences, and feedback in real time. Advanced analytical tools then processed this data for patterns and trends that allowed much finer-grained segmentation. This meant that SMEs, even with their limited resources in emerging markets, were able to develop a deep understanding of their customer base and customise their offers to meet very specific needs. According to E. Genc *et al.* (2019), this approach will not only enhance competitiveness, but also enable dynamic segmentation adapted to market changes.

Customer behaviour analysis helps SMEs understand not only who their customers are, but how they interact with products and services. This can include purchasing patterns, brand interactions, and even social media behaviour, which was often overlooked in conventional segmentation models. Customer preference analysis will allow businesses to track changing tastes and preferences over time, providing a dynamic segmentation model that evolves with the market. The data from big data helps to analyse feedback through online reviews, surveys, and comments about services on social media, serving first-hand insights into customer satisfaction and areas needing change. The purpose of this study was to fill the research gap by providing a practical and scalable solution for SMEs in emerging markets to improve their market segmentation decisions.

Literature Review

Market segmentation decisions are those in which a broad market is divided into distinct subsets of customers with common needs, characteristics, or behaviours, and then targeted with an appropriate marketing strategy. According to Y. Cui *et al.* (2025), preference-guided segmentation models addressed heterogeneous customer decision-making, allowing companies to make closer-to-accurate predictions of various customers' behaviours and optimise marketing strategies accordingly.

A. Aouad *et al.* (2023) indicated the development of SMEs, which were considered as a new approach for integrating segmentation with response modelling by offering computationally efficient and interpretable frameworks for segmenting large data.

Customer insights can be defined as understanding customer behaviours, preferences, and feedback, which can then be used from data to drive business strategy. According to B.M. Omowole *et al.* (2024), big data offered scalable solutions for the competitive advantage of SMEs by means of strategies pertaining to the analysis of customer behaviour and preferences. Y. Zhong *et al.* (2024) have shown how big data can be used to improve customer satisfaction by leveraging online reviews in refining service offers, especially for tourism industries.

The integration of customer insights from big data into market segmentation decision-making enables businesses to target their customers with unprecedented accuracy. According to X. Li & Y.S. Lee (2024), big data allowed companies to move beyond static demographic or geographic segmentation by integrating real-time behavioural and preference data into their segmentation models. This helped in the development of customised marketing strategies that will lead to more satisfaction and loyalty among customers. According to Z. Zhang (2024), neural network-based models played a crucial role in evaluating segmentation and marketing strategies, showing how these technologies will help to optimise segmentation for better results.

Customer behaviour analysis helped to identify the patterns and every step involved in reaching purchasing decisions. According to S. Garg & A. Khandhar (2024), consumer behaviour analysis indeed provided an opportunity to improve businesses through adjustments of market strategies with data-driven insights on purchasing trends and spending patterns. The relationship between behaviour analysis and market segmentation was implemented through the identification of different behavioural trends across various segments of customers. R.Y. Daulay *et al.* (2024) indicated that preference analysis played a significant role in the identification of customer personas and the elaboration of corresponding marketing strategies; this may refer to the use of K-Means clustering to segment consumers of the coffee shop market by lifestyle, preference, and purchasing behaviour.

Customer feedback analysis is the process of systematic collection and analysis of customer opinions, reviews, and experiences about a product or service. Through the identification of common themes in customer feedback, businesses can address pain points and refine product offerings to improve customer satisfaction and loyalty. A. Gopakumar *et al.* (2024) noted that the integration of consumer behaviour analysis with clustering algorithms was very important to enhance segmentation strategy in both e-commerce and conventional retail settings. According to Z. Samira *et al.* (2024), CRM (Customer Relationship Management) integrated with AI-driven tools helped SMEs to optimise their marketing strategies for better customer interaction. The basic principle of CRM was that companies create more value for themselves, when they focused on customer retention rather than short-term sales, with customer insight driving personalisation and effective segmentation.

In the context of SMEs, CRM theory explained how data exploitation for increased customer insight would lead to more accurate market segmentation. D. Gamba (2022) explained that service-oriented segmentation models allowed the SME to filter out only the profitable clusters of customers, achieve resource optimisation, and adapt to operational barriers. A. Singh *et al.* (2024), investigated machine learning methods, which used to develop a market segmentation model using K-Means clustering and a consumer behaviour prediction model using a Random Forest from large-scale e-commerce datasets. The Random Forest model was much better in predicting customer habits in contrast to the K-Means clustering model. The study included precision, recall, and F1 scores as assessment criteria. According to the findings, machine learning techniques will be useful in market analysis, and businesses may utilise this model to create efficient marketing plans and comprehend customer behaviour.

K. Kumar *et al.* (2025) investigated the characteristics that determine customer preference for OTT (Over the Top) video streaming. Logistic regression was applied to the multivariate analysis of survey data affordability, quality, and accessibility have emerged as crucial factors affecting preference. Demographic data also played an important role in subscription decisions. M.M. Ibrahim & H.A. Mamdouh (2025) investigated the influence of online customer reviews on consumer buying decision. The methodological approach included a quantitative online survey conducted in Egypt, focusing on OCR (Online Customer Reviews) dimensions such as valence and volume. The findings indicated that online reviews have an immense impact on purchasing decisions, though moderated by demographics. However, no evidence has been observed linking customer feedback with market segmentation. It was concluded that though OCRs impact purchasing decisions, its usefulness in market segmentation requires more research.

Materials and Methods

The research questions derived from the specific study objectives led to the use of a quantitative research design, which used a survey technique. The main questions were: 1) how does customer behaviour analysis affects market segmentation decisions; 2) in what ways does customer preference analysis affect market segmentation decisions; 3) what is the effect of customer feedback analysis on market segmentation decisions. This meant that via surveys, numerical data was collected from small business owners to understand how they use customer data for market segmentation. This design was chosen

because it allowed gathering specific, measurable information from many SME owners and analysing it statistically to draw reliable conclusions about how big data insights influenced their market segmentation decisions (Ragab & Arisha, 2018).

Selection consisted of 1,628 registered SME owners in Kwara State, Nigeria, who maintained customer databases and have defined market segments. The 2023 dataset of registered SMEs maintained by the Ministry of Commerce & Co-Operatives (2025) provided this figure. These SMEs were selected because they reflected companies that actively participate in official market segmentation procedures and keep track of consumer data. To determine the sample size, the study used T. Yamane's (1969) equation for finite population: $n = N/(1 + N(e)^2)$, where: n – sample size; N – population size (1,628); e – margin of error (0.05); n – 1,628/$(1 + 1{,}628(0.05)^2)$; n = 1,628/5.07; n = 321 respondents. To account for potential non-responses, the sample size was increased by 10%, resulting in 353 respondents. The study employed a systematic random sampling technique, where every fifth SME owner from the alphabetically arranged list of 1,628 eligible SMEs was selected. This method ensured unbiased selection, while maintaining representativeness across different business sectors and sizes. The systematic approach provided a structured way of selecting participants, while maintaining randomness.

The unit of inquiry was individual SME owners or managers who: 1) have registered businesses in Kwara State; 2) maintained customer databases with at least one year of data; 3) have implemented some form of market segmentation in their business operations. This specific focus ensured that respondents have relevant experience with both data management and market segmentation practices. The unit of analysis was the individual SME owner's responses regarding their use of customer data insights for market segmentation decisions. This included their practices in data collection, analysis methods, and how they applied these insights to segment their markets and make business decisions. A structured questionnaire was used, divided into sections covering demographics, customer insight, and market segmentation decisions. The questionnaire employed a 5-point Likert scale ranging from "Strongly disagree" (1) to "Strongly agree" (5).

Partial Least Squares Structural Equation Modelling (PLS-SEM) using SmartPLS v3.2.9 was employed for data analysis. It was used to examine the measurement model and structural model of the study data. Content validity was established through expert review by three business management professors and two SME consultants. Construct validity was assessed through convergent validity (AVE >0.5) and discriminant validity (Fornell Larcker). Reliability was measured using composite reliability and Cronbach's Alpha (threshold >0.7). A pilot test with 35 SME owners (10% of sample size) was conducted to refine the instrument.

Results and Discussion

The analysis began with an overview of the response rate to the administered questionnaire. A majority of participants provided complete and valid responses, ensuring a solid foundation for the study's findings. This strong level of engagement reflected the relevance and clarity of the research instrument. The subsequent analysis included descriptive statistics and tests of normality, offering deeper insight into the data distribution (Table 1).

Table 1. *Questionnaire administered response rate*

Validity	Frequency	Percentage	Valid percentage	Cumulative percentage
Fully submitted responses	254	71.9	71.9	71.9
Remaining sample size	99	28.1	28.1	100.0
Total	353	100	100	

Source: *developed by the authors*

Table 1 showed that 71.9% of respondents answered the questionnaire completely and accurately of which their responses were valid for this study. The high response rate helped to achieve reliable findings from the study. The descriptive result, which showed the mean of the measures of the study in depicted in Table 2, also gave the standard deviation of the measures, the normality test, including the kurtosis and skewness.

Table 2. *Descriptive analysis and normality test*

	Mean	Standard deviation	Excess kurtosis	Skewness	Number of observations used
Customer behaviour analysis 1	3.236	1.383	-1.164	-0.305	254.000
Customer behaviour analysis 2	3.457	1.356	-0.928	-0.566	254.000
Customer feedback analysis 1	2.866	1.193	-0.873	-0.019	254.000
Customer feedback analysis 2	3.339	1.305	-1.022	-0.284	254.000
Customer preference analysis 1	3.433	1.290	-0.911	-0.450	254.000
Customer preference analysis 2	3.213	1.234	-0.730	-0.310	254.000

Table 2, Continued

	Mean	Standard deviation	Excess kurtosis	Skewness	Number of observations used
Market segmentation decision 1	3.780	1.380	-0.463	-0.900	254.000
Market segmentation decision 2	3.929	1.393	-0.118	-1.122	254.000
Market segmentation decision 3	3.874	1.403	-0.240	-1.065	254.000

Source: *developed by the authors*

The study considered market segmentation and customer insights. A number of important indicators were evaluated, each of which provided insight into a distinct facet of the market segmentation and consumer insights. The mean scores, standard deviations, and the number of observations used for each indicator provided valuable insights and implications for researchers and practitioners. The relatively high mean score, which were above 3 for the questions suggested that respondents perceive customer insights to be highly relevant to market segmentation decisions. With low standard deviation in each cases, indicating that there was low deviation of the responses from the mean. These descriptive results underscored the multifaceted nature of customer insights on market segmentation decisions. They emphasised the importance of market segmentation decisions through successful customer insights.

The normality results of the distribution revealed that the sample size was above 100, which implied that an absolute value of skewness of +1.0 or below was expected for the data to be normal. In addition, for kurtosis, an absolute value of ±3.0 was expected for a normal peak, as any value outside the threshold could be a serious signal of concern. The normality results showed that all the variables were within the threshold of the absolute value of ±1.0 and the kurtosis results were also within the absolute value of ±3.0. The implication from the normality test results showed that all the data inputted for the analysis were normally distributed and can be used for further analysis and inferences. This implied that all the variables used to measure resource optimisation have moderate mean with low deviation from the mean and the variables were all normally distributed indicating the usefulness of the variables in determining the causality between customer insights and market segmentation decisions. For this, the variables used to measure customer insights were customer behaviour analysis, customer preference analysis, and customer feedback analysis against market segmentation decisions. Figure 1 showed the structural path model that assesses the effect of customer insights on market segmentation decisions.

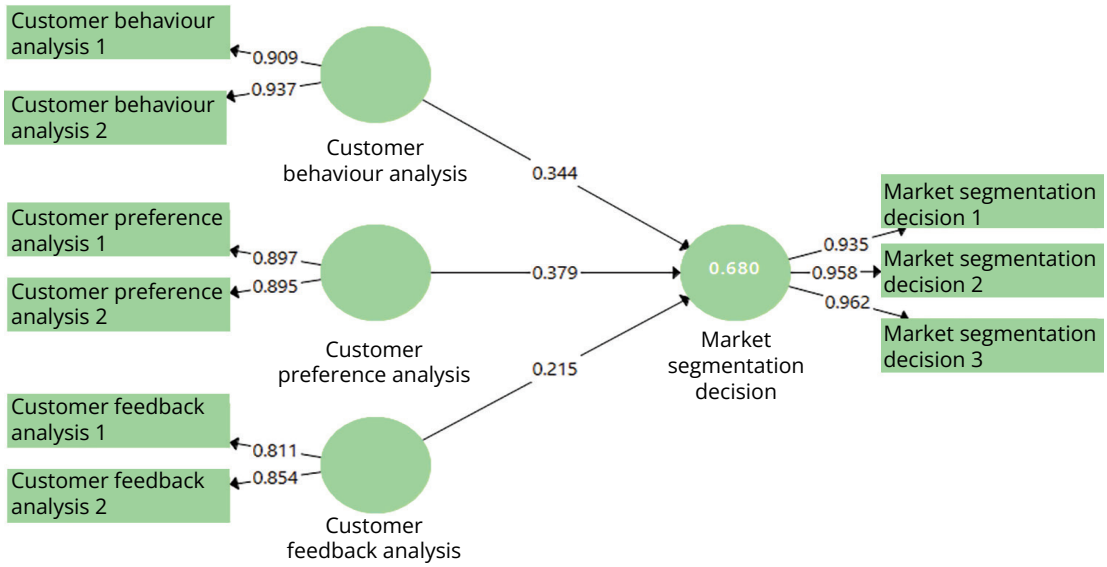

Figure 1. *Model of the path to customer insights and market segmentation decision*
Source*: developed by the authors*

Three independent variables – analysis of consumer behaviour, preferences, and feedback – and one dependent variable – choice to segment the market were included in the model. According to the model's findings, market segmentation decisions were significantly influenced favourably by all three independent factors. This indicated that organisations should value consumer insights since they can aid in making better market segmentation decisions. The particular impacts demonstrated that every independent variable significantly

influences the choice to segment the market. This implied that in order to improve market segmentation decisions, organisations should concentrate on creating consumer insights. Important statistical indicators pertaining to the validity and construct reliability of the four latent variables in this study were shown in Table 3.

Table 3. *Construct reliability and validity*

	Cronbach's Alpha	Composite reliability	Average Variance Extracted (AVE)
Customer behaviour analysis	0.828	0.920	0.852
Customer feedback analysis	0.759	0.819	0.693
Customer preference analysis	0.754	0.891	0.803
Market segmentation decision	0.948	0.966	0.905

Source: *developed by the authors*

These metrics aid in evaluating how well these variables quantify the fundamental ideas they are meant to reflect. Cronbach's Alpha and composite dependability were the two main measures used to assess construct dependability. Cronbach's Alpha assesses a latent variable's internal consistency by determining the extent to which each item was related to every other item. Good quality was shown by the internal consistency scores of the four latent variables, which were above 0.7. Since these values were far higher than the widely accepted cut off limit of 0.7, they suggested that the items within each variable were reliable markers of the related structures. Composite reliability was another construct reliability statistic that considered both internal consistency and the relationships between the items and the latent variable. All of the variables in this study showed strong composite dependability, providing a more trustworthy measure of reliability, with all values over 0.7. The latent variables' high values suggested that they were trustworthy predictors of the constructs they stand for.

Table 3 also displayed the Average Variance Extracted (AVE), which evaluated each latent variable's convergent validity. The degree to which items in a variable measure the same underlying notion and were connected to one another was known as convergent validity. All of the AVE values in the table were higher than the suggested cut off of 0.5. This suggested that each latent variable's items were converging nicely and measuring their respective constructs as a whole. The choice of these variables as valid and dependable measures in the study was supported by their strong composite reliability, high internal consistency, and good convergent validity (Osei *et al.*, 2024). Strong evidence of discriminant validity among the latent variables – customer feedback analysis, customer behaviour analysis, market segmentation decision, and customer preference analysis – was shown by the findings of the discriminant validity study in Table 4. Whether these constructs were separate and not strongly associated with one another was determined by discriminant validity.

Table 4. *Discriminant validity*

	Customer behaviour analysis	Customer feedback analysis	Customer preference analysis	Market segmentation decision
Customer behaviour analysis	**0.923**			
Customer feedback analysis	0.723	**0.833**		
Customer preference analysis	0.642	0.601	**0.896**	
Market segmentation decision	0.743	0.691	0.729	**0.952**

Source: *developed by the authors*

It was clear from examining the correlations between these variables that the off-diagonal values – the correlations between other variables – were significantly lower than the diagonal values, which represent the correlations of each variable with itself. This supported the notion that each latent variable was unique and measures a separate feature of the overall construct by indicating that each latent variable has a stronger relationship with itself than with the other constructs. Compared to its correlations with customer behaviour, customer feedback, and customer preference analysis, the market segmentation decision has a stronger connection with itself. In a similar vein, the connection between customer preference analysis and itself was stronger than that between the other factors. However, this was also true for other variables in their own contexts. These findings demonstrated that rather than being merely various expressions of the same underlying construct, the latent variables in this study were measuring unique ideas. Given that it successfully distinguished between these crucial elements – customer feedback analysis, customer behaviour analysis, market segmentation decision, and customer preference analysis – it appeared that the measurement model was appropriate for the goals of this investigation.

This allowed evaluating the independent variable's correlation. The purpose was to determine, whether two independent variables were not associated and yielding same results. In this study, the expected association between the independent variables was evaluated using

the variance inflation factor (VIF). The VIF values for the latent variables pertaining to the choice of market segmentation were shown in Table 5. Customer feedback, customer behaviour, and consumer preference analysis all have VIF values that were much below the 10-point cut off, which was encouraging. It implied that these latent variables do not exhibit significant multicollinearity. Since there was little correlation between these variables, multicollinearity was not a major problem, when they were included in this study. The coefficient of determination, or R-squared, which is a measure of a model's quality of fit, was displayed in Table 6.

Table 5. *Inner VIF values*

	Customer behaviour analysis	Customer feedback analysis	Customer preference analysis	Market segmentation decision
Customer behaviour analysis				**2.444**
Customer feedback analysis				**2.246**
Customer preference analysis				**1.822**
Market segmentation decision				

Source: *developed by the authors*

Table 6. *Coefficient of determination score*

	R-square	R-square adjusted
Market segmentation decision	0.680	0.676

Source: *developed by the authors*

Approximately 68.0% of the variability seen in the dependent variable (market segmentation decision) can be explained by the independent or latent variables included in the model, according to the market segmentation decision model's R-squared score of 0.680. This suggests that the model captures and explained the observed variations in the buying experience. The corrected R-squared value was 0.676. This results in a more careful evaluation of the model's degree of fit. The modified R-squared value was almost the same as the conventional R-squared value, indicating that the inclusion of the independent variables in the model was unlikely to cause overfitting or excessive complexity. This implied that even when considering any problems relating to model complexity, the explanatory power of the model was still strong. According to the R-squared and modified R-squared values, the market segmentation decision model explained market segmentation decision variability rather well, and adding more latent variables does not seem to degrade the model's performance. In statistical analysis, the effect size, which was commonly represented as f-square and shown in Table 7, quantified the strength of the correlation or influence of independent variables on a dependent variable.

Table 7. *Assessment of the effect size (f^2)*

	Customer behaviour analysis	Customer feedback analysis	Customer preference analysis	Market segmentation decision
Customer behaviour analysis				**0.152**
Customer feedback analysis				0.064
Customer preference analysis				**0.246**
Market segmentation decision				

Source: *developed by the authors*

It evaluated the impact sizes of several latent factors on market segmentation decision. Every independent variable had a value greater than 0.02, which was regarded as a minor effect size. This implied that every variable had a moderate effect size, meaning that each one had a discernible influence on the choice to segment the market. Variability in market segmentation decisions can be moderately explained by changes or variations in any of the factors. The null hypothesis that customer insights have no discernible impact on market segmentation decisions was tested using the bootstrap route coefficient analysis shown in Table 8.

Table 8. *Bootstrapping results showing path coefficient for structural model*

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T-statistics (|O/STDEV|)	P-values
Customer behaviour analysis -> Market segmentation decision	0.344	0.346	0.075	4.608	**0.000**
Customer feedback analysis -> Market segmentation decision	0.215	0.213	0.068	3.155	**0.002**

Table 8, Continued

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T-statistics (|O/STDEV|)	P-values
Customer preference analysis -> Market segmentation decision	0.379	0.379	0.057	6.654	**0.000**

Source: *developed by the authors*

According to the findings, market segmentation decisions were significantly impacted by customer feedback, customer behaviour, and consumer preference analyses as components of customer insights. An examination of the sequence from Customer feedback, customer behaviour, and customer preference analysis to the decision about market segmentation reveals a statistically significant relationship between these three types of analysis and the decision to segment the market. Strong evidence to reject the null hypothesis was suggested by the t-statistics being more than 1.96 and the p-values being less than the traditional significance level of 0.05. As a result, the choice to segment the market was greatly influenced by the characteristics of consumer insights; customer feedback, customer behaviour, and customer preference.

The study determined the effect of customer insights on market segmentation decisions, with the hypothesis being that customer insights do not significantly affect market segmentation decisions. The results revealed that all three factors; customer feedback analysis, customer behaviour analysis, and customer preference analysis, have statistically significant effects on market segmentation decisions. This finding aligned with O.R. Amosu *et al.* (2024), who demonstrated that real-time data analytics provides strategic customer insights crucial for effective e-commerce segmentation. Similarly, M.E. Jalal & A. Elmaghraby (2024) found that counterfactual analysis offered a new perspective on personalised marketing, enabling more precise customer segmentation. S. Park *et al.* (2024) supported this finding through their importance-induced customer segmentation approach using explainable machine learning, which enhanced the accuracy of market segmentation decisions. These studies collectively emphasised, how modern analytical techniques transformed customer insights into actionable segmentation strategies.

The rejection of the null hypothesis was further supported by both historical and contemporary research. F. Qian (2008) established a foundational understanding of CRM and customer segmentation outsourcing for small and medium businesses, highlighting the long-standing importance of customer insights in segmentation. More recently, B.S.V. Reddy *et al.* (2023) demonstrated the effectiveness of clustering algorithms in customer segmentation analysis, providing technical validation for the relationship between customer insights and segmentation decisions. L. Sanu (2024) presented a practical application through Reliance Jio's customer analytics platform, showing how big data can be collected for meaningful customer insights that drive segmentation strategies. D.K. Sharma & M. Kumar (2023) contributed methodological rigour through their market segment evaluation using grey relational analysis, demonstrating quantitative approaches to translate customer insights into segmentation decisions.

The comprehensive effect of customer insights on market segmentation was contextualised by P. Singh *et al.* (2023), who provided an integrative review of consumer behaviour in the service industry, establishing the theoretical foundation for why customer insights matter in segmentation decisions. The findings of this study were also consistent with the results of M.K. Chaudhary *et al.* (2024), who found customer behaviour to be vital marketing concept, M. Deng (2024) focused on customer profiling for market segmentation, and M.M. Ibrahim & H.A. Mamdouh (2025), who demonstrated that utilising customer insights through advanced analytics enabled businesses to create more precise customer profiles, leading to more effective segmentation strategies. Through leveraging these multi-dimensional customer insights, organisations can develop highly targeted marketing approaches that addressed specific customer needs, significantly improving engagement and conversion rates. This data-driven approach to segmentation allowed for continuous refinement and adaptation to changing market conditions, ensuring sustainable competitive advantage in increasingly dynamic business environments.

Conclusions

In the dynamic landscape of emerging markets, small and medium-sized enterprises in Kwara State, Nigeria, have discovered the transformative power of data-driven market segmentation. Research has highlighted the critical role of customer insights derived from big data analytics in shaping strategic business decisions.

The comprehensive analysis in the study revealed three pivotal factors of customer insights that significantly impact market segmentation: customer feedback analysis, customer behaviour analysis, and customer preference analysis. These dimensions provided SMEs with a nuanced understanding of their target markets, enabling more precise and effective strategic positioning. Businesses may gain numerous significant benefits by collecting and analysing client data in a systematic manner. First, it was determined how to design highly focused marketing tactics that resonate with certain client categories. This approach allowed for more personalised product offerings and

communication, which directly addressed the unique needs and preferences of different customer groups. The normality test results indicated that all variables fell within acceptable thresholds for skewness (±1.0) and kurtosis (±3.0), confirming a normal distribution of the data. This validated the reliability of the variables used to measure resource optimisation and supported their suitability. Customer insights can be effectively used to assess their influence on market segmentation decisions. SMEs in emerging markets should enhance market segmentation by leveraging customer feedback, behaviour, and preference analysis through tools like surveys, CRM systems, and social media analytics to inform targeted marketing strategies.

Moreover, the research underscored the potential for improved customer satisfaction and loyalty through data-driven insights. SMEs that leveraged these analytical approaches can develop a more intimate understanding of their customer base, anticipating needs and adapting their strategies proactively. This was particularly crucial in emerging markets, where customer expectations and market dynamics were rapidly evolving. The findings presented a compelling argument for investment in data analytics capabilities, positioning customer insights as a critical competitive advantage for SMEs seeking to ensure long-term expansion in a challenging market environment.

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Conflict of Interest

None.

References

[1] Abdul-Azeez, O., Ihechere, A.O., & Idemudia, C. (2024). SMEs as catalysts for economic development: Navigating challenges and seizing opportunities in emerging markets. *GSC Advanced Research and Reviews*, 19(03), 325-335. doi: 10.30574/gscarr.2024.19.3.0230.

[2] Amosu, O.R., Kumar, P., Fadina, A., Ogunsuji, Y.M., Oni, S., & Adetula, K. (2024). Harnessing real-time data analytics for strategic customer insights in e-commerce and retail. *World Journal of Advanced Research and Reviews*, 23(02), 880-889. doi: 10.30574/wjarr.2024.23.2.2407.

[3] Aouad, A., Elmachtoub, A.N., Ferreira, K.J., & McNellis, R. (2023). Market segmentation trees. *Manufacturing & Service Operations Management*, 25(2), 371-810. doi: 10.1287/msom.2023.1195.

[4] Chaudhary, M.K., Chaudhary, R.K., & Pokharel, P. (2024). Green marketing's role in molding customer buying decisions for green products. *Journal of Emerging Management Studies*, 1(2), 137-147. doi: 10.3126/jems.v1i2.71521.

[5] Cui, Y., Sun, Z., Xiao, Y., Sha, Z., Koskinen, J., Contractor, N., & Chen, W. (2025). Network analysis of two-stage customer decisions with preference-guided market segmentation. *Journal of Computing and Information Science in Engineering*, 25(6), article number 061003. doi: 10.1115/1.4066420.

[6] Daulay, R.Y., Passalaras, R.A., & Heikal, J. (2024). Customer segmentation using K-Means clustering with SPSS program in a case study of consumer interest in current coffee shops. *Budgeting*, 5(2), 721-740. doi: 10.31539/budgeting.v5i2.9288.

[7] Deng, M. (2024). Application of big data analysis in Chinese art song market research. *Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications*, 15(4), 1-10. doi: 10.58346/jowua.2024.i4.001.

[8] Gamba, D. (2022). Servitized customer segmentation model for SMEs. *Academy of Management*, 2022(1). doi: 10.5465/ambpp.2022.18212abstract.

[9] Garg, S., & Khandhar, A. (2024). Analysing segmentation and behavioural dynamics in customer purchase behavior. *International Journal of Scientific Research in Engineering and Management*, 8(8), 1-7. doi: 10.55041/ijsrem37271.

[10] Genc, E., Dayan, M., & Genc, O.F. (2019). The impact of SME internationalization on innovation: The mediating role of market and entrepreneurial orientation. *Industrial Marketing Management*, 82, 253-264. doi: 10.1016/j.indmarman.2019.01.008.

[11] Gopakumar, A., Shine, A., Ajim, A., & Anjali, T. (2024). Consumer behaviour analysis for customer segmentation and purchase prediction. In *10th international conference on advanced computing and communication systems (ICACCS)*. Coimbatore: IEEE. doi: 10.1109/icaccs60874.2024.10717226.

[12] Ibrahim, M.M., & Mamdouh, H.A. (2025). The impact of online customer reviews (OCRs) on consumer purchasing decisions. *Arab Journal of Administration*, 2(45), 227-244. doi: 10.21608/aja.2022.130150.1225.

[13] Jalal, M.E., & Elmaghraby, A. (2024). Analyzing the dynamics of customer behavior: A new perspective on personalized marketing through counterfactual analysis. *Journal of Theoretical and Applied Electronic Commerce Research*, 19(3), 1660-1681. doi: 10.3390/jtaer19030081.

[14] Kumar, K., Krishna, V.R., Govindaraj, M., Pawar, V., Sathyakala, S., & Viswanathan, R. (2025). Characteristics determining customer's preferences for OTT video streaming: A multivariate analysis. *Entertainment Computing*, 52, article number 100746. doi: 10.1016/j.entcom.2024.100746.
[15] Li, X., & Lee, Y.S. (2024). Customer segmentation marketing strategy based on Big Data analysis and clustering algorithm. *Journal of Cases on Information Technology*, 26(1). doi: 10.4018/JCIT.336916.
[16] Ministry of Commerce & Co-Operatives. (2025). *Kwara State Application Form Portal*. Retrieved from https://forms.irs.kw.gov.ng/ministry-commerce-co-operatives.
[17] Oduro, S. (2020). Exploring the barriers to SMEs' open innovation adoption in Ghana: A mixed research approach. *International Journal of Innovation Science*, 12(1), 21-51. doi: 10.1108/ijis-11-2018-0119.
[18] Omowole, B.M., Olufemi-Phillips, A.Q., Ofodile, O.C., Eyo-Udo, N.L., & Ewim, S.E. (2024). Big data for SMEs: A review of utilization strategies for market analysis and customer insight. *International Journal of Scholarly Research in Multidisciplinary Studies*, 5(2), 1-18. doi: 10.56781/ijsrms.2024.5.2.0044.
[19] Osei, F., Mensah, R., Kankam-Kwarteng, C., & Owusu, J.D. (2024). The impact of innovation dimension and marketing intelligence on the performance of small and medium enterprises in Ghana. *Economics, Entrepreneurship, Management*, 11(2), 8-18. doi: 10.56318/eem2024.02.008.
[20] Park, S., Jiang, Y., & Kim, H. (2024). Importance-induced customer segmentation using explainable machine learning. *Journal of Mechanical Design*, 147(4), article number 044501. doi: 10.1115/1.4066746.
[21] Qian, F. (2008). A study on CRM and its customer segmentation outsourcing approach for small and medium businesses. In L.D. Xu, A.M. Tjoa & S.S. Chaudhry (Eds.), *Research and practical issues of enterprise information systems II. IFIP international federation for information processing* (Vol. 255, pp. 1387-1394). Boston: Springer. doi: 10.1007/978-0-387-76312-5_67.
[22] Ragab, M.A., & Arisha, A. (2018). Research methodology in business: A starter's guide. *Management and Organizational Studies*, 5(1), 1-14. doi: 10.5430/mos.v5n1p1.
[23] Reddy, B.S.V., Rishikeshan, C.A., Dagumati, V., Prasad, A., & Singh, B. (2023). Customer segmentation analysis using clustering algorithms. In S.K. Udgata, S. Sethi & X.Z. Gao (Eds.), *Intelligent systems. ICMIB 2023. Lecture notes in networks and systems* (Vol. 728, pp. 353-368). Singapore: Springer. doi: 10.1007/978-981-99-3932-9_31.
[24] Samira, Z., Weldegeorgise, Y.W., Osundare, O.S., Ekpobimi, O.H., & Kandekere, R.C. (2024). Development of an integrated model for SME marketing and CRM optimization. *International Journal of Management & Entrepreneurship Research*, 6(10), 3209-3242. doi: 10.51594/ijmer.v6i10.1612.
[25] Sanu, L. (2024). Harnessing big data for insights: Reliance Jio's customer analytics platform. In J. Kaur & D. Ingale (Eds.), *Indian management case studies*. Tamil Nadu: San International Scientific Publications. doi: 10.59646/imcsc9/192.
[26] Sharma, D.K., & Kumar, M. (2023). Market segment evaluation and selection by grey relational analysis. In *1st international conference on cognitive computing and engineering education (ICCCEE).* Pune: IEEE. doi: 10.1109/ICCCEE55951.2023.10424483.
[27] Singh, A., Dhanda, N., Tiwari, S., & Verma, R. (2024). Market segmentation using machine learning and data analysis: A comprehensive study. In *15th international conference on computing communication and networking technologies (ICCCNT).* Kamand: IEEE. doi: 10.1109/icccnt61001.2024.10725035.
[28] Singh, P., Arora, L., & Choudhry, A. (2023). Consumer behavior in the service industry: An integrative literature review and research agenda. *Sustainability*, 15(1), article number 250. doi: 10.3390/su15010250.
[29] Tavor, T., Gonen, L.D., & Spiegel, U. (2023). Customer segmentation as a revenue generator for profit purposes. *Mathematics*, 11(21), article number 4425. doi: 10.3390/math11214425.
[30] Yamane, T. (1969). *Statistics: An introductory analysis* (2nd ed.). New York: Harper & Row.
[31] Zhang, Z. (2024). Market segmentation and personalized marketing strategy optimization driven by big data analysis. In *Advances in transdisciplinary engineering* (Vol. 56, pp. 240-249). doi: 10.3233/atde240434.
[32] Zhong, Y., Williady, A., Handani, N.D., & Kim, H.-S. (2024). Big data insights into coastal tourism: Analyzing customer satisfaction at Egyptian Red Sea dive resorts. *Tourism and Hospitality*, 5(4), 996-1011. doi: 10.3390/tourhosp5040056.

Використання big data для розуміння споживачів і сегментації ринку МСП у країнах, що розвиваються

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Анотація. Малі та середні підприємства у всьому світі, особливо в країнах з економікою, що розвивається, стикаються з викликами у процесі сегментації ринку. Вони мають обмежене уявлення про важливість отримання інсайтів про споживачів із великих даних для прийняття обґрунтованих рішень щодо сегментації ринку. Метою цього дослідження було оцінити роль здобуття споживчих інсайтів із великих даних у прийнятті рішень щодо сегментації ринку малих та середніх підприємств в умовах економік, що розвиваються. Результати дослідження засвідчили, що аналіз споживчої поведінки суттєво впливає на рішення щодо сегментації ринку серед малих і середніх підприємств. Значення β-коефіцієнта становило 0,344, що свідчило про те, що одинична зміна в аналізі споживчої поведінки зумовлює відповідну зміну в рішеннях щодо сегментації ринку, при t-статистиці 4,608 та p-значенні 0,001. Було також встановлено, що аналіз споживчих переваг має значний вплив на сегментаційні рішення малих та середніх підприємств. Значення β-коефіцієнта становило 0,379, що вказало на сильну залежність між змінами в аналізі переваг споживачів та рішеннями щодо сегментації ринку, при t-статистиці 6,654 та p-значенні 0,001. Крім того, результати дослідження показали, що аналіз зворотного зв'язку від споживачів також істотно впливає на рішення щодо сегментації ринку серед малих та середніх підприємств. Значення β-коефіцієнта дорівнювало 0,215, при t-статистиці 3,155 та p-значенні 0,002. Зроблено висновок, що отримання інсайтів про споживачів із великих даних є важливим чинником для малих і середніх підприємств в економіках, що розвиваються, у процесі прийняття ефективних рішень щодо сегментації ринку

Ключові слова: складні дані; аналіз споживчої поведінки; аналіз відгуків споживачів; споживча перспектива; аналіз споживчих переваг

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Forecasting cash flows of industrial enterprises in the context of implementing their development strategy: Accounting, analytical, and organisational aspects

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Abstract. The availability of cash at the disposal of any industrial enterprise provides a sense of economic freedom in the implementation of its development strategy. The total cash indicator is directly dependent on the cash flows across various types of activities. To meet the informational needs of managerial personnel of an industrial enterprise, the ability to forecast projected cash flow indicators is essential. The aim of this article was to present a methodology for forecasting the cash flows of industrial enterprises to ensure the successful implementation of their development strategies. A comparative analysis of statistical indicators of cash flows in Ukrainian bakery enterprises had made it possible to determine the share of cash in their total assets and to calculate their liquidity ratios. Analytical calculations have revealed predominantly low liquidity ratios, both at the national level and among individual bakery enterprises in Western Ukraine, with values falling below the normative thresholds of 0.1-0.2. The article presented indicators on cash flows generated from various types of activities of Ukrainian bakery enterprises, enabling the conclusion that there was a direct relationship between cash flow dynamics and the actual cash balances held in enterprise bank accounts. The dominant cash flow was the one generated from operating activities. It was this flow that should provide the main source of cash for the enterprise and serve as a driving force for both investment and financial activities. The balance among cash flows from various activities wasn't conform to standardised norms, but rather reflected the individual strategic vision of the enterprise's owner, as implemented by the hired personnel. Forecast calculations of cash flows were crucial for the implementation of any enterprise's development strategy. The article systematised approaches to organising cash flow forecasting. It outlined the construction of a cash flow model from operating activities, taking into account the forecasted sales volume. The practical significance of the research findings lies in the methodological substantiation of cash flow forecasting indicators, which can be utilised by economic entities in the industrial sector to predict both operational and strategic performance indicators

Keywords: operational cash flows; investment cash flows; financial cash flows; total cash flow; total receipts

Introduction

In order to survive in the contemporary business environment, any industrial enterprise must organise its cash flow in accordance with the capital formula: "Money – Commodity – Money*". In accordance with this capital formula, the amount of money at the final stage of the cash cycle should exceed the amount introduced into the business at the initial stage, generating a certain level of economic return. Otherwise, the economic entity risks depleting its reserves (accumulated profits, non-current and current assets) and moving towards its eventual dissolution as a business unit. These considerations also affirm the principles of accounting as enshrined in the Law of Ukraine No. 996-XIV (2024), particularly the going concern principle, which assumed

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that the enterprise will continue to operate in the foreseeable future and, accordingly, its assets and liabilities were assessed on this basis. Forecasting cash flows represented a complex process encompassing the collection, accumulation, summarisation, processing, and presentation of analytical data in a specific format to define development benchmarks for an economic entity within a given business environment.

M.S. Shahriar *et al.* (2021) highlighted the importance of forecasting in decision-making under the uncertainties of modern business conditions and stressed the significance of selecting appropriate forecasting methods. According to the authors, the chosen methodology greatly influenced the quality of the forecasting project, which in turn motivated or discouraged sponsors and other stakeholders from investing in the enterprise. They noted the existence of a wide range of forecasting methods, though the reliability of each individual method remained uncertain, making the selection process for a particular business case quite challenging. A. Rahman & R.B. Sharma (2020) stated that an economic entity should primarily generate cash through its operating activities, which were dominant among all activity types. Failure to properly manage operational cash flows can lead to deteriorating financial performance and reduced business efficiency over time. According to the authors, it was the Statement of Cash Flows that provided the opportunity to forecast and manage the enterprise's cash flow.

F. Alnori (2020) conducted a study on the relationship between cash reserves and financial performance indicators of Saudi Arabian firms, excluding banks and insurance companies. The author concluded that a non-linear relationship exists between cash holdings (i.e., cash balances recorded in firms' balance sheets) and financial performance outcomes. The author also underscored the critical role of cash in both day-to-day operations and the long-term development of any firm. Based on the identified non-linear relationship, the study supported the "compromise theory" regarding optimal cash levels, which suggested that the ideal cash holding depends on cultural factors, industry-specific features, and a balance between the benefits of high liquidity and the costs of cash retention.

Scientist F. Nadeem (2024) explored the issue of optimal cash levels to enhance firm value, using a sample of energy companies listed on the Saudi Arabian Stock Exchange. The study investigated the relationships between cash holdings, return on capital (as a variable factor), and firm size (as a control variable). The results weren't confirmed a strong correlation between these indicators, suggesting that optimal cash levels depend on the management tasks, forecasting targets, regional business context, and other influencing factors. These aspects should be carefully considered, when forecasting cash flows for any enterprise.

X. Chen *et al.* (2021) conducted an in-depth study on cash flow forecasting using the CFF (cross-functional flowcharts) method. The authors identified key factors affecting the accuracy and usefulness of forecasts within Australia's mining sector. Their conclusions can be adapted to various sectors of Ukraine's economy. The feasibility of conducting CFF analysis depended on investor demand and analyst capacity. Furthermore, generating the cash flow statement using the direct method reduced analytical processing costs and minimised forecasting errors. However, a large number of analysts wasn't always enhanced the forecasting process due to the increased complexity of coordination.

The authors S. Li *et al.* (2024) focused on the impact of applying international accounting and reporting standards on the quality of accounting information used for forecasting business activity. It was worth noting that Ukrainian accounting standards were based on international accounting frameworks. Order of the Ministry of Finance of Ukraine No. 73 (2013) included a template for the "Statement of Cash Flows", which can be completed using either the direct or indirect method. This report allowed comprehensive tracking of cash movements across operating, investing, and financing activities.

R. Ball & V.V. Nikolaev (2022) investigated the accrual method, which underpined the recognition of income from operating activities and directly influences operational cash flows. The accrual basis assumes that recorded profit exceeds operational cash inflows, a fact that was particularly relevant for forecasting future cash flows. Unlike the cash basis, the accrual method generated more informative indicators for financial reporting. Profit calculated using this approach played a key role in predicting future cash flows, and actual cash movements helped to analyse discrepancies between accrued profit and net cash flow. These insights were utilised by the researchers to forecast industrial enterprise revenues.

Researchers B. Noury *et al.* (2020) examined the relevance of cash flow forecasting in the context of growing investment activity and its influence on strategic management decisions. They emphasised the importance of operational cash flows as the foundation of a firm's financial activities. Their study also compared the use of accrual and cash methods for cash flow forecasting, noting the absence of consensus among scholars. They concluded that the accrual method offered greater analytical capacity and serves as the foundation for forecasting operating cash flows. C.-W. Wang *et al.* (2023) asserted that a firm's financial policy was shaped by the uncertainty of its cash flows. The greater this uncertainty, the more cash was required to ensure the coordinated functioning of the enterprise's structural units. The aim of this study was to present an original approach to forecasting cash flows in industrial enterprises.

Materials and Methods

This scientific study employed analytical and synthetic methodological techniques. The analytical approach

facilitated the examination of the formation of specific types of cash flows from operating, investing, and financing activities; the analysis of changes in the volume and structure of cash flows over a defined period; the identification of trends and patterns; and the application of various financial ratios (such as the share of cash in current assets, the share of cash in total assets, and the absolute liquidity ratio) to assess the financial condition of enterprises and the effectiveness of their cash flow management. The synthetic method was applied to integrate the various types of cash flows by combining inflows from different activities to form a comprehensive picture of the enterprise's overall cash flow. It also allowed the identification of influencing factors and their impact on the formation and dynamics of cash flows, the establishment of cause-and-effect relationships, the development of a holistic view of the enterprise's financial standing, highlighting its strengths and weaknesses, the formulation of an effective cash flow management strategy aimed at ensuring financial stability and growth.

To study the economic processes associated with cash flows in industrial enterprises, the method of generalisation was applied at different stages of the research. This method allowed the systematisation of existing theoretical approaches to the study of cash flows, the identification of key research directions, and the detection of general trends and patterns in the formation and dynamics of cash flows based on the analysis of statistical data and corporate financial statements. Conclusions were drawn regarding the specific features of cash flow formation and management in industrial enterprises, and practical recommendations for forecasting cash flows were developed.

The research was based on statistical data on the operations of Ukrainian bakery enterprises obtained from open sources. To facilitate comparisons and draw generalised conclusions, aggregate indicators for all active enterprises in Ukraine and for enterprises engaged in the production of bread, bakery, and flour products were used, as provided by the Official website of State Statistics Service of Ukraine (2023). For the calculation of the share of cash in current and total assets and the absolute liquidity ratios, thematic summaries of the State Statistics Service of Ukraine were utilised, specifically the data on current assets by economic activity type, with a breakdown by large, medium, small, and micro-enterprises (2013-2023). The absolute liquidity ratio was calculated as the ratio between the value of the balance sheet item "Cash and cash equivalents, thousand UAH" and the value of the item "Current liabilities and provisions, thousand UAH". To estimate cash flows from operating activities of all active enterprises in Ukraine and those producing bread and bakery products, the indirect method was used, based on statistical indicators from thematic datasets, including: Financial result before taxation of enterprises by types of economic activity with a breakdown into large, medium, small, and micro-enterprises (excluding banks) for the years 2010-2023 (profit or loss before taxation); Non-current assets of enterprises by types of economic activity with a breakdown into large, medium, small, and micro-enterprises (2013-2023) (depreciation of non-current assets); Current assets of enterprises by types of economic activity with a breakdown into large, medium, small, and micro-enterprises (2013-2023) (change in current assets); Current liabilities and provisions of enterprises by types of economic activity with a breakdown into large, medium, small, and micro-enterprises (2013-2023) (change in current liabilities and provisions) (Official website of State Statistics Service of Ukraine, 2023).

To validate the conclusions drawn from the statistical analysis of all active enterprises and the bakery sector, selected bakery enterprises in Western Ukraine were examined in detail, specifically: Additional liability company "Ivano-Frankivsk Bread Plant" (2024), Limited liability company "Believer" (2024), Private joint-stock company "Teremno Khlib" (2024). Additionally, data were analysed from: Limited liability company "Khlibodar" (2024), Limited liability company "Ternopilkhlibprom" (2024), Private joint-stock company "Concern Hlibprom" (2024).

The key selection criteria for these enterprises included: a strong regional reputation, high consumer demand for their products, and a workforce exceeding 100 employees. The methodology for calculating analytical indicators of cash flows for these selected enterprises mirrors the methodology used for calculating the same indicators across all active enterprises.

Results and Discussion

Cash flow forecasting should be conducted with consideration for the movement of cash from various types of business activities. According to Order of the Ministry of Finance of Ukraine No. 73 (2013), information on the cash flow of an industrial enterprise was disclosed in Form No. 3, "Statement of cash flows", broken down into operating, investing, and financing activities. The characteristics of cash flows by type of industrial activity were presented in Table 1.

Table 1. *Characteristics of cash flows by type of industrial activity*

Incoming cash flows	Outgoing cash flows
1. Operating activities	
Proceeds from sales of goods, products, services	Payment for goods, works, services to suppliers
Proceeds from rental income	Payment of employee wages
Receipts of fines, penalties, forfeits	Payment of single social contribution
Refund of overpaid taxes, fees, and charges	Payment of taxes, fees, and charges (excluding the single social contribution)

Table 1, Continued

Incoming cash flows	Outgoing cash flows
Refund of overpayments to suppliers for goods, works, services	Refunds to buyers for goods, products, works, services
Targeted financing from budgetary funds	Payment of interest on bank loans
	Payments under targeted financing agreements of budgetary programmes
Net cash flow from operating activities: difference between the total inflows from operating activities and the total outflows related to operating activities	
2. Investing activities	
Proceeds from the sale of non-current assets	Payment for the acquisition of non-current assets
Receipts of interest and dividends from corporate rights and securities	Payment for the acquisition of corporate rights and securities
Proceeds from derivatives	Payments on derivatives
Receipts of interest from deposits in bank accounts	
Net cash flow from investing activities: difference between the total inflows and outflows related to investing activities	
3. Financing activities	
Contributions from shareholders under the founding documents	Repurchase of the company's own shares
Receipts of loans from banks and other financial institutions	Repayment of loans to banks and other financial institutions
	Dividend payments to shareholders
Net cash flow from financing activities: difference between the total inflows and outflows related to financing activities	
4. Total cash flow: total value of net cash flows from operating, investing, and financing activities	

Source: *based on Order of the Ministry of Finance of Ukraine No. 73 (2013)*

The total cash flow generated from various activities directly influences the cash balance of the enterprise and, consequently, its financial stability indicators. Since Western Ukraine has largely adapted to the new economic realities and maintained business activity, the study was based on commonly accepted normative values for the absolute liquidity ratio, ranging from 0.2 to 0.35. The dynamics of cash balances of bakery enterprises in the western regions of Ukraine, in comparison with the overall indicators of all active enterprises in Ukraine and those specifically in the production of bread, bakery, and flour-based products, were presented in Table 2. It should be noted that each region of Ukraine has a considerable number of enterprises engaged in the production of bread and bakery goods. These enterprises may vary in production volume, workforce size, and target consumer focus. The study concentrated on bakery enterprises in Western Ukraine that are well known within their respective regions and employ more than 100 staff members.

Table 2. *Dynamics of cash balances in Ukrainian bakery enterprises*

Period	Cash and cash equivalents, thousand UAH	Current assets, thousand UAH	Share of cash in current assets, %	Total assets, thousand UAH	Share of cash in total assets, %
1	2	3	4	5	6
All active enterprises in Ukraine (2013 – 393327 units, 2014 – 341001 units, 2015 – 343440 units, 2016 – 306369 units, 2017 – 338256 units, 2018 – 355877 units, 2019 – 380597 units, 2020 – 373822 units, 2021 – 370834 units, 2022 – 261924 units, 2023 – 307852 units)					
2013	207,799,071.5	3,069,041,563.6	6.77	5,712,274,810.1	3.64
2014	248,656,117.5	3,271,954,021.3	7.60	5,994,265,571.9	4.15
2015	301,587,227.7	4,108,602,679.3	7.34	8,073,783,376.4	3.74
2016	334,528,258.2	5,772,816,523.9	5.79	9,991,791,211.6	3.35
2017	365,615,871.6	5,650,817,419.4	6.47	9,961,779,060.4	3.67
2018	377,118,530.5	6,285,066,560.4	6.00	10,878,050,628.0	3.47
2019	463,514,738.0	6,640,282,371.6	6.98	11,494,975,428.7	4.03
2020	545,592,742.2	7,360,593,624.4	7.41	12,682,480,085.0	4.30
2021	631,067,419.2	8,411,902,475.0	7.50	14,070,487,840.4	4.49
2022	723,519,895.2	9,024,337,965.0	8.02	14,654,653,024.4	4.94
2023	1,099,212,362.8	10,193,400,959.3	10.78	16,442,568,885.4	6.69
Enterprises engaged in the production of bread, bakery, and flour products (2013 – 1362 units, 2014 – 1158 units, 2015 – 1133 units, 2016 – 1007 units, 2017 – 1036 units, 2018 – 1075 units, 2019 – 1102 units, 2020 – 1069 units, 2021 – 1113 units, 2022 – 838 units, 2023 – 923 units)					
2013	411,261.8	7,272,214.3	5.66	14,731,592.0	2.79
2014	578,497.7	7,418,985.6	7.80	15,074,022.2	3.84
2015	507,793.7	10,926,500.9	4.65	20,430,462.9	2.49
2016	477,987.7	11,617,683.2	4.11	18,467,113.3	2.59
2017	667,385.1	12,351,258.4	5.40	19,339,112.8	3.45

Table 2, Continued

1	2	3	4	5	6
2018	834,901.6	13,610,085.4	6.13	23,422,002.4	3.56
2019	821,783.1	14,423,307.6	5.70	25,653,231.4	3.20
2020	1,137,640.2	17,258,418.9	6.59	30,944,047.9	3.68
2021	1,302,529.1	19,948,005.8	6.53	36,062,066.6	3.61
2022	2,310,128.0	20,974,301.0	11.01	32,902,568.6	7.02
2023	3,387,637.8	26,192,663.8	12.93	41,193,111.5	8.22
Volyn region, Private joint-stock company "Teremno Khlib"					
2019	3,472	36,966	9.39	111,147	3.12
2020	808	37,887	2.13	146,049	0.55
2021	739	39,036	1.89	143,589	0.51
2022	1,637	44,328	3.69	155,041	1.06
2023	2,264	53,635	4.22	179,343	1.26
Zakarpattia region, Limited liability company "Believer"					
2020	3,306	27,405	12.06	32,338	10.22
2021	6,930	59,170	11.71	75,966	9.12
2022	7,255	88,742	8.18	115,771	6.27
2023	25,679	121,050	21.21	159,470	16.10
Ivano-Frankivsk region, Additional liability company "Ivano-Frankivsk Bread Plant"					
2019	3,980	31,249	12.74	94,935	4.19
2020	3,659	79,707	4.59	161,228	2.27
2021	1,674	129,127	1.30	243,534	0.69
2022	4,951	152,907	3.24	253,634	1.95
2023	4,881	170,756	2.86	280,894	1.74
Lviv region, Private joint-stock company "Concern Hlibprom"					
2019	39,814	224,855	17.71	723,007	5.51
2020	9,972	229,643	4.34	714,776	1.40
2021	9,456	273,288	3.46	849,416	1.11
2022	35,439	333,939	10.61	915,178	3.87
2023	8,534	334,171	2.55	1,068,315	0.80
Rivne region, Limited liability company "Khlibodar"					
2019	788	62,511	1.26	101,236	0.78
2020	682	57,325	1.19	111,116	0.61
2021	992	88,495	1.12	149,634	0.66
2022	2,367	96,194	2.46	205,458	1.15
2023	15,380	154,310	9.97	307,416	5.00
Ternopil region, Limited liability company "Ternopilkhlibprom"					
2019	535	6,019	8.89	16,243	3.29
2020	278	5,758	4.83	13,690	2.03
2021	123	5,307	2.31	13,128	0.93
2022	106	6,712	1.58	14,015	0.76
2023	97	6,263	1.55	15,689	0.62

Source: *based on Additional liability company "Ivano-Frankivsk Bread Plant" (2024), Limited liability company "Believer" (2024), Limited liability company "Khlibodar" (2024), Limited liability company "Ternopilkhlibprom" (2024), Private joint-stock company "Concern Hlibprom" (2024), Private joint-stock company "Teremno Khlib" (2024)*

Statistical data on cash balances indicated that their share in the assets of any enterprise remains relatively low. At the national level, the proportion of cash and cash equivalents in total assets of active enterprises ranged between 3% and 7%. For enterprises engaged in the production of bread, bakery, and flour products, this range extended to 3-8%. In general, a clear trend was observed: the share of cash and cash equivalents in total assets was consistently lower than their share in current assets. This trend was also evident among the selected bakery enterprises from Western Ukraine included in the study. However, it was important to note that each enterprise was unique, and the variability of their indicators may be more pronounced due to individual circumstances.

A significant development was the increased concentration of cash across all Ukrainian enterprises, and particularly among enterprises involved in the production of bread, bakery, and flour products (Table 2). As of the end of 2023, cash and cash equivalents accounted for 6.69% of the total assets of all active enterprises in Ukraine. In the bread and bakery sector, the concentration was even higher – 8.22% (Official website of State Statistics Service of Ukraine, 2023).

This pattern, however, was not consistently observed across other individual bakery enterprises. These figures were likely the result of the full-scale war that has been ongoing in Ukraine since 2022, leading enterprises to adopt a more cautious approach to managing their cash reserves.

A critical benchmark in the operation of any industrial enterprise was the minimum level of cash required to cover its most urgent needs. This was typically assessed using the absolute liquidity ratio, calculated as the ratio of the balance sheet item "Cash and cash equivalents, thousand UAH" to the item "Current liabilities and provisions, thousand UAH." Table 3 presented the absolute liquidity ratios of Ukrainian bakery enterprises, illustrating the relationship between cash, its equivalents, and current liabilities and provisions.

Table 3. *Absolute liquidity ratios of Ukrainian bakery enterprises*

Period	Cash and cash equivalents, thousand UAH	Current liabilities and provisions, thousand UAH	Absolute liquidity ratio
1	2	3	4
All active enterprises in Ukraine (2013 – 393327 units, 2014 – 341001 units, 2015 – 343440 units, 2016 – 306369 units, 2017 – 338256 units, 2018 – 355877 units, 2019 – 380597 units, 2020 – 373822 units, 2021 – 370834 units, 2022 – 261924 units, 2023 – 307852 units)			
2013	207,799,071.5	2,689,338,170.9	0.08
2014	248,656,117.5	3,151,253,038.8	0.08
2015	301,587,227.7	4,114,903,221.6	0.07
2016	334,528,258.2	5,846,688,669.2	0.06
2017	365,615,871.6	5,769,538,995.9	0.06
2018	377,118,530.5	6,408,553,734.3	0.06
2019	463,514,738.0	6,764,591,798.3	0.07
2020	545,592,742.2	7,424,970,644.4	0.07
2021	631,067,419.2	8,111,316,792.1	0.08
2022	723,519,895.2	8,713,997,338.1	0.08
2023	1,099,212,362.8	9,625,767,944.5	0.11
Enterprises engaged in the production of bread, bakery, and flour products (2013 – 1362 units, 2014 – 1158 units, 2015 – 1133 units, 2016 – 1007 units, 2017 – 1036 units, 2018 – 1075 units, 2019 – 1102 units, 2020 – 1069 units, 2021 – 1113 units, 2022 – 838 units, 2023 – 923 units)			
2013	411,261.8	6,614,120.4	0.06
2014	578,497.7	8,683,477.6	0.07
2015	507,793.7	11,304,604.5	0.04
2016	477,987.7	10,412,235.8	0.05
2017	667,385.1	11,926,521.7	0.06
2018	834,901.6	13,378,968.4	0.06
2019	821,783.1	13,177,083.4	0.06
2020	1,137,640.2	15,839,561.4	0.07
2021	1,302,529.1	19,460,076.2	0.07
2022	2,310,128.0	19,531,346.2	0.12
2023	3,387,637.8	23,301,709.3	0.15
Volyn region, Private joint-stock company "Teremno Khlib"			
2019	3,472	40,517	0.09
2020	808	51,899	0.02
2021	739	59,356	0.01
2022	1,637	76,591	0.02
2023	2,264	87,822	0.03
Zakarpattia region, Limited liability company "Believer"			
2020	3,306	28,977	0.11
2021	6,930	70,692	0.10
2022	7,255	106,040	0.07
2023	25,679	138,594	0.19
Ivano-Frankivsk region, Additional liability company "Ivano-Frankivsk Bread Plant"			
2019	3,980	40,391	0.10
2020	3,659	82,915	0.04
2021	1,674	155,967	0.01
2022	4,951	191,914	0.03
2023	4,881	224,500	0.02
Lviv region, Private joint-stock company "Concern Hlibprom"			
2019	39,814	206,794	0.19
2020	9,972	223,160	0.04

Table 3, Continued

1	2	3	4
2021	9,456	281,158	0.03
2022	35,439	322,132	0.11
2023	8,534	367,017	0.02
Rivne region, Limited liability company "Khlibodar"			
2019	788	66,892	0.01
2020	682	70,298	0.01
2021	992	97,089	0.01
2022	2,367	139,238	0.02
2023	15,380	177,213	0.09
Ternopil region, Limited liability company "Ternopilkhlibprom"			
2019	535	7,069	0.08
2020	278	5,508	0.05
2021	123	8,685	0.01
2022	106	13,023	0.01
2023	97	14,483	0.01

Source: *based on Additional liability company "Ivano-Frankivsk Bread Plant" (2024), Limited liability company "Believer" (2024), Limited liability company "Khlibodar" (2024), Limited liability company "Ternopilkhlibprom" (2024), Private joint-stock company "Concern Hlibprom" (2024), Private joint-stock company "Teremno Khlib" (2024)*

The analytical indicators presented in Table 3 demonstrated that the absolute liquidity of all active enterprises in Ukraine during the period from 2013 to 2023 did not exceed the recommended normative levels. Only in 2023 did the absolute liquidity of all operating enterprises in the country rise to 0.11, compared to 0.08 in 2022. Similar conclusions can be drawn regarding the absolute liquidity of Ukrainian enterprises engaged in the production of bread, bakery, and flour products. The increase in absolute liquidity ratios among all active enterprises in 2023 can be attributed to the impact of the ongoing war in the country, during which cash served as a stabilising factor in the economic activities of enterprises. Predominantly low absolute liquidity ratios were recorded at several of the studied bakery enterprises in Western Ukraine, indicating an insufficient volume of highly liquid assets and, at times, a lack of capacity to promptly settle short-term liabilities to other economic agents. This lack of highly liquid assets – primarily represented by cash – served as a basis for further analysis of cash flows by types of activity (Table 4).

Table 4. *Cash flows by types of activity in Ukrainian bakery enterprises*

Period	Net cash flow and cash equivalents, thousand UAH	Net cash flow from operating activities, thousand UAH	Net cash flow from investing and financing activities, thousand UAH
1	2	3	4
All active enterprises in Ukraine (2013 – 393327 units, 2014 – 341001 units, 2015 – 343440 units, 2016 – 306369 units, 2017 – 338256 units, 2018 – 355877 units, 2019 – 380597 units, 2020 – 373822 units, 2021 – 370834 units, 2022 – 261924 units, 2023 – 307852 units)			
2014	40,857,046	3,225,214,426	-3,184,357,380
2015	52,931,110.2	-7,075,184,129	7,128,115,240
2016	32,941,030.5	-116,912,023.1	149,853,053.6
2017	31,087,613.4	-260,016,125.2	291,103,738.6
2018	11,502,658.9	1,586,670,385	-1,575,167,726
2019	86,396,207.5	319,721,867.6	-233,325,660
2020	82,078,004.2	905,424,863.6	-823,346,859
2021	85,474,677	706,454,578	-620,979,901
2022	92,452,476	-1,190,910,227	1,283,362,703
2023	375,692,467.6	1,323,520,778	-947,828,311
Enterprises engaged in the production of bread, bakery, and flour products (2013 – 1362 units, 2014 – 1158 units, 2015 – 1133 units, 2016 – 1007 units, 2017 – 1036 units, 2018 – 1075 units, 2019 – 1102 units, 2020 – 1069 units, 2021 – 1113 units, 2022 – 838 units, 2023 – 923 units)			
2014	167,235.9	1,252,356.7	-1,085,120.8
2015	-70,704	13,271,629.8	-13,342,333.8
2016	-29,806	-2,820,277.3	2,790,471.3
2017	189,397.4	152,427.5	36,969.9

Table 4, Continued

1	2	3	4
2018	167,516.5	1,653,228.3	-1,485,711.8
2019	-13,118.5	-3,529,830.4	3,516,711.9
2020	315,857.1	28,912,597.5	-28,596,740.4
2021	164,888.9	-35,151,402.5	35,316,291.4
2022	1,007,598.9	1,439,346.7	-431,747.8
2023	1,077,509.8	2,152,783.3	-1,075,273.5
Volyn region, Private joint-stock company "Teremno Khlib"			
2020	-2,664	18,338	-21002
2021	-69	3,842	-3911
2022	898	12,252	-11354
2023	627	6,919	-6292
Zakarpattia region, Limited liability company "Believer"			
2020	349	349	0
2021	3,624	3,624	0
2022	325	325	0
2023	18,424	18,424	0
Ivano-Frankivsk region, Additional liability company "Ivano-Frankivsk Bread Plant"			
2020	-321	14,187	-14,508
2021	-1,985	1,257	-3,242
2022	3,277	4,976	-1,699
2023	-70	10,857	-10,927
Lviv region, Private joint-stock company "Concern Hlibprom"			
2020	-29,842	71,380	-101,222
2021	-516	83,785	-84,301
2022	25,983	71,596	-45,613
2023	-26,905	123,659	-150,564
Rivne region, Limited liability company "Khlibodar"			
2020	-106	5,637	-5,743
2021	310	2,878	-2,568
2022	1,375	143	1,232
2023	13,013	25,477	-12,464
Ternopil region, Limited liability company "Ternopilkhlibprom"			
2020	-257	1,175	-1,432
2021	-155	470.1	-625.1
2022	-17	-678	661
2023	-9	679	-688

Source: *based on Additional liability company "Ivano-Frankivsk Bread Plant" (2024), Limited liability company "Believer" (2024), Limited liability company "Khlibodar" (2024), Limited liability company "Ternopilkhlibprom" (2024), Private joint-stock company "Concern Hlibprom" (2024), Private joint-stock company "Teremno Khlib" (2024)*

The analytical indicators presented in Table 4 demonstrated a direct relationship between cash flow and the available cash balances in the bank accounts of enterprises. The dominant cash flow was that generated from operating activities, which was expected to be the principal source of funds for the enterprise and to serve as a driver for both investment and financing activities. In cases where cash generated from operating activities was insufficient, the enterprise was compelled to seek alternative sources to support its statutory operations, particularly through activating financial or investment activities. Thus, the analytical data concerning enterprise cash flows at the national level in Ukraine allowed to draw the following conclusion: a positive cash flow from operating activities serves as a resource for expanding investment and financing operations, whereas a negative operating cash flow necessitates the search for additional financial resources to cover the immediate needs

of the enterprise's core operations. There were also instances where positive cash flows from all types of activities can be observed. In such cases, an increase in the cash balance on enterprises' bank accounts occurs. On one hand, this may reflect a planned accumulation of cash for a specific strategic objective or the execution of an operational-tactical task. On the other hand, such a situation may indicate the unjustified accumulation of cash and its inefficient use due to a lack of dynamic turnover. A third scenario was also possible, where the enterprise engages solely in operational activities without involving cash in financial or investment operations. In this case, the enterprise extracts all potential value from its initially invested resources, without constructing a future-oriented development strategy. Over time, such an approach to economic activity may result in a loss of production capacity and, ultimately, the exit of the enterprise from the business environment.

These arguments provided a basis for concluding that all areas of enterprise activity were of significant importance. The balance between cash flows from various types of activities was not governed by standards, but rather determined by the individual strategic vision of the enterprise's owner, which was implemented by the employed staff. Therefore, forecast calculations of cash flow movements have become critical for the implementation of any enterprise's development strategy.

Cash flow forecasting was a set of sequential actions that must be properly organised. Issues related to the organisation of cash flow forecasting have been explored by both Ukrainian and international scholars. G. Chumak (2023) viewed budgeting as a tool for enterprise expenditure management. The author presented a structured system of budgets, which was considered in the course of this study. S. Tereshchenko & A. Pietukhov (2024) addressed the issue of short-term forecasting through budgeting systems for medium-sized enterprises. Given that most bakery enterprises, including those studied in this work in Western Ukraine, fall under the category of medium-sized businesses, the operational budgeting approach described by S. Tereshchenko & A. Petukhov (2024) merits attention. The authors Z.-M.V. Zadorozhny *et al.* (2023) aimed to present a widely accepted methodology for cash flow forecasting using accessible and simple examples. The practical application of the proposed forecasting approaches may vary depending on the specific operational characteristics of each individual enterprise. The organisation of cash flow forecasting involves the following key stages (Table 5).

Table 5. *Stages of forecasting cash flows*

Forecasting stage	Purpose of the forecasting stage	Sources of information	Responsible executives
Familiarisation with the enterprise development strategy and identification of forecast development indicators for the forecast year	To define forecast performance indicators for the enterprise for the upcoming year	Approved enterprise development strategy with established annual targets for achieving strategic goals	Head of the forecasting team
Development of a methodology for forecasting key cash flow indicators	To establish a unified approach to forecasting cash flow indicators; to develop a set of forecast reports (budgets) for cash flow forecasting	Review of international and Ukrainian accounting practices; regulatory framework on cash flow accounting	Head of the forecasting team
Collection of accounting and analytical information	To define principles and methods of collecting and summarising accounting information; to develop internal analytical and consolidated registers for cash flow forecasting	Primary documents, analytical and synthetic accounting registers, financial statements, external statistical data, expert assessments, and unofficial information sources	Members of the forecasting team
Processing and analysis of accounting information	To present all possible alternative management decisions regarding cash flows and select the optimal one	Internal analytical and consolidated registers used to summarise accounting and analytical information for various forecasting scenarios	Members of the forecasting team
Development of a forecast model of cash flows	To forecast cash flows according to the optimal management decision selected by the management team	Forecast reports (budgets) confirming projected cash flow indicators	Members of the forecasting team
Analysis of forecast indicators for compliance with strategic development targets	To assess adherence to the enterprise's development strategy over the forecast year	Developed cash flow model; approved development strategy with annual performance indicators	Members of the forecasting team
Decision-making on the forecast cash flow model and adjustment of forecast cash flow indicators	To adjust cash flow forecasts if necessary	Forecast balance model; liquidity indicators of the enterprise	Senior management of the enterprise

Source: *developed by the author*

All stages of organising cash flow forecasting are sequential and interdependent. However, the quality of the forecast calculations was directly influenced by the methodology used to forecast cash flow indicators. At this stage of organising forecasting operations, a general set of forecast cash flow indicators and the sequence

of their forecasting was established. In organising the forecasting calculations, it was advisable to distinguish between general and analytical forecast indicators. Only after this distinction should the forecasting methodology for these indicators be determined. It was recommended that the enterprise formalise this methodology through an internal order or directive addressed to the accounting and analytical department or an individual specialist. The set of general forecast cash flow indicators and the sequence of their forecasting were presented in Table 6.

Table 6. *Set of general forecast indicators of cash flow and the sequence of their forecasting*

Indicator	Initial data for calculations	Sources of information and forecasting recommendations
1. Cash balances at the beginning of the forecast period	Form 1 of financial reporting "Balance sheet (Statement of financial position)"	Actual figures from official reporting or initial forecast indicators, if the forecast period covers multiple years
2. Net cash flow from operating activities	**Result of mathematical calculations of forecast indicators 2.1-2.4**	
2.1. Forecast of sales of products, works, services	Forecast data on product assortment, list of works and services, pricing policy, expected payments from customers	Extract from the enterprise's strategic development plan for the forecast year; amendments to the annual development plan considering external and internal factors
2.2. Forecast of other operating income	Forecast of types and volumes of non-core operational activities, pricing policy, expected payments	
2.3. Forecast of main production costs	Forecast production volume of goods, works, and services; norms for material, labour, and overhead costs	
2.4. Forecast of other operating expenses	Forecast staff numbers in administration, sales, and non-production areas; salaries, bonuses, indexation rates; tax policy; material and other costs for administrative, sales, and non-production activities	
3. Net cash flow from investing activities	**Result of mathematical calculations of forecast indicators 3.1-3.2**	
3.1. Forecast of investment income	Forecast of sales of non-current assets; income from corporate rights and securities; interest on deposits	Extract from the enterprise's strategic development plan for the forecast year; amendments to the annual development plan considering external and internal factors
3.2. Forecast of investment expenditures	Forecast of expenditures for acquisition of non-current assets; corporate rights and securities	
4. Net cash flow from financing activities	**Result of mathematical calculations of forecast indicators 4.1-4.2**	
4.1. Forecast of financing income	Forecast of contributions from shareholders; forecast of bank loans and borrowings from financial institutions	Extract from the enterprise's strategic development plan for the forecast year; amendments to the annual development plan considering external and internal factors
4.2. Forecast of financing expenditures	Forecast of expenditures on share buybacks; forecast of repayments of loans and borrowings	
5. Total cash flow from all types of activities	**Result of mathematical calculations based on forecast indicators 2, 3, 4**	
6. Cash balances at the end of the forecast period	Result of mathematical calculations based on forecast indicators	It is advisable to compare this with the absolute liquidity ratio and the liquidity indicator at the beginning of the forecast period

Source: *developed by the author*

The core of the forecast calculations was based on the projection of sales volumes of products, works, and services. This indicator was the most crucial among all forecast indicators, as it directly influenced the forecasted revenues and expenses of core operations, and enabled the development of investment and financing activities. It was important to track the construction of the cash flow model from operating activities while considering the forecasted sales volume factor. The initial sales forecast was based on the approved enterprise development strategy for the specific forecast year. However, the final decision regarding the baseline sales forecast should be made based on the following factors:

- product, work, and service assortment;
- available production capacity;
- availability of financial resources;
- availability of raw materials;
- availability of human resources;
- regulatory framework and tax policy;
- pricing policy;
- competitive environment.

Each factor may be taken into account using a scoring method, which forms the basis for making decisions on the production of a particular product. An example of applying a scoring method to assess the influence of a set of factors on the decision to produce specific types

of products at the industrial enterprise PJSC "Teremno Khlib" was presented in Table 7. The products were selected among those known and in demand by consumers in the relevant region.

Table 7. *Analysis of factors influencing the forecast product assortment*

Influencing factor	Product assortment, points		
	"Rodynnyi" bread	"Zdorovia" bread	"Domashnii" bread (sourdough)
Available production capacity	10	8	5
Availability of financial resources	10	10	10
Availability of raw materials	10	7	3
Availability of human resources	10	7	4
Regulatory framework and tax policy	10	9	6
Pricing policy	10	7	5
Competitive environment (absence of competitors)	10	6	4
Consumer demand	10	6	4
Total	80	60	41

Source: *developed by the author*

The approach to scoring the ranking of product types should be developed by the analytical team of the specific enterprise. This means that the list of factors influencing the forecast product assortment can be further expanded, and the scoring scale for each factor may even follow a 100-point system. The choice of the scoring system and the list of influencing factors should be formalised in an internal order or directive of the enterprise. Thus, the ranking assessment of the product assortment presented in Table 7 made it possible to identify priority product types and adjust the forecasted sales volumes for the relevant year. The forecasting team made decisions regarding the percentage adjustment of the forecast sales volumes. For instance, the bread type "Rodynnyi" received a score of 80 points, the highest among the assessed assortment, and can be used as a benchmark. Assuming a maximum forecasted increase in sales volume of 10% for "Rodynnyi", the corresponding growth for "Zdorovia" bread would be 7.5%. As for "Domashnii" bread, the forecasting team may decide to reduce its forecasted sales volume, as consumer demand for this type was assessed at only 4 out of 10 points. The final forecast indicators were determined by the head of the forecasting team. Therefore, based on the total score, it was possible to establish a ranking of individual product types and adjust the forecasted production volumes for the year accordingly (Table 8). These evaluative judgements will directly affect production volumes and all related forecasted expenses, thereby influencing cash flow.

Table 8. *Product, work, and service assortment*

Type of product	Forecasted sales volume according to the strategic plan for the respective year, units	Change in forecasted sales volume, %	Adjusted forecasted indicator, units
"Rodynnyi" bread	12,000	+10.0%	13,200
"Zdorovia" bread	7,000	+7.5%	7,525
"Domashnii" bread (sourdough)	5,000	−4.0%	4,800

Source: *developed by the author*

It was worth noting that, in many cases, the percentage change in the forecasted sales volumes of individual product assortments may reflect the personal judgement of the head of the forecasting team. These decisions were often based not only on the expert evaluations of the analytical team, but primarily on the business intuition of the team leader. In Table 8, the key factor influencing the changes in forecasted sales volumes for "Rodynnyi" and "Zdorovia" bread was identified as the competitive environment. As for "Domashnii" bread, a decision may be made to reduce its production volume, as the majority of influencing factors received a score of 5 or below. The overall model of cash flow forecasting was presented in Figure 1.

Figure 1 illustrated the sequence of forecasting operations for obtaining the total projected cash flow of an enterprise from various types of activities. Thus, the determination of forecast sales indicators enabled the estimation of production volumes. The forecasted production volume was equal to the forecasted sales volume, adjusted for the change in the expected inventory of finished goods at the beginning and end of the forecast period. Based on the forecasted production volume, the enterprise's analytical department calculates all forecasted operating expenses and forecasted operating revenues. Adjusting the forecasted operating expenses for non-cash items (such as depreciation), and aligning the forecasted operating revenues with expected cash inflows,

allowed for the calculation of net forecasted operating cash inflows (Mamchur & Studinska, 2024). This indicator directly influenced the subsequent forecasting of cash flows from investing and financing activities. It was advisable to present a mechanism for forecasting cash flows from operating activities, using as an example a single type of product from a bakery enterprise that was consistently in demand among end consumers (Table 9).

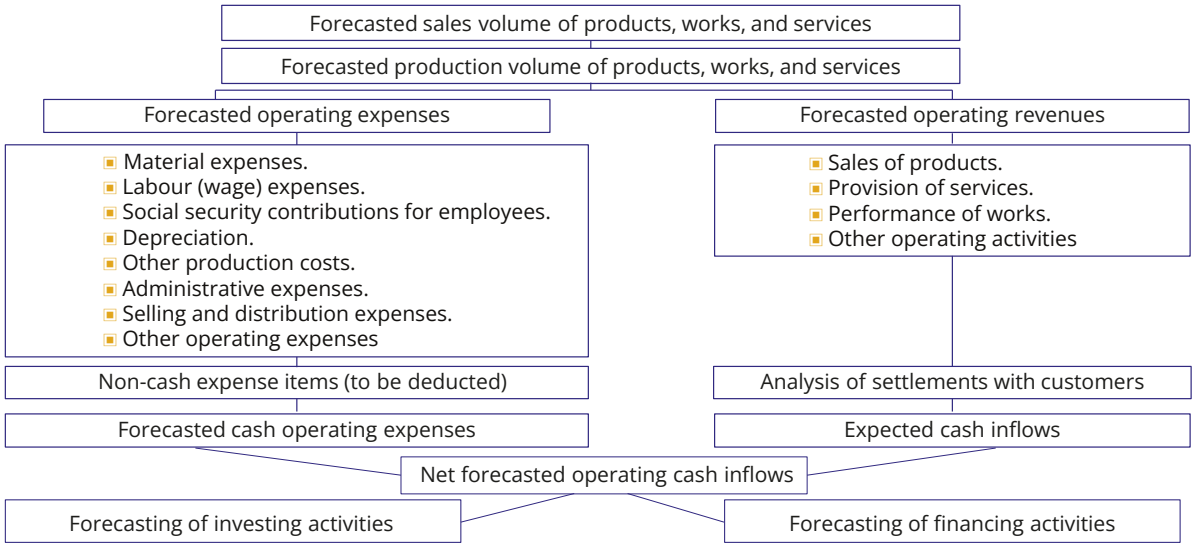

Figure 1. *Revenues in the global online lottery market (USD billion) and the number of users (million)*
Source*: developed by the author*

Table 9. *Forecasted production and sales volumes of "Rodynnyi" bread*

Indicator	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for the year
Forecasted sales volume, units	3,300	3,300	3,300	3,300	13,200
Opening inventory of finished goods, units	300	330	363	396	–
Closing inventory of finished goods, units	330	363	396	462	–
Forecasted production volume, units	3,330	3,333	3,333	3,366	13,362
Forecasted production volume, tonnes (1 unit = 0.7 kg)	2,331	2,333.1	2,333.1	2,356.2	9,353.4

Source: *developed by the author*

Table 9 provided a quarterly breakdown; however, more detailed calculations can also be performed for each month of the forecast year. Since the baseline assumption of the forecast involved a product with consistent and stable demand, the quarterly distribution was set at 25%. The inventory of finished goods must ensure the ability to meet continuous consumer demand for a specific product. Based on the forecasted production volume, it was possible to calculate the forecasted operating expenses (Table 10).

Table 10. *Forecasted material costs for "Rodynnyi" bread*

Indicator	Rate per 100 kg	Requirement for forecasted production volume, tonnes	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1	2	3	4	5	6	7
1. Raw Materials and Ingredients:						
Rye flour, coarse (per 1 kg)	40	3,741.4	935.3	935.3	935.3	935.3
Wheat flour, first grade (per 1 kg)	40	3,741.4	935.3	935.3	935.3	935.3
Drinking water, litres	16.8	1,571.4	392.8	392.8	392.8	392.8
Yeast, kg	0.5	46.8	11.7	11.7	11.7	11.7
Table salt, kg	1.2	112.2	28.1	28.1	28.1	28.1
White sugar, kg	1.5	140.3	35.1	35.1	35.1	35.1
2. Price, UAH:						
Rye flour, coarse (per 1 kg)	–	–	18	19	20	22
Wheat flour, first grade (per 1 kg)	–	–	16	17	18	19

Table 10, Continued

1	2	3	4	5	6	7
Drinking water (per cubic metre)	–	–	30.38	30.38	30.38	30.38
Yeast, per kg	–	–	170	172	175	180
Table salt, per kg	–	–	20	22	23	24
White sugar, per kg	–	–	25	26	27	28
3. Total cost of raw materials to meet forecasted needs, UAH	–	–	35,239.18	37,224.44	39,193.33	42,120.94
4. Total annual cost of raw materials and ingredients, UAH	–	–	–	–	–	153,777.9

Source: *developed by the author*

Typically, enterprises take into account the quantity and projected value of raw material inventories at the beginning and end of each reporting period in order to ensure the consistent support of the production programme. It was also essential to consider the terms of settlements with suppliers of raw materials and components, as these factors directly influence the cash outflows associated with core operational activities. However, these aspects were not reflected in the calculations presented in the article. Similarly, the forecasting of other operational expenses was carried out in accordance with Figure 1. The projected calculation of revenue from the sale of finished products was presented in Table 11.

Table 11. *Projected revenue from the sale of "Rodynnyi" bread*

Indicator	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for the year
Projected sales volume, units	3,300	3,300	3,300	3,300	13,200
Price per unit, UAH	27	29	30	32	
Projected sales volume, UAH	89,100	95,700	99,000	105,600	389,400
Percentage of unpaid customer invoices, %	3	4	2	5	
Expected cash inflows from sales, UAH	86,427	91,872	97,020	100,320	375,639

Source: *developed by the author*

When compiling the indicators in Table 11, it was advisable to pay attention to the percentage of unpaid invoices. This indicator was determined based on a retrospective analysis of settlements with customers over an extended period. The analysis of customer payments made it possible to identify unreliable customers and to calculate the average percentage of customers, who either do not intend to settle their accounts for the products supplied or pay with various delays. The expected cash inflows from the sale of finished products, as indicated in Table 11, were reduced by the percentage of unpaid customer invoices. A comparison of cash inflows and cash outflows (taking into account only material costs) enabled the forecasting of expected operational cash flows and facilitated planning of cash movements to ensure funding for other activities (Table 12).

Table 12. *Net projected operational cash inflows*

Indicator	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for the year
Expected cash inflows from product sales, UAH	86,427	91,872	97,020	100,320	375,639
Cost of annual requirement for raw materials and components, UAH	35,239.18	37,224.44	39,193.33	42,120.94	153,777.90
Net projected operational cash inflows, UAH	51,187.82	54,647.56	57,826.67	58,199.06	221,861.10
Percentage of absolute liquidity coverage, %	15	15	15	15	10
Projected cash available for investment and financial activities, UAH	43,509.65	46,450.43	49,152.67	49,469.20	188,581.90

Source: *developed by the author*

The author O. Stepanenko (2024) explored the characteristics of cash flows and their impact on a company's financial stability. The researcher summarised the groups of internal risks that influence the formation of enterprise cash flows and provided a detailed description of the consequences associated with these risks. The study highlighted the necessity of effective cash flow management, where forecasting and planning are integral components of the overall cash management system. Conceptual approaches were proposed to ensure sustainable financial stability of enterprises.

An important direction in the study of cash flow dynamics was reflected in the work of N. Boiko *et al.* (2021), who examined methods for analysing enterprise cash flows at various levels of complexity. The authors introduced a methodology encompassing horizontal,

vertical, comparative, and ratio analysis of cash flows. The choice of analytical complexity level was determined by the company's leading analysts. The approaches proposed by N. Boiko *et al.* (2021) may be applied in the assessment of cash flows to support adjustments in managerial decisions regarding the enterprise's future operations and to enhance the informational basis of forecasting calculations.

Zh.M. Zhygalkevych & O.V. Kamyanska (2022) presented their own vision of the concept of corporate cash management, which was based on budgeting and the calculation of analytical indicators such as required cash reserves, optimal cash reserves, and the average cash balance in the cash register. These indicators proved informative and useful for organising further forecasting calculations related to cash flows. However, in this case, the forecasting process may be complicated by complex mathematical computations. Therefore, the feasibility of applying these indicators should be determined by the project team leader. H. Koshelok & R. Hrinchenko (2020) emphasised the importance of analysis in the effective management of cash resources. They outlined both theoretical and practical aspects of cash flow analysis as a component of the overall enterprise management system. For the purposes of their research, the authors classified current assets according to their level of liquidity.

T.Yu. Chaika *et al.* (2018) discussed a methodology for analysing liquidity ratios. The authors raised concerns about existing discrepancies among scholars regarding the normative values of various liquidity ratios and emphasised the risks of superficial cash flow analysis, when industry-specific characteristics were not taken into account. The researchers recommended that the absolute liquidity ratio should range between 0.2 and 0.6. If the value of this ratio was below 0.2, it may indicate ineffective management of accounts receivable and an insufficient level of current assets.

A different opinion regarding the normative value of the absolute liquidity ratio was presented by M.I. Krupka *et al.* (2019), who argued that the "lower limit of this ratio is 0.2". Nevertheless, the authors did not rule out the possibility of setting the normative level at 0.25. H. Kindratska (2019), in analysing various methodologies for assessing corporate solvency, cited the normative values of the absolute liquidity ratio as defined by the Order of the Agency for the Prevention of Bankruptcy of Enterprises and Organizations No. 22 (1998) and Order of the Ministry of Economy of Ukraine No. 14 (2006). These documents recommend a range of 0.2 to 0.35. Yu. Kostenko *et al.* (2022) addressed the challenges of liquidity management under wartime conditions. In their view, normative liquidity indicators should be higher during wartime than in peacetime due to businesses operating primarily with their own funds. The authors recommended increasing the absolute liquidity ratio to 0.7. Therefore, in this study, the expected cash inflows were adjusted based on the level of unpaid customer invoices. The analysis of the ratio between inflows and material costs enabled forecasting of cash from operating activities. This, in turn, facilitated the effective planning of cash movements and the provision of financial support for other business activities.

Conclusions

This study presented the results of an analysis of the availability and movement of cash at the level of all active enterprises in Ukraine, with a particular focus on enterprises engaged in the production of bread, bakery, and flour-based products. An assessment of statistical indicators revealed a consistently low share of cash in the structure of total assets across all active enterprises. During the period from 2013 to 2022, the share of cash in total assets did not exceed 5%. An important development was the 35% increase in this indicator during the 2022-2023 period, reaching 6.69%. Slightly higher values were observed among enterprises producing bread, bakery, and flour-based goods. However, this trend was not evident at the level of individual bakery enterprises. Most of the analysed bakery enterprises in Western Ukraine demonstrated a low proportion of cash within the structure of total balance sheet assets. As a result, all entities studied recorded a low absolute liquidity ratio. These enterprises lacked a sufficient amount of highly liquid assets, one of the reasons being the impact of military actions on their economic activity. In general, the state has been compelled to prioritise the military sector of the economy, thus enterprises in the bread and bakery sector were forced to focus on operational activities and carefully evaluate their capacities, when engaging in financial and investment operations.

Cash flow forecasting has become an essential component of the entire set of predictive calculations and should be carried out in accordance with the developed methodology for forecasting the key indicators of the projection model. The selection of a forecasting method should be based on the balance between rationality and the feasibility of the computational operations. This implied that the efforts of analysts to perform complex mathematical calculations must be justified and should generate significantly higher economic benefits compared to the resources invested – such as the remuneration of in-house accounting and analytical personnel or fees paid to external consultants. If complex forecasting computations merely confirm information already known to managers, it would be reasonable to simplify such mathematical procedures and reduce the financial costs associated with them.

Prospective areas for further research include examining the impact of military operations on the territory of Ukraine on the structure of cash flows in industrial enterprises; analysing cash flow forecasting methodologies across large, medium, and small enterprises; and

evaluating the effectiveness of the selected cash flow forecasting method for industrial enterprises.

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Conflict of Interest

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References

[1] Additional liability company "Ivano-Frankivsk Bread Plant". (2024). Retrieved from https://clarity-project.info/edr/05495259/finances.
[2] Alnori, F. (2020). Cash holdings: Do they boost or hurt firms' performance? Evidence from listed non-financial firms in Saudi Arabia. *International Journal of Islamic and Middle Eastern Finance and Management*, 13(5), 919-934. doi: 10.1108/IMEFM-08-2019-0338.
[3] Ball, R., & Nikolaev, V.V. (2022). On earnings and cash flows as predictors of future cash flows. *Journal of Accounting and Economics*, 73(1), article number 101430. doi: 10.1016/j.jacceco.2021.101430.
[4] Boiko, N., Turpak, T., & Nazarenko, Ya. (2021). Cash flow analysis of transport enterprises: Problematic and pragmatic approach. *Modern Economics*, 28, 13-21. doi: 10.31521/modecon.V28(2021)-02.
[5] Chaika, T.Yu., Loshakova, S.Ye., & Vodoriz, Ya.S. (2018). Calculation of liquidity factors by the balance, accounting financial and industrial features of the enterprise in the coefficient analysis of liquidity. *Economy and Society*, 15, 900-908.
[6] Chen, X., Lu, M., Shan, Y., & Zhang, Y. (2021). Australian evidence on analysts' cash flow forecasts: Issuance, accuracy and usefulness. *Accounting & Finance*, 61, 3-50. doi: 10.1111/acfi.12552.
[7] Chumak, G. (2023). Budgeting as a component of the cost management system. *Herald of Khmelnytskyi National University. Economic Sciences*, 316(2), 33-38. doi: 10.31891/2307-5740-2023-316-2-5.
[8] Kindratska, H. (2019). The assessment of solvency of Ukrainian enterprises: Problematic issues of typical methodological approaches. *Economic Journal of Lesya Ukrainka Volyn National University*, 3(19), 133-143. doi: 10.29038/2411-4014-2019-03-133-143.
[9] Koshelok, H., & Hrinchenko, R. (2020). Analysis of cash flows in the enterprise management system. *Galician Economic Journal*, 63(2), 231-242. doi: 10.33108/galicianvisnyk_tntu2020.02.231.
[10] Kostenko, Yu., Korolenko, O., & Huz, M. (2022). Financial stability analysis of the enterprise under martial law. *Economy and Society*, 43. doi: 10.32782/2524-0072/2022-43-77.
[11] Krupka, M.I., *et al.* (2019). *Financial management*. Lviv: Ivan Franko National University of Lviv.
[12] Law of Ukraine No. 996-XIV "On Accounting and Financial Reporting in Ukraine". (2024, September). Retrieved from https://zakon.rada.gov.ua/laws/show/996-14#Text.
[13] Li, S., Sougiannis, T, & Wang, S.I. (2024). Mandatory IFRS adoption and the usefulness of accounting information in predicting future earnings and cash flows. *The International Journal of Accounting*, 60(1), article number 2450016. doi: 10.1142/S1094406024500161.
[14] Limited liability company "Believer". (2024). Retrieved from https://clarity-project.info/edr/43174863/finances.
[15] Limited liability company "Khlibodar". (2024). Retrieved from https://clarity-project.info/edr/32358874/finances.
[16] Limited liability company "Ternopilkhlibprom". (2024). Retrieved from https://surl.lu/zqqnkm.
[17] Mamchur, V., & Studinska, G. (2024). Effectiveness assessment of technical innovations in the implementation of the modern model of the agricultural sector of Ukraine. *Ekonomika APK*, 31(2), 32-40. doi: 10.32317/2221-1055.202402032.
[18] Nadeem, F. (2024). Factors affecting corporate cash holdings: Evidence from the energy sector of Saudi Arabia. *Investment Management and Financial Innovations*, 21(3), 265-273. doi: 10.21511/imfi.21(3).2024.22.
[19] Noury, B., Hammami, H., Ousama, A.A., & Zeitun, R. (2020). The prediction of future cash flows based on operating cash flows, earnings and accruals in the French context. *Journal of Behavioral and Experimental Finance*, 28, article number 100414. doi: 10.1016/j.jbef.2020.100414.
[20] Official website of State Statistics Service of Ukraine. (2023). Retrieved from https://www.ukrstat.gov.ua/.
[21] Order of the Agency for the Prevention of Bankruptcy of Enterprises and Organizations No. 22 "On the Approval of the Methodology for Integral Assessment of Investment Attractiveness of Enterprises and Organisations". (1998, February). Retrieved from https://zakon.rada.gov.ua/laws/show/z0214-98#Text.
[22] Order of the Ministry of Economy of Ukraine No. 14 "On the Approval of Methodological Recommendations for Identifying Signs of Insolvency of an Enterprise and Signs of Actions Aimed at Concealing Bankruptcy, Fraudulent Bankruptcy". (2006, January). Retrieved from https://zakon.rada.gov.ua/rada/show/v0014665-06#Text.
[23] Order of the Ministry of Finance of Ukraine No. 73 "On Approval of the National Accounting Standard (Provision) 1 "General Requirements for Financial Reporting". (2013, February). Retrieved from https://zakon.rada.gov.ua/laws/show/z0336-13#Text.

[24] Private joint-stock company "Concern Hlibprom". (2024). Retrieved from https://surl.lu/lophrb.
[25] Private joint-stock company "Teremno Khlib". (2024). Retrieved from https://surl.li/eqxvtx.
[26] Rahman, A., & Sharma, R.B. (2020). Cash flows and financial performance in the industrial sector of Saudi Arabia: With special reference to insurance and manufacturing sectors. *Investment Management and Financial Innovations*, 17(4), 76-84. doi: 10.21511/imfi.17(4).2020.07.
[27] Shahriar, M.S., Hasan, K.B.M.R., Hossain, T., Beg, T.H., Islam, K.M.A., & Zayed, N.M. (2021). Financial decision making and forecasting techniques on project evaluation: A planning, development and entrepreneurial perspective. *Academy of Entrepreneurship Journal*, 27(4), 1-7.
[28] Stepanenko, O. (2024). Properties of cash flows and risks of their impact on the financial stability of the enterprise. In *Proceedings of the 7th international scientific and practical conference "Scientific trends and trends in the context of globalization"* (No. 44, pp. 94-107). Umeå, Sweden. doi: 10.51582/interconf.19-20.04.2024.009.
[29] Tereshchenko, S., & Pietukhov, A. (2024). Implementation of an operational budgeting system at medium-sized enterprises. *Entrepreneurship and Innovation*, 30, 78-81. doi: 10.32782/2415-3583/30.12.
[30] Wang, C.-W., Lee, C.-C., & Wu, L.-T. (2023). The relationship between cash flow uncertainty and extreme risk: International evidence. *Pacific-Basin Finance Journal*, 77, article number 101927. doi: 10.1016/j.pacfin.2022.101927.
[31] Zadorozhny, Z.-M.V., Muravskyi, V.V., Semanyuk, V.Z., & Ometsinska, I.Ya. (2023). *Management accounting*. Ternopil: PPC "University Thought".
[32] Zhygalkevych, Zh.M., & Kamyanska, O.V. (2022). *Financial management*. Kyiv: National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute".

Прогнозування руху грошових коштів промислових підприємств у контексті реалізації їхньої стратегії розвитку: обліковий, аналітичний та організаційний аспект

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Анотація. Наявність грошових коштів у розпорядженні будь-якого промислового підприємства дає відчуття економічної свободи при реалізації стратегії його розвитку. Сумарний показник грошових коштів перебуває у прямій залежності від руху грошових коштів у межах різних видів діяльності. Для забезпечення інформаційних потреб управлінського персоналу промислового підприємства необхідною є можливість передбачати прогнозні показники руху грошових коштів. Метою статті було висвітлення методики прогнозування руху грошових коштів промислового підприємства для забезпечення реалізації стратегії його розвитку. Порівняльний аналіз статистичних показників руху грошових коштів хлібопекарських підприємств України дав можливість визначити питому вагу грошових коштів в сукупних активах хлібопекарських підприємств, розрахувати коефіцієнт їх ліквідності. Аналітичні розрахунки засвідчили про переважно низькі коефіцієнти ліквідності, як для всієї країни, так і на рівні окремих хлібопекарських підприємств Заходу України, також ці показники менші за прийняті нормативні 0,1-0,2. Наведено показники руху грошових коштів від різних видів діяльності хлібопекарських підприємств України, які дали можливість зробити висновок щодо безпосереднього зв'язку між рухом грошових коштів та наявними грошовими коштами на банківських рахунках підприємств. Домінуючим грошовим потоком став грошовий рух від операційної діяльності. Саме він повинен приносити основну масу грошових коштів підприємству і давати поштовх для інвестиційної та фінансової діяльності. Питання співвідношення між рухом грошових коштів від різних видів діяльності не підпорядковується нормативам, а є виключно індивідуальним баченням стратегії розвитку підприємства його власником, яку реалізує найманий штат працівників. Для реалізації стратегії розвитку будь-якого підприємства важливими стали прогнозні розрахунки руху грошових коштів. У статті було систематизовано підходи до організації прогнозування руху грошових коштів. Висвітлено побудову моделі руху грошових коштів від операційної діяльності, враховуючи фактор прогнозного обсягу реалізації продукції. Практичне значення результатів дослідження полягає в методичній обґрунтованості прогнозних розрахунків показників руху грошових коштів, що дає можливість використовувати пропозиції суб'єктами господарювання промислового сектору економіки для прогнозування оперативних та стратегічних показників розвитку

Ключові слова: операційні грошові потоки; інвестиційні грошові потоки; фінансові потоки грошових коштів; загальний грошовий потік; суми сукупних надходжень

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Using big data for demand forecasting and dynamic pricing

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Abstract. The research involved developing and implementing a big data-driven demand forecasting and dynamic pricing system for retail businesses in Ukraine. The methodology covered gathering a massive database from online trading platforms, transactional information from points of sale, and loyalty programmes, which showed an overall aggregated data quality index of 92.6%. Applying a comprehensive set of cleaning and normalisation methods boosted data quality by 12.47%. A comparative analysis of predictive models revealed the highest effectiveness of the LSTM network among individual models ($R^2 = 0.874$, MAPE = 6.83%) and of the ensemble model among all tested approaches ($R^2 = 0.896$, MAPE = 5.92%). Implementing the developed system in various retail formats, such as ATB-Market LLC, Foxtrot LLC, Nova Liniya PJSC, ALLO LLC, Silpo-Fud LLC, METRO Cash and Carry Ukraine LLC, Epicentr K LLC, Rozetka LLC, Comfy Trade LLC, and INTERTOP Ukraine LLC, showed a significant improvement in economic efficiency, with an average revenue increase of 9.16%, a marginal profit increase of 11.08%, and a 6.95% reduction in inventory levels. The best performance was demonstrated by the online stores Rozetka and ALLO, with Return on Investment figures of 516% and a payback period of 2.7 months. Regional analysis revealed significant differences in system implementation effectiveness, with the best results in the Western region, specifically Lviv and Volyn regions (revenue increase 9.27 ± 2.05%), and among non-food retailers, particularly Comfy Trade LLC and INTERTOP Ukraine LLC (9.86 ± 2.23%). Small businesses showed the highest adaptability to dynamic pricing, with a revenue increase of 10.23 ± 2.14% and an Return on Investment of 405 ± 86%. The research confirmed the high scalability and adaptability of the proposed approach for the Ukrainian market and allowed for the development of differentiated recommendations for system implementation for various types of retail businesses, considering their size, regional location, and product specialisation

Keywords: datasets; predictive models; economic efficiency; retail chain; consumer behaviour

Introduction

During 2021-2025, Ukraine actively integrated big data technologies into the retail sector. Modern enterprises needed effective tools for demand forecasting and dynamic pricing to optimise their operations in a changing market environment. The use of big data analytics opened up new opportunities for informed management decisions, which affected business competitiveness and customer service quality.

P. Arguelles Jr & Z. Pólkowski (2023) studied the impact of big data on supply chain efficiency through demand forecasting, demonstrating how massive data set analytics enabled enterprises to optimise logistics processes, reduce inventory storage costs, and improve customer service by more accurately predicting market demand fluctuations in real time. L. Bondarenko & Y. Liashenko (2023) studied the application of time series analysis methods for forecasting pricing in the real estate market, developing models that took into account seasonal fluctuations, macroeconomic indicators and regional market characteristics, providing investors and developers with tools for more informed decision-making in a changing economic environment.

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The authors G. Chornous & Y. Horbunova (2020) developed approaches to modelling and forecasting dynamic pricing factors in e-commerce, proposing mathematical models that took into account consumer behaviour patterns, the competitive environment and seasonal fluctuations in demand to optimise the pricing strategies of online retailers and maximise profits under different market conditions. O. Dobrovolska & N. Fenenko (2024) analysed the forecasting of trends in the real estate market by studying relevant determinants, identifying key influencing factors, including economic indicators, demographic variables, legislative norms and technological innovations, which made it possible to improve the accuracy of long-term forecasts for the development of the industry.

A. Guizzardi *et al.* (2021) proposed an intelligent approach to forecasting tourism demand based on big data from dynamic pricing, developing algorithms for analysing information arrays from online bookings, social networks and search engines to create adaptive pricing strategies that allowed tourism companies to maximise occupancy and revenue. R. Iftikhar & M.S. Khan (2020) studied big data analytics from social networks to forecast demand, developing a methodology for processing unstructured data from various platforms to identify consumer trends, user sentiments, and responses to marketing campaigns, enabling businesses to stay ahead of market trends and respond quickly to changes in customer preferences.

Scientists A. Kaminskyi *et al.* (2023) formed a dynamic basis for strategic forecasting of the consumer lending market of banks using the example of Ukraine, integrating macroeconomic indicators, borrower behaviour models and sectoral trends to create multifactorial predictive models that increased the effectiveness of banks' credit policies in conditions of economic instability. S. Kanyhin (2024) investigated the use of big data in financial management of enterprises, identifying methods for integrating analytics of massive sets of structured and unstructured information to optimise budgeting, cash flow management, investment risk assessment, and improve the overall efficiency of financial operations in the digital economy.

S. Kumar *et al.* (2022) conducted a comprehensive analysis of the past, present, and future of sustainable finance through the lens of big data analytics using machine learning to process scientific research, identifying evolutionary trends, key thematic areas, and promising areas for the development of sustainable financial instruments and practices in the global economic environment. The analysed scientific works did not link the analytical capabilities of big data with the needs of Ukrainian retail enterprises, taking into account the peculiarities of the Ukrainian consumer market and conditions of economic instability.

The aim of the study was to create and test the effectiveness of a comprehensive big data processing system for optimising management decisions in the field of demand forecasting and dynamic pricing in retail enterprises. Research objectives: development of methods for cleaning and normalising large amounts of information; creation of predictive models using modern machine learning algorithms; implementation and evaluation of the effectiveness of a dynamic pricing system for various enterprises.

Materials and Methods

The research was conducted involving ten Ukrainian retail enterprises: ATB-Market LLC, Foxtrot LLC, Nova Liniya PJSC, ALLO LLC, Silpo-Fud LLC, METRO Cash and Carry Ukraine LLC, Epicentr K LLC, Rozetka LLC, Comfy Trade LLC, and INTERTOP Ukraine LLC, between September 2023 and February 2025. The work comprised four sequential stages with clearly defined tasks and methodological approaches. The main research data collection for this study was conducted during March-April 2024. During the first stage, primary data was collected from the following sources: APIs of trading platforms – Prom.ua (n.d.), Bigl.ua (n.d.), Rozetka (n.d.), ALLO (n.d.); open marketplace data; and data from price aggregators such as Price.ua (n.d.) and Hotline.ua (n.d.), and data from Euromonitor (n.d.). Web scraping methods were utilised to obtain competitor pricing information from Ukrainian online shops using Python software with BeautifulSoup and Scrapy libraries. Transaction data from retail chain POS terminals, covering over 4.5 million purchases, was collected. Information from loyalty programmes, containing data on 1.3 million unique customers, was integrated. Additionally, search query data from Google Trends and seasonal consumer price indices from the State Statistics Service of Ukraine (2025) were incorporated, along with reports from Youcontrol. Silpo-Fud LLC (n.d.), Youcontrol. METRO Cash and Carry Ukraine LLC (n.d.), Youcontrol. Epicentr K LLC (n.d.), Youcontrol. ATB-Market LLC (n.d.), Youcontrol. Comfy Trade LLC (n.d.), Youcontrol. INTERTOP Ukraine LLC (n.d.), Youcontrol. Foxtrot LLC (n.d.), Youcontrol. Nova Liniya PJSC (n.d.), Youcontrol. Rozetka LLC (n.d.), Youcontrol. ALLO LLC (n.d.) regarding the financial performance of the surveyed enterprises, accessed via Premium subscription. The second stage was dedicated to the cleaning and normalisation of the collected data. A methodology for outlier detection and removal using the Density-Based Spatial Clustering of Applications With Noise (DBSCAN) algorithm was applied. Heterogeneous data was integrated into a unified analytical platform based on Apache Hadoop. A metadata schema was developed to ensure the interoperability of various information sources. Procedures for regular data updates via API interfaces were established. Mechanisms for the anonymisation of personal data were implemented in accordance with the requirements of Law of Ukraine No. 80/94-VR (1994) and Law of Ukraine No. 2297-VI (2010).

In the third stage, predictive models were developed. A deep learning methodology with an LSTM architecture was utilised for sales time series forecasting, accounting for seasonality. Gradient boosting algorithms were applied to identify hidden dependencies between factors influencing demand. Probabilistic networks were implemented to model price elasticity of demand. Model training was conducted on graphics processing units using modern frameworks. Model validation was performed using cross-validation with data partitioned into training and test sets.

The fourth stage focused on the development and testing of the dynamic pricing system. Price optimisation algorithms based on multiple criteria were implemented. Mechanisms for real-time price adjustment were developed, considering demand, stock availability, and competitor pricing strategies. A monitoring dashboard was created for result visualisation. The developed system was tested across various retail chain formats – hypermarket, supermarket, specialised store, online shop, and construction materials hypermarket. A comprehensive set of statistical methods was used for data processing and analysis. To evaluate the quality of the predictive models, the following standard accuracy metrics were calculated: Root Mean Square Error (RMSE), Mean Absolute Error (MAE), Mean Absolute Percentage Error (MAPE), and Coefficient of Determination (R^2), which allowed for a comprehensive assessment of the accuracy and reliability of the developed models across various datasets.

Results

Data quality analysis and effectiveness of processing methods

The analytical processing of transactional information enabled the formation of a representative sample, encompassing various consumer segments and product categories. The integration of information from loyalty programmes provided the opportunity to conduct an in-depth analysis of consumer behaviour, taking into account clients' demographic characteristics and purchasing preferences. The results of the analysis concerning the structure and quality of the acquired data were presented in Table 1.

Table 1. *Characteristics of data sources and its quality indicators*

Data source	Number of items	Data completeness, %	Data accuracy, %	Data consistency, %	Overall quality index %
Web scraping of online shops	6 websites	92.4	87.6	85.3	88.4
POS-transactions	4,568,921 transactions	98.7	99.2	97.8	98.6
Loyalty programmes	1,342,869 clients	84.5	91.3	89.7	88.5
Google Trends	846 search terms	100	95.8	100	98.6
Data from State Statistics Service of Ukraine	32 indices	100	100	100	100
Aggregated data	5,912,868 records	92.7	93.8	91.4	92.6

Source: *compiled by the author*

Data completeness (%) reflected, how complete the data was (i.e., whether values were missing in fields). Data accuracy (%) indicated, how well the values correspond to reality or stated criteria. Data consistency (%) was a measure of the agreement of data among themselves (e.g., absence of logical contradictions), and the overall quality index (%) was an aggregated indicator that integrated all preceding indicators into a single quality assessment. According to the results of the data quality assessment in Table 1, the highest indicators were observed in official statistical data from the State Statistics Service of Ukraine (2025) and POS transaction data (Youcontrol. ATB-Market LLC, n.d.; Youcontrol. Silpo-Fud LLC, n.d.). Data obtained through web-scraping demonstrated lower quality indicators due to the presence of missing values and the unstructured nature of certain information fragments. It was revealed that information from loyalty programmes (Youcontrol. Comfy Trade LLC, n.d.; Youcontrol. Foxtrot LLC, n.d.) was characterised by insufficient completeness, owing to the voluntary provision of personal data by customers and differences in the structure of loyalty programmes across various retail chains. The results of the evaluation of the effectiveness of data cleaning and normalisation methods were presented in Table 2.

Table 2. *Evaluation of the effectiveness of data cleaning and normalisation methods for analysed enterprises*

Data processing method	Volume of processed data, GB	Outliers detected, %	Processing speed, GB/hour	Information loss, %	Data quality increase, %
DBSCAN algorithm	1,742.8	3.21	64.2	0.96	7.85
Duplicate removal	1,742.8	n/f	127.6	2.17	4.32
Filling in gaps	1,742.8	n/f	85.3	0	5.64
Normalisation of numerical values	846.4	1.85	183.5	0.12	2.93

Table 2, Continued

Data processing method	Volume of processed data, GB	Outliers detected, %	Processing speed, GB/hour	Information loss, %	Data quality increase, %
Integration of heterogeneous data	1,742.8	n/f	38.7	0.47	8.26
Comprehensive processing	1,742.8	5.06	27.4	3.72	12.47

Note: *n/f – not found*
Source: *compiled by the author*

An analysis of the effectiveness of data processing methods showed in Table 2 that the use of the DBSCAN algorithm allowed the detection of 3.21% of anomalous values that could negatively affect the quality of predictive models. The method of normalising numerical values demonstrated the highest processing speed (183.5 GB/hour), while complex processing using all methods was characterised by the lowest speed (27.4 GB/hour). It was found that filling in gaps using machine learning methods made it possible to avoid information loss, while simultaneously improving data quality by 5.64%.

According to the results obtained, the comprehensive application of cleaning and normalisation methods provided a cumulative increase in data quality of 12.47% with a moderate level of information loss (3.72%). The integration of heterogeneous data into a single analytical platform demonstrated the highest data quality gain among all the methods used (8.26%), confirming the effectiveness of the chosen architecture for working with large data sets in the context of demand forecasting and dynamic pricing.

Effectiveness of predictive models and results of dynamic pricing system implementation

A set of machine learning methods was used to analyse the effectiveness of various predictive models in the context of forecasting demand for retail goods. The models were compared based on standard metrics for evaluating forecasting accuracy, which identified the most effective algorithms for further implementation in the dynamic pricing system. The results of a comparative analysis of the effectiveness of various predictive models were presented in Table 3.

Table 3. *Comparative analysis of the effectiveness of predictive models*

Model	RMSE	MAE	MAPE, %	R^2	Training time, hours	Prediction time, ms
LSTM network	145.3	112.7	6.83	0.874	23.6	186
XGBoost	162.8	127.2	7.65	0.856	8.2	54
Bayesian network	183.4	142.6	8.42	0.823	12.4	76
Linear regression	287.5	215.3	12.74	0.712	1.2	12
ARIMA	207.1	164.2	9.38	0.805	3.5	28
Ensemble model	131.8	101.5	5.92	0.896	31.4	248

Note: *RMSE – Root Mean Square Error; MAE – Mean Absolute Error; MAPE – Mean Absolute Percentage Error; R^2 – coefficient of determination; ARIMA – Autoregressive Integrated Moving Average*
Source: *compiled by the author*

According to the results obtained in Table 3, the ensemble model combining LSTM network, XGBoost and Bayesian network demonstrated the best predictive ability. This model was characterised by the lowest values of RMSE = 131.8, MAE = 101.5 and MAPE = 5.92%. The coefficient of determination of the ensemble model was 0.896, confirming its high predictive ability. At the same time, this model required the most computing resources, which was reflected in the long training time (31.4 hours) and the highest prediction time (248 ms). Among the individual models, the LSTM network demonstrated the highest efficiency (R^2 = 0.874, MAPE = 6.83%). This result confirmed the feasibility of using deep learning to predict sales time series, taking into account seasonality. Linear regression showed the lowest efficiency among all tested models (R^2 = 0.712, MAPE = 12.74%), which was explained by the complexity and non-linearity of the relationships between factors affecting demand in the retail sector. The results of the evaluation of the economic effectiveness of the implementation of a dynamic pricing system compared to traditional approaches to pricing were presented in Table 4.

Table 4. *Indicators of the effectiveness of implementing a dynamic pricing system*

Company	Format	Revenue growth, %	Marginal profit growth, %	Inventory reduction, %	ROI of implementation, %	Payback period, months
Silpo-Fud LLC	Hypermarket	8.72	11.28	6.54	327	4.2
METRO Cash and Carry Ukraine LLC	Hypermarket	7.64	10.35	5.92	298	4.8
ATB-Market LLC	Supermarket	7.85	9.46	5.87	274	5.1
Foxtrot LLC	Specialised store	9.24	10.75	7.18	382	3.6
Comfy Trade LLC	Specialised store	8.96	10.32	6.85	365	3.9
INTERTOP Ukraine LLC	Specialised store	8.53	9.84	6.42	341	4.1
Nova Liniya PJSC	Construction materials hypermarket	7.94	9.72	6.13	296	4.7
Epicentr K LLC	Construction materials hypermarket	8.46	10.54	6.38	318	4.4
Rozetka LLC	Online store	12.37	14.53	9.42	516	2.7
ALLO LLC	Online store	11.85	13.96	8.78	487	2.9
Average value		9.16	11.08	6.95	360	4

Note: *ROI – return on investment*
Source: *compiled by the author*

An analysis of the economic indicators of the effectiveness of implementing a dynamic pricing system from Table 4 showed a significant positive impact on key business metrics for all retail formats studied. The highest results were demonstrated by the online stores of Rozetka LLC and ALLO LLC, where revenue growth amounted to 12.37% and 11.85%, respectively, and marginal profit growth amounted to 14.53% and 13.96%. Specialised stores also showed high efficiency, especially Foxtrot LLC with a revenue growth of 9.24%. Hypermarkets and supermarkets showed slightly lower, but still unambiguous indicators of improvement in economic results.

The introduction of a dynamic pricing system contributed to a 6.95% reduction in inventory levels on average, indicating improved inventory management and optimisation of assortment policy. The positive impact on consumer behaviour was reflected in an increase in the frequency of purchases and an increase in the average cheque. The highest ROI was recorded for online stores (516% for Rozetka LLC) and specialised stores (382% for Foxtrot LLC), which were characterised by flexible pricing policies and technological readiness to implement innovative solutions. The results of a comparative analysis of the effectiveness of the system's implementation by type of enterprise were presented in Table 5.

Table 5. *Effectiveness of the implementation of the dynamic pricing system by type of enterprise*

Company characteristics	Number of companies	Revenue growth, %	Increase in return on sales, p.p.	ROI of implementation, %	p-value
By business size					
Small	3	10.23±2.14	3.65 ± 0.87	405 ± 86	0.024
Medium	4	8.76 ± 1.92	2.94 ± 0.73	357 ± 72	0.031
Large	3	6.84 ± 1.47	2.35 ± 0.58	274 ± 63	0.028
By region					
Central	4	8.93 ± 1.86	3.12 ± 0.74	364 ± 75	0.033
Western	2	9.27 ± 2.05	3.24 ± 0.79	378 ± 82	0.029
Eastern	2	7.85 ± 1.74	2.76 ± 0.65	312 ± 69	0.042
Southern	2	8.42 ± 1.95	2.98 ± 0.71	342 ± 77	0.037
By specialisation					
Food products	3	7.23 ± 1.68	2.54 ± 0.63	286 ± 65	0.027
Non-food products	5	9.86 ± 2.23	3.45 ± 0.82	412 ± 89	0.022
Mixed assortment	2	8.52 ± 1.97	2.98 ± 0.75	352 ± 78	0.035

Note: *ROI – return on investment*
Source: *based on State Statistics Service of Ukraine (2025)*

Based on the results of the comparative analysis in Table 5, statistically significant differences in the effectiveness of implementing a dynamic pricing system depending on the characteristics of enterprises were

established ($p < 0.05$). In terms of business size, small enterprises demonstrated the highest performance with a revenue growth of 10.23 ± 2.14% and an ROI of 405 ± 86%. This effect was explained by the greater flexibility of small enterprises and their ability to respond quickly to changes in market conditions.

In regional terms, the best results were recorded in the Western region, namely in Lviv and Volyn regions (revenue growth of 9.27 ± 2.05%), and the lowest in the Eastern region (Kharkiv and Dnipropetrovsk regions) (7.85 ± 1.74%). The regional differences identified correlate with the overall level of retail trade development and business process digitalisation in the respective regions. In terms of specialisation, the largest revenue growth was observed in companies specialising in non-food products (9.86 ± 2.23%), which was due to the higher price elasticity of demand for this category of goods compared to food products.

So, based on a thorough analysis of the obtained results, tailored guidelines were developed to identify optimal strategies for implementing a dynamic pricing system across various types of enterprises. For small and medium-sized enterprises, it was involved full implementation of the system, with a focus on quickly adapting to changes in market conditions. For large enterprises, a phased approach was proposed, with an initial focus on categories of goods with high price elasticity of demand. An important aspect of the study was the confirmation of the high scalability of the proposed system for enterprises of different types and sizes. The analysis revealed that, despite differences in performance indicators, all the companies studied demonstrated a positive economic effect from the implementation of the dynamic pricing system. This confirmed the universality and adaptability of the developed approach to various business models in the retail sector.

Discussion

The results of the study confirmed the key role of big data analytics in shaping modern approaches to demand forecasting and establishing adaptive pricing strategies in retail. It has been found that the implementation of a dynamic pricing system based on the analysis of massive data sets significantly enhanced the competitiveness of enterprises through the optimisation of pricing strategies, increased forecasting accuracy and improved inventory management. The results of V. Kustov & M. Kovalenko (2024) on information support for process management in the context of digitalisation confirmed the identified pattern of increasing the efficiency of analytical systems with the increase in the level of digitalisation of business processes. The authors demonstrated higher ROI (375-420%) for enterprises with developed digital infrastructure, which was consistent with the results obtained for online stores (ROI = 516%).

Research by J. Maksymova (2021) confirmed the patterns identified in the study results regarding the strategic importance of big data for improving the competitiveness of enterprises, demonstrating similar indicators of economic efficiency of the implementation of analytical systems with an average productivity increase of 7-9%. There was complete agreement on the differentiation of implementation effectiveness depending on industry specifics, confirming the validity of the conclusion about lower effectiveness for food companies (7.23% revenue growth) compared to non-food companies (9.86%). Neural network machine learning methods for forecasting large noisy data, studied by A. Maltsev (2022), demonstrated similar effectiveness to the results obtained for LSTM networks with RMSE in the range of 135-155 units, which correlated with the indicators of this study (RMSE = 145.3). At the same time, the author found a more pronounced influence of model hyperparameters on the accuracy of forecasting, which was not fully reflected in this study and required further study for further improvement of the models.

The results of modelling and forecasting demand for a digital product by O. Novoseletskyy *et al.* (2021) revealed similar patterns to the data obtained for online stores, in particular regarding the high price elasticity of demand and the effectiveness of dynamic pricing with a 10-14% increase in revenue. There were differences in the methodological approaches to consumer segmentation, as the authors used cluster analysis based on purchasing behaviour, while the presented study used demographic characteristics and purchase history. T. Petriv (2024) studied the ecosystem of leading software development companies in Ukraine, identifying a growing demand for big data analytics solutions in the retail sector. Scientist's findings accepted the results of the study on the high effectiveness of implementing analytical systems for demand forecasting and dynamic pricing, demonstrating similar ROI indicators for technological solutions (380-450%) compared to those obtained in the study (360% on average).

The study by D. Schultz *et al.* (2023) on causal forecasting for pricing complements the results obtained, offering methods for identifying causal relationships between pricing strategies and market indicators, which were not fully taken into account in this study. The authors demonstrated the potential to increase forecasting accuracy by 5-8%, when causal relationships were taken into account, which was a promising direction for improving the developed dynamic pricing system. Predictive big data analytics for demand forecasting in supply chains, researched by M. Seyedan & F. Mafakheri (2020), established the conclusions regarding the positive impact of analytical systems on reducing inventory levels (the authors recorded figures in the range of 5-7%, which corresponded to the average value of 6.95%). The authors also emphasised the importance of integrating data from external sources, which was consistent with the high effectiveness of web scraping and the use of Google Trends data identified in this study.

The research by I. Shkyrta & V. Lazar (2019) on the essence and possibilities of big data technology for business was consistent with the results obtained regarding the differentiation of implementation effectiveness depending on the size of the business and technological readiness. The authors also confirmed the conclusion about the higher adaptability of small enterprises to the implementation of innovative analytical solutions, which explained the highest ROI indicators for small businesses (405%) identified in the study. A. Sharma (2025) analysed in detail the application of big data in retail, highlighting key areas of use, including demand forecasting, pricing optimisation and personalisation of offers. The author emphasised the importance of a comprehensive approach to big data analysis, which was fully consistent with the study's findings on the highest effectiveness of ensemble models ($R^2 = 0.896$) compared to individual algorithms. The dynamic pricing strategy for logistics revenue management using intelligent data analysis technology, presented by D. Xu *et al.* (2020), proved the conclusions regarding the feasibility of using ensemble models to improve forecasting accuracy. Researchers demonstrated similar performance indicators for the ensemble model ($R^2 = 0.883$) compared to the obtained result ($R^2 = 0.896$), although there were differences in the structure of the ensemble and approaches to weighting individual models.

The study by J.T. Hancock & T.M. Khoshgoftaar (2020) on the application of the CatBoost algorithm for big data analysis was consistent with the results obtained regarding the high efficiency of gradient boosting methods, although the authors found CatBoost to be superior to XGBoost, while the study used mainly XGBoost. The authors noted the potential to increase forecasting accuracy by 3-5%, when replacing XGBoost with CatBoost, which opened up opportunities for further improvement of the developed system. K. Zabor (2023) analysed leading European companies in the field of big data, identifying key trends in the development of the industry and promising areas for the application of analytical solutions. The results of his research confirmed the identified pattern of higher efficiency of implementing dynamic pricing systems for non-food companies (9.86% revenue growth) compared to food companies (7.23%), which was explained by differences in demand elasticity and frequency of assortment updates.

The results of A. Razzaq & X. Yang (2023) on the use of web crawling and big data technology to assess digital finance demonstrated technological approaches similar to those used in the study for web scraping, although the authors achieved higher data completeness rates (95.7% compared to 92.4%). The discrepancies found can be explained by the different areas of application and structure of the analysed web resources, confirming the need to adapt web scraping methods to the specifics of the industry under study. The study by W.K. Jawad & A.M. Al-Bakry (2023) established the patterns identified in the study results regarding the effectiveness of different methods of big data processing, demonstrating similar DBSCAN performance indicators with an average increase in data quality of 7-8% compared to the obtained 7.85%. There was significant agreement on the importance of pre-processing data to improve forecasting accuracy, confirming the validity of the attention paid to the data cleaning and normalisation stage, with an overall quality increase of 12.47%.

The transformation of business process structures in the modern economic environment, as studied by A. Pakki (2025), demonstrated methodological approaches similar to those used in the this study, especially with regard to assessing the impact of digitalisation on business process efficiency. The author recorded slightly lower productivity growth rates, when implementing analytical systems (5-7% compared to the 9.16% revenue growth obtained), which was explained by the broader focus of the study and its coverage of various sectors of the economy, not just retail trade. Results of detecting anomalies and threats in big data of hotel and restaurant industry enterprises H. Liavynets *et al.* (2024) complemented the conclusions regarding the effectiveness of the DBSCAN algorithm for detecting anomalous values, although the authors demonstrated a lower percentage of detected outliers (2.54% compared to 3.21%). There were differences in the approaches to processing the detected anomalies, as the authors focused on the security aspect, while in this study, priority was given to improving the quality of predictive models.

The study by V. Nesterov (2024) on the impact of big data analytics on business efficiency in the digital age aligned with the findings regarding the differentiation of economic effects based on industry specifics and enterprises' technological readiness. The author found patterns similar to those obtained regarding the higher return on investment in digital analytical solutions for enterprises with a mixed assortment (ROI = 330-370%) compared to the results of this study (ROI = 352 ± 78%), which confirmed the validity of the obtained estimates of economic efficiency. The server pool model for assessing energy consumption in big data processing, proposed by Y. Ponochovnyi *et al.* (2021), expanded on the results obtained, adding an important aspect of energy efficiency assessment that was not fully taken into account in this study. The authors demonstrated the potential to reduce energy consumption by 15-20% by optimising the data processing architecture, which was a promising direction for further improvement of the developed system, given the growing importance of environmental aspects of business and rising electricity costs.

Thus, the analysis of the literature confirmed the validity of the results obtained in the study regarding the effectiveness of big data processing methods, the performance of predictive models, and the economic effects of implementing a dynamic pricing system. The

discrepancies identified with individual studies were explained by industry specifics, regional characteristics, and differences in methodological approaches, which opened up prospects for further improvement of the developed system through the integration of causal models, the application of the CatBoost algorithm, and the expansion of data sources.

Conclusions

The analysis quality of big data for demand forecasting and dynamic pricing confirmed the high representativeness of the collected information, with an overall aggregate data quality index of 92.6%. Transaction information from POS terminals, which was characterised by the highest accuracy rates (99.2%), was identified as the priority source for building predictive models. The testing of data cleaning and normalisation methods demonstrated their high efficiency. The comprehensive application of various processing methods ensured a 12.47% increase in data quality. The use of the DBSCAN algorithm made it possible to identify and remove anomalous values without significant information loss, and the integration of heterogeneous data into a single analytical platform contributed to the improvement of the efficiency of further analysis. The ensemble model, which combined an LSTM network, XGBoost, and a Bayesian network, demonstrated the highest prediction accuracy with a MAPE of 5.92%. This result confirmed the feasibility of using combined methods to predict complex nonlinear processes in the retail sector. The implementation of the dynamic pricing system provided a significant economic effect for all retail formats studied. The average return on investment was 360%, which indicated the high economic efficiency of the developed solution. The highest performance was observed in the online store segment of Rozetka LLC and ALLO LLC, where the increase in marginal profit reached 14.53% and 13.96%, respectively, confirming the promise of implementing systems in e-commerce.

A comparative analysis of the effectiveness of implementation for different types of enterprises revealed statistically significant differences depending on the size of the business, geographical location and specialisation. The largest increase in revenue was observed in small enterprises (10.23 ± 2.14%), due to their greater flexibility and adaptability. In regional terms, the best results were recorded in the Lviv and Volyn regions (9.27 ± 2.05%), while in terms of specialisation, the leaders were Comfy Trade LLC and INTERTOP Ukraine LLC, which sell non-food products (9.86 ± 2.23%). The proposed system was flexible and suitable for implementation in enterprises of various sizes and specialisations, which ensured its practical value and versatility. The study had limitations, in particular geographical unevenness of the sample and instability of macroeconomic conditions, which could have affected the accuracy of individual forecasts. Insufficient digitalisation of small enterprises in some regions created technical barriers to the full implementation of the system. To improve the effectiveness of the implementation of the dynamic pricing system, it was recommended to: regularly update predictive models to reflect new data; adapt model parameters to seasonal fluctuations in demand; use a differentiated approach to pricing for different product categories; implement a phased strategy for large enterprises with an initial focus on categories with high demand elasticity; integrate the system with existing ERP solutions to ensure business continuity. A promising area for further research is the integration of dynamic pricing systems with artificial intelligence technologies to achieve a higher level of personalisation of price offers and automation of management decision-making processes based on predictive analytics.

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References

[1] ALLO. (n.d.). Retrieved from https://allo.ua/.
[2] Arguelles Jr, P., & Pólkowski, Z. (2023). Impact of big data on supply chain performance through demand forecasting. *International Journal of Computations, Information and Manufacturing*, 3(1), 19-26. doi: 10.54489/ijcim.v3i1.232.
[3] Bigl.ua. (n.d.). Retrieved from https://bigl.ua/.
[4] Bondarenko, L., & Liashenko, Y. (2023). Application of time series analysis methods for forecasting pricing in the real estate market. *Automobile Roads and Road Construction*, 114, 233-240. doi: 10.33744/0365-8171-2023-114.1-233-240.
[5] Chornous, G., & Horbunova, Y. (2020). Modeling and forecasting dynamic factors of pricing in e-commerce. In *IT&I-2020 information technology and interactions* (pp. 71-82). Kyiv: KNU Taras Shevchenko.
[6] Dobrovolska, O., & Fenenko, N. (2024). Forecasting trends in the real estate market: Analysis of relevant determinants. *Financial Markets, Institutions and Risks*, 8(3), 227-253. doi: 10.61093/fmir.8(3).227-253.2024.
[7] Euromonitor. (n.d.). *Market Research Ukraine*. Retrieved from https://www.euromonitor.com/ukraine.

[8] Guizzardi, A., Pons, F.M.E., Angelini, G., & Ranieri, E. (2021). Big data from dynamic pricing: A smart approach to tourism demand forecasting. *International Journal of Forecasting*, 37(3), 1049-1060. doi: 10.1016/j.ijforecast.2020.11.006.
[9] Hancock, J.T., & Khoshgoftaar, T.M. (2020). CatBoost for big data: An interdisciplinary review. *Journal of Big Data*, 7, article number 94. doi: 10.1186/s40537-020-00369-8.
[10] Hotline.ua. (n.d.). Retrieved from https://hotline.ua/.
[11] Iftikhar, R., & Khan, M.S. (2020). Social media big data analytics for demand forecasting: Development and case implementation of an innovative framework. *Journal of Global Information Management*, 28(1), 103-120. doi: 10.4018/JGIM.2020010106.
[12] Jawad, W.K., & Al-Bakry, A.M. (2023). Big data analytics: A survey. *Iraqi Journal for Computers and Informatics*, 49(1), 41-51. doi: 10.25195/ijci.v49i1.384.
[13] Kaminskyi, A., Versal, N., Petrovskyi, O., & Prykaziuk, N. (2023). Dynamic framework for strategic forecasting of the bank consumer loan market: Evidence from Ukraine. *Banks and Bank Systems*, 18(3), 87-100. doi: 10.21511/bbs.18(3).2023.08.
[14] Kanyhin, S. (2024). Big data in corporate financial management. *Economics, Management and Administration*, 3, 97-104. doi: 10.26642/ema-2024-3(109)-97-104.
[15] Kumar, S., Sharma, D., Rao, S., Lim, W.M., & Mangla, S.K. (2022). Past, present, and future of sustainable finance: Insights from big data analytics through machine learning of scholarly research. *Annals of Operations Research*, 345, 1061-1104. doi: 10.1007/s10479-021-04410-8.
[16] Kustov, V., & Kovalenko, M. (2024). Information support for managing processes on exchanges in the context of digitalization. *Modeling the Development of the Economic Systems*, 2, 47-57. doi: 10.31891/mdes/2024-12-7.
[17] Law of Ukraine No. 2297-VI "On Personal Data Protection". (2010, June). Retrieved from https://zakon.rada.gov.ua/laws/show/2297-17#Text.
[18] Law of Ukraine No. 80/94-VR "On Protection of Information in Information and Communication Systems". (1994, July). Retrieved from https://zakon.rada.gov.ua/laws/show/80/94-%D0%B2%D1%80#Text.
[19] Liavynets, H., Rohliev, Y., & Bortnichuk, O. (2024). Anomaliy and fraud detection mode from big data of hotel and restaurant industry enterprises. *Economy and Society*, 70. doi: 10.32782/2524-0072/2024-70-29.
[20] Maksymova, J. (2021). The importance of big data in industry and economy. *Economy and Society*, 28. doi: 10.32782/2524-0072/2021-28-38.
[21] Maltsev, A. (2022). Methods of machine learning of the neural network to predict large noisy data using modern programming languages. *Information Technology: Computer Science, Software Engineering and Cyber Security*, 1, 39-43. doi: 10.32782/it/2022-1-6.
[22] Nesterov, V. (2024). Exploring the impact of big data analytics on business performance in the digital era. *Information Technology and Society*, 1, 70-76. doi: 10.32689/maup.it.2024.1.10.
[23] Novoseletskyy, O., Zubenko, I., & Gurina, M. (2021). Modeling and forecasting demand for a digital product. *Scientific Notes of Ostroh Academy National University, "Economics" Series*, 22, 95-101. doi: 10.25264/2311-5149-2021-22(50)-95-101.
[24] Pakki, A. (2025). Transformation of business process structure in modern conditions of economic development. *Modeling the Development of the Economic Systems*, 1, 168-175. doi: 10.31891/mdes/2025-15-23.
[25] Petriv, T. (2024). Top software development companies in Ukraine with a strong portfolio. *N-ix*. Retrieved from https://www.n-ix.com/software-development-companies-in-ukraine/.
[26] Ponochovnyi, Y., Pryada, O., Soroka, Y., & Dikun, Y. (2021). Model of server pool for estimation of energy consumption in big data processing. *IT Synergy*, 1, 26-31. doi: 10.53920/its-2021-1-4.
[27] Price.ua. (n.d.). Retrieved from https://price.ua/.
[28] Prom.ua. (n.d.). Retrieved from https://prom.ua/.
[29] Razzaq, A., & Yang, X. (2023). Digital finance and green growth in China: Appraising inclusive digital finance using web crawler technology and big data. *Technological Forecasting and Social Change*, 188, article number 122262. doi: 10.1016/j.techfore.2022.122262.
[30] Rozetka. (n.d.). Retrieved from https://rozetka.com.ua/.
[31] Schultz, D., Stephan, J., Sieber, J., Yeh, T., Kunz, M., Doupe, P., & Januschowski, T. (2023). *Causal forecasting for pricing*. doi: 10.48550/arXiv.2312.15282.
[32] Seyedan, M., & Mafakheri, F. (2020). Predictive big data analytics for supply chain demand forecasting: Methods, applications, and research opportunities. *Journal of Big Data*, 7, article number 53. doi: 10.1186/s40537-020-00329-2.
[33] Sharma, A. (2025). Big data in retail: Industry applications, benefits & best practices. *Turing*. Retrieved from https://www.turing.com/resources/big-data-in-retail.

[34] Shkyrta, I., & Lazar, V. (2019). Big data technology: Essence, opportunities for business. *Scientific Bulletin of Mukachevo State University. Series "Economics"*, 6(2), 51-56. doi: 10.31339/2313-8114-2019-2(12)-51-56.
[35] State Statistics Service of Ukraine. (2025). *Economic statistics. Economic activity. Business activity*. Retrieved from https://www.ukrstat.gov.ua/operativ/menu/menu_u/sze_20.htm.
[36] Xu, D., *et al.* (2020). Dynamic pricing strategy for logistics revenue management using data mining technology. In *Proceedings of the 2020 4th international symposium on computer science and intelligent control* (article number 7). New York: Association for Computing Machinery. doi: 10.1145/3440084.3441183.
[37] Youcontrol. ALLO LLC. (n.d.). Retrieved from https://youcontrol.com.ua/catalog/company_details/30012848/.
[38] Youcontrol. ATB-Market LLC. (n.d.). Retrieved from https://youcontrol.com.ua/catalog/company_details/30487219/.
[39] Youcontrol. Comfy Trade LLC. (n.d.). Retrieved from https://youcontrol.com.ua/ru/catalog/company_details/36962487/.
[40] Youcontrol. Epicentr K LLC. (n.d.). Retrieved from https://youcontrol.com.ua/catalog/company_details/32490244/.
[41] Youcontrol. Foxtrot LLC. (n.d.). Retrieved from https://youcontrol.com.ua/catalog/company_details/23703827/.
[42] Youcontrol. INTERTOP Ukraine LLC. (n.d.). Retrieved from https://youcontrol.com.ua/catalog/company_details/41097426/.
[43] Youcontrol. METRO Cash and Carry Ukraine LLC. (n.d.). Retrieved from https://youcontrol.com.ua/catalog/company_details/32049199/.
[44] Youcontrol. Nova Liniya PJSC. (n.d.). Retrieved from https://youcontrol.com.ua/catalog/company_details/32816917/.
[45] Youcontrol. Rozetka LLC. (n.d.). Retrieved from https://youcontrol.com.ua/catalog/company_details/34047188/.
[46] Youcontrol. Silpo-Fud LLC. (n.d.). Retrieved from https://youcontrol.com.ua/catalog/company_details/40720198.
[47] Zabor, K. (2023). The best Big Data companies in Europe. *N-ix*. Retrieved from https://www.n-ix.com/top-big-data-companies-europe/.

Використання big data для прогнозування попиту та динамічного ціноутворення

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Анотація. Дослідження передбачало розробку та впровадження системи прогнозування попиту й динамічного ціноутворення на основі аналізу великих даних для підприємств роздрібної торгівлі України. Методологія роботи охопила збір масивного набору даних з онлайн-торговельних платформ, транзакційної інформації з терміналів продажів та програм лояльності, які продемонстрували загальний індекс якості агрегованих даних на рівні 92,6 %. Застосування комплексу методів очищення та нормалізації забезпечило приріст якості даних на 12,47 %. Порівняльний аналіз прогностичних моделей виявив найвищу ефективність LSTM-мережі серед індивідуальних моделей (R^2 = 0,874, MAPE = 6,83 %) та ансамблевої моделі серед усіх апробованих підходів (R^2 = 0,896, MAPE = 5,92 %). Впровадження розробленої системи на підприємствах різних форматів, таких як ТОВ «АТБ-Маркет», ТОВ «Фокстрот», ПрАТ «Нова Лінія», ТОВ «АЛЛО», ТОВ «Сільпо-Фуд», ТОВ «МЕТРО Кеш енд Керрі Україна», ТОВ «Епіцентр К», ТОВ «Rozetka», ТОВ «Комфі Трейд», ТОВ «ІНТЕРТОП Україна» показало підвищення економічної ефективності з середнім приростом виручки на 9,16 %, маржинального прибутку на 11,08 % та зниженням рівня запасів на 6,95 %. Найвищу результативність продемонстрували інтернет-магазини «Rozetka» та «ALLO» з показниками повернення інвестицій (ROI) на рівні 516 % та періодом окупності 2,7 місяця. Регіональний аналіз виявив значні відмінності в ефективності впровадження системи з найкращими показниками у західному регіоні, а саме у Львівській та Волинській областях (приріст виручки 9,27 ± 2,05 %) та серед підприємств непродовольчої спеціалізації, зокрема ТОВ «Комфі Трейд», ТОВ «ІНТЕРТОП Україна» (9,86 ± 2,23 %). Найвищу адаптивність до динамічного ціноутворення продемонстрували малі підприємства з приростом виручки 10,23 ± 2,14 % та ROI 405 ± 86 %. Дослідження підтвердило високу масштабованість та адаптивність запропонованого підходу для українського ринку та дозволило розробити диференційовані рекомендації щодо впровадження системи для різних типів підприємств роздрібної торгівлі з урахуванням їх розміру, регіонального розташування та товарної спеціалізації

Ключові слова: масиви даних; прогностичні моделі; економічна ефективність; роздрібна мережа; споживча поведінка

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Strategic priorities for the balanced development of cultural tourism entities in the post-war period

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Abstract. Armed conflicts were considered as potential catalysts for the modernisation of the tourism infrastructure. Under the conditions of comprehensive economic recovery, involving the implementation of innovations and the stimulation of both internal and external demand, growth in the sector could be encouraged despite significant losses experienced by Ukraine's tourism industry. These losses were associated with the destruction of infrastructure, a decline in entrepreneurial activity, imbalances in the labour market, and an increase in the cost of services. The purpose of the study – to determine the strategic priorities for the recovery of cultural tourism entities in Ukraine during the post-war period, to develop mechanisms for the integration of cultural heritage into sustainable development strategies. The research involved the analysis of tourism sector losses, the impact of war on tourism infrastructure, the development of business support programmes, the stimulation of internal tourism. Primary attention was given to the assessment of the damage inflicted on the tourism industry by the war, which included direct destruction, disruption of critical infrastructure, a decline in tax revenues. Despite substantial losses, internal tourism continued to function, particularly in the Western regions such as Zakarpattia and Bukovyna, which emerged as hubs of economic activity due to business relocation. A positive factor was identified in the increased demand for local tourism services, which contributed to the development of regional tourism. In 2023, Ukraine's tourism sector contributed UAH 383 million in taxes to the national budget, reflecting a 29% decrease compared to 2022 and a 39% decrease compared to 2021. Simultaneously, the number of taxpayers in the sector declined by 34%. However, the tourism industry encountered numerous challenges, including insufficient funding, destruction of infrastructure, restricted access to certain areas, and safety risks. The study proposed strategic approaches for the restoration of the tourism industry, including the development of special entrepreneurship support programmes, attraction of investment, infrastructure reconstruction, and promotion of the Ukrainian tourism brand on the international stage. Particular emphasis was placed on the importance of preserving and restoring cultural heritage as a key component of sustainable tourism development. The practical recommendations could serve as a foundation

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for the formulation of specific action plans aimed at revitalising Ukraine's tourism potential and enhancing its positioning as an attractive and safe international tourist destination

Keywords: tourism industry; cultural heritage; hospitality; war; sustainable development; digitalisation

Introduction

At the onset of the COVID-19 pandemic, Ukraine's hospitality industry found itself in a critical state and on the verge of survival. The full-scale military aggression launched by the russian federation in 2022, which led to the closure of a significant number of entities in the sector, further emphasised the urgent need for adaptation of the tourism business to new and challenging conditions. These circumstances resulted in a decline in business activity and an increased risk of crisis-related phenomena. In light of this, and given the important role of the hospitality industry in restoring socio-economic connections and interactions, it became necessary to identify optimal development strategies. These would enable tourism enterprises to adapt and function effectively under adverse economic and political conditions, ensuring their resilience and competitiveness within the tourism market. This strategy was to serve as a key element combining competitive actions and business approaches, determining success in the industry.

The tourism and hospitality industry plays a vital role in the modern world by contributing to economic growth and cultural development. Strategic management has been recognised as a key factor in ensuring competitiveness, attracting tourists, and supporting sustainable development. The main challenges have included the development and implementation of strategic plans, branding of tourist destinations, effective media and advertising use, cultural heritage preservation, promotion of sustainable tourism, cooperation with local communities, and the integration of innovations and technologies. Military actions in Ukraine significantly affected the tourism sector, causing a decline in demand, reduced revenues to state and local budgets, logistical disruptions, and destruction of tourism infrastructure. In addition, the closure of businesses and the reduction of jobs adversely impacted the economy. The inability to guarantee safety for tourists and to maintain appropriate service standards further damaged the country's image, exacerbating the crisis in the sector.

The work of M. Bosovska *et al.* (2023) focused on the recovery of Ukraine's tourism system under martial law and the development of forecast scenarios using the foresight methodology. Based on the analysis of economic indicators, the study identified potential opportunities for the sector, such as increased tax revenues and improved hotel performance metrics in 2023. The BANI method was employed to formulate both optimistic (α) and pessimistic (β) tourism development scenarios, which facilitated the definition of strategic directions for recovery and the mitigation of war-related impacts during the post-war period.

The authors L. Matviychuk & Yu. Dashchuk (2022) examined the potential application of European experience in sustainable hospitality development in Ukraine. The author's study explored the dynamics of the international tourism market and Ukraine's position within global tourism competitiveness. Particular attention was paid to the war's impact on the hospitality sector, including global economic consequences, and security was identified as a key priority for sustainable development. N. Yakymenko-Tereshchenko & O. Nosyriev (2024) investigated theoretical and methodological foundations for the development of the tourism and hotel industry, with a focus on strategic approaches to sustainable growth in a market economy. Reseracher's analysis addressed the war's effects on the sector, outlined prospective recovery pathways, and offered practical recommendations for product diversification and strategic partnerships to ensure destination sustainability.

Researchers L. Maliuta & S. Koroliuk (2023) analysed the state of internal tourism under martial law, highlighting its role in economic development and the preservation of cultural and natural resources. The author's findings addressed the sector's operational characteristics, identified key challenges, and proposed support measures, including security assurance, marketing strategy development, and legislative improvements. R. Kryvenkova & E. Sira (2023) examined the development of the hotel and restaurant industry under martial law, outlining priorities for post-war recovery. Scientist's analysis included core economic indicators, tax contributions, and the potential for restoring accommodation and food services in Ukraine.

The authors T. Bezsmertniuk & M. Melniichuk (2021) explored planning approaches for tourism activities within the protected areas network, integrated into regional and national planning frameworks. The study elaborated on the concept of sustainable tourism, its types and principles, and proposed strategic measures for sectoral development. Special attention was given to recreational activity management and the interaction of legal, economic, and financial regulatory mechanisms. O. Roik (2023) assessed the war's impact on Ukraine's tourism sector, estimated the losses, and justified the need to implement a sustainable development concept for post-war recovery and enhanced tourism competitiveness, taking national characteristics into account. The study identified issues affecting sustainable tourism during wartime and outlined pathways for future growth.

Scientist S. Filiuk (2022) analysed the problems and prospects for the development of Ukraine's tourism and recreation sector under globalisation and crisis

conditions, particularly in the context of martial law. The author proposed a system of innovation- and investment-oriented measures to modernise and enhance the competitiveness of Ukraine's tourism product in the international market. O. Morhulets & O. Nyshenko (2023) evaluated the economic condition of Ukraine's hotel and restaurant business during the COVID-19 pandemic and martial law. The study reviewed key operational indicators, influencing factors, and strategies for industry preservation and development, with an emphasis on the role of cross-cultural management in post-war recovery. I. Ierko (2023) addressed sustainable and secure tourism development as a critical factor in transforming the competitiveness of tourism enterprises. The research analysed aspects of balanced development, including environmental, social, and economic components, and stressed the importance of safety for tourism appeal, especially in the context of Ukraine's post-war reconstruction.

The purpose of this article was to define the strategic priorities for the balanced development of cultural tourism entities in the post-war period.

Materials and Methods

The study of strategic priorities for the balanced development of cultural tourism entities in the post-war period was based on the analysis of academic literature, regulatory and legal frameworks, statistical data, and reports from international and national organisations engaged in tourism and cultural heritage. To ensure the objectivity of results and the formulation of well-grounded conclusions, a comprehensive set of scientific methods was applied within the research framework. An empirical approach facilitated the collection and analysis of factual information regarding the operation of tourism enterprises. This enabled the reconstruction of an accurate picture of the sector's transformations and the tracing of regional interconnections. The theoretical method made it possible to examine modern scientific concepts and models of sustainable cultural tourism development and to identify directions for further research, particularly in terms of their adaptation to the Ukrainian context.

To process the economic indicators of the tourism industry, economic and mathematical tools were employed. Regression analysis was used to forecast tourist flow volumes based on factors such as the condition of cultural heritage sites, the level of infrastructure, promotion expenditures, and seasonal fluctuations. Simulation modelling enabled the assessment of pressure on cultural sites in specific regions, based on data regarding visitor numbers and heritage preservation efforts (e.g., restoration, protection measures, UNESCO listing). The analytical foundation of the study was built upon data from the following sources: Over 4 million tourists visited Ukraine last year (2022), As of November 2022, the total amount of damage caused to Ukraine's infrastructure is nearly USD 136 billion (2024), Public Report of the State Agency for Tourism Development of Ukraine for 2024 (2024), and 1255 cultural heritage sites in Ukraine were damaged due to russian aggression as of the end of December 2024 (2025). Additional sources included the works of A. Me & H. Fu (2021), the Travel & Tourism Development Index 2024 (2024), and data from the State Statistics Service of Ukraine (2025). These sources made it possible to conduct graphical analysis of tourism-related tax revenues across regions from 2021 to 2024 and to identify both global and regional trends in the tourism sector. To achieve the research purpose, methods of analysis and synthesis were applied to generalise theoretical approaches to cultural tourism development. A systemic approach was used to identify the interrelationship between tourism activity, economic factors, and cultural policy. Additionally, comparative analysis was conducted to assess international tourism development experience and its adaptation to modern realities. To forecast the sector's development prospects, the scenario analysis method was used, which allowed for the modelling of possible recovery and growth pathways for cultural tourism in Ukraine.

Results and Discussion

Armed conflicts often became a catalyst for the renewal and modernisation of destroyed cities. The process of recovery offered not only an opportunity to reshape urban spaces, but also to create modern tourism infrastructure that can contribute to the country's economic growth. The reconstruction of the economy required a comprehensive approach that included the implementation of innovations, restoration of production processes, improvement of living standards, and stimulation of demand in both internal and international markets. Ukraine's tourism industry had suffered substantial losses due to the destruction of infrastructure, cultural and natural heritage, a decline in the number of tourism enterprises, labour market imbalances, and rising costs of tourism services. Effective economic recovery necessitated the development of targeted business support programmes and the intensification of internal tourism development. The revitalisation of regions must be based on measures that promote population return, improvement of living conditions, resolution of social issues, reconstruction of infrastructure and its integration into the national system, as well as the creation of financial mechanisms to support these processes.

As of 2025, it is difficult to fully assess the extent of war-inflicted damage to the tourism industry and its infrastructure, as hostilities are ongoing. In addition to direct destruction, the industry suffered from disruptions to critical infrastructure, including frequent power outages caused by missile strikes. As of November 2022, tens of thousands of facilities had been damaged or destroyed, including tourist establishments, cultural landmarks, and transportation hubs (Fig. 1). Many hotels

and recreational centres experienced partial or total destruction, and some tourism assets were located in close proximity to the front line. Despite significant losses, internal tourism had not ceased – Ukrainians have continued to travel, albeit under restrictions such as bans on visiting forested and border areas. Most tourist activity had shifted to the relatively safe Western regions, particularly Zakarpattia and Bukovyna, which have become new centres of economic activity due to business relocation. Along with companies, their employees have also moved to these areas, which has driven increased demand for local tourism services, visits to cultural institutions, and the growth of regional tourism. Some internally displaced persons may choose to remain in these regions permanently, while others will share their experiences with relatives and friends – creating a foundation for a new stage in the development of the tourism industry.

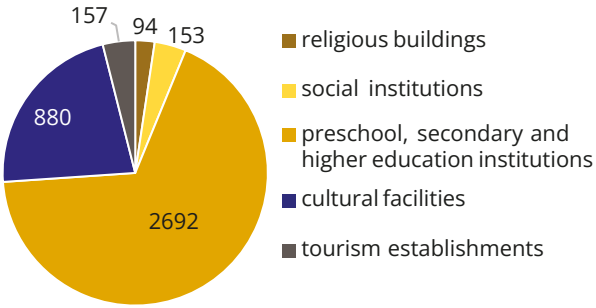

Figure 1. *Number of destroyed or seised objects (as of November 2022)*
Source: *As of November 2022, the total amount of damage caused to Ukraine's infrastructure is nearly USD 136 billion (2022)*

According to the Ministry of Culture and Strategic Communications of Ukraine, as of the end of December 2024, a total of 1255 cultural heritage sites were damaged as a result of russian aggression. Among them, 125 monuments were of national importance, 1055 were of local importance, and 75 were classified as newly discovered sites (Fig. 2). One of the key indicator of the effectiveness of the tourism industry was the volume of tax revenues, which was directly dependent on the number of tourists visiting a region. The COVID-19 pandemic in 2019-2020 caused a significant decline in these revenues. However, in 2021, the hospitality industry began a gradual recovery. Nevertheless, with the onset of the full-scale invasion on February 24, 2022, tourism-related activities in Ukraine nearly came to a halt, with the exception of providing accommodation for internally displaced persons. The Travel & Tourism Development Index 2024 (2024) report by the World Economic Forum highlighted the partial recovery of the global transport and tourism sectors post-pandemic, although it also pointed to an imbalance between supply and demand and a decline in price competitiveness. While highly developed countries such as the United States, Spain, and Japan maintained leading positions, developing countries showed significant progress, but still required investment to close the gap.

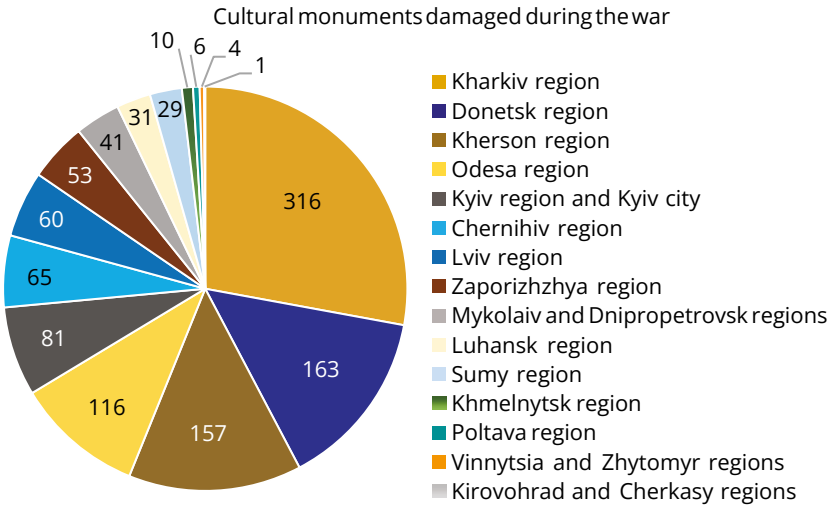

Figure 2. *Number of cultural heritage sites damaged (as of December 2024)*
Source*: 1255 cultural heritage sites in Ukraine were damaged due to russian aggression as of the end of December 2024 (2025)*

In 2021, Ukraine was visited by more than 4 million international tourists, demonstrating a 26% increase compared to 2022. The largest number of visitors came from Moldova – approximately 1054 million individuals. Other countries with substantial tourist flows to Ukraine included Poland (311 thsd), Belarus (273 thsd), Romania (264 thsd), Turkey (247 thsd), Hungary (227 thsd), Germany (154 thsd), Israel (133 thsd), and the United States (103 thsd). The data showed that nearly 30% of travellers came for leisure and entertainment. Approximately 25.9% visited Ukraine for business purposes, while 22.4% travelled to visit relatives or friends. Around 11.7% came for health-related reasons, and only 4% travelled for shopping (Fig. 3).

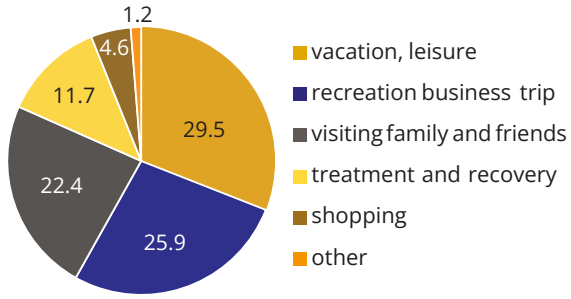

Figure 3. *Purpose of travel among international tourists in 2022*

Source*: Over 4 million tourists visited Ukraine last year (2022)*

In terms of travel formats, most visitors arrived with their families – accounting for 36.5% of all international tourists. Individual travellers comprised 35.4%, while 21.8% travelled with friends. Business trips in work collectives accounted for 5.1%, and organised tourist groups represented only 1.2% of total arrivals (Over 4 million tourists..., 2022).

An analysis of tax revenues for the first quarters of 2021, 2022, and 2023 revealed a negative trend: in 2023, the tourism industry contributed UAH 383 million in taxes, which was 29% lower than in 2022, and 39% lower than in 2021. The number of taxpayers in the tourism sector declined by 34%, with hotels traditionally providing the largest share of tax revenues (61%). However, even these contributions dropped by 22% compared to 2022 and 41% relative to 2021. An increase in tax revenues from accommodation facilities was observed in ten Ukrainian regions, largely due to their distance from active combat zones and attractiveness to both tourists and internally displaced persons (IDPs). The highest increases were recorded in Chernivtsi (+98%), Lviv (+16%), and Zakarpattia (+15%) regions. Conversely, in conflict-affected regions such as Luhansk, Donetsk, Kherson, Zaporizhzhia, Mykolaiv, and Kharkiv, revenues from accommodation providers fell by 50-100%. Several other regions, including Odesa, Ternopil, Ivano-Frankivsk, and Kyiv, also experienced a 10-50% decline compared to 2022 (Public report of the State Agency..., 2024).

In Kyiv, previously a major tourist hub, tax revenues from accommodation decreased by 47% compared to 2022, primarily due to ongoing missile strikes. Revenues from recreational bases and children's camps dropped by 48%, largely because of insufficient bomb shelters and the use of such facilities for housing IDPs. In contrast, campgrounds and caravan parks saw a 20% increase in revenue, as they were generally located further from strategic targets. However, their total figures remained below 2021 levels, partly due to the closure of cross-border mountain routes. In the first quarter of 2023, the number of taxpayers in the tourism industry declined by 34% compared to the same period in 2022. The number of legal entities and sole proprietors decreased by 35% and 34%, respectively. Overall, the number of active tourism-related businesses fell by 38% compared to 2021, indicating a substantial exodus of entrepreneurs from the sector (Public report of the State Agency..., 2024).

In the second quarter of 2023, the situation deteriorated further due to the destruction of the Kakhovka Hydroelectric Power Plant by russian forces and the nuclear terrorism threat at the Zaporizhzhia Nuclear Power Plant. The resulting ecocide led to the flooding of cultural and natural heritage sites, submersion of tourist facilities in Kherson and Mykolaiv regions, water pollution, potential desalinisation of the Black Sea near the Odesa coastline, and drinking water shortages across Southern Ukraine. These factors significantly delayed prospects for tourism recovery in the region, even after the war's conclusion (Starodubtsev *et al.*, 2023). It must be acknowledged that a range of challenges have significantly hampered the development of Ukraine's tourism sector, particularly under conditions of war and economic instability (Table 1). Overcoming these challenges required a comprehensive set of measures aimed at infrastructure restoration, business support, and rebuilding a positive tourism image of the country.

Table 1. *Key factors hindering the development of the tourism industry*

Category of factors	Description
Economic	Decline in population's purchasing power. High inflation and national currency instability. Insufficient funding and lack of investment in tourism infrastructure. High tax rates and regulatory pressure on the tourism business
Political and security	Military actions and occupation of territories. High level of threat to tourists due to shelling and mined areas. Insufficient state support for the tourism sector. Unstable political situation affecting the country's international image

Table 1, Continued

Category of factors	Description
Infrastructure	Destruction of tourist sites, roads, airports, and bridges. Problems with transport connectivity, especially in frontline regions. Insufficient development of modern hotels and other accommodation facilities. Poor condition of utilities and energy infrastructure
Social	Workforce outflow due to migration and job cuts in the tourism sector. Decline in staff qualifications due to lack of stable employment. Decrease in interest in internal tourism amid general uncertainty
Environmental	Ecocide and environmental pollution due to hostilities. Destruction of nature reserves and recreational areas. Insufficient attention to the preservation of natural heritage
Marketing and informational	Formation of a negative image of the country as a dangerous tourism destination. Lack of effective advertising campaigns to promote internal tourism. Insufficient level of digitalisation of tourism services

Source: *developed by the authors*

The modern state of development of cultural tourism entities in Ukraine was characterised by significant challenges, but also held prospects for recovery. Improvement was possible through effective management approaches that will promote the innovative development of territories, the implementation of modern technologies, and the creation of favourable conditions for cooperation between the state, entrepreneurs, and tourism organisations. Competent governance of the sector at the national level required a deep analysis of the overall economic situation and the specifics of the tourism sector.

The key challenges facing Ukraine's tourism industry included the absence of international tourist flows due to military actions; capital flight and insufficient funding for infrastructure restoration; high levels of danger in many regions; substantial destruction of tourist sites, historical monuments, and cultural institutions; lack of reliable information on the condition of tourist sites across the country; a limited network of tourist information centres and an outdated hotel classification system; the absence of an automated statistical data collection system for sectoral analysis; a ban on flights in Ukraine's airspace; and the lack of a unified national tourism portal to promote the country internationally in the post-war period. To ensure effective development of cultural tourism entities under conditions of uncertainty, it was necessary to apply both proven management practices and innovative, creative approaches. Key directions included:

- comprehensive modernisation of management processes in the sector;
- creation of favourable conditions for the development of tourism businesses;
- development of tourism growth models within the framework of national and regional economic policy;
- implementation of automated systems for data collection and analysis to improve monitoring and planning;
- use of digital technologies to promote tourism products, organise e-marketing, and facilitate service booking;
- introduction of innovations in hospitality, transportation, and financial services for tourists;
- creation of new types of tourism products and improvement of traditional services;
- access to international markets with competitive tourism offerings.

The efficiency of coordination and development of cultural tourism entities depended on high-quality legal and organisational frameworks. Moreover, a clear distribution of responsibilities between central, regional, and local authorities was essential, enabling effective development of local tourism, attraction of investment, and infrastructure creation.

Given the importance of legal and organisational support for the development of cultural tourism, it was also necessary to consider effective mechanisms for integrating cultural heritage into sustainable development strategies (Table 2). The creation of an effective tourism management system should combine the preservation of historical and cultural assets with the socio-economic growth of regions. In this context, the key role was played by mechanisms that ensured a harmonious balance between heritage protection, tourism infrastructure development, and investment attraction.

Table 2. *Effective mechanisms for integrating cultural heritage into sustainable development strategies*

Direction	Implementation mechanisms
Legislative and institutional consolidation	Integration of cultural heritage protection into sustainable development strategies; development of state programmes supporting monument preservation; cooperation between government bodies, communities, and businesses
Economic and financial support	Public-private partnership in funding restoration projects; attraction of international grants and investors; tax incentives and subsidies for enterprises in the cultural heritage sector
Education and awareness raising	Inclusion of heritage preservation topics in educational programmes; conducting information campaigns and training events; use of digital platforms to promote cultural heritage
Tourism and social integration	Development of tourist routes involving cultural landmarks; support for local communities in developing cultural tourism; use of traditional architecture, crafts, and gastronomy in tourism products

Table 2, Continued

Direction	Implementation mechanisms
Technological innovations	Digitalisation of heritage (3D-scanning, virtual tours, mobile applications); use of smart technologies to monitor the condition of monuments; innovative formats for presenting cultural heritage (AR, VR, NFT-museums)

Source: *developed by the authors*

The sustainable development of the tourism sector largely depended on the renewal and expansion of tourism and resort-recreational infrastructure. To this end, it was advisable to introduce a special investment regime that would stimulate the construction and renovation of hotels and other tourism-related facilities by attracting both Ukrainian and foreign investors. In addition, a crucial step involved ensuring direct funding from state and local budgets for the development of tourism infrastructure, including the arrangement of tourist routes, recreational areas in forests and mountainous regions, public beaches, observation decks, tourist information centres, and road signage (Trostianska, 2024). Given the above, proposed recovery models were expected to contribute to the revival of cultural tourism in Ukraine by stimulating economic growth, promoting international cooperation, and shaping a positive image of the country as an attractive tourist destination (Table 3).

Table 3. *Models for the recovery and growth of cultural tourism entities in Ukraine*

Path of recovery	Key measures	Expected results
State support and legal regulation	Adoption of programmes for the preservation and restoration of cultural heritage. Provision of state grants and subsidies for the reconstruction of tourism sites. Simplification of legal procedures for running tourism businesses	Restoration of destroyed landmarks and infrastructure. Increase in the number of enterprises in the field of cultural tourism. Creation of a favourable investment climate
Investment and international partnership	Attraction of foreign investors and international funds to finance projects. Development of public-private partnerships. Establishment of special economic zones for tourism recovery	Improvement of the material and technical base of cultural tourism. Stimulation of infrastructure and service development. Formation of a positive international image of Ukraine
Internal tourism development	Promotion of national cultural heritage through educational programmes and media. Organisation of cultural festivals, guided tours, and themed trips. Support for local initiatives and tourism start-ups	Increase in internal tourist flow. Enhancement of economic activity in the regions. Revival of interest in history and culture among the population
Innovation and digitalisation	Creation of virtual tours, mobile applications, interactive tourist route maps. Use of AR/VR technologies to popularise cultural heritage. Automation of tourism services (online booking, e-tickets)	Accessibility of cultural tourism to a wider audience. Improvement in the quality of tourism services. Better interaction between tourists, businesses, and cultural institutions
Sustainable development and ecotourism	Restoration of cultural landmarks using environmentally-friendly materials. Development of green tourism (eco-trails, rural tourism, ethnoparks). Implementation of responsible tourism principles	Formation of an environmentally conscious tourist environment. Minimisation of negative environmental impact. Increase in the flow of eco-tourists and international partners

Source: *developed by the authors*

From 2022 to 2025, under wartime conditions, Ukraine's tourism sector suffered significant losses due to a sharp decline in tourist flows and the destruction of tourism and recreational potential in areas affected by hostilities and shelling. According to data from the official website of the State Statistics Service of Ukraine (2025), the industry's performance was measured by the number of collective accommodation facilities, the number of people staying in them, and the number of hotel rooms. It was determined that the number of collective accommodation facilities decreased by 525 units from 2019 to 2020. In 2024, the global tourism sector contributed 10% to the world's GDP, reaching USD 10.9 trillion. The industry supported 357 million jobs, accounting for approximately one in ten worldwide. Both internal and international visitor spending increased, with foreign visitor expenditures rising by 11.6%, amounting to USD 1.9 trillion (Me & Fu, 2024).

Post-war recovery of tourism infrastructure will require large-scale investments and active measures to stimulate tourism, aiming for the swift restoration of damaged facilities and the revival of the sector's operations. This has been confirmed by research focused on the post-war reconstruction of the tourism industry. For instance, O. Bordun *et al.* (2022) noted that tourism recovery costs can be conditionally divided into two categories: direct (reconstruction and repair of tourism facilities, demining costs) and indirect, which included funding for infrastructure projects such as the reconstruction of roads, bridges, and airports essential for the tourism industry's full functionality. Therefore, the total recovery costs were significantly broader, encompassing related economic sectors. The preliminary estimated need for funding the restoration of tourism infrastructure amounts to UAH 16.80 billion, representing only 0.26% of the total costs required for Ukraine's overall

reconstruction. N. Shevchenko (2025) analysed the priority directions of tourism development during wartime and the formation of adaptation strategies for the post-war recovery of the sector through the promotion of cultural heritage. The author proposed flexible approaches to regional tourism development, including specialised types such as gastronomic tourism, taking into account new socio-cultural conditions.

As noted by I. Tsurkan & R. Kryvenkova (2023), the assessment of tourism industry losses caused by the war can be conducted in several directions. These include reduced tax revenues due to fewer taxpayers, direct losses from infrastructure destruction, indirect losses from expected future income declines, and recovery costs for the industry. O. Vasylyeva *et al.* (2023) identified emerging trends in tourism market recovery that will be relevant for Ukrainians, notably the increasing demand for recreational tourism and visits to former conflict zones. After two years of the COVID-19 pandemic, Ukrainians found themselves facing war-related realities, including mass migration, emotional exhaustion, and loss. As a result, many people sought rest in natural areas – by the sea, in the mountains, or forests – to restore physical and emotional well-being. Simultaneously, interest in military tourism was expected to grow as Ukrainians wish to see firsthand the places that became symbols of resistance, and which they had previously learned about from the news. A combination of these factors, along with the development of existing routes and active promotional campaigns, will help restore Ukraine's image as an attractive tourist destination.

Researcher H. Omelchak (2023) emphasised the importance of cybersecurity and IT-development as key factors contributing to the recovery of tourism in post-war Ukraine. To attract investment, active cooperation with international tourism organisations was needed to facilitate Ukraine's integration into global tourism networks. One effective measure could be the establishment of Ukrainian tourism offices abroad to promote the country's tourism potential to international travellers. The implementation of innovative recovery approaches will support the creation of a unique tourism image for Ukraine, combining war heritage with advanced technologies and modern infrastructure.

V. Kholodok (2023) stressed the necessity of developing strategies and mechanisms for the rapid recovery of the tourism business to ensure its efficient operation after the end of hostilities. An important aspect was the effective coordination between regional and local authorities aimed at developing the tourism industry and creating favourable conditions for its recovery. T. Herasymenko *et al.* (2024) analysed the challenges and prospects of attracting investment into Ukraine's tourism sector after the war, taking into account global trends and internal industry issues. The authors justified the importance of foreign investment and proposed mechanisms to stimulate investment activity for the recovery and development of the country's tourism potential. L. Chepurda *et al.* (2024) examined the essence and significance of strategic marketing for tourism and hospitality enterprises under conditions of uncertainty and crisis, particularly during the post-pandemic and wartime periods in Ukraine. Researchers analysed theoretical aspects, assessed the industry's situation, and proposed measures for determining strategic priorities and effective marketing tools.

Thus, the effective development of cultural tourism entities required active state support. The tourism sector must be integrated into national humanitarian policy and identified as one of the country's strategic priorities. This will allow Ukraine to fully realise its tourism potential, contribute to economic growth, to develop recreation and wellness services, and to accelerate the socio-economic recovery of regions in the post-war period.

Conclusions

The study comprehensively highlighted the fatal impact of the full-scale war on Ukraine's tourism sector during the period from 2022 to 2025. The destruction of tourism infrastructure, damage to cultural and natural heritage sites, the sharp decline in international and internal tourist flows, and the mass closure of businesses led to significant economic losses and labour market destabilisation. The analysis of tax revenues confirmed this negative trend, showing a decrease in financial contributions to the state budget and a reduction in the number of tourism business entities.

As of 2025, Ukraine's tourism industry had suffered severe losses due to the war: over 1255 cultural heritage sites were destroyed or damaged, and tax revenues from the tourism sector in 2023 decreased by 29% compared to 2022 and by 39% compared to 2021. The number of tourism business entities fell by 38% relative to the pre-war level in 2021, indicating a massive outflow of entrepreneurs from the sector. At the same time, certain regions relatively remote from hostilities, such as Chernivtsi (+98%), Lviv (+16%), and Zakarpattia (+15%) regions, recorded an increase in revenues, demonstrating the potential of internal tourism as a factor of local economic recovery.

The study revealed the resilience of internal tourism, particularly in the Western regions of Ukraine, which became relatively safe and hosted a significant number of internally displaced persons. This highlighted the internal potential to partially offset losses and provided a foundation for future recovery. The relocation of businesses and populations to these regions contributed to increased demand for local tourism services, serving as a positive signal for regional tourism development. The findings emphasised the critical need for comprehensive strategies for post-conflict tourism recovery. Proposed models included active government support through targeted programmes and favourable regulatory frameworks, the attraction

of internal and foreign investments to rebuild infrastructure, stimulation of internal tourism by promoting national cultural heritage, implementation of innovative technologies to enhance service quality and tourism product promotion, as well as the integration of sustainable development principles to ensure long-term competitiveness of the sector.

Special attention was paid to the preservation and restoration of cultural heritage, which remained a key element of Ukraine's tourism appeal. Effective mechanisms for integrating cultural sites into tourism routes and sustainable development strategies will not only attract tourists, but also help preserve the country's national identity and cultural wealth. Therefore, the study results represented an important step in understanding the devastating impact of war on Ukraine's tourism industry and substantiate the urgent need for coordinated efforts by the government, business sector, and international partners to ensure its effective recovery and sustainable development. Prospects for further research include exploring balanced development strategies for cultural tourism entities in the context of European integration processes.

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Conflict of Interest

None.

References

[1] 1255 cultural heritage sites in Ukraine were damaged due to russian aggression as of the end of December 2024. (2025). *Ministry of Culture and Strategic Communications of Ukraine*. Retrieved from https://mcsc.gov.ua/news/1255-pamyatok-kulturnoyi-spadshhyny-postrazhdaly-v-ukrayini-cherez-rosijsku-agresiyu-stanom-na-kinecz-grudnya-2024-roku/.

[2] As of November 2022, the total amount of damage caused to Ukraine's infrastructure is nearly USD 136 billion. (2022). *Kyiv School of Economics*. Retrieved from http://tinyurl.com/KSE15122022.

[3] Bezsmertniuk, T., & Melniichuk, M. (2021). Strategic priorities of development of tourism in nature protected areas of Ukraine. *Economy and Society*, 29. doi: 10.32782/2524-0072/2021-29-7.

[4] Bordun, O., Shevchuk, V., Monastyrskyy, V., & Luchka, O. (2022). Losses and rescue areas of tourism business under the war in Ukraine. *Bulletin of Lviv University*. *Economic Series*, 62, 178-196. doi: 10.30970/ves.2022.62.0.6214.

[5] Bosovska, M., Boiko, M., Bovsh, L., Okhrimenko, A., & Vedmid, N. (2023). Foresight (prevision) of development of the tourist system in Ukraine. *Problems and Perspectives in Management*, 21(4), 696-712. doi: 10.21511/ppm.21(4).2023.52.

[6] Chepurda, L., Chepurda, H., & Matviichuk, L. (2024). Experience of applying innovative technologies in the practice of implementing strategic marketing methods in tourism and hotel and restaurant business. *Innovations and Technologies in the Service Sphere and Food Industry*, 2, 68-78. doi: 10.32782/2708-4949.2(12).2024.9.

[7] Filiuk, S. (2022). System of innovation and investment measures of the economic strategy to restore tourism and recreational potential of Ukraine. *Ukrainian Journal of Applied Economics and Technology*, 7(2), 417-425. doi: 10.36887/2415-8453-2022-2-51.

[8] Herasymenko, T., Omelyanenko, D., & Kuvavina, V. (2024). Challenges and prospects of attracting investments in the tourist sector of Ukraine in the post-war period. *Change Management and Innovation*, 12, 20-24. doi: 10.32782/CMI/2024-12-3.

[9] Ierko, I. (2023). Sustainable and safe development of tourism as one of the criteria for transforming the competitive potential of tourist industry subjects. *Entrepreneurship and Innovation*, 29, 7-13. doi: 10.32782/2415-3583/29.1.

[10] Kholodok, V. (2023). Regional tourism management in wartime and strategies for the future. *Taurida Scientific Herald. Series: Economics*, 16, 206-214. doi: 10.32782/2708-0366/2023.16.27.

[11] Kryvenkova, R., & Sira, E. (2023). Imperatives for the development of the hotel and restaurant industry under martial law: Trends and prospects for recovery. *Black Sea Economic Studies*, 83, 40-44. doi: 10.32782/bses.83-7.

[12] Maliuta, L., & Koroliuk, S. (2023). War as a cause of change in Ukraine's tourism potential: Analysis of organizational and economic measures to restore of domestic tourism. *Galician Economic Journal*, 85(6), 139-147. doi: 10.33108/galicianvisnyk_tntu2023.06.139.

[13] Matviychuk, L., & Dashchuk, Yu. (2022). European vector of sustainable development hospitality industry of Ukraine. *Economy and Society*, 45. doi: 10.32782/2524-0072/2022-45-28.

[14] Me, A., & Fu, H. (2021). *How COVID-19 is changing the world: A statistical perspective*. New York: The Committee for the Coordination of Statistical Activities.

[15] Morhulets, O., & Nyshenko, O. (2023). Hotel and restaurant business of Ukraine in the pre-war, war and post-war period. *Tourism and Hospitality Industry in Central and Eastern Europe*, 8, 88-96. doi: 10.32782/tourismhospcee-8-12.

[16] Omelchak, H. (2023). Features of the innovative development of tourism in Ukraine in the conditions of war and European integration. *Sustainable Development of Economy*, 1, 106-109. doi: 10.32782/2308-1988/2023-46-14.
[17] Over 4 million tourists visited Ukraine last year. (2022). *MinFin*. Retrieved from https://minfin.com.ua/ua/2022/01/22/79640488/.
[18] Public report of the State Agency for Tourism Development of Ukraine for 2024. (2024). *SATD*. Retrieved from https://surl.li/jzybtr.
[19] Roik, O. (2023). The directions of sustainable development of tourism in Ukraine in the conditions of post-war recovery. *Economic Space*, 184, 58-61. doi: 10.32782/2224-6282/184-9.
[20] Shevchenko, N. (2025). Directions of development of Ukrainian tourism in the context of military realities and post-war recovery processes. *National Academy of Managerial Staff of Culture and Arts Herald*, 1, 96-101. doi: 10.32461/2226-3209.1.2025.327926.
[21] State Statistics Service of Ukraine. (2025). Retrieved from http://ukrstat.gov.ua.
[22] Starodubtsev, V., Haichenko, V., & Ladyka, M. (2023). The destruction of the Kakhovka Hydroelectric Power Station is a man-made, ecological and social catastrophe. *National University of Life and Environmental Sciences of Ukraine*. Retrieved from https://nubip.edu.ua/node/129298.
[23] Trostianska, K. (2024). Viability of local communities: Theoretical analysis and review of scientific research. *University Economic Bulletin*, 19(1), 44-55. doi: 10.69587/ueb/1.2024.44.
[24] Travel & Tourism Development Index 2024. (2024). *World Economic Forum*. Retrieved from https://www.weforum.org/publications/travel-tourism-development-index-2024/in-full/1-about-the-travel-tourism-development-index-2023/.
[25] Tsurkan, I., & Kryvenkova, R. (2023). Priorities of tourism industry functioning during the war in Ukraine. *Black Sea Economic Studies*, 79, 247-250. doi: 10.32782/bses.79-38.
[26] Vasylyeva, O., Domashenko, S., & Kaptiukh, T. (2023). Prospects for the development of the tourism industry of Ukraine in the post-war period. *Market Infrastructure*, 72, 185-191. doi: 10.32782/infrastruct72-33.
[27] Yakymenko-Tereshchenko, N., & Nosyriev, O. (2024). *Strategic priorities of tourism and hotel business in the concept of sustainable regional development.* Kharkiv: NTU "KhPI". doi: 10.20998/978-617-05-0488-3.

Стратегічні пріоритети збалансованого розвитку суб'єктів культурного туризму в повоєнний період

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Анотація. Військові конфлікти можуть стати імпульсом для сучасної туристичної інфраструктури, що в умовах комплексного економічного відновлення із впровадженням інновацій та підтримкою внутрішнього і зовнішнього попиту здатне стимулювати зростання, попри серйозні втрати туристичної галузі України, що пов'язані з руйнуванням інфраструктури, спадом підприємницької активності, дисбалансом на ринку праці й зростанням вартості послуг. Мета дослідження – визначити стратегічні пріоритети відновлення суб'єктів культурного туризму в Україні в умовах повоєнного періоду, а також розробити механізми інтеграції культурної спадщини у стратегії сталого розвитку. Дослідження включало аналіз втрат туристичної галузі, впливу війни на туристичну інфраструктуру, розробку програм підтримки бізнесу та активізацію внутрішнього туризму. Основна увага приділена оцінці збитків, завданих війною туристичній індустрії, що охоплювало прямі руйнування, порушення критичної інфраструктури та зменшення податкових надходжень. Попри значні втрати, внутрішній туризм продовжив функціонувати, особливо в безпечних західних регіонах, таких як Закарпаття та Буковина, які стали центрами економічної активності через релокацію бізнесу. Позитивним фактором стало зростання попиту на місцеві туристичні послуги, що сприяло розвитку регіонального туризму. У 2023 році туристична галузь України сплатила до бюджету 383 млн грн податків, що на 29% менше, ніж у 2022 році, та на 39% менше порівняно з 2021 роком, водночас кількість платників податків скоротилася на 34%. Однак туристична галузь стикнулася з низкою викликів, зокрема нестачею фінансування, руйнуванням інфраструктури, обмеженнями на відвідування певних територій та загрозами безпеці. У дослідженні запропоновані стратегічні підходи до відновлення туристичної індустрії, що включають створення спеціальних програм підтримки підприємництва, залучення інвестицій, розбудову інфраструктури та просування українського туристичного бренду на міжнародній арені. Особливий акцент зроблено на важливості збереження та відновлення культурної спадщини як ключового елемента сталого розвитку туризму. Практичні рекомендації можуть слугувати основою для розробки конкретних планів дій, спрямованих на відродження туристичного потенціалу України та її позиціонування як привабливого та безпечного туристичного напрямку на міжнародній арені

Ключові слова: індустрія туризму; культурна спадщина; гостинність; війна; сталий розвиток; цифровізація

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Investment strategies for athletes, considering the specifics of their career path and income instability

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Abstract. The purpose of this study was to analyse approaches to the development of effective investment strategies for professional athletes. The research methodology included an analysis of the international experience of financial education of athletes, and modelling investment strategies on the example of a hypothetical career of a Ukrainian football player. The importance of financial planning for athletes, which goes beyond just managing income and expenses, was considered. It was determined that sports required athletes not only to maintain a high standard of living during their careers, but also to develop an investment strategy to ensure stability after completion. Since the athlete's career lasts only a limited period of time, and income reaches a peak between the ages of 18 and 35, an important component was proper financial management, which will ensure the athlete not only financial stability during the period of active activity, but also in the post-career time. The paper described the adaptation of the classical income life cycle hypothesis to the conditions of a sports career, which required a more aggressive savings and investment strategy. Financial literacy was also considered a necessary tool for achieving long-term stability and fraud protection. International financial education programmes for athletes, in particular, in the United States, Great Britain, Australia, and Canada, were analysed, and their effectiveness was compared. Special attention was paid to the situation in Ukraine, where the financial education of athletes was not yet systematic. Modelling of investment strategies for the conditions of Ukraine showed the difference between a basic and more structured approach to financing athletes, which included active investment and post-career planning. The results of the study showed that basic financial literacy significantly reduced the likelihood of financial difficulties after the end of a career and provided greater economic stability for athletes. The findings can be used by sports federations, educational institutions, and government agencies to develop financial literacy programmes tailored to the needs of athletes at different stages of their careers

Keywords: financial literacy; cross-sectoral cooperation; investment; risk-management; government support

Introduction

A sports career is characterised by high, but unstable incomes, limited to certain periods, which emphasise the need to develop investment strategies to ensure financial stability both during active activity and after its completion. The problem of investment behaviour of athletes was considered from different angles – from the psychology of financial decision-making to macroeconomic income planning during the life cycle. In particular, J. Moolman (2023) focused on analysing bankruptcies among professional athletes. The researchers found that the main cause of financial collapse after the end of a career was the lack of long-term investment and inability to plan expenses. This confirmed the thesis about the need to create specialised financial programmes for athletes.

The authors B. Melnykov & O. Melnykova (2024) discussed the uneven income in professional sports, in particular in football. The researchers analysed the time

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structure of contractual payments and concluded that short-term financial stability often masked deep vulnerability in the long term. M.A. Weston (2024), investigating the financial behaviour of Olympic athletes, highlighted low levels of financial literacy as a key obstacle to effective money management, emphasising the importance of including financial education in the training process.

T. Schlesinger *et al*. (2023) conducted a study in an Asian context showing that adaptive investment portfolios that considered changes in income levels, age, and risk of investment were most effective for athletes. Researchers have shown that gradually reducing risk in accordance with the end of a career contributed to financial stability in the post-sports period. V. Bulba & S. Fedchenko (2024), focusing on Ukrainian athletes, identified institutional barriers to investment, including the lack of access to high-quality financial consulting and distrust of investment instruments due to the instability of the financial market.

Researchers S. Bykova *et al*. (2024) raised the issue of emotional financial management and examined, how impulsive spending during a career without proper investment planning led to financial losses in the long run. The researchers' conclusions supported the idea of forming an investment portfolio at an early stage of their career. In turn, B. Saliba *et al*. (2022) analysed the role of insurance and crisis planning in athletes' investment strategies, emphasising the importance of including insurance products in the overall financial plan.

A. Iancu *et al*. (2023) reviewed athletes' multidisciplinary investments, including real estate, small businesses, and passive financial instruments. The study has shown that asset diversification significantly reduced the risks of financial exhaustion. D. Nybondas (2023) has developed a dynamic investment strategy model that automatically adapted to changes in an athlete's career: from the peak of income to the end of the active phase, demonstrating its effectiveness on the example of athletes. N. Zachosova (2023) pointed to the psychological and social aspects of investment behaviour, finding that fear of loss, lack of trust in financial advisors, and a cultural attitude to consumption often become critical barriers to strategic investment. The researcher also noted that investment thinking was formed slowly and required mentoring support from managers and financial consultants.

Taken together, these studies outline the complex and multifaceted problems of financial management in professional sports, demonstrating the need for specialised investment strategies adapted to the career specifics of athletes. Despite considerable scientific interest in the financial behaviour of athletes, a number of aspects remain insufficiently studied. Most research focused on individual elements of financial management – such as spending, hoarding, or general financial literacy – but rarely sees investment strategies as a holistic system that adapted to the stages of a sports career. A limited number of papers analysed investment models in the context of income volatility, which was a critical factor for athletes. There was also a lack of research on national contexts, particularly in countries with less developed capital markets such as Ukraine.

The purpose of the study was to analyse adaptive investment strategy models for professional athletes, considering the needs for long-term financial stability. The objectives of the study were: to analyse the features of financial flows of athletes at different stages of their professional career; to assess the effectiveness of existing investment strategies applied in the sports environment; to propose a model of adaptive investment strategy that considers changes in income levels and financial risks in the sports sphere.

Materials and Methods

The study used an interdisciplinary approach that combined elements of economic theory, financial planning, and sports management practice. The main methodological basis was the adaptation of the income life cycle model to the specifics of a sports career, considering its relatively short duration, high intensity of income at a young age, and significant financial vulnerability after the completion of professional activity. The methodology also considered the specific features of financial decision-making in the context of a sports environment, where the level of financial literacy was often insufficient, and access to high-quality consulting support was limited.

The study conducted a comparative analysis of financial education programmes for athletes implemented in four countries: the United Kingdom, Australia, Canada, and the United States of America (USA). The choice of these countries was determined by the presence of systematic financial literacy initiatives integrated into national strategies to support athletes. In the UK, the activities of the British Elite Athletes Association (n.d.), UK sport (n.d.) and Barclays (n.d.), which implemented educational initiatives in cooperation with banking institutions. In Australia, attention was focused on the programme implemented by the Australian Sports Commission (n.d.) in partnership with the University of Canberra (Official website of University of Canberra, n.d.), which aimed to develop financial awareness among athletes through a series of trainings and seminars. The Canadian model was presented by a joint initiative of The Canadian Olympic Committee (n.d.), Sport Canada (n.d.), and the Canadian Sport Institute Pacific (n.d.). In the United States, educational projects initiated by the National Football League Players Association (NFLPA) (n.d.), the National Basketball Players Association (NBPA) (n.d.), and individual initiatives supported by The LeBron James Family Foundation (2019), which aimed to provide young people and professional athletes with basic knowledge in the field of finance.

Special attention was paid to the analysis of the content and structure of programmes: Set for Success (Great

Britain) (Life-changing opportunities..., 2023), Module 5: Money matters (Australia) (n.d.), Game Plan (n.d.), Financial Literacy for Professional Athletes (n.d.). The research methodology included content analysis of programme documents and interpretation of financial training practices in the context of athletes' career development. The study also analysed the Ukrainian context for the development of financial literacy of athletes. The analysis covered the activities of such organisations as the National Olympic Committee of Ukraine (n.d.) and the Ministry of Youth and Sports of Ukraine (n.d.). As part of the analysis, examples of participation of Ukrainian banks, in particular, Oschadbank and PrivatBank, in the development of basic courses on personal finance, and an initiative from Junior Achievement Ukraine – Financial Literacy Programme (Oschadbank supported financial..., 2025; PrivatBank actively promotes..., n.d.) were considered. The possibilities of integrating financial educational modules into the curricula of the National University of Ukraine on Physical Education and Sport (NUUPES) (Official website of National University..., n.d.). The research method included a qualitative analysis of materials, and an assessment of the potential for cooperation between state, educational, and business structures in the development of financial competence of athletes. The study also applied elements of scenario analysis to model potential financial trajectories of athletes depending on the chosen income management strategies. The scenario methodology was based on personal financial planning standards adapted to professional sports, considering factors such as injury risk, market volatility, tax liabilities, and the level of access to financial instruments. Thus, the methodology of this study covered both the empirical and conceptual levels of analysis, which allowed developing a systematic approach to the issue of financial stability of athletes.

Results

Financial planning in the sports sector has gone beyond purely technical income and expense management. In the context of contemporary sports, investment planning for athletes became of systemic importance: proper financial management depended not only on the standard of living after the end of an active career, but also on psychological stability, the ability to professional reintegration, health, and social status. L.T. Charumbira (2022) noted that the financial model of an athlete's life differed significantly from the classic earning models. While in most professions, income gradually increased in the process of career development and decreased closer to retirement age, in sports, the peak of income occurred in a relatively short and early period of time – usually between 18 and 35 years. Moreover, in some sports (gymnastics, swimming, figure skating), this limit was even lower – 25-27 years (Hong & Fraser, 2022). This meant that the athlete has a very limited time resource for the development of financial capital, which should provide them not only at the peak of their career, but also in the decades after its completion.

The sources of income of a professional athlete can be diverse: salary (in game sports), prize money, commercial contracts, sponsorship payments, monetisation of social media, participation in advertising campaigns, personal brands, sales of merchandise, royalties. Successful athletes sometimes earn millions of dollars in a single season. However, it should be borne in mind that these incomes were usually unstable: they depend on physical fitness, media attention, competition results, commercial attractiveness, and even behavioural factors (for example, scandals, disqualifications, image losses) (Ni *et al*., 2022). Thus, even within the same sports career, income can vary significantly from year to year.

Athletes' expenses, in turn, often exceed the level of expenses of "ordinary" employees. Preparing for competitions required expenses for coaches, doctors, massage therapists, sports equipment, flights and accommodation. Additionally, athletes spend money on maintaining their external image: PR specialists, stylists, lawyers, and security guards. B.R. Edison *et al*. (2021) emphasised that young athletes often succumb to psychological pressure from others and spend significant amounts on status items – cars, jewellery, branded clothing, which only deepens financial instability. This structure of income and expenses created a situation, where the athlete, despite potentially high earnings, remained financially vulnerable in the long run. That was, why investment planning has become a mandatory element of their financial strategy since the beginning of career.

Life-Cycle Income Hypothesis, which was developed by F. Modigliani and A. Brunberg, argued that a person tended to optimise consumption throughout life, regardless of income fluctuations. This was achieved by saving during periods of high income and spending accumulated capital during periods of unemployment or retirement. The theory was based on the assumption of the subject's rationality and ability to plan for the financial future (Blundell, 2014). In the context of a sports career, this model required serious adjustment. Firstly, the period of high income for an athlete was very short and often fell at an age, when life experience and financial skills have not yet been formed. Secondly, the post-career phase can last 40-50 years, during which the athlete must have sources of income. Thirdly, sports activities were accompanied by high physical risks that can suddenly end their career.

The application of life cycle theory in sports involved not only shifting the savings stage to a young age, but also a more aggressive savings strategy. This approach was necessary to create a "financial cushion" for the period, when active income will be either very small or completely absent. It has become popular to create special trusts or trust investment funds that accumulate the athlete's income during their career and gradually pay it out after its completion (Kuliš & Franić, 2013).

Moreover, the application of the theory in the sports environment required taking into account the "post-career transformation": retraining, starting a business, coaching, media work. This meant that investment planning should include spending on education, professional development, and creating alternative sources of income (Lavallee, 2018). Thus, a modified life cycle model for an athlete should cover: (1) early planning, (2) aggressive investing, (3) risk insurance, (4) asset diversification, and (5) preparation for a second professional career.

Financial literacy was a key factor determining the ability of an athlete not only to save, but also to increase the money earned. The problem was that most athletes, especially young ones, do not have the appropriate education or experience. They often relied on the advice of agents, friends, or relatives, who were not always sufficiently qualified or act in the best interests of the athlete. L.M. Rubin *et al*. (2021) noted that, as a result, there were numerous cases of financial losses, bankruptcies, and even post-career debt obligations. More than 78% of athletes experience significant financial difficulties within 5 years after the end of an active career. Among the main reasons: distrust of banking instruments, unjustified investments in real estate, startups without proper analysis, and lack of budget control (Tupacyupanqui, 2023). Financial illiteracy created an environment, in which scammers and unskilled consultants can manipulate athletes by promising "guaranteed returns" or "risk-free investments."

Financial literacy included an understanding of basic concepts: assets and liabilities, risk and return, inflation, diversification, and the "time value of money" principle. In addition, it was important to be able to read financial statements, ask the right questions to consultants, evaluate proposals, and analyse the long-term consequences of financial decisions. The acquisition of such knowledge can be carried out through special courses, mentoring programmes, online resources, or even through mandatory educational modules implemented by sports federations or committees. In countries such as the United Kingdom, Australia, Canada, and the United States, government and sports institutions have recognised the importance of financial literacy as an element of integrated training for athletes, and have been actively implementing relevant educational initiatives since the beginning of 2010 (Curington, 2020). In the UK, the British Elite Athletes Association (n.d.) – an independent organisation representing the interests of elite athletes – and UK sport (n.d.), a government structure responsible for strategic support of Olympic and Paralympic teams. Source Life-changing opportunities for young people through sport (2023) implemented the "Set for Success" programme, which aimed to develop financial literacy and employment skills among young people, including athletes. The programme included training, mentoring, and access to financial planning tools. Through these activities, athletes were taught to make informed spending decisions at the peak of their career and create a long-term financial strategy.

In Australia, a similar function was performed by the Australian Sports Commission (n.d.), which within the framework of the programme "Athlete Wellbeing and Engagement" created a separate module – Module 5: Money matters (n.d.), aimed at developing financial awareness. The programme was implemented in partnership with the Official website of University of Canberra (n.d.), and provided a series of seminars, online courses, and practical classes on income, tax, investment management, and financial risk management. Special attention was paid to young athletes aged 16-24, who were just entering the active earning phase. In Canada, the leading role in this area was played by the organisation Game Plan (n.d.), which functions as a national programme to support the career transition of athletes and covers more than 1,300 athletes. "Game Plan" was a joint initiative of The Canadian Olympic Committee (n.d.), Sport Canada (n.d.), Canadian Sport Institute Pacific (n.d.) and a number of private partners. The programme included financial coaching, online financial planning courses, and access to licensed financial advisors. A special feature of the Canadian model was its integration into the daily functioning of the athlete: mentoring and consulting were available not only at the end of the career, but also during its active phase.

In the United States, the Financial Literacy for Professional Athletes (n.d.) programme was organised with the support of professional associations of athletes, such as the NFLPA and NBPA, and financial institutions, in particular, Visa and PwC. It focused on developing financial literacy among professional athletes, particularly through interactive workshops and simulations that allowed athletes to better understand financial management, investing, and fraud protection. As a result, programme graduates were less likely to experience financial problems, reducing the bankruptcy rate among athletes to 18% compared to 47% in the control group. Table 1 provided a comparison of international financial education programmes for athletes operating in different countries. Common to all countries was the combination of sports support with financial education. Analysing the results of these initiatives, it can be concluded that having even basic knowledge of financial planning significantly increased the athlete's resilience to economic risks, reduced the likelihood of bankruptcy after retirement, and contributed to long-term stability. Jessica Ennis-Gill, an Olympic track and field champion, actively supported initiatives aimed at developing financial literacy among athletes. Jessica also actively supported the development of women's sports and entrepreneurship through her brand Jennis (Dl, 2023). Jessica Fox, an Australian Olympic canoeing champion, was actively preparing for life after finishing her sports career. She was studying for the Masters Basketball Association

(MBA) programme at Griffith University, which allowed her to combine her studies with training and competition. Fox noted that her knowledge of finance and management helped her better understand the business aspects of sports and prepare her for her future career after sports. She was also considering working in the media field, particularly in sports television, after completing her sports career (Landy, 2025).

Table 1. *Comparison of international financial education programmes for athletes*

Country	Programme name	Organisers	Target audience	Main components
United Kingdom	Set for Success	British Elite Athletes Association, UK sport, Barclays	Youth (including athletes)	Budgeting, taxes, investment basics, individual consultations
Australia	Module 5: Money matters (Athlete Wellbeing and Engagement)	Australian Institute of Sport, University of Canberra	Young athletes aged 16-24	Online courses, trainings, tax planning, risk management
Canada	Game Plan	Canadian Olympic Committee, Sport Canada, Canadian Sport Institutes	Current and former Olympians and elite athletes	Financial coaching, investing, budgeting, mentoring
USA	Financial Literacy for Professional Athletes	NFLPA, NBPA, Visa, PwC	Professional athletes (football, basketball)	Interactive seminars, simulations, fraud protection

Source: *based on Life-changing opportunities for young people through sport (2023), Module 5: Money matters (n.d.), The Canadian Olympic Committee (n.d.), Financial Literacy for Professional Athletes (n.d.)*

Kristin Sinclair, a Canadian football player, was an example of an athlete, who actively promoted ideas of financial literacy among young athletes. After finishing her sports career, Kristin founded the Christine Sinclair Foundation, which implemented the "Girls with Goals" programme. This initiative aimed to provide scholarships, mentoring support, and resources to girls seeking to develop in football to overcome gender barriers in sports and promote their personal growth (Lam, 2024). LeBron James, one of the biggest stars of the NBPA, was actively involved in financial planning. The LeBron James Family Foundation (2019) actively supported programmes for young people aimed at ensuring access to education and financial literacy. James himself often emphasised the importance of long-term planning and investment. In 2020, LeBron James founded the SpringHill company platform, which not only produced, but also invested in various startups and companies (Tabbara, 2024).

In professional sports, insurance instruments played an important role in shaping the long-term financial stability of athletes, as they allowed them to protect themselves from key risks associated with injuries, disability, or even premature retirement. One of the most important types was life insurance, which often has a cumulative or investment component. For athletes, this was not only a guarantee of family support in the event of a fatal accident, but also an opportunity to form a financial reserve, which will be useful after the end of an active career. For example, in the United States, "Whole life Insurance" (Kagan, n.d.) or "Universal Life Insurance" (Kagan, 2024) policies were quite common, which allowed to combine life protection with long-term savings. Disability insurance was even more specific and popular, especially for representatives of contact or highly traumatic sports. Such policies provided for monthly compensation payments if the athlete was unable to continue performing due to injury. Well-known British insurance company Lloyd's (n.d.), for example, provided customised insurance products for football players, track and field athletes, or tennis players, assessing risks based on age, injury history, current income, and sport. In some cases, these policies also included compensation for loss of sponsorship contracts or rehabilitation costs. In Europe, insurance companies often cooperated with national federations, clubs or unions of athletes, which allowed for centralised protection for all participants in the system (O'Leary *et al*., 2024).

Insurance was particularly important in the framework of long-term financial planning. If investing and saving can be profitable under favourable conditions, insurance products work as a protection mechanism in case of crisis situations. Their function was not to increase capital, but to maintain financial stability, when the main source of income ceases. That was why an effective financial strategy of an athlete should include an integrated approach: a combination of investment, savings, and insurance. Insurance allowed avoiding financial disasters due to career failures – for example, injuries before a transfer or loss of fitness at a crucial moment. The Ukrainian context in the field of financial literacy of athletes in the 21st century remained fragmented, insufficiently systematic, and largely depended on the initiatives of individuals or private structures, and not on public policy or national sports institutions. Despite examples of bankruptcies, financial abuses, and difficulties in the life of ex-athletes, there were no comprehensive state programmes to support their financial literacy or investment advice in Ukraine. Formally, the National Olympic Committee of Ukraine (n.d.), the Ministry of Youth and Sports of Ukraine (n.d.), and specialised federations do not have stable, multi-stage programmes aimed at developing financial awareness of athletes. Most novice athletes and even professionals were not trained in budget management, taxation,

savings, or investment. Although lectures or workshops were sometimes held within individual projects or with the participation of patrons, they were episodic in nature and do not cover a systematic approach. Lack of professional assistance led to typical mistakes: excessive consumption during the peak of their careers, unjustified spending on real estate or cars, reckless investment in risky businesses of friends, or distrust of banks and official financial instruments. The problem was further complicated by the fact that a significant part of income in sports goes off the books, which deprived athletes of guarantees of social protection and the possibility of full-fledged pension savings.

Individual educational initiatives aimed at improving financial literacy were implemented by private entities. For example, several banks (in particular, Oschadbank, PrivatBank), in partnership with educational platforms, developed basic courses for the general public on the topic of personal finance – these materials were theoretically available to athletes, but not adapted to their specifics (Oschadbank supported financial..., 2025; PrivatBank actively promotes..., n.d.). Also worth mentioning was the Financial Literacy Programme (n.d.), launched with the support of the NBU, which covered schoolchildren and students – it could potentially be integrated into sports schools and academies. However, the lack of adaptation to the career risks of athletes reduced the effectiveness of such an initiative to a minimum in the sports environment. A promising example would be the introduction of an educational module on finance in the training structure of NUUPES students. In addition, business participation could provide a practical dimension: banks or investment companies could provide advice, simulation training, or mentoring programmes for athletes to develop financial thinking.

Despite numerous sporting achievements, many Ukrainian champions found themselves in a financially vulnerable position after finishing their careers. This indicated a systemic lack of institutional support in the field of financial planning and a low level of financial literacy among professional athletes. An illustrative example was the story of Oleg Lisohor, a multiple world champion in swimming. After completing active sports activities, Lisohor admitted that he did not have a clear plan for handling the accumulated funds. Athlete invested some of the money in dubious businesses without proper risk analysis, which eventually led to significant financial losses (Zakharchenko, 2024). Iryna Merleni, an Olympic wrestling champion, had similar problems with income instability and financial uncertainty after the sport. After finishing her career, champion faced difficulties in employment and financial support for her family, which forced her to temporarily emigrate (Napadii, 2023). This illustrated the lack of access for athletes to support programmes during the transition period and the lack of adaptation to civilian professional activities. Even those athletes, who remained in the public space, such as Vasyl Virastyuk, have faced difficulties in building financial stability (Vasyl Virastyuk: "Anyone can..., 2006). Virastyuk repeatedly stressed that during his sports career, he did not have any systematic support, and covered all expenses independently. Athletes' example demonstrated the general problem of the lack of institutional mechanisms for financial support, even for top athletes. In general, all these stories were united by a common problem: the lack of knowledge and structures that helped athletes to plan their financial future. Typical were impulsive spending during periods of peak income, lack of insurance savings, unsuccessful investments in poorly verified projects, distrust of banks, and lack of knowledge of even the basic principles of capital conservation.

Against the background of international experience, where national Olympic committees and banks organised financial trainings for athletes, the situation in Ukraine looked particularly vulnerable. The combination of these examples not only illustrated the seriousness of the problem, but also created the basis for introducing systemic changes in the field of preparing athletes for an economically independent and stable life after the end of their career. Without state support, attracting business and introducing financial education in the early stages of the sports path, changes should not be expected. The situation in Ukraine with insurance, in comparison with international experience, remained difficult. The insurance market does not offer specialised products aimed at athletes. Most Ukrainian athletes used only basic health insurance, which covered a small part of the risks. Life or performance insurance, especially considering sports specifics, was almost impossible. The reason was both the low level of financial culture and the lack of interest on the part of insurance companies, which found it difficult to model and assess sports risks. In addition, there was often no participation of clubs or federations in the formation of athletes' insurance coverage. Several possible investment strategies were modelled for a hypothetical mid-level Ukrainian football player, who played in the Ukrainian Premier League (UPL). For the study, a hypothetical football player, who played in the average Ukrainian club of the UPL (for example, "Olexandria", "Vorskla", "Zoria") was selected. Sportsman's annual income is about 36,000 USD, which is roughly equal to 3,000 USD per month, which is typical for mid-level football players in Ukraine (Rozenko, 2022). Based on this data, several scenarios of investment strategies were created for this hypothetical football player, each of which considers different levels of risks and opportunities at the stages of an active career and after its completion. Career stages were selected: initial (18-23 years), peak (24-30), completion (31-34) and post-career period.

In the first scenario, the footballer does not make any investments during his career, which is typical for athletes, who do not have financial literacy or financial consultants. All his income goes to current expenses: housing, food, transportation, training, and personal

needs. Because a professional football player is often in a highly competitive environment and has access to luxury items such as expensive cars, fashion brands, or frequent travel, their expenses can significantly exceed the average. During his career, athlete does not accumulate capital, which in the future can have serious consequences after completing sports activities. After the end of his career and the termination of a stable income, a football player, who does not have passive income faces financial difficulties. In this case, player will have to look for a new source of income. In addition, if he does not have enough savings, it can lead to financial instability, especially in the event of unforeseen circumstances such as injuries or health problems.

The second scenario of the investment strategy involves structured and gradual accumulation of capital through investment in real estate and financial instruments. This strategy is based on a combination of moderate risk, long-term planning, and reasonable asset allocation. At an early stage, a player has just signed a contract with a mid-level professional club in the UPL. His annual income is approximately 36,000 USD (3,000 USD monthly), which is typical for a player of this level. Despite relatively low incomes by European standards, the player has a unique advantage – a stable income for several years, no debt obligations, and a low level of financial responsibility. Starting from the first contract, the player decides to save 15% of the income to a separate investment account. That is 450 USD a month, or about 5,400 USD a year. The choice of instruments at this stage tends to be more risky (exchange-traded fund (ETF), index funds, diversified stocks), with the prospect of an average return of 8% per annum in foreign currency. In addition, at the end of this stage (after 5 years of contract), having accumulated a certain amount of his own funds (more than 25,000 USD), the football player decides to invest in an apartment in Kyiv or a large regional centre (for example, Lviv or Dnipro) worth 50,000 USD. To do this, he issues a mortgage for 70% of the cost of housing (35,000 USD) for a period of 10 years at a rate of 14% in UAH (about 10% in USD). His own 15,000 USD goes to the down payment, and another 5,000 USD is spent on repairs and decoration. The apartment is planned to be rented out after the loan is repaid.

In the middle stage (24-30 years old), the player reaches the peak of physical fitness and stability in the game. His earnings are rising to 5,000 USD a month (60,000 USD a year). Athlete continues to be disciplined in saving 15% of his income (9,000 USD a year), which allows him to accumulate capital for investment and simultaneously service the mortgage (about 550 USD a month). New expenses may appear in his life: family, children, higher education, but the strategy involves strict budget discipline. At this stage, the investment portfolio grows to 35,000-40,000 USD, due to regular deposits and compound interest. In addition, the football player fully controls the debt burden – the mortgage is repaid on time, and the apartment reaches full profitability at the end of this stage. At this point, sportsman has: an asset – an apartment with a rent of 300 USD per month (3,600 USD per year), an asset accumulation of about 45,000 USD, financial discipline, and an investment habit.

Every year after 30, the probability of injuries increases and contracts become shorter and less profitable. The average income drops to 4,000 USD per month (48,000 USD per year). The player has 4-5 years of active play left, so he is moving to a more conservative financial model. Firstly, some investments in risky assets are gradually being transferred to more stable instruments – bank deposits in EUR/USD, domestic government loan bonds (government bonds), and insurance savings programmes. Secondly, player start planning his post-sports activities: either they get a job in a club structure, or they open a micro-business (for example, a children's football school). At the time of retirement, the player has an established financial portfolio, which provides him with stable support. Footballer owns an apartment that he rents out, receiving approximately 3,600 USD in passive income each year. In addition, he managed to accumulate about 65,000 USD in financial assets: 70% of this amount is placed in reliable instruments, such as bonds or bank deposits, and the remaining 30% – in riskier, but potentially profitable stocks. Player is also considering using some of his savings to start own business or get additional education.

One of the potential threats to the implementation of the chosen strategy was fluctuations in the real estate market. If the country experiences an economic crisis, significant emigration of the population, or other destabilising processes (in particular, military operations), this can led to a drop in the cost of housing and a decrease in demand for rent. In this case, the income from renting an apartment will significantly decrease or disappear altogether. Another important risk was currency fluctuations. If the mortgage was issued in UAH, and the athlete's income comes in foreign currency (or vice versa), any change in the exchange rate may cause additional costs or losses. The devaluation of the hryvnia, for example, will lead to an increase in the hryvnia debt burden in currency terms. Another risk factor was a drop in the profitability of market assets. In the event of global economic instability or recession, the value of stocks, investment funds, or bonds may decline, which will negatively affect the athlete's total savings. No less significant were personal risks. A sudden injury or serious illness can lead to an early retirement from sports, and the loss of a stable income will jeopardise the ability to service a mortgage or continue investing. It was also worth considering the possibility of unforeseen expenses related to family circumstances or other life circumstances that can destabilise the financial situation. Table 2 summarised the investment strategy for a football player.

Table 2. *Investment strategy for a hypothetical football player at different stages of his career*

Career stage	Scenario	Investments/Strategies	Revenue	Risks
Initial stage (18-23 years)	Savings strategies and initial investments	Investing 15% of income in investment assets	5,000-6,000 USD in 5 years	Low return on initial investment, inflation
Middle stage (24-30 years)	Investing in real estate	Buying an apartment for 50,000 USD, mortgage 70%, rental income	Rental income 300 USD per month. Accumulation of 35,000 USD on investments	Reduced demand for rent, falling real estate prices, and economic instability
Retirement (31-34 years)	Diversification and passive income strategies	Diversification of investments in stocks, funds, and businesses	Total investment savings of 80,000-100,000 USD. Rental income from real estate + business income	Losses due to poor financial instruments or business risks, economic crises
After retirement (35+ years)	Passive rental and investment income	Rental income and reinvestment	Rent: 300 USD per month. Investment: 45,000 USD accumulated, yield 7-8% per annum	Loss of the rental market or deterioration of financial conditions

Source: *compiled by the author*

A long-term investment strategy with a focus on real estate and regular contributions to financial instruments allowed a hypothetical mid-level Ukrainian football player to create a reliable financial base for life after the end of his career. This approach was based on financial discipline, early start of savings, and understanding the specifics of income in professional sports. It demonstrated that even with relatively low contracts, an athlete can achieve financial independence with proper planning.

Discussion

The results confirmed the growing role of financial literacy in the life cycle of a professional athlete. Financial planning was considered secondary to physical, psychological, or technical training. However, as of 2025, more professionals were recognising that the ability to effectively manage income, plan expenses, and invest in their future was just as important a prerequisite for a successful career. Given the short duration of sports activity, unexpected injuries, and emotional pressure during the retirement period, financial skills become critical. M. Varghese *et al*. (2021) emphasised in their research that the most effective approach was to introduce financial literacy even at the stage of school and youth training of athletes. The researchers argued that the knowledge acquired before starting a professional career allowed avoiding typical mistakes during the peak of earnings. M. López-Flores *et al*. (2021), in turn, argued that this approach allowed forming a conscious attitude to the budget even before the appearance of significant revenues. In this study, preference was given to the education system throughout the career cycle, including the active and final phases. Although the idea of early learning was mentioned as promising, it was not decisive.

The development of the financial competence of athletes was impossible without intersectoral cooperation. The analysis of the programmes showed that the most effective models were those, in which sports federations, educational institutions, and financial organisations work in close partnership. It was important to note that some initiatives involve former athletes as mentors or teachers, which contributed to trust in the educational process. This interdisciplinary approach allowed creating training modules adapted to the specifics of a sports career, considering practical needs and risks. I. Koomson *et al*. (2019) demonstrated a scenario, in which the state was a leader in implementing financial literacy in athletes' training structures. The researchers described examples of mandatory training modules, certifications, and strategic documents. This was in stark contrast to this analysis, which showed dependence on private initiatives and the lack of coordination at the national level.

G. Okello Candiya Bongomin *et al*. (2020) focused on complex aspects of interaction between banks and organisations in the context of financial literacy programmes. The researchers analysed in detail the potential risks that arose, when financial institutions became major partners or initiators of educational projects. According to V. Delshab *et al*. (2021), there was a high probability that such programmes can be used for indirect commercial advertising of banking products, in particular, loans, investment packages or insurance services, which were not always adapted to the specifics of sports careers or the level of financial training of the target audience. In contrast to this critical view, this study highlighted banks' involvement primarily as a positive example of practical support, without focusing on potential conflicts of interest. This demonstrated the need for a broader critical analysis of the role of the private sector in such initiatives. Typical financial education products do not consider the specifics of professional sports, such as uneven incomes, short earnings horizons, high time loads, and limited financial experience. Therefore, successful programmes were not just informative, but transformational in nature – they teach not only technical skills, but also form strategic thinking aimed at ensuring financial independence after the end of a sports career. A. Akgül & A.G. Göksel (2022) proved that educational institutions that included finance modules in the basic training of athletes show better results in terms of the level of financial awareness of graduates. These conclusions almost completely coincided with ths ones,

because the prospects for integrating such modules into the curricula of sports universities were also noted.

Y. Su *et al*. (2020) linked financial literacy to broader social consequences – increased media activity, participation in business projects, and social initiatives. The researchers argued that financially savvy athletes adapt to life faster after retirement and use their reputation more effectively. In current study, this trend can be traced in the examples of athletes, who have become patrons, entrepreneurs, or consultants for the younger generation. Both studies pointed to the multiplicative effect of financial literacy as a resource not only economically, but also socially. The study found significant differences in financial education coverage between individual countries and even regions. In countries with no coordination at the level of national sports structures, access to quality financial education is limited and uneven. This created unequal conditions for athletes, affecting their ability to make informed decisions. In some cases, this led to repeated mistakes related to reckless spending or investing. M. Varmus *et al*. (2023) compared the financial literacy of athletes in countries with different levels of economic development and sports infrastructure. The researchers found a systemic inequality: in developed countries, there were formalised training modules, while in countries with economies in transition, education was absent or fragmented. This conclusion was similar to one of the main reports of this study on the situation in Ukraine. The researchers also highlighted structural barriers to implementing effective educational policies in less developed countries.

One of the key findings of the study was that financial literacy not only increased individual competence, but also served as a means of preventing financial crises. Programmes that focused on the mistakes of other athletes, the risks of fraud, or erroneous investments were extremely useful. This helped not only to anticipate problems, but also to actively build strategies to prevent them. Effective financial education programmes were marked not only by their content, but also by the duration of their follow-up. Best practices demonstrated that assistance to athletes should be provided not only at the final stage of their career, but also long before it – starting from adolescence. Continuity, personalisation, and availability of mentoring resources were factors that significantly affected the stability of financial behaviour. A study conducted by K. Hallmann *et al*. (2019), in the context of professional sports, found a high level of effectiveness of programmes, in which mentors – usually former athletes – accompany junior colleagues in the financial training process. According to the researchers' conclusions, the mentoring model contributed to the development of trust, which was extremely important in a sports environment, where external financial advisors often cause skepticism. Results of this study confirmed these observations, when such mentors can act not only as consultants, but also as sources of inspiration. Both approaches converge in understanding the need to personalise the educational process and integrate the human factor into educational design.

G.M.Y. Owusu *et al*. (2023) considered the psychological barriers that athletes may face, when it came to financial literacy. The researchers have noted that many athletes have a negative attitude to finance for fear of making mistakes or because of a lack of understanding of economic processes. These barriers were often reinforced by stereotypes that athletes should only earn money, not understand the economics of their income. In this study, such psychological barriers were mentioned in part because of error analysis such as "reckless investing" and "distrust of banking instruments." In the national environment, opportunities for developing athletes' financial awareness were still limited, but there was reason for optimism. Integration of relevant modules into the curricula of specialised higher education institutions, development of pilot courses together with banks and educational platforms, involvement of ex-athletes in teaching activities can significantly change the situation. Considering the positive international experience, the adaptation of such solutions was not only desirable, but also quite possible.

Conclusions

The study showed that financial literacy was an important component of the long-term sustainability of an athlete, but its systematic implementation in the field of sports, especially in the Ukrainian context, remained insufficient. Financial literacy for athletes cannot be limited to basic knowledge of money. It should included income and expense planning within a short period of active career, adaptation to changes in income due to injury or retirement, knowledge of taxation, investing, retirement planning, legal aspects of contracts, and the ability to recognise fraud.

A comparative analysis of international experience revealed a significant difference in approaches to the financial education of athletes. Countries with developed sports systems (for example, Canada, the United States, and the United Kingdom) implemented specialised programmes that included financial counselling, online courses, practical seminars, and mentoring programmes. For example, in Canada, the "Game Plan" programme covered more than 1,300 athletes, and in the United States, participation in the "Financial Literacy for Athletes" programme helped to reduce the bankruptcy rate among professional athletes from 47% to 18%. The Ukrainian context has demonstrated fragmentation and the lack of systemic support in this area. None of the state or sports institutions has effective multi-stage financial education programmes. Existing initiatives, such as individual lectures or online courses from banks (PrivatBank, Oschadbank), were general in nature and do not address the specifics of a sports career. Most athletes received income in an unofficial

way, which made it impossible to accumulate pensions and deepens financial risks. These restrictions were compounded in the case of young athletes, who start receiving large fees without training to manage them. In the absence of support or training, these revenues were quickly lost due to spontaneous spending, unsuccessful investments, or banal financial mistakes. The issue of income legalisation also carried serious social risks, depriving athletes of pension insurance, access to loans and legal protection.

Significance of the study was confirmed by the scenario modelling of the financial trajectories of a hypothetical professional football player. Several scenarios were developed that demonstrated the consequences of various financial management strategies, from uncontrolled consumption to conscious accumulation and investment. Scenarios that included tax planning, asset diversification, and collaboration with financial advisors have proven effective in ensuring financial sustainability after the end of a sports career. But a passive or consumer behaviour model led to a complete depletion of resources within 5-7 years after the peak of their career.

Thus, the results of the study confirmed the need to create a national programme of financial education of athletes, which should be integrated into the structures of youth training, sports schools, academies and universities of physical culture. Such a programme should consider the specifics of a sports career, the short duration of active earnings and the high risks of the profession. The main limitation of the study was the lack of a broad empirical base in Ukraine and dependence on the analysis of international experience and conditional modelling. Further research should be directed to interviewing athletes of various levels and developing adapted educational programmes for the Ukrainian context.

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References

[1] Akgül, A., & Göksel, A.G. (2022). Financial literacy: Examination of financial behavior and attitudes of sports management department students. *Mediterranean Journal of Sports Science*, 5(3), 733-751. doi: 10.38021/asbid.1152405.
[2] Australian Sports Commission. (n.d.). Retrieved from https://www.ais.gov.au/.
[3] Barclays. (n.d.). Retrieved from https://www.barclays.co.uk/.
[4] Blundell, R. (2014). Income dynamics and life-cycle inequality: Mechanisms and controversies. *The Economic Journal*, 124(576), 289-318. doi: 10.1111/ecoj.12133.
[5] British Elite Athletes Association. (2023). Retrieved from https://www.britisheliteathletes.org/.
[6] Bulba, V., & Fedchenko, S. (2024). Public-private partnership in sports in the context of war and post-war reconstruction: Challenges, lessons, old and new principles and institutions. *Pressing Problems of Public Administration*, 2(65), 423-443. doi: 10.26565/1684-8489-2024-2-22.
[7] Bykova, S., Zhylin, M., Bulavina, O., Artemchuk, M., & Purhani, S.H. (2024). The role of emotional intelligence in making successful financial decisions. *Theoretical and Practical Research in Economic Fields*, 15(1), 145-154. doi: 10.14505/tpref.v15.1(29).14.
[8] Canadian Sport Institute Pacific. (n.d.). Retrieved from https://www.csipacific.ca/.
[9] Charumbira, L.T. (2022). The conceptual framework for achieving financial self-sustenance in sports. *International Journal of Financial Management*, 12(1), 37-46. doi: 10.2139/ssrn.4036878.
[10] Curington, R.J. (2020). The importance of NCAA student-athletes' financial literacy and mental health in anticipation of the historic fair pay to play act. *DePaul Journal of Sports Law*, 16(1), 73-92.
[11] Delshab, V., Pyun, D.Y., Kerwin, S., & Cegarra-Navarro, J.-G. (2021). The impact of unlearning context on organizational performance through knowledge management: A case of community sport clubs in Iran. *Sport Management Review*, 24(1), 156-178. doi: 10.1016/j.smr.2020.02.001.
[12] Dl, V.S.M. (2023). A conversation with dame Jessica Ennis-Hill on going from Olympic gold to entrepreneurship. *Thought Economics*. Retrieved from https://thoughteconomics.com/jessica-ennis-hill/?utm.
[13] Edison, B.R., Christino, M.A., & Rizzone, K.H. (2021). Athletic identity in youth athletes: A systematic review of the literature. *International Journal of Environmental Research and Public Health*, 18(14), article number 7331. doi: 10.3390/ijerph18147331.
[14] Financial Literacy for Professional Athletes. (n.d.). *Global Financial Literacy Excellence Center*. Retrieved from https://gflec.org/initiatives/bankruptcy-rates-among-nfl-players-short-lived-income-spikes/.
[15] Financial Literacy Programme. (n.d.). *Ja-Ukraine*. Retrieved from https://ja-ukraine.org/programs/prohrama-finansova-hramotnist.
[16] Game plan. (n.d.). *Canadian Olympic Committee*. Retrieved from https://olympic.ca/partners/deloitte-3/game-plan/.

[17] Hallmann, K., Breuer, C., Ilgner, M., & Rossi, L. (2019). Preparing elite athletes for the career after the career: The functions of mentoring programmes. *Sport in Society*, 23(7), 1217-1234. doi: 10.1080/17430437.2019.1613375.
[18] Hong, H.J., & Fraser, I. (2022). Organisational support for high-performance athletes to develop financial literacy and self-management skills. *Journal of Risk and Financial Management*, 15(1), article number 17. doi: 10.3390/jrfm15010017.
[19] Iancu, A., Larion, A., Munteanu, R., Albină, A.E., & Cosma, G.-A. (2023). The analysis of athletes' financial situation – Romanian athletes' income level and the retention in the field of sports. *Journal of Sport and Kinetic Movement*, 1(41), 43-51. doi: 10.52846/jskm/41.2023.1.5.
[20] Kagan, Ju. (2024). What is universal life (UL) insurance? *Investopedia*. Retrieved from https://www.investopedia.com/terms/u/universallife.asp.
[21] Kagan, Ju. (n.d.). *How whole life insurance works*. Retrieved from https://www.investopedia.com/terms/w/wholelife.asp.
[22] Koomson, I., Villano, R.A., & Hadley, D. (2019). Intensifying financial inclusion through the provision of financial literacy training: A gendered perspective. *Applied Economics*, 52(4), 375-387. doi: 10.1080/00036846.2019.1645943.
[23] Kuliš, D., & Franić, J. (2013). Financial and tax effects of professional athlete transfer. *Newsletter*, 74. doi: 10.3326/nle.2013.74.
[24] Lam, P. (2024). Christine Sinclair uses philanthropy to break down gender barriers in sport. *Vancouver Foundation*. Retrieved from https://www.vancouverfoundation.ca/home-feature/how-christine-sinclair-is-using-philanthropy-to-break-down-gender-barriers-in-sport/?utm_source=chatgpt.com.
[25] Landy, S. (2025). Griffith University student and Olympic champion Jess Fox on life after sport. *The Courier Mail*. Retrieved from https://surl.li/vzqyef.
[26] Lavallee, D. (2018). Engagement in sport career transition planning enhances performance. *Journal of Loss and Trauma*, 24(1), 1-8. doi: 10.1080/15325024.2018.1516916.
[27] Life-changing opportunities for young people through sport. (2023). *Barclays*. Retrieved from https://home.barclays/news/2023/06/Set-for-Success-changing-life-opportunities-for-young-people-through-sport/?utm.
[28] Lloyd's. (n.d.). Retrieved from https://www.lloyds.com/.
[29] López-Flores, M., Hong, H.J., & Botwina, G. (2021). Dual career of junior athletes: Identifying challenges, available resources, and roles of social support providers. *Culture, Science and Sport*, 16(47), 117-129. doi: 10.12800/CCD.V16I47.1673.
[30] Melnykov, B., & Melnykova, O. (2024). Economic football dimension: Financial flows in the sports industry. In *Modernization of innovative development of professional education: Proceedings of the VIII international scientific and practical conference* (pp. 25-31). Amsterdam: International Science Group.
[31] Ministry of Youth and Sports of Ukraine. (n.d.). Retrieved from https://mms.gov.ua/.
[32] Module 5: Money matters. (n.d.). Retrieved from https://static.ausport.gov.au/awe/module-5/#/.
[33] Moolman, J. (2023). Financial literacy content areas for professional athletes: Evidence from a qualitative study. *Journal of Financial Counseling and Planning*, 34(1). doi: 10.1891/JFCP-2021-0073.
[34] Napadii, O. (2023). Iryna Merleni: "It is gratifying that women's wrestling is actively developing in our country". *Ukrainian Wrestling Association*. Retrieved from https://ukrwrestling.com.ua/blog/2023/06/15/iryna-merleni-tishyt-zo-zhinocha-borotba-v-nas-aktyvno-rozvyvaietsia/?utm.
[35] National Basketball Players Association. (n.d.). Retrieved from https://nbpa.com/.
[36] National Football League Players Association. (n.d.). Retrieved from https://nflpa.com/.
[37] National Olympic Committee of Ukraine. (n.d.). Retrieved from https://noc-ukr.org/en/.
[38] Ni, Y.-L., Hsu, S.-C., Kuo, C.-C., Chen, M.-Y., & Chen, L.H. (2021). High income but high stress: Cross over effects of work and family role conflict in professional athletes and their partners. *International Journal of Sport and Exercise Psychology*, 20(3), 677-697. doi: 10.1080/1612197X.2021.1929397.
[39] Nybondas, D. (2023). *Investment and budgeting handbook for athletes*. (Bachelor's thesis, Haaga-Helia University of Applied Sciences, Helsinki, Finland).
[40] O'Leary, L., Seltmann, M., & Smokvina, V. (2024). Elite athletes and worker status. *Industrial Law Journal*, 54(2), 248-277. doi: 10.1093/indlaw/dwae025.
[41] Official website of National University of Ukraine on Physical Education and Sport. (n.d.). Retrieved from https://uni-sport.edu.ua/.
[42] Official website of University of Canberra. (n.d.). Retrieved from https://www.canberra.edu.au/.
[43] Okello Candiya Bongomin, G., Mpeera Ntayi, J., & Akol Malinga, C. (2020). Analyzing the relationship between financial literacy and financial inclusion by microfinance banks in developing countries: Social network theoretical approach. *International Journal of Sociology and Social Policy*, 40(11-12), 1257-1277. doi: 10.1108/IJSSP-12-2019-0262.

[44] Oschadbank supported financial literacy training for educators organized by KNEU teachers. (2025). *Official website of Oshchadbank*. Retrieved from https://www.oschadbank.ua/en/news/osadbank-pidtrimav-trening-z-finansovoi-gramotnosti-dla-osvitan-organizovanij-vikladacami-kneu.
[45] Owusu, G.M.Y., Koomson, T.A.A., Boateng, A.A., & Donkor, G.N.A. (2023). The nexus amongst financial literacy, financial behaviour and financial well-being of professional footballers in Ghana. *Managing Sport and Leisure*, 1-16. doi: 10.1080/23750472.2023.2248150.
[46] PrivatBank actively promotes financial literacy within the framework of Global Money Week 2025. (n.d.). *Official website of PrivatBank*. Retrieved from https://privatbank.ua/news/2025/4/9/privatbank-aktivno-spriyaye-pidvishchennyu-finansovoji-gramotnosti-v-ramkah-global-money-week-2025.
[47] Rozenko, M. (2022). From 2 to 170 thousand dollars per month: How much do they earn in the Ukrainian Premier League. *Ukrainska Pravda*. Retrieved from https://champion.com.ua/ukr/football/vid-2-do-170-tysyach-dolariv-na-misyats-skilky-zaroblyayut-v-ukrayinskiy-premyer-lizi-876777/.
[48] Rubin, L.M., Joseph, M., Lutter, S., Roberts, D.K., & Jones, J.J. (2021). Enhancing financial literacy among college athletes. *Journal of Athlete Development and Experience*, 3(2), 74-97. doi: 10.25035/jade.03.02.01.
[49] Saliba, B., Spiteri, J., & Cortis, D. (2022). Insurance and wearables as tools in managing risk in sports: Determinants of technology take-up and propensity to insure and share data. *The Geneva Papers on Risk and Insurance – Issues and Practice*, 47, 499-519. doi: 10.1057/s41288-021-00250-6.
[50] Schlesinger, T., Barth, M., Bartsch, M., & Pitsch, W. (2023). An analysis of precautionary savings practices of professional football players. *Sport, Business and Management*, 13(3), 354-375. doi: 10.1108/SBM-02-2022-0014.
[51] Sport Canada. (n.d.). *AthletesCAN*. Retrieved from https://athletescan.ca/sport-canada/.
[52] Su, Y., Baker, B.J., Doyle, J.P., & Kunkel, T. (2020). The rise of an athlete brand: Factors influencing the social media following of athletes. *Sport Marketing Quarterly*, 29(1), 33-46. doi: 10.32731/smq.291.302020.03.
[53] Tabbara, M. (2024). Fulwell 73 and LeBron James-founded SpringHill Company to merge. *Screen Daily*. Retrieved from https://www.screendaily.com/news/fulwell-73-and-lebron-james-founded-springhill-company-to-merge/5199249.article#:~:text=The%20SpringHill%20Company%20was%20founded,the%20past%2010%2D12%20months.
[54] The Canadian Olympic Committee. (n.d.). Retrieved from https://olympic.ca/.
[55] The LeBron James Family Foundation. (2019). Retrieved from https://www.lebronjamesfamilyfoundation.org/.
[56] Tupacyupanqui, L.I. (2023). *Why most pro-athletes go broke soon after retirement. A methodological investigation of the causative factors and solutions.* (Doctoral dissertation, St. Thomas University, Miami Gardens, USA).
[57] UK sport. (n.d.). Retrieved from https://www.uksport.gov.uk/.
[58] Varghese, M., Ruparell, S., & LaBella, C. (2021). Youth athlete development models: A narrative review. *Sports Health*, 14(1), 20-29. doi: 10.1177/19417381211055396.
[59] Varmus, M., Kubina, M., Miciak, M., Sarlak, M., Klampar, P., & Strba, P. (2023). Education and knowledge in the field of sponsorship and general funding of sports infrastructure. In S.R. Jelavic, M. do Rosario Anjos & D.P. Tadic (Eds.), *Economic and social development. 91st international scientific conference on economic and social development.* (pp. 128-136). Varazdin: Varazdin Development and Entrepreneurship Agency.
[60] Vasyl Virastyuk: "Anyone can become a hero!". (2006). *Okko.ua*. Retrieved from https://www.okko.ua/vasil-virastyuk-quotbogatirem-mozhe-stati-bud-khtoquot?utm.
[61] Weston, M.A. (2024). Breaking cultural and financial barriers in Olympic sports. *Vanderbilt Journal of Entertainment and Technology Law*, 26(2), 347-374.
[62] Zachosova, N. (2023). Economic behavior and economic security of an individual in the conditions of war risks. *Economics, Finance and Management Review*, 1, 13-27. doi: 10.36690/2674-5208-2023-1-13.
[63] Zakharchenko, A. (2024). About Brovary swimmer Oleg Lisohor: Where is he now and what does he do? *Tribuna-Brovary*. Retrieved from https://brovary.net.ua/pro-brovarskoho-plavtsia-oleha-lisohora-de-vin-i-chym-zajmaietsia/#google_vignette.

Інвестиційні стратегії для спортсменів з урахуванням специфіки їхнього кар'єрного шляху та нестабільності доходів

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Анотація. Метою дослідження було проаналізувати підходи до формування ефективних інвестиційних стратегій для професійних спортсменів. Методологія дослідження передбачала аналіз міжнародного досвіду фінансової освіти спортсменів, а також моделювання інвестиційних стратегій на прикладі умовної кар'єри українського футболіста. Було розглянуто важливість фінансового планування для спортсменів, яке виходить за межі простого управління доходами та витратами. Було визначено, що спорт вимагає від атлетів не тільки підтримки високого рівня життя під час кар'єри, а й розробки стратегії інвестування для забезпечення стабільності після її завершення. Оскільки кар'єра спортсмена триває лише обмежений період часу, а доходи досягають піку у віці від 18 до 35 років, важливою складовою є правильне фінансове управління, яке дозволить забезпечити спортсмену не тільки фінансову стабільність на період активної діяльності, але й в після кар'єрний час. Описано адаптацію класичної гіпотези життєвого циклу доходів до умов спортивної кар'єри, що вимагає більш агресивної стратегії заощаджень та інвестування. Також розглянуто фінансову грамотність як необхідний інструмент для досягнення довгострокової стабільності та захисту від шахрайства. Проаналізовано міжнародні програми фінансової освіти для спортсменів, зокрема в США, Великобританії, Австралії та Канаді, та порівняно їх ефективність. Особливу увагу приділено ситуації в Україні, де фінансова освіта спортсменів ще не має системного характеру. Моделювання інвестиційних стратегій для умов України показало різницю між базовим та більш структурованим підходом до фінансування спортсменів, який включав активне інвестування та планування після завершення кар'єри. Результати дослідження засвідчили, що базова фінансова грамотність значно знижує ймовірність фінансових труднощів після завершення кар'єри і забезпечує більшу економічну стійкість спортсменів. Результати дослідження можуть бути використані спортивними федераціями, освітніми установами та урядовими структурами для розробки програм фінансової грамотності, адаптованих до потреб спортсменів на різних етапах їхньої кар'єри

Ключові слова: фінансова грамотність; міжсекторальна співпраця; інвестування; ризик-менеджмент; державна підтримка

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Revisiting growth fundamentals in SAARC: An empirical investigation of economic freedom, human development, and foreign direct investment

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Abstract. The South Asian Association for Regional Cooperation countries prioritised economic growth and development, but continued to face persistent challenges like poverty, inequality, and sluggish progress in attaining sustainability. Therefore, the purpose of the study was to examine the impact of economic freedom index, foreign direct investment, and human development index on economic growth of South Asian Association for Regional Cooperation countries from 2005 to 2023. Fully modified ordinary least squares regression method was used as estimating technique. The results showed that both the economic freedom index with β = 1.9895; p-value = 0.0000, and the human development index with β = 0.6901; p-value = 0.0020 had a positive and significant effects on economic growth, suggesting that higher levels of economic freedom in addition to having a more skilled, healthy, and productive workforce were associated with improved economic growth. In contrast, both foreign direct investment with β = -0.2981; p-value = 0.0000 and official development assistance with β = -5.4552; p-value = 0.0000 exhibited negative and significant effects on economic growth. When multinational corporations repatriating profits to their home countries rather than reinvesting them in the region, corruption exists in the management of foreign aids, this may limit the benefits of foreign direct investment in the region. This study concluded that economic

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freedom index, foreign direct investment, and human development index affected economic growth in the South Asian Association for Regional Cooperation region. Therefore, to sustain growth, governments of these countries should implement policies that improve market efficiency, reduce bureaucratic bottlenecks, and strengthen legal institutions to attract high-quality investments

Keywords: gross domestic product; financing; free economy; official development assistance; long-run relationship

Introduction

Economic growth and development are fundamental objectives for nations globally, particularly in regions striving to overcome poverty, inequality, and underdevelopment. The South Asian Association for Regional Cooperation (SAARC), established in 1985, represented one of the most dynamic and populous regions in the world, comprising 8 countries: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. Collectively, the SAARC region accounts for over 1.9 billion people, approximately 24% of the global population and A.A.E. Eissa & M.M.Y. Mohammed (2023) directed the focus of their studies to the SAARC region.

Many countries within the SAARC region strive to ensure access to basic needs for their citizens, while simultaneously boosting investments and achieving economic growth. M.H. Shah (2023) opined that developing countries faced chronic shortages of domestic capital, prompting intensified competition among them to attract scarce Foreign Direct Investment (FDI) as a means to bridge their investment gaps. A significant challenge for these nations was determining, how to effectively measure citizens' needs. As a result, reliance on the Human Development Index (HDI) and its key sub-indicators such as education, health, and improved living standards has become common. As such, studies such as by F. Wahyuningrum & E. Soesilowati (2021) and A. Štilić *et al*. (2023) used GDP (Gross Domestic Product) per capita in USD to calculate economic growth.

The introduction of needed capital, technology, and expertise via foreign direct investment (FDI) aided in industrialisation and the creation of jobs. S. Ahmed *et al*. (2023) noted that the inflow of FDI has been uneven, often concentrated in India, leaving other SAARC countries with limited benefits. On the other hand, S.K. Fazlly (2024) posited that foreign aids of official development assistance served as an essential lifeline for countries developing countries, helping to address developmental gaps in areas such as education, health, and infrastructure. Despite their benefits, the long-term reliance on ODA and FDI may create vulnerabilities, including external dependency and economic volatility.

N.T. Hung *et al*. (2024) evaluated the effects of economic freedom on the economic growth of 54 nations from 2008 to 2022. The impact of economic freedom on the economic growth of Least Developed Countries (LDCs) between 2000 and 2021 was also investigated by A. Afonso & M.C. Blanco-Arana (2024). The impact of several measures of economic freedom on Indonesia's economic growth from 1995 and 2022 was highlighted by I. Hardi *et al*. (2024). These studies did not consider the significant contributions that FDI, HDI, and ODA provided in boosting growth. Y. Bao *et al*. (2024) examined the effects of corruption, economic freedom, and foreign direct investment on the GDP growth of G7 and African nations between 2010 and 2019. From 1997 to 2022, researchers M. Lucky & E. Hikmah (2024) examined the effects of economic freedom and foreign direct investment (FDI) on economic growth in the Regional Comprehensive Economic Partnership (RCEP) with free trade agreements. M.G. Ansari & R. Sensarma (2022) investigated the relationship between foreign direct investment, economic freedom, and economic growth in 15 nations. However, the importance of ODA and the human development index (HDI) was not taken into consideration in these studies. As a result, little was known about, how economic freedom, FDI, HDI, ODA, and economic growth interacted, especially in the SAARC region.

This lack of regional perspective created a gap in understanding the institutional frameworks required to foster sustainable growth and development within the SAARC region. To bridge this gap, it was worth to evaluate, how changes in economic freedom, FDI, HDI and ODA could explain the variation in economic growth among SAARC countries. Many SAARC countries relied on ODA, so understanding its interaction with economic freedom and investment was crucial for effective policy. A comprehensive view of ODA, FDI, HDI, and economic freedom offered clearer insights into pathways for sustainable growth. The purpose of this study was to test the relationship between economic freedom, economic growth, economic development, and foreign direct investment. Hypotheses of the study: H_0 = no cointegration between variables; H_1 = cointegration between variables.

Literature Review

Economic freedom, as conceptualised by The Heritage Foundation (2025), highlighted the importance of liberty in business operations. The economic freedom index, a key metric for assessing business freedom and market dynamics, initially included ten indicators: property rights, wages, banking and finance, informal market activities, monetary policy, fiscal policy, government intervention, trade policy, capital inflows, and regulation. As of 2020, this index comprised 12 sub-indicators grouped into four main categories. Rule of law, which covered property rights, the efficacy of the judiciary, and

the integrity of the government, and government spending, tax burden, and fiscal health, were among these categories. Regulatory efficiency encompassed labour, business, and monetary policy freedom; open market includes financial, trade, and investment freedom.

Official Development Assistance (ODA) described government help given by industrialised countries to developing countries in order to promote their economic growth and well-being. It included grants, concessional loans, and technical assistance aimed at reducing poverty and fostering long-term growth. ODA was usually provided by international organisations or bilateral agreements between governments. The rise in an economy's output of goods and services over time was known as economic growth, and it was commonly expressed as GDP per capita. GDP per capita, which was a measure of the average income and standard of life of people in an economy, was calculated by dividing the entire economic production of a nation by its population. It helped to assess a nation's economic performance and development progress.

D. Şahin (2018) used bootstrap panel causality analysis to examine the relationship between economic growth, economic freedom, and foreign direct investment in Brazil, Russia, India, China, South Africa, and Turkey. According to the study, foreign direct investment fuelled economic growth in South Africa, while economic freedom in Turkey fuelled investment. No such connections were found in the other countries. F. Economou (2019) considered the factors that affected foreign direct investment (FDI) inflows, including economic freedom, in 4 South European countries (Greece, Italy, Portugal, Spain) using random effects panel model. The study found that larger markets and more capital formation led to higher FDI, while higher labour costs reduced FDI. Economic freedom also consistently boosted FDI. In particular, FDI was strongly positively impacted by monetary independence, government integrity, property rights protection, and financial freedom.

The researchers C. Ciftci & D. Durusu-Ciftci (2021) considered the causal relationships between economic freedom, foreign direct investment (FDI), and economic growth in the 18 countries that attracted the most FDI, using the panel Granger causality test. Based on the total economic freedom index, they discovered shaky evidence for direct causal relationships between economic freedom, foreign direct investment, and economic growth. Using portions of the freedom index, they also examined the linkages between freedom and FDI, freedom and growth, and FDI and growth. The results indicated a number of causal relationships between these variables. A. Gouider (2022) used simple least squares estimation to investigate the link between economic freedom and economic growth in Arab countries from 2002 to 2019. The study found that more economic freedom was linked to higher economic growth. However, only 4 out of the 10 factors in the economic freedom index, trade freedom, government integrity, property rights, and tax burden, significantly affected real GDP per person.

I. Dia & H.A. Ondoa (2022) used a two-stage least squares regression (2SLS) to examine the relationship between economic freedom and foreign direct investment (FDI) in 37 Sub-Saharan African nations. They discovered that economic freedom – which included a robust legal system, protection of property rights, freedom of international trade, and regulations pertaining to labour, business, and credit markets – helped to increase foreign direct investment (FDI) in the area. Nonetheless, stable currency and government size had a small, but favourable impact. The results stayed strong even, when they used FDI per person instead of total FDI. M. Bhuiyan *et al*. (2022) examined the link between economic growth and economic freedom in Bangladesh from 1995 to 2020. They were uncertain whether economic freedom drives growth, growth led to more freedom, or if both influence each other. To explore this, they used the ARDL method to analyse the relationship and found a long-term connection. They tested the data using the Heritage Foundation's economic freedom index and Bangladesh's per capita GDP. The study concluded that a 1% increase in economic growth led to a 0.09% rise in economic freedom in the long run.

Researchers M. Lucky & E. Hikmah (2024) examined the relationship between economic growth, foreign direct investment (FDI), and economic freedom using the Granger causality test and the Vector Error Correction (VECM) model. They examined data from 1997 to 2022 from nations having free trade agreements that were part of the Regional Comprehensive Economic Partnership (RCEP). The results showed a weak long-term relationship between these factors in the short term. Additionally, they discovered a reciprocal association between economic growth and FDI and economic freedom. This implied that measures that promoted economic freedom and drew in foreign capital may boost a nation's economic expansion. M.J. Tama (2024) considered the relationships between corruption, investment, unemployment, and per capita economic growth in 22 Asia-Pacific countries from 2012 to 2020, using the Granger causality test and Vector Error Correction Model. The findings showed a two-way link between corruption and per capita economic growth, while the unemployment rate only affected economic growth in one area. No connection was found between the other variables. In the short term, corruption does not greatly affect economic growth or unemployment, but it does reduce the investment rate. In the long term, corruption harmed per capita economic growth, while investment and unemployment both help it. Overall, corruption slowed down economic growth.

I. Hardi *et al*. (2024) examined the static and dynamic effects of several economic freedom variables on Indonesia's economic growth from 1995 and 2022 using the Solow growth model. They employed techniques

such as Fully Modified Ordinary Least Squares (FMOLS), Dynamic Ordinary Least Squares (DOLS), and Robust Least Squares (RLS), and they used Canonical Cointegration Regression (CCR) to verify the outcomes. 8 of the 9 factors, including property rights, government integrity, tax burden, investment freedom, financial freedom, trade freedom, business freedom, and monetary flexibility, were found to have a favourable impact on Indonesia's economic growth. M.M. Türk (2025) used the Toda Yamamoto causality test to investigate how economic freedom related to Turkey's economic growth from 1999 to 2022, considering globalisation and human development. The findings showed that economic freedom strongly influenced both globalisation and growth, and human development also played a key role. The study also discovered that the effect of globalisation on growth differed according on the institutions and laws of the nation.

Materials and Methods

To investigate the relationship between economic freedom, economic development, and economic growth, this study used GDP growth rate as a measure of economic growth and the economic freedom index from The Heritage Foundation (2025). In addition, HDI was employed as an indicator of economic development, as it included key factors like education and health. The data related to HDI and GDP growth rates were extracted from the World Development Indicators (2023). These data were used on annual basis from 2003 to 2023 as the 2024 data were not available for all sampled countries. This study provided coverage for countries in the SAARC region including India, Bangladesh, Nepal, Pakistan, and Sri-Lanka, excluding Afghanistan and Bhutan.

The variables were taken in logarithmic form to reduce differences. Although the Heritage Foundation's economic freedom index began in 1994, some SAARC countries have missing data, and no estimates were made for them. HDI was used as a measure of economic development, while GDP per capita represented economic growth, and the economic freedom index was used to measure economic freedom. The economic freedom index was chosen because it included all the sub-indicators that can influence human development. The control variable, ODA (% of GDP), was used to represent official development assistance. Thus, the study's functional model was specified as:

$$GDP = f(FREE, FDI, HDI, ODA). \quad (1)$$

This model posited that economic growth was a function (f) of economic freedom level, foreign investment inflow, human development, and foreign aid received. Then, the equivalent equation can be expressed in the second equation as:

$$lnGDP_{it} = \propto_{it} + \beta_1 lnHDI_{it} + \beta_2 lnFREE_{it} + \\ + \beta_3 lnODA_{it} + \beta_4 lnFDI_{it} + \varepsilon_{it}. \quad (2)$$

In this model, GDP represented GDP per capita; ODA – official development assistance; FDI – foreign direct investment; HDI – human development index; *ln* – natural logarithm; and – error term; β_1, β_2, β_3, and β_4 – slope parameters, while α – fixed effect of the parameters. To determine whether the variables in the panel dataset were stationary, the Levin-Lin-Chu Test (LLC) and IM-Pearson-Shin (IPS) panel unit root tests were adopted. Levin-Lin-Chu Test and IM-Pearson-Shin were the most famous statistical analysis to test the stationary between cross-sectional data – thus, if p-value <0.05, rejected the null hypothesis of a unit root, variable was stationary. Then, the Johansen-Jesules (J-J) cointegration test was used to test the validity of the following hypotheses: H_0 = no cointegration between variables; H_1 = there is cointegration between variables.

To determine the optimal Lag length, selection criteria such as Sequential Likelihood Ratio (LR) test, Akaike Information Criterion (AIC), Final Prediction Error (FPE), Schwarz Criterion (SC) and Hannan-Quinn (HQ) were applied, to minimise the effect of omitted variable bias and ensured that serial correlation and endogeneity were adequately addressed. VAR stability test was conducted to ensure the model's stability and confirm that all eigenvalues had moduli were less than one. Fully modified ordinary least squared (FMOLS) regression was used to avoid the non-exogeneity and heterogeneity between panel data. FMOLS was used in panel data studies to estimate relationships among non-stationary, but cointegrated variables. That was, variables that had unit roots individually and move together over time. Therefore, the data should be cointegrated across the time series in order to reach consistency, and avoid bias and inconsistent data. FMOLS was more reliable in estimating panel data more than OLS because the latter depended only on nuisance parameters (Pedroni, 2001).

Results and Discussion

The wide gap between the minimum and maximum GDP per capita highlighted economic inequality among countries. As noted in n Table 1, GDP per capita had a mean of 1,489.794. Economic freedom had a mean of 54.35294, showing that on average, sampled countries have moderate levels of economic freedom. FDI had a mean of 1.17518, showing a positive average inflow of FDI as a percentage of GDP. HDI had a mean of 0.589387, suggesting that most sampled countries struggle with poor healthcare, education, and living standards. ODA had a mean of 1.631167, showing that on average, countries receive positive ODA inflows as a percentage of GDP. Summarily, economic disparities exist among sampled countries, with wide variations in GDP, ODA, and FDI. A unit root test was done to check, if there was variation between the different variables. Two cointegration tests including Levin-Lin-Chu Test and IM-Pearson-Shin (IPS) were used as shown in Table 2.

Table 1. *Descriptive data (USD)*

	GDP	FREE	ODA	HDI	FDI
Mean	1,489.794	54.35294	1.631167	0.589387	1.17518
Maximum	4,077.044	62.50000	5.450494	0.782000	3.668323
Minimum	315.8058	44.20000	-0.289102	0.190000	-0.073509
Standard Deviation	975.3391	3.107853	1.599651	0.103729	0.802245

Note: *GDP – Gross Domestic Product, FREE – Economic Freedom, ODA – Official Development Assistance, HDI – Human Development Index, FDI – Foreign Direct Investment*
Source: *World Development Indicators (2023)*

Table 2. *Panel unit root results (USD)*

Variables	Levin-Lin-Chu Test				IM-Pearson-Shin Test			
	Level	Status	1st difference	Status	Level	Status	1st difference	Status
FREE	1.6343	–	7.094**	I(1)	-0.5042	–	-3.3535**	I(1)
GDP	-1.2262	–	-3.767**	I(1)	1.7395	–	7.2688**	I(1)
HDI	1.3730	–	7.4712**	I(1)	0.6807	–	-3.0334**	I(1)
FDI	1.0169	–	-4.5235**	I(1)	-1.9147	–	-1.8328**	I(1)
ODA	-2.5476**	I(0)	5.3763**	I(1)	1.9143	–	-2.6295**	I(1)

Note: *GDP – Gross Domestic Product, FREE – Economic Freedom, ODA – Official Development Assistance, HDI – Human Development Index, FDI – Foreign Direct Investment, ** – 5% level of statistical significance*
Source: *World Development Indicators (2023)*

The results showed mixed outcomes for the two tests. For most variables, economic freedom (FREE), gross domestic product (GDP), human development index (HDI), and foreign direct investment (FDI), both tests consistently indicated non-stationarity at levels. However, each of the variables became stationary after first differencing, signifying that they were integrated of order one, I(1). This implied that, while the original series exhibited time-dependent trends, their first differences were mean-reverting. In contrast, official development assistance (ODA) presented conflicting results: the LLC test suggested stationarity at level [I(0)], whereas the IPS test identified stationarity only after first differencing I(1). To ensure robustness and comparability, ODA was treated as an I(1) variable. The Lag length selection results Table 3 indicated that Lag 2 was the most appropriate for the model, based on multiple selection criteria.

Table 3. *Lag length criteria (USD)*

lag	LogL	LR	FPE	AIC	SC	HQ
0	-464.94	NA	809.96	20.886	21.087	20.961
1	-282.82	315.672	0.7572	13.903	15.108*	14.352*
2	-251.87	46.775*	0.6064*	13.639	15.847	14.462

Note: *LogL – Log Likelihood, LR – Likelihood Ratio, FPE – Final Prediction Error, AIC – Akaike Information Criterion, SC – Schwarz Criterion, HQ – Hannan-Quinn Criterion, NA – not available, * – statistical significance – optimal lag length*
Source: *World Development Indicators (2023)*

Specifically, the Sequential Likelihood Ratio (LR) test and the Final Prediction Error (FPE) both favour a two-Lag structure, as evidenced by the significant improvement in model fit and predictive accuracy, when moving from Lag 1 to Lag 2. Although the Schwarz Criterion (SC) and Hannan-Quinn (HQ) slightly favour Lag 1, the Akaike Information Criterion (AIC) and the lowest FPE value suggested that Lag 2 offer the better balance between model complexity and explanatory power. Consequently, Lag 2 was taken as the optimal Lag length for the subsequent estimation procedures to ensure robustness and reliability in the model specification (Table 4).

Table 4. *VAR stability check (USD)*

Root	Eigenvalue	Modulus
0.98612		0.98612
0.95069		0.95069
0.72718		0.72718
0.65606		0.65606
0.36249 +	0.26774i	0.45064
0.36249 -	0.26774i	0.45064
-0.38371		0.38371

Table 4, Continued

Root	Eigenvalue	Modulus
-0.17474 +	0.13007i	0.21784
-0.17474 -	0.13007i	0.21784
0.17583		0.17583
The unit circle contains all of the eigenvalues. VAR meets the stability requirement		

Note: *i – i^{th} eigenvalue*
Source: *World Development Indicators (2023)*

The stability of VAR showed the stability of data used in Table 4. The results showed that all eigenvalues lied inside the unit circle, as each modulus was less than 1, with the largest being approximately 0.98612. This indicated that the VAR model was dynamically stable and satisfies the necessary condition for stationarity. In order words, this meant that shocks to the system will dissipate over time rather than persist or explode, making the model reliable. In order to test whether a long-run relationship existed among the variables (GDP, FREE, FDI, HDI, and ODA), Johansen-Jesules (J-J) test was employed as shown in Table 5.

Table 5. *Cointegration test results (USD)*

Series: GDP, FREE, FDI, HDI, ODA				
Lags interval (in first differences): No. of lags				
No. of CE(s)	Eigenvalue	Trace stat	5% critical value	p-values
None *	0.42019	86.4694	69.8189	0.0013
At most 1 *	0.39500	53.7658	47.8561	0.0126

Note: *GDP – Gross Domestic Product, FREE – Economic Freedom, ODA – Official Development Assistance, HDI – Human Development Index, FDI – Foreign Direct Investment, * – 5% level of statistical significance*
Source: *World Development Indicators (2023)*

The results confirmed the presence of a statistically significant long-run relationship among the variables economic freedom (FREE), foreign direct investment (FDI), human development index (HDI), and official development assistance (ODA) at the 5% significance level. This meant that these variables tend to move together over time in a consistent manner. In other words, changes in one of the variables will eventually lead to systematic adjustments in the others to restore long-run equilibrium. As all of the variable were integrated according to unit root test results in Table 2, FMOLS was applicable. Thus, FMOLS test was the best choice for the data that were integrated at the first level within unit root test. The results from the FMOLS analysis were presented in Table 6.

Table 6. *FMOLS results (USD)*

Dependent variable: economic growth			
Variables	Coefficient	t-Stat.	Prob.
FREE	1.9895	3.4470	0.0000
FDI	-0.2981	4.2672	0.0000
HDI	0.6901	2.3922	0.0020
ODA	-5.4552	5.1715	0.0000
C	0.2962	5.5624	0.0000
	R^2 = 0.8197		
	F-stat. = 11.1103		
	Prob. = 0.0000		
	D-W stat. = 2.0002		

Note: *GDP – Gross Domestic Product, FREE – Economic Freedom, ODA – Official Development Assistance, HDI – Human Development Index, FDI – Foreign Direct Investment, C – Constant, R2 – R-squared, t-Stat. – t-Statistic, F-stat. – F-statistic, Prob. – p-value, D-W stat. – Durbin-Watson statistic*
Source: *World Development Indicators (2023)*

The outcome demonstrated that economic freedom significantly boosted economic expansion. This implied that a higher GDP per capita was linked to greater economic freedom (Filipishyna *et al*., 2023). Economic freedom typically reflected the degree to which individuals and businesses can operate freely in an economy, with minimal government intervention. When these conditions were present, they created an environment conducive to investment, innovation, and productivity, which, in turn, driven economic growth. For example, if

a country improved its economic freedom index (e.g., by reducing trade barriers, enhancing property rights, or simplifying business regulations), it was likely to experience higher economic output per person. This finding aligned with the findings of S. Zeng & Y. Zhou (2021), which discovered that economic freedom significantly boosted economic growth. However, the finding contradicted that of Y. Bao *et al*. (2024), which found economic freedom to exert significant negative effect on economic growth. Similarly, the result showed that human development index had significant positive effect on GDP per capita. This suggested that higher levels of human development were strongly associated with increased GDP per capita. The HDI was a composite metric that represented a nation's accomplishments in three important areas of human development: standard of living (income), education (years of schooling), and health (life expectancy). When these dimensions improved, they contributed to a more skilled, healthy, and productive workforce, which directly enhanced economic productivity and growth. For example, if a country invested in education, healthcare, and income-generating opportunities, it was likely to experience higher economic output per person. This was consistent with economic theory, which emphasised the importance of human capital in promoting economic expansion. This finding aligned with the results obtained by A.A.E. Eissa & M.M.Y. Mohammed (2023), who found that HDI had significant positive effect on economic growth.

On the other hand, the outcome demonstrated that FDI significantly lowered GDP level per capita. This implied that, within the study's parameters, greater FDI was linked to lower GDP per capita. This was a counterintuitive result, as FDI was generally expected to contribute positively to economic growth by bringing in capital, technology, and expertise. However, in this case, the relationship was negative, indicating that increased FDI may not be translating into higher economic output per person. This could be conditioned by multinational corporations repatriating profits to their home countries rather than reinvesting them locally, thereby limiting the benefits of FDI to the host economy. Moreover, FDI may be crowding out domestic investment in such a wat that FDI might displace local businesses or domestic investment, reducing the overall contribution to economic growth. Factors such as weak institutions, inadequate infrastructure, or unfavourable policies might prevent FDI from having its intended positive impact. Additionally, the type of FDI (e.g., resource extraction vs. manufacturing) and the sectors it targeted could influence its effect on GDP per capita. This aligned with the findings of I.K. Ofori *et al*. (2023), who found a significant negative effect of FDI on economic growth. As noted by M. Akkaya (2019) and J.O. Sekunmade (2021), FDI had no significant effect on economic growth. In addition, O. Akisik *et al*. (2020) found significant positive effect on economic growth. C. Naanwaab (2018) examined, how economic freedom affected human development across 88 developing countries from 1990 to 2005, while M.A. Gezer (2020) assessed, how economic freedom impacted human development among European transition economies for the period of 1996-2018.

Ultimately, the result showed that official development assistance (ODA) had significant negative effect on GDP per capita. The finding suggested that higher levels of ODA were associated with lower GDP per capita. This was a counterintuitive result, as ODA was typically intended to support economic development, reduce poverty, and improve infrastructure in recipient countries. However, in this case, the relationship was negative, indicating that increased ODA may not be effectively contributing to higher economic output per person. This finding aligned with the results of A. Anwar *et al*. (2024), who found a significant negative effect of ODA on economic growth. This might be conditioned by ODA being directed toward projects or sectors that do not contribute significantly to economic growth or might be misused due to corruption or inefficiency. In addition, high levels of ODA might create dependency on foreign aid, reducing the incentive for domestic resource mobilisation and self-sustaining economic policies. ODA also often came with conditions or may not align with the recipient country's priorities, leading to ineffective use of funds. However, the finding contradicted that of S.K. Fazlly (2024), who found foreign aids to exert significant negative effect on economic growth. Accordingly, the study discovered that human development and economic freedom have a substantial beneficial impact on economic growth, suggesting that improvements in living standards, healthcare, and education, and increased business independence raise GDP per capita. Conversely, foreign direct investment (FDI) and official development assistance (ODA) showed significant negative effects on economic growth. This may be conditioned by issues like profit repatriation, crowding out of local investment, misallocation of aid, or dependency on foreign assistance.

Conclusions

The study concluded that economic freedom index with $\beta = 1.9895$; p-value = 0.0000, human development index with $\beta = 0.6901$; p-value = 0.0020, foreign direct investment with $\beta = -0.2981$; p-value = 0.0000 and official development assistance with $\beta = -5.4552$; p-value = 0.0000 had effected on economic growth in the South Asian Association for Regional Cooperation region. Thus, economic growth in this region was positively determined by level of human capital, foreign investment, and official development assistance, but the enabling environment created by economic freedom must be tailored to each country's unique economic environment. Therefore, to get the most from foreign investment and aid, each country needs its own plan to guide these funds into useful

areas that supported long-term growth. This meant making economic policies and reforms that match the country's unique situation and development goals. Consequently, the study recommended that policymakers should reduce trade barriers, simplify business regulations, and encourage foreign investors to reinvest locally or partner with internal businesses to boost investment, innovation, and knowledge transfer. It also advised directing aid toward key sectors like infrastructure, education, and health, aligning it with national priorities to reduce dependency, while increasing investment in human capital to improve productivity and support long-term economic growth.

Future research may examine other types of foreign capital such as portfolio investment and foreign debts, alongside their distinct impacts on the economies of the South Asian Association for Regional Cooperation region.

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Conflict of Interest

None.

References

[1] Afonso, A., & Blanco-Arana, M.C. (2024). The nexus between economic freedom and economic growth in the least developed countries. An empirical analysis for the period of 2000-2021. *Czech Journal of Economics and Finance*, 74(2), 191-220. doi: 10.32065/CJEF.2024.02.02.

[2] Ahmed, S., Mushtaq, M., Fahlevi, M., Aljuaid, M., & Saniuk, S. (2023). Decomposed and composed effects of economic freedom on economic growth in South Asia. *Heliyon*, 9(2), article number e13478. doi: 10.1016/j.heliyon.2023.e13478.

[3] Akisik, O., Gal, G., & Mangaliso, M.P. (2020). IFRS, FDI, economic growth and human development: The experience of Anglophone and Francophone African countries. *Emerging Markets Review*, 45, article number 100725. doi: 10.1016/j.ememar.2020.100725.

[4] Akkaya, M. (2019). The relationship between direct foreign capital investment, economic freedom and economic growth in emerging markets. *Journal of Selçuk University Social Sciences Vocational School*, 22(1), 1-10. doi: 10.29249/selcuksbmyd.454388.

[5] Ansari, M.G., & Sensarma, R. (2022). Does economic freedom influence the FDI-growth nexus in ASEAN economies? *Journal of Asian Economic Integration*, 4(2), 144-159. doi: 10.1177/26316846221112228.

[6] Anwar, A., Manzoor, Z., & Younas, D. (2024). The nexus between foreign aid and economic growth of Pakistan: A cointegration analysis. *CARC Research in Social Sciences*, 3(2), 277-286. doi: 10.58329/criss.v3i2.131.

[7] Bao, Y., Lin, X., Mei, K., & Pi, Y. (2024). African real GDP growth, views from FDI, economic freedom and corruption of African countries. In *Proceedings of the 2nd international conference on financial technology and business analysis* (pp. 53-59). Oxford: EWA Publishing. doi: 10.54254/2754-1169/92/20231230.

[8] Bhuiyan, M., Haseen, L., Hossain, M.S., & Hossain, M.A. (2022). The empirical relationship between economic growth and economic freedom in Bangladesh. *The Jahangirnagar Review: Part II: Social Science*, 46(1), 33-45.

[9] Ciftci, C., & Durusu-Ciftci, D. (2021). Economic freedom, foreign direct investment, and economic growth: The role of sub-components of freedom. *The Journal of International Trade & Economic Development*, 31(2), 233-254. doi: 10.1080/09638199.2021.1962392.

[10] Dia, I., & Ondoa, H.A. (2022). Does economic freedom improve FDI inflow in Sub-Saharan Africa? *Research Square*. doi: 10.21203/rs.3.rs-2013709/v1.

[11] Economou, F. (2019). Economic freedom and asymmetric crisis effects on FDI inflows: The case of four South European economies. *Research in International Business and Finance*, 49, 114-126. doi: 10.1016/j.ribaf.2019.02.011.

[12] Eissa, A.A.E., & Mohammed, M.M.Y. (2023). The impact of economic freedom on economic growth: Evidence from SAARC. *Scientific Journal of Commercial Research (Menoufia University)*, 1, 95-114.

[13] Fazlly, S.K. (2024). Foreign aid and economic growth: An econometric study of Afghanistan. *Journal of Indonesian Applied Economics*, 12(1), 46-54. doi: 10.21776/ub.jiae.2024.012.01.4.

[14] Filipishyna, L., Metil, T., & Gechbaia, B. (2023). Integration strategies in the market system of maritime trade of Ukraine. *Philosophy, Economics and Law Review*, 3(1), 137-145. doi: 10.31733/2786-491X-2023-1-137-145.

[15] Gezer, M.A. (2020). The impact of economic freedom on human development in European transition economies. *Economic Computation and Economic Cybernetics Studies and Research*, 3, 161-178. doi: 10.24818/18423264/54.3.20.10.

[16] Gouider, A. (2022). The nexus between economic freedom and economic growth in Arab countries. *Montenegrin Journal of Economics*, 18(1), 117-125. doi: 10.14254/1800-5845/2022.18-1.9

[17] Hardi, I., Afjal, M., Khan, M., Idroes, G.M., Noviandy, T.R., & Utami, R.T. (2024). Economic freedom and growth dynamics in Indonesia: An empirical analysis of indicators driving sustainable development. *Cogent Economics & Finance*, 12(1), article number 2433023. doi: 10.1080/23322039.2024.2433023.

[18] Hung, N.T., Oanh, T.T.K., & Trang, C.T.T. (2024). The impact of economic freedom on economic growth in countries with high and low regulatory quality – lessons for Viet Nam. *Humanities and Social Sciences Communications*, 11, article number 1237. doi: 10.1057/s41599-024-03741-8.
[19] Lucky, M., & Hikmah, E. (2024). Analysis of economic freedom, foreign direct investment, and economic growth. *Jurnal Ekonomi Pembangunan*, 22(1), 89-103. doi: 10.22219/jep.v22i01.33754.
[20] Naanwaab, C. (2018). Does economic freedom promote human development? New evidence from a cross-national study. *The Journal of Developing Areas*, 52(3), 183-198. doi: 10.1353/jda.2018.0045.
[21] Ofori, I.K., Figari, F., & Ojong, N. (2023). Towards sustainability: The relationship between foreign direct investment, economic freedom and inclusive green growth. *Research Square*. doi: 10.21203/rs.3.rs-2790984/v1.
[22] Pedroni, P. (2001). Fully modified OLS for heterogeneous cointegrated panels. In B.H. Baltagi, T.B. Fomby & R. Carter Hill (Eds.), *Nonstationary panels, panel cointegration, and dynamic panels (Advances in econometrics)* (Vol. 15, pp. 93-130). Leeds: Emerald Group Publishing Limited. doi: 10.1016/S0731-9053(00)15004-2.
[23] Şahin, D. (2018). The relationship between economic freedoms and foreign direct investments in BRICS-t countries: Boostrap panel Causality test. *Bingöl Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 8(16), 285-294. doi: 10.29029/busbed.389932.
[24] Sekunmade, J.O. (2021). FDI, economic freedom and economic growth of Nigeria. *Open Journal of Management Science*, 2(2), 1-16. doi: 10.52417/ojms.v2i2.231.
[25] Shah, M.H. (2023). Economic institutions and foreign direct investment in South Asia. *Journal of Business and Tourism*, 9(2), 13-29.
[26] Štilić, A., Mastilo, A., Vuković, K., & Mastilo, D. (2023). Innovative solutions for economic growth: Exploring the impact of economic freedoms on foreign direct investment attraction. *Economics*, 11(1), 29-44. doi: 10.2478/eoik-2023-0013.
[27] Tama, M.J. (2024). Causality and long-term impacts of investment, corruption, unemployment, and economic growth in Asia-Pacific countries. *The Asian Journal of Professional and Business Studies*, 5(1), article number 5-1-22-162. doi: 10.61688/ajpbs.v5i1.329.
[28] The Heritage Foundation. (2025). *The index of economic freedom*. Retrieved from https://www.heritage.org/index/pages/about.
[29] Türk, M.M. (2025). The influence of economic freedom on growth: An assessment within the context of globalization and human development. *Euroasia Journal of Social Sciences & Humanities*, 12(1), 7-25. doi: 10.5281/zenodo.14919934.
[30] Wahyuningrum, F., & Soesilowati, E. (2021). The effect of economic growth, population and unemployment on HDI. *Efficient: Indonesian Journal of Development Economics*, 4(2), 1217-1229. doi: 10.15294/efficient.v4i2.46325.
[31] World Development Indicators. (2023). *World Bank Group*. Retrieved from https://databank.worldbank.org/source/world-development-indicators.
[32] Zeng, S., & Zhou, Y. (2021). Foreign direct investment's impact on China's economic growth, technological innovation and pollution. *International Journal of Environmental Research and Public Health*, 18(6), article number 2839. doi: 10.3390/ijerph18062839.

Переосмислення основ економічного зростання в країнах АРСПА: емпіричне дослідження економічної свободи, людського розвитку та прямих іноземних інвестицій

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Анотація. Країни Асоціації регіонального співробітництва Південної Азії вважали пріоритетним економічне зростання та розвиток, однак продовжували стикатися з тривалими викликами, такими як бідність, нерівність і повільний поступ у досягненні цілей сталого розвитку. Метою даного дослідження було оцінити вплив індексу економічної свободи, прямих іноземних інвестицій та індексу людського розвитку на економічне зростання країн Асоціації регіонального співробітництва Південної Азії у період з 2005 по 2023 рік. У якості методу оцінювання було використано регресійний аналіз із повністю модифікованими найменшими квадратами. Результати показали, що як індекс економічної свободи (β = 1,9895; p-значення = 0,0000), так й індекс людського розвитку (β = 0,6901; p-значення = 0,0020) мали позитивний і статистично значущий вплив на економічне зростання. Це свідчило про те, що вищий рівень економічної свободи, а також наявність більш кваліфікованої, здорової та продуктивної робочої сили асоціювалися з покращенням економічних показників. Натомість, прямі іноземні інвестиції (β = -0,2981; p-значення = 0,0000) та офіційна допомога розвитку (β = -5,4552; p-значення = 0,0000) виявили негативний і значущий вплив на економічне зростання. Такий результат може пояснюватися тим, що транснаціональні корпорації репатріювали прибутки до країн походження замість їх реінвестування в регіон, а також наявністю корупції в управлінні іноземною допомогою. Було зроблено висновок про те, що індекс економічної свободи, прямі іноземні інвестиції та індекс людського розвитку впливали на економічне зростання у країнах Асоціації регіонального співробітництва Південної Азії. Отже, для підтримання зростання урядам цих країн слід реалізовувати політику, що сприятиме підвищенню ефективності ринку, зменшенню бюрократичних бар'єрів і зміцненню правових інституцій з метою залучення якісних інвестицій

Ключові слова: валовий внутрішній продукт; фінансування; вільна економіка; офіційна допомога розвитку; довгостроковий зв'язок

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Public health risk control in international sports events: Strategy evolution in the post-pandemic period

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Abstract. The COVID-19 pandemic has highlighted the need to revise traditional security strategies for international sporting events and has brought public health issues to the forefront as a systemic component. The study aimed to address the transformation of security management strategies at mass sporting events in the post-pandemic reality. The research methodology was based on the use of such scientific methods as structural and functional analysis, methods of analogy and analytical review, which ensured a comprehensive and integrated coverage of the issue. The study determined that sanitary and epidemiological control has ceased to be a secondary function and has become a structural axis of strategic planning. The examples of the Olympic and Paralympic Games in Tokyo in 2021 and the FIFA World Cup in Qatar in 2022 demonstrated that a high level of efficiency was achieved both under severe restrictions and moderate scenarios, providing digital support and vaccination coverage. In addition, the study determined that digital platforms in the COVID and post-COVID period became central for control and analytics, forecasting and modelling risk behaviour. At the same time, barriers have been identified in the form of inequality of access, politicisation of health and fragmentation of the regulatory framework. As a conclusion, the study proposed to use the concept of integrated risk management, which involved cross-sectoral coordination, adaptive scenario planning and digital support for early warning systems. The significance of the study is determined by the outline of a systematic framework for rethinking security strategies at mass sporting events, which can be used as an analytical basis for the development of practical recommendations

Keywords: digital technologies; risk management; epidemiological control; international coordination; strategic planning

Introduction

The COVID-19 pandemic created a new logic for international sporting events, in which public health risks have become a systemic factor in strategic planning. Furthermore, after 2020, the usual mechanisms for organising such events were unable to guarantee the controllability of biological threats without technological support and regulatory adaptation. The change in the status of sanitary and epidemiological control in the structure of security strategies has led to a rethinking of the role of digital tools, inter-institutional cooperation and prevention policies on a global scale. In this context, the study of public health risk management at the intersection of sport, digitalisation and biosecurity is becoming increasingly important for the development of new analytical frameworks.

Since 2020, the scientific community has focused on certain aspects of this issue, but an integrated vision of post-pandemic risk management in international sports has not been formed as of 2025. T. Schmidt *et al*. (2024), using the example of the 2020 European Football Championship, determined that the holding of sporting events was accompanied by an increase in COVID-19 cases in several host countries, where generally accepted preventive restrictions were not followed. The researchers

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concluded that mass events without strict epidemiological control can significantly increase local transmission of the virus. At the same time, J.P. Sugden & J.T. Sugden (2020) proposed a critical reflection on the future of global sports governance in the context of epidemiological threats. In particular, the study considered the inequality of access to medical resources the imbalance in the implementation of security policies at the level of international federations and the need to reform governance models. J.J. Reade (2024) considered the relationship between public safety and management approaches to major sporting events, providing general recommendations on safety protocols, including medical response and crowd risk prevention.

F. Bazzanella *et al*. (2021) examined the transformation of approaches to risk management in the context of organising cycling events. The study analysed the changing role of local organisers and the structural restructuring of safety protocols, demonstrating the desire for more formalised and technologically supported decision-making mechanisms. A. Pacak (2020) analysed the social media strategies of professional football clubs in the UK in response to the pandemic crisis. Additionally, another perspective on the problem was presented in the study by J. Carswell *et al*. (2023), which discussed overcoming the consequences of the pandemic in the context of developing the sustainability of tourist and sports destinations. A scientific publication by T.-Y. Chou & P.-Y. Lee (2023) analysed the behavioural and psychological factors that influence people's desire to return to sports activity, given the perception of sanitary safety as a key factor of trust.

Thus, modern scientific discourse showed a multidisciplinary approach to the study of sporting events in the post-pandemic environment, but there was fragmentation in the coverage of the strategic interaction of components. These publications do not form a holistic model of post-pandemic biological risk management that incorporated digital infrastructure, adaptive regulation and interoperability limitations within mass sporting events. In this regard, the study aimed to analyse the model of transformation of public health risk management strategies in the international sports context, incorporating the changes caused by the pandemic and the spread of digital technologies. The implementation of this goal involved the following tasks: to identify functional changes in the security management structure based on a comparative analysis of strategies during and after COVID-19; to provide a theoretical interpretation of the role of digital platforms in the risk management structure; to identify barriers and potential ways to improve the implementation of biosecurity mechanisms.

Materials and Methods

The methodological basis of the study was based on the application of theoretical methods of scientific knowledge, such as structural and functional analysis, methods of analogy and analytical review, which provided a holistic understanding of the dynamics of transformations in the field of public health risk management in the context of international sporting events during the pandemic (December 2019-May 2023) and post-pandemic (since May 2023).

Based on an analytical review of the models of regulation, institutional interaction and digital monitoring, the transformational vectors of post-pandemic regulation were described. In particular, the mechanisms analysed included: protocols for admission to events, testing models (mandatory polymerase chain reaction (PCR) testing, daily screening), regulations for the movement and creation of isolated bubble systems, algorithms for the operation of digital applications, standardised response procedures in case of symptoms or positive test results. The use of the analytical method ensured a conceptual transition from a fragmented description of individual mechanisms to a unified view of the structure of the updated management paradigm. The regulatory document, such as The playbook international federations. Your guide to a safe and successful Games (2021) developed for the Olympic and Paralympic Games in Tokyo 2021, was involved in the analytical review. The World Health Organization recommendations were used as a conceptual basis, in particular the document Key planning recommendations for mass gatherings in the context of COVID-19: Interim guidance (2021), as well as Fan health information/Covid-19 information & travel policy (2023) of Quatar.

In addition, the study analysed mobile digital applications such as COCOA (COVID-19 contact-confirming..., n.d.), a digital contact recording application used during the Tokyo 2021 Olympic Games; and Ehteraz, a mandatory digital platform in Qatar during the 2022 FIFA World Cup (Al-Kuwari *et al*., 2022). Furthermore, as a separate example, MY2022, a mobile application with the function of monitoring and verifying the state of public health, was analysed (Knockel, 2022). The analysis of the functionality of these applications was used to trace the transformation of digital solutions as an element of the biosafety system. The regulatory framework was supplemented by statistics contained in the reports of the Johns Hopkins University Centre for Systems Science and Engineering (JHU CSSE) (Research, 2022) on the number of tests, the percentage of positive results among participants, the vaccination rate among the population of the organising countries, and the volume of contact interaction (Understanding vaccination progress, n.d.). The aggregate indicators were used for analytical comparison of the selected security models.

A structural-functional analysis was used for the theoretical construction of a public health risk management system as a complex structure with interconnected functional blocks. This approach covered the organisational components of digital monitoring platforms, regulatory documents, protocol movement systems, testing

algorithms, and regulatory isolation scenarios as elements of an ordered model, in which each component played a stabilising role in ensuring the continuity and predictability of management decisions. The method outlined the internal logical links between such areas as digital verification, protocol regulation, information policy and regulatory modelling of behaviour in the context of potential biological threats. The method of analogy was used to make a theoretical comparison of different types of organisational response models to identify common features that indicated the existence of stable efficiency factors in systems with different parameters. It was used to conceptually compare variable approaches to security organisations. The analogy served as a tool for identifying the interoperability and practical transferability of individual management elements within different regulatory environments, which provided a basis for further unification of approaches to biosafety.

Results

The organisation of large-scale international sporting events, such as the Olympic Games or World Championships, has traditionally been associated with a set of challenges related to security at various levels. Before 2020 and the introduction of COVID-19 restrictions, the threat of terrorist attacks, public order disruptions, man-made accidents, and certain aspects of sanitary control related to food, hygiene, or living conditions remained a priority. At the same time, issues related to public health in a broader sense were largely not treated as independent in strategic planning and were seen as an auxiliary area that did not require centralised decisions or integrated management structures. However, the events related to the COVID-19 pandemic have led to a fundamental rethinking of the principles of organising mass events, particularly the role of security in the healthcare sector (Schütte *et al*., 2023).

The formation of a new model of risk communication, the expansion of the definition of "threat" in the context of sport, and the global scale of the challenge have led to the institutionalisation of practices that were previously considered temporary or emergency. Thus, the issue of health protection has gone beyond the functional area of medical care, becoming a systemic element that permeated logistics, infrastructure, financial calculations, information policy and diplomatic interactions. Thus, A. Khorram-Manesh *et al*. (2024) noted that determination of risk control as a multidirectional process that required predictability, adaptability and constant monitoring has become particularly relevant. In this context, the role of preliminary analysis of the epidemiological situation, protocol support for the movement of people, management of the flow of information on symptoms and test results, and the creation of effective response mechanisms in case of danger signs have increased. In addition, the set of tools (digital platforms, mobile applications, remote health monitoring, big data analysis, simulation modelling) used to ensure the sustainable functioning of events in a dynamic environment has significantly expanded. As a result, this shift in focus has led to the need to investigate, how public health risk management strategies have evolved, which models have become dominant in the post-pandemic period, which temporary solutions have turned into institutional practices, and what challenges remain in protecting the health of participants and spectators of international competitions.

Therefore, the emergence of new challenges related to health in a highly concentrated social environment has called into question the effectiveness of previously established strategies that dominated the organisation of sporting events. Until 2020, in the period preceding the pandemic, the dominant focus was on issues associated with safety in the classical sense: organisers focused their efforts on preventing athlete injuries, ensuring food safety at food outlets, and monitoring the sanitary condition of premises and infrastructure (Glebova *et al*., 2022). At the same time, the epidemiological component was considered a factor of secondary importance that did not require deep integration into the overall risk management system. The limited tools for predicting and preventing the spread of infections, in particular respiratory infections, were not considered a critical threat, as such incidents were either local in nature or remained outside the information field of the sporting event.

With the outbreak of the SARS-CoV-2 pandemic, event organisers were faced with the need to rapidly transform their usual response mechanisms. The existing system was not adapted to long-term global crises of this magnitude, so experimental, temporary or hybrid approaches came to the fore. To minimise the risk of infection, several emergency protocols were implemented, including regular testing of participants, mandatory self-isolation in case of symptoms, the creation of isolated accommodation groups, the so-called "bubbles", and restrictions on physical contact between delegations (Massey *et al*., 2021). At the same time, digital technologies ensured prompt monitoring of the health status of participants. These systems actively used mobile applications such as COVID-19 contact-confirming application (n.d.), Enteraz (Al-Kuwari *et al*., 2022) and MY2022 (Knockel, 2022) to record symptoms, vaccination certificates, digital "health passports", as well as algorithms that analysed the flow of people to prevent high-risk contacts. At the final stage of the pandemic, when global organisations began to gradually move to long-term planning strategies, a new concept of permanent preparedness for biological threats was formed. Some of the measures that were initially temporary were found to be effective and included in the permanent regulations that apply to all mass events. Among these innovations are the updated standards initiated by international institutions, including Key planning recommendations

for mass gatherings in the context of COVID-19: Interim guidance (2021) and The playbook international federations. Your guide to a safe and successful Games (2021), and document of the Ministries of Health of different countries (Fan health information..., 2023).

In response to the unprecedented global challenges posed by the COVID-19 pandemic, international and national institutions have implemented a set of regulatory and institutional transformations that have radically changed approaches to the organisation of mass sporting events. These shifts have become a vector for ongoing reforms aimed at integrating health risk management into the entire logistics infrastructure of sporting events. At the international level, the main coordinator was the Tokyo Organising Committee for the Olympic and Paralympic Games 2020, which has developed and implemented several mandatory regulatory documents, such as The playbook international federations. Your guide to a safe and successful Games. (2021) that have become a prototype for similar solutions for other mass events. These regulations contained detailed testing protocols, isolation strategies in case of infection, algorithms for the movement of participants, as well as requirements for staying in Olympic venues, incorporating the specifics of each sport. Thus, the Tokyo Organising Committee for the Olympic and Paralympic Games 2020 has initiated the development of industry-specific safety standards that incorporate both epidemiological challenges and the technical characteristics of the competition.

At the same time, the Tokyo Organising Committee for the Olympic and Paralympic Games 2020 and other sports organisations were institutionally supported by the World Health Organization recommendations, which published Key planning recommendations for mass gatherings in the context of COVID-19: Interim guidance (2021). The document, which has been updated several times, emphasised the need for a comprehensive risk assessment, integration of health monitoring measures, clear communication with the public, and readiness to respond quickly to possible disease outbreaks. These recommendations have become the basis for shaping approaches to sporting, cultural and religious events, including at the regional level. In addition, following the new protocols, transparency in risk communication, combating disinformation, digital ethics and protection of personal data used in monitoring the epidemiological situation was emphasised.

In analysing public health risk management strategies in the context of international sporting events, it was useful to consider specific examples of the implementation of such strategies. For example, the Tokyo Olympics in 2021 and the FIFA World Cup in Qatar in 2022 have become testbeds for implementing and evaluating the effectiveness of different approaches to ensuring the safety of participants and spectators. The 2021 Tokyo Olympics was the first major international sporting event held during the active phase of the COVID-19 pandemic. Given the challenging epidemiological situation in Japan and globally, the organisers have developed and implemented a comprehensive system of measures to prevent the spread of the infection among athletes, technical staff and the local population. One of the main solutions was to completely exclude spectators from the stands, which significantly reduced the load on the infrastructure and avoided massive crowds. This decision, although it had economic consequences, was made in the interests of public safety, given the high risk of virus transmission in a dense crowd. In addition, to minimise the likelihood of the internal spread of COVID-19 among the Games participants, a multi-level testing system was implemented, including both pre- and post-event monitoring. All participants had to provide proof of a negative test result before arriving in Japan and were subject to daily screening upon arrival. The athletes, delegation members and support staff were kept in a controlled-access environment to ensure isolation from the outside environment. All movements were strictly regulated, and compliance with sanitary requirements was monitored at all levels. Mask regime, disinfection of premises and physical distancing were mandatory. The effectiveness of the measures taken was confirmed by data showing that out of more than 1 million tests conducted during the Olympic and Paralympic Games, only 299 samples showed positive results, which was 0.03% of the total. Among the approximately 11,000 athletes, who stayed in the Olympic Village, only 15 cases of close contact infection were reported (Akashi *et al*., 2022). Such statistics indicate a high level of control and effectiveness of anti-epidemic measures. Thus, Japan's experience has confirmed that under strict regulation, even many international participants does not lead to a large-scale spread of the virus, provided that protocols were followed.

However, in contrast to the Japanese approach, which was based on maximum restriction of social interaction, the organisers of the 2022 FIFA World Cup in Qatar have opted for a strategy of moderate liberalisation. The competition was held with spectators, which led to significant flows of fans from different countries and large crowds in stadiums, fan zones and transport hubs. Despite the easing of restrictions, basic protocols remained in place, including digital health monitoring and systems for alerting people to potential infectious threats. The Ehteraz mobile app was used during the event to quickly track contacts and alert people to possible epidemiological risks (Al-Kuwari *et al*., 2022). Notably, during the championship, there was a short-term increase in COVID-19 cases, but due to high vaccination rates among the local population and tournament participants, as well as the health system's readiness to handle the load, there were no large-scale outbreaks or collapses of the medical infrastructure (Dergaa *et al*., 2023). A visual comparison of the effectiveness of different approaches to controlling public health risks during these events was presented in Table 1.

Table 1. *Comparison of risk control measures*

Metric	Tokyo 2021 (Olympic and Paralympic Games)	Qatar 2022 (FIFA World Cup)	Effect
The presence of the audience	Lack of spectators at all venues	More than 3.4 million viewers	It affected the density of contacts and the complexity of control
Vaccination rate of the host country's population	<40% at the time of the event	>95% fully vaccinated	Reduced the risk of severe forms and hospitalisations
Mandatory testing for all participants	Yes (daily PCR for athletes)	Yes (upon entry + selectively during the tournament)	The frequency and scope of testing determined the level of detection
Masks in interior spaces	Mandatory everywhere, even in gyms	Recommended, not required	Determined the probability of airborne transmission
Digital health monitoring systems	Yes (COCOA application)	Yes (EHTERAZ, with QR codes)	Simplified contact acquisition
Number of positive cases recorded among participants	Approximately 0.03%	Data was not made public, but no major outbreaks were reported	Reflected the overall effectiveness of a set of measures

Source: *based on M.G. Al-Kuwari et al. (2022), Fan health information/Covid-19 information & travel policy (2023), COVID-19 contact-confirming application (n.d.), Understanding vaccination progress (n.d.)*

Notably, both cases did not demonstrate major epidemiological failures, although they used fundamentally different approaches to organisation. This indicated that effectiveness was not determined by the severity of the restrictions, but rather by the context of their implementation, including the level of training, health system mobilisation (including vaccination of the population), technological support and communication policy. Therefore, it was possible to argue that the modern model of organising sporting events was transforming towards a synthesis of epidemiological safety, digital analytics and cross-sectoral coordination (Fahim *et al*., 2024). The institutional and regulatory shifts initiated during the pandemic have shaped a new governance paradigm that focused not only on ensuring the safe physical presence of spectators and athletes, but also on guaranteeing this safety in the face of biological uncertainty. As a result, this approach has opened new opportunities for the development of sustainable practices aimed at the long-term preservation of public health, even outside the pandemic context.

The practice of holding large-scale international sporting events has shown that innovative digital tools are becoming an effective tool for achieving safety. Therefore, as part of modern health risk management in the organisation of international sporting events, digital technologies have gradually transformed from auxiliary tools to systemic components of the overall biosafety infrastructure. At the same time, their implementation was not limited to the control or verification function, but was expanding towards the creation of sustainable models for monitoring, analytics and early threat forecasting. The process was determined by the transition from reactive to proactive control mechanisms, in which digital solutions provided the ability to adaptively adjust protocols in real-time, analyse behavioural deviations and identify potential infection clusters before symptoms appear.

During and after the pandemic, mobile health passport platforms became universal for digital epidemiology, accumulating data on testing, vaccination status, contact history, and permission to enter designated areas (A COVID-19 health..., n.d.). However, the experience of their implementation has also confirmed a significant number of risks associated with privacy violations, insufficient transparency of algorithms, and inequality of access to digital services. For example, the mandatory MY2022 app used during the Beijing 2022 Winter Olympics had serious vulnerabilities in terms of protecting personal health data, as well as the lack of basic encryption protocols for information transmission (Knockel, 2022). This example raised the issue of the need for a preliminary independent audit of software solutions before their large-scale use on a global scale.

Alongside the technical aspects, geographical and practical challenges have also become more acute. Geographical barriers included inequalities in access to vaccines, differences in regulatory frameworks, differences between countries in data security and privacy policies, and difficulties with standardisation and interoperability. This was compounded by limitations in digital infrastructure and access to technology. In turn, practical challenges include medical contraindications to vaccination, breakthrough infections, uncertainty about natural immunity, and the limited accuracy of standardised tests for assessing the risk of infection (Towett *et al*., 2023).

To address these challenges, global international coordination of efforts to harmonise regulatory frameworks, improve digital infrastructure and ensure equal access to technology and healthcare resources has become necessary. Investing in research and improving risk assessment and health monitoring systems has also become important. In this case, the use of predictive analytics technologies based on large data sets opened prospects. An example was the collaboration between

the University of Pittsburgh and Amazon Web Services, which resulted in the emergence of a risk prediction laboratory, where artificial intelligence (AI) was used to identify potential diseases of athletes based on data on physiology, logistics trajectories, behavioural variables, and contact chains (Suttles, 2025). Such solutions can improve the accuracy of real-time decision-making and introduce adaptive access control scenarios, but also require clear regulation at the level of international law and alignment with data protection standards.

In the context of post-pandemic risk management in the field of international sporting events, it was worth highlighting the challenges that were emerging at the intersection of biomedical, social, information and geopolitical vectors. Although the adaptation of many crisis protocols has become a sustainable practice in the organisation of global events, the risks themselves have not lost their relevance. First and foremost, the probability of new pandemic threats, which can be of both viral and bacterial origin, remains high. The evolution of institutional approaches has already considered the need to develop early warning systems and adaptive logistics. However, the challenges of the future may not be limited to the development of contingency scenarios. Here, the need for multi-level scenario modelling that can consider the mutational dynamics of pathogens, climate change factors, and the social responsiveness of the population comes to the fore (Table 2).

Table 2. *Systematic classification of determinants of public health risk control during international sporting events*

Determinant	Elements
Epidemiological profile	The possibility of new pathogens (viral/bacterial); genetic variation and mutational dynamics of pathogens
Scenario forecasting	Multi-level modelling system; integration of backup epidemiological scenarios
Environmental parameters	Impact of climate change on pathogen transmission; local environmental risks (temperature, humidity, population density)
Social behaviour	Level of social mobilisation; degree of trust in healthcare systems; public perception of risk
Institutional capacity	Availability of early warning systems; adaptive logistics and cross-national coordination
Technological infrastructure	Use of digital platforms for surveillance; ensuring cybersecurity of personal medical data
Healthcare resources	Vaccination coverage based on medical contraindications; scalability and reliability of diagnostic tools

Source: *developed by the author*

Given the data provided, effective control of public health risks during international sporting events required the integration of an interdisciplinary approach that encompassed both biomedical and socio-institutional factors. The key was to introduce adaptive, digitally supported epidemiological modelling systems that can respond quickly to changes in pathogenic, environmental and behavioural determinants. One of the constant factors of increased risk was the mass movement of fans during events. The density, cross-border nature, and varying levels of vaccination, health insurance, and awareness create an extremely heterogeneous environment in which traditional approaches to infection control lose their effectiveness. A particular challenge was posed by areas of temporary residence/stay (fan camps, hostels, hotels, airport transits), where it was difficult to provide a comprehensive sanitary infrastructure. This factor further reinforces the need for coordination between organisers, municipal services and healthcare systems, as well as the need to expand the responsibilities of logistics partners.

The tendency of public health issue politicisation was also notable, being manifested in the rhetoric around vaccination, testing, masks and digital monitoring. Anti-vaccination movements based on misinformation can significantly reduce compliance with mandatory standards on the part of both spectators and athletes. This situation undermined the effectiveness of even the most carefully designed protocols, as it threatens not only the epidemiological balance, but also social trust, which was a key factor in the implementation of participatory mechanisms that were the basis of modern biosecurity management in the sports context. At the same time, limited international cooperation in health data exchange remained another significant barrier to building an effective warning and response system. Although some digital solutions were already being implemented towards integration, their effectiveness was often hampered by national regulations, lack of common standards, institutional mistrust and geopolitical tensions. As a result, the system for monitoring the health of both participants and viewers was often fragmented, and the ability to detect and localise potential threats promptly was significantly hampered. All of this showed that public health risk management at global sporting events must respond promptly and effectively to existing challenges and refocus on long-term strategic foresight based on the integration of interdisciplinary data, flexible coordination mechanisms, and strengthened institutional trust on an international scale.

Discussion

Since the spread of the coronavirus infection in 2019, the issue of public health risk management in the context of international sporting events has been at the centre of professional discussions in the field of sports

management, epidemiology and digital policy. Strategic approaches that were formed before the pandemic have undergone transformations that go beyond purely anti-epidemic response and cover a wide range of organisational, regulatory, technical and behavioural factors. In the scientific field, this has led to the formation of several parallel research vectors, each of which highlighted certain aspects of the sports industry's adaptation to the new era of biological threat. However, the systematic generalisation and theoretical coherence of these areas was still in its infancy, which made it necessary to conduct a conceptual analysis of the models that have emerged in response to global challenges. For this reason, an approach that can describe the changing role of sanitary and epidemiological control as a structuring element of security strategies, based on specific cases and theoretical interpretation of digital technologies as a platform for forecasting, verification and management integration, was used.

For instance, the publication by O. Havryliuk *et al*. (2021) were devoted to communicative and discursive practices in the sports sphere during the pandemic. The study conducted an in-depth analysis of the transformation of media communication, highlighting the emergence of new formats for presenting sports content, changes in rhetoric, and the adaptation of information space players to new conditions. Within the framework of the analysis, sports communication was presented as a means of strengthening trust in events taking place under restrictions, as well as a tool for normalising epidemiological behaviour. While the study highlighted information dynamics, this study focused on the organisational and regulatory basis of security, covering not only athletes, but also ordinary citizens. At the same time, both approaches recognised the need to synchronise management decisions with communicative logic. While the author interpreted media communication as a factor influencing public readiness to comply with rules, this study addressed procedural clarity and digital predictability as factors that created the basis for the legitimacy of decisions. As a result, this edition expanded the context of the discussion from media interpretations to managerial integration, enshrined in digital mechanisms that simultaneously performed the functions of control and transmission of normativity.

At the same time, J. Drury *et al*. (2021) outlined the issue of behavioural risks during the opening of mass events during the period of lifting lockdowns. The researchers conducted an in-depth assessment of social dynamics, trust mechanisms, compliance with restrictions, and the potential for collective responsibility as a factor of stability. The study analysed the conditions under which participants agree to protocols and found a dependence on transparency of decision-making, public involvement in rulemaking, and stability of information channels. However, this article examined behavioural variables in the context of digital models that can predict deviations and detect abnormal trajectories, providing a new line of interpretation between behavioural sociology and analytical digital epidemiology. Such a discussion revealed the potential for combining humanitarian reflection with technological governance, which created a conceptual space for the formation of models of predictive participation that combined behavioural trends with scripted interfaces of digital solutions.

A more detailed analysis of the use of digital security management tools was proposed by C. Meng & W. Rui (2023). The study was based on the concept of a multi-level institutional response based on the example of China. The authors focused on analysing organisational procedures that included filtering fan flows, administering access to facilities, and using QR systems as a sanitary control tool. The concept of coordination between municipal authorities and sports institutions was also given importance. However, for this article, the approach to the Chinese case was interpreted in terms of ethical and legal dilemmas related to the exploitation of personal data. In particular, the analysis of the MY2022 digital app gave grounds to question its effectiveness without proper external audit and privacy protection standards. Thus, although both papers dealt with the same tools, they represented different research perspectives. In this case, the comparison helped strengthen the rationale for the need to introduce standardised regulations and to bring the issue of digital monitoring into the realm of interstate legal and social discourse.

J.A.L. Ludvigsen & J.W. Hayton (2020) analysed the basic organisational framework for the restart of sporting events in a pandemic, with a particular focused on the structure of responsibility between institutional actors, risks to public trust and the need for transparent communication. The analyses described the elements of ethical support, and adaptation of spatial logistics, and substantiated the dependence of the effectiveness of security measures on the quality of interagency coordination. However, the study also did not reveal the importance of using digital tools, touching on them only in the form of general references without functional profile analysis. Instead, this work has demonstrated that digital solutions such as COCOA or Ehteraz not only facilitated the localisation of contacts in practice, but also provided the ability to build scenario models in real-time. Thus, if J.A.L. Ludvigsen & J.W. Hayton (2020) outlined the macro-political mechanisms of risk management, analyses of this study addressed the functional links between protocols and technology platforms.

When studying the issue of security management transformation, it was advisable to pay attention not only to the public, but also to the actual and direct participants of athletes' events. Thus, B.T. Barbosa *et al*. (2020) identified the physiological and psychological aspects of the pandemic's impact on athletes, in the absence of tournament activity, restrictions on training processes, and high levels of anxiety. The study analysed changes

in exercise regimes, adaptation to training in isolation, and the consequences for psycho-emotional stability. As the study addressed only biomedical aspects, strategic or digital event management was omitted. The correlation between these approaches demonstrated that an effective management model should incorporate both epidemiological and logistical dimensions, as well as the condition of the participants themselves. Furthermore, this idea was reflected in the findings that highlighted the need for systematic integration of scenario-based risk modelling that can incorporate behavioural and psychophysiological variables alongside digital data. In the context of this aspect of the issue, this article provided an overview of the University of Pittsburgh's Risk Prediction Lab and Amazon Web Services, which highlighted the importance of exploring the dimension of a multifactorial security construct, in which digital infrastructure was one element.

Thus, the study formulated a systematic vision of the evolution of public health risk management strategies in the international sports context, based on an interdisciplinary analysis of digital tools, regulatory dynamics and organisational practices. A comparison with relevant scientific works has shown both the breadth of coverage and analytical specificity of this work, which can be used to integrate separate approaches to security into a single conceptual field and identify new areas of research, among which the leading ones were risk scenario modelling based on digital behavioural analytics, ethical coding of biosecurity management decisions and harmonisation of regulations at the international level to ensure adaptability to possible future biological threats.

Conclusions

The analysis has shown that modern public health risk management in the sports context was increasingly tending to synthesise technological, regulatory and behavioural factors within a single adaptive system. Digital tools, initially introduced as temporary control measures, have evolved into full-fledged components of the biosecurity infrastructure, capable of providing not only operational contact tracing, but also multidimensional scenario risk modelling based on big data. In this context, the concept of safety has ceased to be a healthcare issue and has been transformed into a cross-sectoral strategy, where technological integration, regulatory compatibility (in particular, using recommendations of Ministry of Health, World Health Organization and national regulations) and institutional trust were interrelated factors of resilience. The case studies of the Tokyo 2021 Olympic and Paralympic Games and the 2022 FIFA World Cup in Qatar demonstrated a gradual shift from reactive to proactive management models, where protocol flexibility, decision transparency and analytical support form the basis for a new paradigm for organising sporting events in the face of biological uncertainty.

The study has shown that it was the combination of proactive risk modelling and inter-institutional cooperation that can create the preconditions for timely response and sustainability of events in a dynamic epidemiological context. Despite the comprehensive nature of the analysis, the limitation of the study was its theoretical orientation, since the generalisations and conclusions were based on the analysis of documents, digital tools and cases without the involvement of empirical methods that could verify hypotheses, deepen the interpretation of patterns and identify barriers that remained outside the scope of public analytics. In the future, it is advisable to develop empirical models for assessing the effectiveness of digital protocols and their impact on the behavioural dynamics of participants, define criteria for international harmonisation of biosafety standards based on the analysis of regulatory compatibility and legal conflicts, and model multifactorial risks in the sports environment, incorporating geopolitical instability, politicisation of healthcare and growing cyber threats. Thus, the study provided a conceptual framework for further research aimed at improving health management strategies in the context of mass sports events. In combination with the empirical verification of the proposed provisions, this creates the potential for the formation of a stable, transparent and technologically supported security infrastructure in the global sports context.

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References

[1] A COVID-19 health passport secured by blockchain to enable deconfinement. (n.d.). *SICPA*. Retrieved from https://www.sicpa.com/news/covid-19-health-passport.

[2] Akashi, H., Shimada, S., Tamura, T., Chinda, E., & Kokudo, N. (2022). SARS-CoV-2 infections in close contacts of positive cases in the Olympic and Paralympic village at the 2021 Tokyo Olympic and Paralympic Games. *JAMA*, 327(10), 978-980. doi: 10.1001/jama.2022.0818.

[3] Al-Kuwari, M.G., Al Nuaimi, A.A., Semaan, S., Gibb, J.M., AbdulMajeed, J., & Al Romaihi, H.E. (2022). Effectiveness of Ehteraz digital contact tracing app versus conventional contact tracing in managing the outbreak of COVID-19 in the State of Qatar. *BMJ Innovations*, 8(4), 255-260. doi: 10.1136/bmjinnov-2021-000879.

[4] Barbosa, B.T., De Lima-Junior, D., & Da Silva Filho, E.M. (2020). The impact of COVID-19 on sporting events and high-performance athletes. *Journal of Sports Medicine and Physical Fitness*, 60(11), 1507-1508. doi: 10.23736/S0022-4707.20.11309-4.
[5] Bazzanella, F., Muratore, N., Schlemmer, P.A., & Happ, E. (2021). How the Covid-19 pandemic influenced the approach to risk management in cycling events. *Journal of Risk and Financial Management*, 14(7), article number 296. doi: 10.3390/jrfm14070296.
[6] Carswell, J., Jamal, T., Lee, S., Sullins, D.L., & Wellman, K. (2023). Post-pandemic lessons for destination resilience and sustainable event management: The complex learning destination. *Tourism and Hospitality*, 4(1), 91-140. doi: 10.3390/tourhosp4010007.
[7] Chou, T.-Y., & Lee, P.-Y. (2023). Predicting athlete intentions for using sports complexes in the post-pandemic era. *International Journal of Environmental Research and Public Health*, 20(6), article number 4864. doi: 10.3390/ijerph20064864.
[8] COVID-19 contact-confirming application. (n.d.). *Ministry of Health, Labour and Welfare*. Retrieved from https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/cocoa_00138.html.
[9] Dergaa, I., *et al.* (2023). Large-scale sporting events during the COVID-19 pandemic: Insights from the FIFA World Cup 2022 in Qatar with an analysis of patterns of COVID-19 metrics. *Biology of Sport*, 40(4), 1249-1258. doi: 10.5114/biolsport.2023.131109.
[10] Drury, J., Rogers, M.B., Marteau, T.M., Yardley, L., Reicher, S., & Stott, C. (2021). Re-opening live events and large venues after Covid-19 'lockdown': Behavioural risks and their mitigations. *Safety Science*, 139, article number 105243. doi: 10.1016/j.ssci.2021.105243.
[11] Fahim, B., Affan Shaikh, M., Ejaz, T., & Batool, P. (2024). Evaluating topical treatments for mild to moderate acne: A cross-sectional study. *Ukrainian Journal of Medicine, Biology and Sports*, 9(4), 16-34. doi: 10.63341/ujmbs/4.2024.016.
[12] Fan health information/Covid-19 information & travel policy. (2023). *Sports and Health 2022*. Retrieved from https://sportandhealth.moph.gov.qa/EN/faninfo/Pages/Covid19InformationAndTravelPolicy.aspx.
[13] Glebova, E., Zare, F., Desbordes, M., & Géczi, G. (2022). COVID-19 sport transformation: New challenges and new opportunities. *Physical Culture and Sport. Studies and Research*, 95(1), 54-67. doi: 10.2478/pcssr-2022-0011.
[14] Havryliuk, O., Nikiforova, Ye., & Pavlichenko, L. (2021). Sports media communication during a pandemic: Communicative discourse aspect. *Young Scientist*, 1, 87-93. doi: 10.32839/2304-5809/2021-1-89-19.
[15] Key planning recommendations for mass gatherings in the context of COVID-19: Interim guidance. (2021). *World Health Organization*. Retrieved from https://www.who.int/publications/i/item/10665-332235.
[16] Khorram-Manesh, A., Burkle Jr, F.M., & Goniewicz, K. (2024). Pandemics: Past, present, and future: Multitasking challenges in need of cross-disciplinary, transdisciplinary, and multidisciplinary collaborative solutions. *Osong Public Health and Research Perspectives*, 15(4), 267-285. doi: 10.24171/j.phrp.2023.0372.
[17] Knockel, J. (2022). Cross-country exposure: Analysis of the MY2022 Olympics app. *The Citizen Lab*. Retrieved from https://citizenlab.ca/2022/01/cross-country-exposure-analysis-my2022-olympics-app/.
[18] Ludvigsen, J.A.L., & Hayton, J.W. (2020). Toward COVID-19 secure events: Considerations for organizing the safe resumption of major sporting events. *Managing Sport and Leisure*, 27(1-2), 135-145. doi: 10.1080/23750472.2020.1782252.
[19] Massey, A., Lindsay, S., Seow, D., Gordon, J., & Lowe, D.J. (2021). Bubble concept for sporting tournaments during the COVID-19 pandemic: Football Club World Cup. *BMJ Open Sport & Exercise Medicine*, 7(2), article number e001126. doi: 10.1136/bmjsem-2021-001126.
[20] Meng, C., & Rui, W. (2023). Security analysis of sports competition under the influence of COVID-19. *Brazilian Journal of Sports Medicine*, 29, article number e2022_0547. doi: 10.1590/1517-8692202329012022_0547.
[21] Pacak, A. (2020). Sports in the time of Coronavirus crisis: Social media response strategies of professional English football clubs. *ResearchGate*. doi: 10.13140/RG.2.2.10674.84169.
[22] Reade, J.J. (2024). Large sporting events and public health and safety. In H.A. Solberg, R.K. Storm & K. Swart (Eds.), *Research handbook on major sporting events* (pp. 563-578). Cheltenham: Edward Elgar Publishing. doi: 10.4337/9781800885653.00055.
[23] Research. (2022). *Johns Hopkins Whiting School of Engineering*. *Center for Systems Science and Engineering*. Retrieved from https://systems.jhu.edu/research/.
[24] Schmidt, T., Beebeejaun, K., Latta, A., Wippel, C., Addo, J., Salvi, C., Tyler, S., Izhyk, O., Smallwood, C., & Perehinets, I. (2024). Mass gathering events and COVID-19; lessons learnt from the 2020 European football championship. *Bulletin of the World Health Organization*, 102, 803-812. doi: 10.2471/blt.23.290044.
[25] Schütte, P.M., Schönefeld, M., Schulte, Y., & Fiedrich, F. (2023). What counts, safety and security or hygiene? Suggestions on the reopening of major events under pandemic conditions in Germany. *International Journal of Event and Festival Management*, 14(2), 141-156. doi: 10.1108/IJEFM-04-2022-0032.

[26] Sugden, J.P., & Sugden, J.T. (2020). Critical reflections on the future of global sport governance in a post-Covid-19 world: Levelling the field. In P.M. Pedersen, B.J. Ruihley & B. Li (Eds.), *Sport and the pandemic: Perspectives on Covid-19's impact on the sport industry* (pp. 157-164). London: Routledge.
[27] Suttles, C. (2025). AI takes the field at Pitt. *AXIOS*. Retrieved from https://www.axios.com/local/pittsburgh/2025/04/24/ai-takes-the-field-at-pitt.
[28] *The playbook international federations. Your guide to a safe and successful Games*. (2021). Tokyo, Lausanne, Bonn: Tokyo Organising Committee for the Olympic and Paralympic Games 2020, International Olympic Committee, International Paralympic Committee.
[29] Towett, G., Snead, R.S., Grigoryan, K., & Marczika, Ju. (2023). Geographical and practical challenges in the implementation of digital health passports for cross-border COVID-19 pandemic management: A narrative review and framework for solutions. *Globalization and Health*, 19, article number 98. doi: 10.1186/s12992-023-00998-7.
[30] Understanding vaccination progress. (n.d.). *Johns Hopkins Whiting School of Engineering. Coronavirus Resource Center.* Retrieved from https://coronavirus.jhu.edu/vaccines/international.

Контроль ризиків для громадського здоров'я на міжнародних спортивних заходах: еволюція стратегії в постпандемічний період

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Анотація. Пандемія COVID-19 висвітлила необхідність перегляду традиційних стратегій безпеки міжнародних спортивних заходів та висунула на перший план питання громадського здоров'я як системний компонент. Дослідження мало на меті розглянути трансформацію стратегій управління безпекою на масових спортивних заходах у постпандемічній реальності. Методологія дослідження базувалася на використанні таких наукових методів, як структурний та функціональний аналіз, методи аналогії та аналітичного огляду, що забезпечило всебічне та інтегроване висвітлення питання. У дослідженні було визначено, що санітарно-епідеміологічний контроль перестав бути другорядною функцією та став структурною віссю стратегічного планування. Приклади Олімпійських та Паралімпійських ігор у Токіо у 2021 році та Чемпіонату світу з футболу у Катарі у 2022 році продемонстрували, що високий рівень ефективності досягається як за суворих обмежень, так і за помірних сценаріїв, забезпечуючи цифрову підтримку та охоплення вакцинацією. Крім того, у дослідженні було визначено, що цифрові платформи в COVID-19 та постковідний період стали центральними для контролю та аналітики, прогнозування та моделювання ризикованої поведінки. Водночас були виявлені бар'єри у вигляді нерівності доступу, політизації охорони здоров'я та фрагментації нормативно-правової бази. Як висновок, у дослідженні запропоновано використовувати концепцію інтегрованого управління ризиками, яка передбачає міжгалузеву координацію, адаптивне сценарне планування та цифрову підтримку систем раннього попередження. Практична цінність дослідження визначається окресленням системної основи для переосмислення стратегій безпеки на масових спортивних заходах, яка може бути використана як аналітична основа для розробки практичних рекомендацій

Ключові слова: цифрові технології; управління ризиками; епідеміологічний контроль; міжнародна координація; стратегічне планування

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