

M. Alamarat^{*1},
orcid.org/0000-0002-3426-9345,
O. Sokil²,
orcid.org/0000-0002-3121-826X,
Ya. Sokil³,
orcid.org/0000-0001-5970-4481,
S. Kucherkova³,
orcid.org/0000-0002-1953-063X,
A. Kostyakova³,
orcid.org/0000-0001-5026-0087,
I. Boiko⁴,
orcid.org/0000-0001-6876-526X

1 – Al-Balqa Applied University, Al Salt, Jordan
2 – Lviv Polytechnic National University, Lviv, Ukraine
3 – Dmytro Motornyi Tavria State Agrotechnological University, Zaporizhzhia, Ukraine
4 – Odesa Polytechnic National University, Odesa, Ukraine
* Corresponding author e-mail: amarat.univder@bau.edu.jo

ASSESSING BUSINESS SECTOR ROLES IN INVESTMENT APPEAL AND INNOVATION DEVELOPMENT

Purpose. To conduct a comprehensive analysis of the results of the influence of business activities on investment attractiveness and innovative development in the country.

Methodology. The methods include a theoretical review and content analysis of business environment indicators, construction of a multifactor regression model of investment intensity as a function of value added, income, own investments and profit of enterprises based on data from 2014–2024, and verification of the reliability (R^2) of trend-extrapolation forecasts.

Findings. The comprehensive analysis confirms the importance of the business sector for the country's investment attractiveness and innovative development. The developed model explains 99 % of the variation in the investment development indicator, noting the dominant role of business reinvestment in determining the share of investment in GDP. The investment-to-GDP ratio fell to 5.3 % in 2022 and partially recovered to 6.98 % in 2024. In the absence of significant policy measures, baseline forecasts indicate a decline to 5.8 % in 2025 and 4.9 % in 2026. The Investment Attractiveness Index in Ukraine has improved but remains below neutral, and business expectations for 2024 remain subdued.

Originality. An integrated model is proposed that quantitatively links business activity indicators with the investment intensity of the economy and empirically confirms the dominant role of reinvestment in capital formation. Regression analysis is combined with business activity indicators and sectoral indicators, which allows for a deeper assessment of the relationships between business behavior, investment flows, and innovative development.

Practical value. The recommendations developed in the article are aimed at business managers regarding long-term capital investment planning, development of reinvestment policies, and partnerships with universities and donor institutions. The implementation of these approaches will increase the investment and innovation potential of enterprises, contribute to the restoration of the national economy, and strengthen the resilience of the business environment in the post-war period.

Keywords: *business, economic modeling, innovation, economic growth*

Introduction. The current socio-economic development is taking place in conditions of a deep crisis caused by a full-scale war and economic instability. The sharp decline in economic activity, which was manifested in a reduction in real GDP by almost a third in 2022, highlights the need to find new drivers of economic growth [1]. Traditional tools for economic recovery are proving insufficient, so it is important to determine the role of business as a factor in the country's investment and innovative development. Despite the devastating consequences of the war, the business sector continues to provide basic economic functions – job creation, production of goods and services, as well as replenishing the state budget through tax revenues [2]. At the same time, small and medium-sized businesses demonstrate high adaptability: by the end of 2023, more than 75 % of enterprises that suspended operations at the beginning of the war had resumed work [3]. This confirms the significant potential of entrepreneurship as a driving force for economic recovery,

modernization and the construction of an innovative development model.

Within the framework of this study, it is also appropriate to analyze the impact of business on innovative development in developing European countries (DEC) (Ukraine, Poland, Bulgaria, etc.). The impact of innovations determines the vector of development of the national economy and the increase in its competitiveness [4].

Innovative development is changes aimed at updating and qualitatively improving processes or products, which are accompanied by a transition to a new level of systemic organization [5].

The essence of innovative development is determined by the following approaches:

1. Subject-technological approach – innovative development is understood as the final result of scientific or scientific and technical activity.

2. Functional approach – innovative development is considered through the functions of creation, implementation, dissemination of innovations and implementation of innovative projects.

The use of innovations is one of the key resources of economic development. Innovations affect not only the

competitiveness of individual enterprises, but also the national economy as a whole, shaping its innovative globalization [6].

A number of factors influence the innovative development of the country, among which the activities of small, medium and large enterprises play an important role. In particular, as A. Grishko and A. Melnyk note, the key factor, basis and driving force of the innovative development of the country is the innovative activity of each enterprise, which is reflected in the efficiency of its innovative activity [7].

It is generally accepted that innovation and high technology are developed thanks to well-known brands and transnational corporations. Although this statement is generally true, one should not ignore the important role of small and medium-sized enterprises in innovative development. In all developed countries, they play a key system-forming role in the entire innovative economy. Although industrial giants spend about 90 % of research and development (R&D) expenditures, small and medium-sized enterprises introduce 2.5 times more innovations than corporate research institutes and laboratories [8]. According to the Organization for Economic Cooperation and Development (OECD), small and medium-sized enterprises generate about 20 % of all innovations, while their expenses for developing innovations remain relatively low – only 4–5 % compared to large businesses [9]. Moreover, the vast majority of inventions that have truly transformed modern society – such as the personal computer, the tape recorder, the airplane, the helicopter, the defibrillator, the integrated circuit, the artificial heart valve, the conveyor belt, the air conditioner, the microprocessor, the solid-fuel rocket engine, and many other groundbreaking innovations – were initially created through the efforts of small and medium-sized enterprises.

However, a problem arises: despite the obvious resilience and ability of business to adapt to crisis conditions, there are no systematic studies that would comprehensively assess its impact on investment and innovation processes. Insufficient attention to this issue creates the risk of underestimating the capabilities of business in post-war reconstruction and the formation of long-term strategies for sustainable development. Thus, an urgent scientific and practical task is to clarify the role of the business sector in the formation of a new economic paradigm of DEC, based on investment, innovation and entrepreneurial activity.

Literature review. Despite the role of business, there are serious problems on the path of investment and innovation development in EC. Investment potential remains limited: investors are extremely cautious about DEC due to the risks associated with the war, and the inflow of foreign direct investment almost stopped in 2022. Until a stable peace is ensured, the investment climate will remain unfavorable [10]. In addition to war-related factors, the situation is complicated by chronic barriers in the business environment. These include a high level of corruption. In 2024, Ukraine ranked 105th out of 180 countries in the Corruption Perceptions Index [11]. At the same time, challenges related to regulatory stability and the functioning of the judicial system remain relevant. These factors created obstacles to the inflow of investment even before the full-scale war [12]

and continue to affect the level of confidence on the part of investors. DEC entrepreneurs also face limited access to financing: lack of their own funds and difficulties in obtaining loans significantly reduce the investment activity of enterprises. In wartime conditions, commercial loans have become more expensive and less accessible, and the investment insurance market has practically ceased to function [11].

No less a problem is the low innovative activity in the DEC economy. The share of research and development spending remains consistently low, or about 0.33 % of GDP in 2022 [1], which lags significantly behind global standards and is reflected in modest indicators of the introduction of new technologies. Most enterprises are focused on survival, not on innovation, which is why DEC ranks relatively low in global innovation potential rankings. Among the key reasons for this situation are the lack of financial resources and effective state incentives, the imperfection of the legislative framework and the low innovation potential of the industrial sector. In addition, the technical and technological base of many industries is outdated, and the outflow of highly qualified specialists abroad due to the war only reinforces these negative trends [13].

These issues demonstrate the complex and multifaceted nature of the influence of military and domestic factors on investment and innovation development. However, the comprehensive impact of business on these processes during a protracted crisis remains understudied. Most existing studies focus separately on the investment climate or innovation activity, but there is a lack of work analyzing the role of the business sector as a driver of both developments during the current crisis.

The question of how entrepreneurship can simultaneously stimulate investment and generate innovation, especially in the presence of barriers such as corruption, regulatory instability, and financial constraints, as well as during military upheavals, remains understudied. This research gap complicates the development of a comprehensive economic recovery strategy that fully exploits the potential of the business sector [14].

The issue of the role of business in the formation of investment and innovation development is actively studied by foreign scientists. In domestic science, there is an increase in attention to the issues of entrepreneurial sustainability, investment attractiveness and innovation activity in conditions of prolonged crisis processes. Thus, Shapoval O. V. conducted a quantitative analysis of the dynamics of innovation in the industry during the pandemic and war [15]. The author proved that after the initial decline in economic activity, a gradual recovery of production was observed, but the level of radical innovations significantly decreased. The key barrier was not only the lack of finances, but also the lack of qualified personnel. Despite the high relevance of this study for understanding innovation dynamics, it focuses only on the industrial sector, without taking into account the influence of inter-industry differences.

Another direction is presented in the work by Riznyk D. V. [16], who studied the features investment activity after the start of a full-scale war. Using a comparative analysis for 2017–2022, the author revealed a radical change in the structure of investments: the IT sector became the most stable, while metallurgy and indus-

try experienced a deep decline. The article emphasizes the need to create conditions for investor protection and the development of new mechanisms for public-private partnership. Although the study is descriptive and short-term in terms of forecast, it clearly demonstrates the shift in the centers of investment activity during the crisis period. The issue of investment attractiveness in wartime is also discussed in the article by Abdullayeva A. E., Danylyuk V. V. and Mazur D. O. [17]. The authors focused on the factors that determine investors' decisions during hostilities, emphasizing the importance of macroeconomic stabilization, anti-corruption reforms, and the development of strategic sectors. Recommendations were developed for attracting international financial assistance and forming a post-war investment strategy. However, the study is of a survey nature and does not contain an empirical test of the proposed mechanisms.

In this context, the research of individual scientists who conducted a comprehensive analysis of the problems of innovation and investment development of enterprises in the post-war period is also important [18]. The authors emphasize the relationship between investments, financial results, and innovative business activity, identifying the main barriers: lack of financial resources, corruption, weak infrastructure, and personnel shortage. At the same time, the need for systematic state support for innovative business is emphasized. The limitation of the study is mainly a macro-level analysis without detailing the impact by economic sector.

In foreign literature, the problem of the role of business in innovative development is also studied from various aspects. Trunschke M., et al. [19] conducted a large-scale empirical study of the consequences of the COVID-19 pandemic for the innovative activity of German companies. Based on the difference-in-differences method, it is proven that firms that suffered significant losses from the pandemic reduced R&D spending by 4.7–5.4 % over three years, which led to the so-called “long COVID” effect in the field of innovation. The authors demonstrate how crises shift business priorities from innovation to survival, but acknowledge that the results may differ depending on the type of economy and its institutional maturity.

A theoretical generalized model of the impact of innovation on economic growth was proposed by Ismail S. and Sidek N. [20]. They prove that innovative activity increases national competitiveness, stimulates the inflow of investments and creates new jobs. At the same time, the authors recognize that most of the empirical evidence comes from developed countries, therefore, adapted mechanisms for implementing innovation policy are needed for economies experiencing a crisis.

A significant addition is a study in which a panel analysis of 70 countries was conducted based on data from the Global Entrepreneurship Monitor and the World Bank [21]. The results showed that only four factors significantly affect the development of entrepreneurship: economic growth rates, foreign direct investment inflows, economic openness and the level of consumer spending. This confirms the key role of the investment environment as a prerequisite for business innovation activity. However, the study does not take into account recent global shocks and has limited relevance for countries with military risks.

In general, modern scientific research shows that the business sector is one of the central factors of investment and innovation development, but its influence is determined by the external environment. DEC works emphasize that in crisis conditions, entrepreneurship demonstrates adaptability, but faces systemic obstacles – from corruption to personnel shortages. Foreign authors prove that in periods of global upheavals, business tends to reduce innovation spending, which threatens long-term growth. At the same time, the general trend shows that reinvesting own resources and partnership between the state and business are the key to forming a sustainable knowledge economy. The unique role of small and medium-sized enterprises in the development of innovation is based on their distinctive features: flexibility, mobility, speed of decision-making, the ability to effectively adapt to changing conditions, and their ability to promote a creative atmosphere due to a typically small team environment [9]. As a result, the entire cycle from “invention to innovative product” is significantly shortened. However, due to limited financial resources, most small and medium-sized enterprises do not generate new knowledge – even in the most developed countries. This area remains the prerogative of large enterprises and the state. At the same time, developed countries have long understood that from the point of view of national innovative development it is advisable to integrate small, medium and large businesses into a single innovation cycle. In this cycle, small enterprises generate new scientific and technical developments, medium-sized enterprises bring them to the industrial stage, and large companies are responsible for mass production of innovative products.

This type of cooperation is beneficial for both business and the state. Small and medium-sized enterprises gain access to additional resources necessary for growth and expansion, the creation of new jobs, access to financial resources and the ability to increase sales. Large enterprises, in turn, are not obliged to produce every component that is included in their final product. Moreover, as the experience of developed countries shows, small and medium-sized enterprises are more focused on innovation and tend to introduce new knowledge and technologies faster. In contrast, large companies, due to higher risks and significant costs, introduce new developments much more slowly [22].

The unstable and low share of innovative enterprises indicates a lack of long-term incentives for businesses to innovate. This confirms the need to expand government support programs, provide tax incentives, and provide grants to stimulate enterprise innovation.

In general, industrial enterprises play an important, but currently quite limited role in the development of innovations. However, given the critical importance of innovations for the country's economic growth, enterprises should pay more attention to promoting innovations, and the state should actively support these efforts. This is equally important both during the war and in the post-war period.

In this context, the opinion of Krykun V. is particularly relevant. He notes that “innovative entrepreneurship itself can serve as a way to restore the economy and entrepreneurial potential in difficult times, ensure the development of business activity, attract investment, strengthen

the country's investment attractiveness and support the innovation-oriented path of development" [23].

Thus, despite a significant amount of research, the mechanisms of the relationship between business activity indicators, investment attractiveness and innovation potential in prolonged crisis conditions remain insufficiently studied. It is this gap that justifies the need for a comprehensive analysis of the role of business in managing investments and innovations at the macro level, which constitutes the scientific novelty of this study.

The purpose of the article is to conduct a comprehensive analysis of the results of business activities on investment attractiveness and innovative development in the country. The study aims to assess how key indicators of business activity affect the dynamics of national investments, and to assess the potential of the business sector, in particular small and medium-sized enterprises, to promote innovation-driven growth. Based on this analysis, the article also offers practical recommendations for strengthening cooperation between business and government to enhance both the investment and innovation efficiency of the national economy.

The objectives of the article are:

- generalization of theoretical approaches to determining the role of business in the formation of investment attractiveness and innovative development;
- analysis of the dynamics and trends of business activity in times of crisis; assessment of the potential of small and medium-sized businesses as a driver of post-war economic recovery;
- identification of barriers that hinder the investment and innovative activity of enterprises;
- formation of practical recommendations for increasing the effectiveness of interaction between business and the state in ensuring sustainable economic growth.

Methods. Before assessing how business affects investment and innovation, it is important to assess the current business environment, namely, the context that shapes entrepreneurial activity, sustainability and sectoral dynamics of positive indicators.

The business environment is the set of institutional, legal, economic and infrastructural conditions within which enterprises conduct their business activities. It includes the regulatory framework, tax policy, access to finance, the quality of public services, legislation and market competition. These factors can both facilitate and constrain activity and strongly influence investment and innovation decisions [24].

In developing countries, the business environment is still being shaped by both external and internal pressures by 2025. The prolonged war in Eastern Europe disrupted supply chains, reduced export opportunities and caused partial deindustrialization in several regions. Despite this, some reforms have cushioned the blow for DEC – notably the digitalization of public services through Diya and donor-funded grants for small and medium-sized enterprises. Together, these steps have led to modest improvements in overall conditions.

A favorable business environment not only reflects the economy as a whole; it also fosters entrepreneurship, increases productivity, and supports macroeconomic stability. This is important for attracting domes-

tic and foreign investment, developing technology, and supporting long-term sustainable growth.

The situation continues to change against a backdrop of protracted conflict and ongoing uncertainty. After a significant contraction of 28.8 % in 2022, DEC GDP grew by 5.3 % in 2023 and 2.9 % in 2024, suggesting a gradual recovery [25]. But it is tempting to believe that such improvements are not driven solely by inflation. Business formation has not yet returned to pre-war levels: the number of large and medium-sized enterprises has decreased, while the number of registered small and micro enterprises (FOPs) has remained almost unchanged – 1.93 million in 2014 and 1.91 million in 2023 [1]. Despite the upward trend since 2023, it is still too early to call this a recovery. Structural problems, security risks and uneven regional development still affect business activity across the country.

As of December 2024, the Business Activity Index (BAI) of DEC was 36.9 out of 100. It has been steadily declining throughout the year – 43.7 in May, 39.9 in August and reached a low in December – reflecting growing uncertainty caused by persistent security threats, limited access to finance and volatile demand. This trend indicates cautious strategic planning and reluctance to invest or diversify production [26]. Fig. 1 presents a visualization of the dynamics of BAI from 2020 to 2024.

The decline in the Business Activity Index in recent years largely reflects weaker consumer demand. Almost half of the businesses surveyed (49 %) cited falling demand as their main concern; 43 % reduced production in response, while 40 % managed to maintain production at a stable level despite the more challenging conditions. These figures highlight how sensitive businesses are to fluctuations in demand and broader volatility, and suggest that they do not expect the economy or business climate to improve in the near term [26].

The index is important because it summarizes general economic conditions, investment attractiveness and global competitiveness. It also serves as a diagnostic tool, identifying weaknesses in the business environment, such as excessive bureaucracy, low transparency or limited access to finance, which require targeted policy changes to support private sector recovery and growth [27].

In these circumstances, investment and innovation are crucial for the revitalization and growth of DEC entrepreneurship. Investment refers to capital directed toward productive assets and supporting sectors such as logistics, trade, digital technologies, infrastructure, and social services.

In the Eastern European region, both domestic and foreign investors continue to invest primarily through loans and direct investments, each of which has different risks, controls and strategic implications, with direct investments remaining more prevalent [28].

In 2024, the Investment Attractiveness Index increased slightly to 2.49, compared to 2.44 in 2023, but remained below the neutral mark of 3.0, which means that the Investment Attractiveness Index is still considered high-risk for forecasting based on its level. The growth signals cautious optimism linked to individual reforms and targeted support, but persistent security, legal, and economic hurdles continue to weigh on sentiment [3]. Despite this, there is a need for continued reform to restore investor confidence.

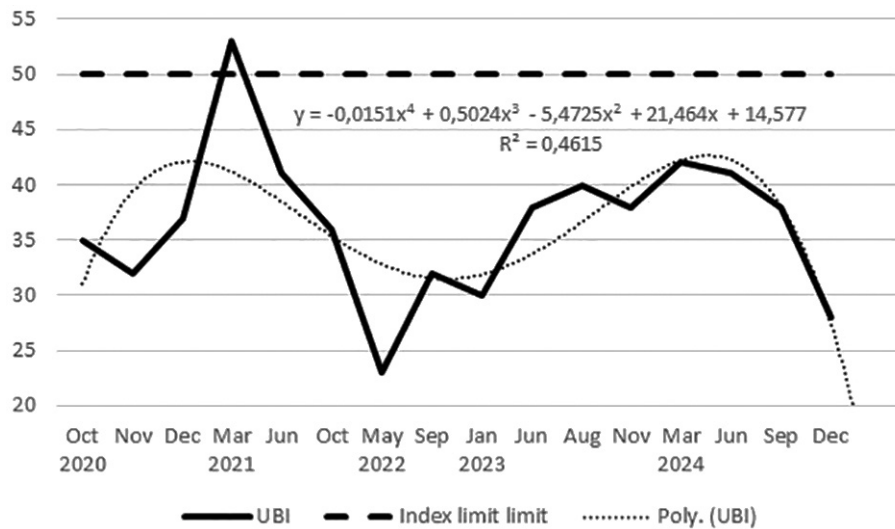


Fig. 1. Dynamics of the Business Activity Index of from 2020 to 2024

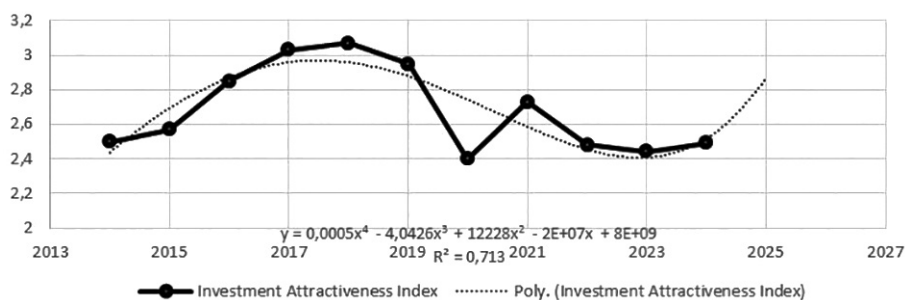


Fig. 2. Dynamics and forecast of investment attractiveness of from 2014 to 2026

Fig. 2 shows the dynamics of the investment climate from 2014 to 2024.

As shown in Fig. 2, the investment attractiveness index peaked in 2018 at 3.07 out of 5. This was followed by a sharp decline in 2019–2020 due to the global impact of the COVID-19 pandemic. Despite a slight recovery in 2021, the onset of a full-scale pandemic in 2022 led to another significant decline. However, positive trends have been observed since 2024. These improvements are largely due to EU candidate status, the abolition of tariffs and quotas on DEC exports, the introduction of a “visa-free regime for transport” with the EU, and significant progress in the digitalization of public services and integration into the EU’s common energy system, all of which have helped to restore investor interest and improve the country’s overall economic prospects [29].

At the same time, business investment, as a key factor in national economic development, is constrained by a number of internal and external challenges affecting DEC economy, legal system, political landscape, and global competitiveness:

Ongoing aggression remains the biggest barrier. It destroys infrastructure, causes civilian casualties, and elevates risk – severely undermining investor confidence.

1. Corruption remains a serious problem for foreign investors. Weak judicial independence, bureaucracy, and limited transparency in government decision-making undermine trust in public institutions.

2. Despite successful recent reforms, frequent and unpredictable tax changes create legal uncertainty and disrupt long-term investment planning.

3. Instability in the energy sector, driven by constant Russian missile strikes, further worsens the business climate.

4. Lack of access to financing, reflected in high interest rates and banks’ low risk appetite for small and medium-sized enterprises, and in particular, underdeveloped investment instruments, slow growth and hinder a broader recovery [30].

Despite these obstacles, several sectors remain resilient and attractive for investment. The technology industry is experiencing a strong recovery. Thus, AVentures Capital reports heavy industry investment of \$462 million in 2024 – a 120 % increase from 2023 – a return to the pre-war level of 2021 and a signal of confidence in the country’s innovative potential and digital ecosystem. Defense is also gaining momentum. Investments in this area reached \$59 million in 2024 (13 % of all business investment), including \$18 million in venture capital and \$41 million in grants [31]. This demonstrates growing support for defense innovation and the strategic need to strengthen the military-industrial base.

Investments are generated not only by foreign sources but also by domestic enterprises, which significantly support GDP and the long-term development prospects of the domestic economy. Even during the war, local businesses continue to invest. Nevertheless, investment remains insufficient, at 17 % of GDP in 2023 – below the 20 % required for sustainable growth. However, there is significant private sector participation. The 20 largest domestic investors poured nearly \$5 billion into the economy in 2022–2023, with total

investment growing by 33 % in 2023 compared to the same period last year [32].

Thus, business activity continues to drive investment, particularly in technology and defense, demonstrating resilience, adaptability, and the ability to attract capital even during times of war. To maintain and strengthen this momentum, DEC must prioritize a stronger regulatory framework, reduce bureaucracy, and intensify anti-corruption efforts. If implemented effectively, these steps can restore trust and unlock the country's full potential as an investment destination, attracting more domestic and foreign capital for reconstruction and long-term, sustainable growth.

The link between business activity and national investment development can be formalized econometrically (equation for the model specification)

$$I = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon,$$

where I is the country's investment development; X_1 is the added value of the business sector; X_2 is the total income of large, medium and small enterprises; X_3 is the business's own investment in development; X_4 is the profit of enterprises before tax; ε is the model error (residual);

The model shows which business-sector efficiency indicators drive national investment and provides an empirical framework to quantify the sector's contribution to DEC's economic recovery.

The country's investment development can be quantified by calculating the percentage ratio of capital investment to gross domestic product (GDP). This indicator reflects the share of total capital investment in the national economy and serves as a key indicator of the country's investment intensity. The formula is as follows [13]

$$I = \frac{\text{Capital Investments}}{\text{GDP}} \cdot 100\%,$$

where I is the country's Investment Development Indicator (in percent); *Capital Investments* is the total value of fixed capital investments during the reporting period; *GDP* is the gross domestic product for the same period.

This ratio allows you to track the dynamics of investments relative to the scale of economic activity and is widely used for international comparisons and policy evaluation.

Table 1

Investment development, 2014–2024

Year	Capital investments, UAH billion	GDP, UAH billion	Investment development indicator, %
2014	204.06	1,586.92	12.86
2015	251.15	1,988.54	12.63
2016	326.16	2,385.37	13.67
2017	412.81	2,981.23	13.85
2018	526.34	3,560.30	14.78
2019	584.45	3,977.20	14.69
2020	419.84	4,222.03	9.94
2021	528.80	5,450.85	9.70
2022	279.60	5,239.11	5.34
2023	395.45	6,627.96	5.97
2024	534.42	7,658.7	6.98

Results. Let us calculate the indicators of the country's investment development for the period 2014–2024 (Table 1).

According to the State Statistics Service, we will also show the values of indicators X_1 (Value added of the business sector), X_2 (Enterprise income), X_3 (Own business investments in development) and X_4 (Enterprise profit before tax) (Table 2).

Between 2014 and 2024, four key indicators of business activity – value added, corporate income, corporate development investment, and pre-tax profit – generally demonstrated upward momentum, with two major slowdowns in 2020 due to COVID-19 and a sharp decline in 2022. Value added and income proved more resilient, as companies adjusted prices and production volumes during these periods. Conversely, corporate investment was more risk-sensitive. However, after a sharp decline in 2022, its recovery was slow and cautious, as companies prioritized liquidity. Pre-tax profit was cyclical, rising during booms and falling during downturns, which indirectly impacted reinvestment.

Corporate investment (X_3) demonstrates the strongest correlation with the capital investment to GDP ratio. As X_3 increases, overall investment intensity increases. Conversely, if revenues and value-added increase without proportional reinvestment, the denominator

Table 2

Values of indicators X_1 , X_2 , X_3 and X_4 in 2014–2024

Year	Added value of the Business sector, UAH billion (X_1)	Enterprise income, UAH billion (X_2)	Own business investments in development, UAH billion (X_3)	Profit before tax of enterprises, UAH billion (X_4)
2014	1,038.41	641.40	178.38	233.62
2015	1,293.60	598.92	213.48	387.65
2016	1,396.29	879.67	281.67	443.01
2017	1,805.59	936.71	359.16	593.17
2018	2,257.30	1,267.88	471.12	668.89
2019	2,510.66	1,529.57	524.47	869.64
2020	2,973.64	1,583.47	398.48	673.98
2021	3,140.86	1,843.05	536.34	1,266.46
2022	4,431.36	1,892.65	336.22	724.69
2023	3,673.57	2,919.24	505.52	1,053.64
2024	3,776.40	3,057.24	565.23	1,125.41

effect pushes I downward and weakens investment-led development.

Regression results for 2014–2024 (Excel) indicate a very strong fit and reliability: $R^2 = 0.9899$ (98.99 % of the variation in I explained by X_1 – X_4), with an adjusted $R^2 = 0.9818$ confirming robustness. Predicted values closely track actuals, demonstrating high predictive accuracy. The results of the statistical significance test further confirmed the validity of the model. The F-statistic was 122.45 with a significance level of $3.57 \cdot 10^{-5}$, which is well below the standard threshold of 0.05. This allows us to confidently reject the null hypothesis that all coefficients are zero. Therefore, at least one of the variables X_1 – X_4 has a significant impact on the investment development indicator, and together they form a reliable predictive equation.

The evaluation of individual variables showed that all four independent variables are statistically significant, with p -values below 0.01. The constant (intercept) is 12.6945, which represents the baseline level of investment development in the hypothetical case where all X variables are equal to zero. It is noteworthy that the coefficients for X_1 , X_2 and X_4 are negative, while the coefficient for X_3 is positive. This indicates that an increase in the value added by the business sector, total enterprise income and profit before tax are associated with a slight decrease in the investment to GDP ratio. In contrast, an increase in enterprises' own investment in development (X_3) has a positive effect on this ratio. The most influential factor is X_3 , the coefficient of which is almost an order of magnitude larger than the others.

Negative coefficients for X_1 , X_2 , and X_4 may reflect an indirect effect: increases in these variables often coincide with increases in GDP (the denominator in the formula for I), or, in the case of pretax profit (X_4), funds may be distributed or retained rather than reinvested. Conversely, when firms allocate more resources directly to development, this increases capital investment without an immediate proportional increase in GDP, thereby increasing the share of investment.

Thus, the final form of the investment-development model can be written as

$$I = 12.6945 - 1.59 \cdot 10^{-9} \cdot X_1 - 3.25 \cdot 10^{-9} \cdot X_2 + 3.06 \cdot 10^{-8} \cdot X_3 - 6.50 \cdot 10^{-9} \cdot X_4 + \varepsilon,$$

where I is the investment growth rate (in percent); X_1 – X_4 are measured in hryvnias, and ε is the residual error term.

To better understand the relationship between business activity and investment growth, we used the final

regression model to calculate how the investment growth rate (I) changed from 2014 to 2024. We also extended the trend to forecast values for 2025 and 2026. These results are shown in Fig. 3.

As shown in Fig. 3, the investment-to-GDP ratio fluctuated between 2014 and 2024. It was around 12.9 % in 2014, declined in 2015, and then peaked at around 14.8 % in 2018–2019. It subsequently declined to around 13.9 % and fell sharply to 9.9 % in 2020 and 9.7 % in 2021, before reaching an all-time low of 5.3 % in 2022. Thereafter, there was a slight recovery – 5.97 % in 2023 and 6.98 % in 2024, still significantly below pre-2020 levels.

The dotted line in Fig. 3 shows the forecast for the Investment Development Indicator beyond 2024, significantly expanding the current dynamics of indicators X_1 – X_4 (Table 2). Simple extrapolation indicates a further decline to 5.8 % in 2025 and 4.9 % in 2026, below the critical level of 2022. These forecasts indicate that without changes in fundamental indicators, the share of investment will continue to decline. Increases in production and various types of income (X_1 , X_2 , X_4) alone are unlikely to increase the coefficient for investment from other variables. Reversing this trend requires targeted measures, particularly increasing enterprise equity investment, provided favorable policies are implemented. Otherwise, investment levels may continue to decline, which will have implications for long-term growth.

The regression results confirm the situation where the model's key business indicators have a significant impact on national investment, and enterprise equity investment has the strongest impact on increasing the investment-to-GDP ratio. Despite the difficulties, business continues to have a positive impact on investment development in DEC. Its resilience and ability to attract capital under pressure signal real potential for recovery. To maintain and strengthen this influence, legislation must be improved, bureaucracy reduced, and anti-corruption efforts strengthened. A more transparent environment will likely attract both domestic and foreign investment, supporting recovery and sustainable growth.

Conclusions. This paper substantiates a parsimonious, transparent way to quantify how business activity shapes a country's investment-led and innovation-driven development. Using an integral indicator of investment development (capital investment to GDP) and a multifactor regression on four canonical business variables (value added, revenue, firms' own investments, and pre-tax profit), the approach avoids arbitrary weight-

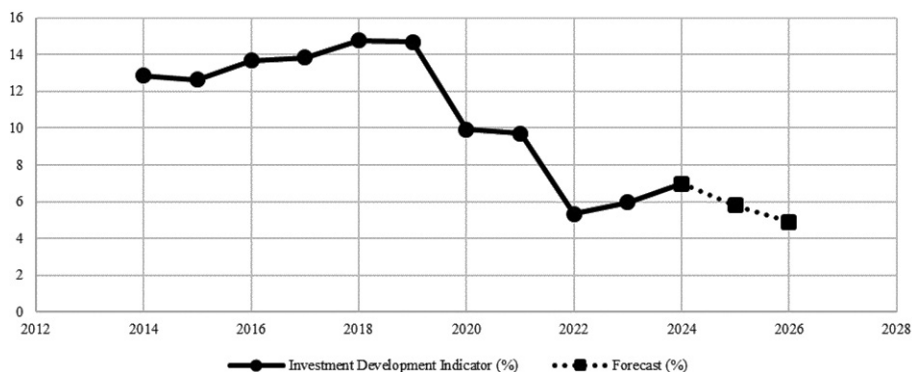


Fig. 3. Calculated investment development indicator (I) for 2014–2024 and forecast for 2025–2026

ing – marginal effects are learned from data rather than imposed – and relies only on official statistics. The results confirm the decisive role of reinvestment: increases in firms' own development spending most reliably raise the investment share in GDP, while purely income-side gains, absent reinvestment, do not. The empirical trajectory and baseline forecast underscore that, without policy shifts that amplify reinvestment, investment intensity risks remaining below pre-shock levels.

The choice of indicators – grounded in widely available, verifiable measures of business performance – provides a consistent basis for an integral assessment that is simple, unified, and reproducible. The methodology is harmonized across scales (firm, sector, region, and national economy) and can be implemented with standard analytical tools, enabling managers and policymakers to translate diagnostics into operational and strategic decisions (capital planning, reinvestment policies, and innovation partnerships) aligned with post-conflict recovery priorities.

As an outcome of the diagnostic work, the integral assessment can serve as the accounting-and-analytical backbone for monitoring dashboards and for extended (non-financial) corporate and sector reports that incorporate investment and innovation metrics relevant to external and internal stakeholders. This, in turn, supports evidence-based prioritization of incentives that reward productive reinvestment and crowd in private capital to innovation pipelines.

Prospects for further research include extending the model to panel designs by sector and region, testing robustness to structural breaks and alternative deflators, enriching the indicator set with innovation outputs (for example R&D, patents, and TFP) alongside expectations data, and developing a standardized reporting protocol that links firm-level reinvestment to macro-level investment intensity and innovation outcomes.

References.

1. State Statistics Service of Ukraine (2025). *National accounts of Ukraine for 2022–2024*. State Statistics Service of Ukraine. Retrieved from <https://www.ukrstat.gov.ua>
2. National Bank of Ukraine (2024). *Inflation report: July 2024*. National Bank of Ukraine. Retrieved from <https://bank.gov.ua>
3. European Business Association (2025). *Investment attractiveness index of Ukraine*. European Business Association. Retrieved from <https://eba.com.ua>
4. Zayed, N. M., Mohamed, I. S., Islam, K. M. A., Perevozova, I., Nitsenko, V., & Morozova, O. (2022). Factors Influencing the Financial Situation and Management of Small and Medium Enterprises. *Journal of Risk and Financial Management*, 15, 554. <https://doi.org/10.3390/jrfm15120554>
5. Nitsenko, V., Ivashchenko, A., Radko, V., Sereda, V., Kuzmenko, O., & Dimov, I. (2024). Financial Potential for Expanding the Opportunities of a Small Enterprise Under the Conditions of Sustainable Development. *Financial and Credit Activity Problems of Theory and Practice*, 6(59), 261–272. <https://doi.org/10.55643/fcaptop.6.59.2024.4524>
6. Tomakh, V. V. (2020). The impact of enterprises' innovation activity on the development of Ukraine's national economy. *Business Inform*, 4, 96–102. <https://doi.org/10.32983/2222-4459-2020-4-96-102>
7. Hryshko, A., & Melnyk, A. (2020). Prospects for the development of enterprises' innovation activity in Ukraine. *Scientific Notes of V. I. Vernadsky Taurida National University. Series: Economics and Management*, 2, 178–184.
8. Zbarsky, V. K., Trusova, N. V., Sokil, O. H., Pochernnina, N. V., & Hrytsaienko, M. I. (2020). Social and economic determinants for the development of resource potential of small forms of agrarian production in Ukraine. *Industrial Engineering & Management Systems*, 19(1), 133–142. <https://doi.org/10.7232/iems.2020.19.1.133>
9. Brezhnieva-Yermolenko, O., Hanzhiuk, S., Gurzhiy, T., Nitsenko, V., & Mazur, Yu. (2025). Development of the financial monitoring system to increase the level of financial security of Ukraine in the conditions of threats. *Economics of Development*, 24(2), 103–112. <https://doi.org/10.63341/econ/2.2025.103>
10. AVentures Capital (2024). *Tech Ecosystem Overview: Ukraine 2024*. Retrieved from <https://aventurescapital.com/>
11. Transparency International (2024). *Corruption perceptions index 2024*. Retrieved from <https://www.transparency.org/en/cpi/2024/index/ukr>
12. Ministry of Finance of Ukraine (2025). *Budget performance and government borrowing*. Retrieved from <https://mof.gov.ua>
13. Organisation for Economic Co-operation and Development (2025). *SMEs and innovation in Eastern Europe and Central Asia*. OECD. Retrieved from <https://www.oecd.org>
14. Matyushenko, I., Hlibko, S., Petrova, M., Khanova, O., Loktionova, M., & Trofimchenko, K. (2021). Assessment of technological competitiveness of Ukraine in terms of association with the EU. *Economic Studies (Ikonomicheski Izsledvania)*, 30(7), 148–176.
15. Shapoval, O. V. (2025). Assessment of the innovation dynamics of Ukraine's industrial sector under crisis conditions. *Business Inform*, 3, 129–137. <https://doi.org/10.32983/2222-4459-2025-3-129-137>
16. Riznyk, D. (2023). Investment activity in Ukraine after the full-scale invasion of Ukraine. *Economy and Society*, 48. <https://doi.org/10.32782/2524-0072/2023-48-60>
17. Abdullayeva, A., Danyliuk, V., & Mazur, D. (2025). Prospects investment attractiveness under martial for Ukraine's law and during post-war recovery. *Economy and Society*, 72. <https://doi.org/10.32782/2524-0072/2025-72-44>
18. Berdar, M., Kot, L., Martyniuk, L., Yevtushevska, O., & Sapa-chuk, Y. (2024). Challenges and prospects of innovation and investment development of enterprises in the post-war period. *Economics of Development*, 23(2), 27–37. <https://doi.org/10.57111/econ/2.2024.27>
19. Trunschke, M., Peters, B., Czarnitzki, D., & Rammer, C. (2024). Pandemic effects: Do innovation activities of firms suffer from long COVID? *Research Policy*, 53(7), 104957. <https://doi.org/10.1016/j.respol.2024.104957>
20. Ismail, S., & Sidek, N. Z. M. (2025). The role of innovation in driving economic growth: A conceptual framework. *International Journal of Research and Innovation in Social Science (IJRISS)*, 9(8), 6750–6759. <https://doi.org/10.47772/IJRISS.2025.908000554>
21. Mai, T. L., Tran, V. T., Phan, T. T., Nguyen, K. N., & Nguyen, Q. T. T. (2025). Impact of macro factors on country-level entrepreneurship: Evidence from an empirical panel data study. *Humanities and Social Sciences Communications*, 12, 778. <https://doi.org/10.1057/s41599-025-05034-0>
22. State Enterprise “Ukrainian Institute of Intellectual Property” (UIIP) (2022). *The role of small and medium-sized enterprises in the development of an innovation economy*. UIIP. Retrieved from <https://iuii.ua/uk/rol-malih-ta-serednih-pidpriemstv-v-rozvitku-inovatsiynoyi-ekonomik>
23. Krykun, V. V. (2024). Innovative development of Ukraine: Main priorities and prospects. *Achievements of the Economy: Prospects and Innovations*, 10. <https://doi.org/10.5281/zenodo.13896011>
24. Pikulik, O. I. (2021). Business environment in Ukraine: problems and prospects for development. *Ekonomika ta pidpriemnytstvo*, (2), 23–26.
25. Samoyliuk, M. (2025). Tracker of Ukraine's economy during the war. *Center for Economic Strategy*. Retrieved from <https://ces.org.ua/tracker-economy-during-the-war/>
26. Center for Innovations Development (2024). *State and needs of business in Ukraine: results of the survey in December 2024*. Center for Innovations Development. Retrieved from <https://cid.center/en/analytics/stan-ta-potreby-biznesu-v-ukrayini-rezultaty-doslidzhen-nya-u-grudni-2024-roku-en-translation/>
27. Momot, V. Ye., & Lytvynenko, O. M. (2023). Modeling changes in domestic business activity under war conditions. *Academic Review*, 2(59), 173–189. <https://doi.org/10.32342/2074-5354-2023-2-59-12>
28. Sokil, O., Kucherikova, S., Kostyakova, A., Podolchak, N., Sokil, Y., & Shkvyria, N. (2022). The context of ‘globalization versus localization’ after the world pandemic and quarantine. *S. G. Yaseen (Ed.), Digital Economy, Business Analytics, and Big Data Analytics Applications*, 1010, (pp. 111–123). Springer. https://doi.org/10.1007/978-3-031-05258-3_8
29. Ukraine Invest (2025). *Investment climate in Ukraine improves: 70% of surveyed companies plan to invest despite the war*. Ukraine Invest. Retrieved from <https://ukraineinvest.gov.ua/news/investycziynij-kli-mat-v-ukrayini-pokrashhuyetsya-70-opytanyh-kompanij-inves-tuvatymut-v-ukrayinu-popry-vijnu/>

30. UNBA Office (2025). *Investment climate in Ukraine: Challenges and prospects for 2025*. UNBA Office. Retrieved from <https://unba.org.ua/publications/print/9914-investicijni-klimat-v-ukraini-vikliki-ta-perspektivi-2025-roku.html>

31. Nesenjuk, A. (2025). The tech sector returns to 2021 levels – AVentures Capital: How much investment Ukrainian startups attracted. *Forbes Ukraine*. <https://forbes.ua/news/tehnologichnij-sektor-povertaetsya-na-riven-2021-go-aventures-capital-skilki-investitsiy-zaluchili-ukrainski-startapi-03032025-27673>

32. [Texty.org.ua](https://texty.org.ua) (2025). *Who are the biggest wartime investors and what is the share of investments in Ukrainians GDP – study*. Retrieved from <https://texty.org.ua/fragments/112449/hto-ye-najbilshymy-investoramy-voyennoho-chasu-i-yakoyu-ye-chastka-investycij-u-vvp-ukrayiny-doslidzhennya/>

Оцінка ролі бізнес-сектору в інвестиційній привабливості й розвитку інновацій

М. Амарат*¹, О. Г. Сокіл², Я. С. Сокіл³,
С. О. Кучеркова³, А. А. Костякова³, І. М. Бойко⁴

1 – Університет Ал-Балка, м. Ал-Салт, Йорданія

2 – Національний університет «Львівська політехніка», м. Львів, Україна

3 – Таврійський державний агротехнологічний університет імені Дмитра Моторного, м. Запоріжжя, Україна

4 – Національний університет «Одеська політехніка», м. Одеса, Україна

* Автор-кореспондент e-mail: amarat.univder@bau.edu.jo

Мета. Проведення комплексного аналізу впливу підприємницької діяльності на інвестиційну привабливість та інноваційний розвиток України.

Методика. Включає теоретичний огляд і контент-аналіз індикаторів бізнес-середовища, побудову багатофакторної регресійної моделі інвестиційної інтенсивності як функції доданої вартості, доходів, власних інвестицій і прибутку підприємств за даними 2014–2024 рр., перевірку вірогідності (R^2) прогнозів трендів-екстраполяції.

Результати. Комплексний аналіз діяльності бізнес-сектору підтвердив його вирішальний вплив на інвестиційну привабливість та інноваційний розвиток країни. Розроблена модель пояснює близько 99 % варіації показника Індикатора інвестиційного розвитку, підтверджуючи домінуючу роль реінвестування у формуванні частки інвестицій у ВВП. Частка інвестицій у ВВП знизилася до 5,3 % у 2022 р., частково відновилася до 6,98 % у 2024 р., але без суттєвих втручань може зменшитися до 5,8 % (2025) і 4,9 % (2026). Індекс інвестиційної привабливості в Україні покращився, проте лишається нижчим за нейтральний рівень, а бізнес-очікування у 2024 р. лишаються пригніченими.

Наукова новизна. Запропонована інтегрована модель, що кількісно пов'язує показники ділової активності з інвестиційною інтенсивністю економіки й емпірично підтверджує домінуючу роль реінвестування у формуванні капіталу. Поєднані регресійний аналіз із показниками ділової активності та секторальними індикаторами, що дозволяє глибше оцінити взаємозв'язки між бізнес-поведінкою, інвестиційними потоками й інноваційним розвитком.

Практична значимість. Рекомендації, запропоновані в роботі, корисні для менеджерів бізнесу із довгостроковим плануванням капіталовкладень, розробки політик реінвестування й партнерств з університетами та донорськими інституціями. Реалізація цих підходів підвищить інвестиційний та інноваційний потенціал підприємств, сприятиме відновленню національної економіки й посиленню стійкості бізнес-середовища у післявоєнний період.

Ключові слова: *бізнес, економічне моделювання, інноваційна діяльність, економічне зростання*

The manuscript was submitted 18.07.25.