

GULIAIEVA Nataliia

 <https://orcid.org/0000-0002-7184-0803>

PhD (Economics), Professor,
Professor of the Department
of Economics and Business Finance
State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine
n.gulyaeva@knute.edu.ua

VAVDIICHYK Iryna

 <https://orcid.org/0000-0002-2787-0327>

PhD (Economics),
Associate Professor,
Associate Professor of the Department
of Economics and Business Finance
State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine
i.vavdiichyk@knute.edu.ua

MELNIK Victoria


 <https://orcid.org/0000-0001-5512-536X>

PhD (Economics),
Associate Professor,
Associate Professor of the Department
of Economics and Business Finance
State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine
v.melnyk@knute.edu.ua

**INVESTMENT DETERMINANTS
OF SUSTAINABLE
DEVELOPMENT AND
COMPETITIVENESS IN TRADE**

In defining the strategic role of the trade sector, especially under the conditions of the full-scale invasion by the Russian Federation, it is important to emphasize the significance of investment activity as a key instrument for preserving and strengthening competitiveness and ensuring sustainable economic development both overall and at the level of individual business units. The study is based on the hypothesis that investment activity is a key driver of sustainable economic development and of strengthening the competitiveness of Ukrainian trade enterprises, an integral component of strategic business models, and a modulator of their contemporary development trajectory. Under a favorable investment strategy, these interrelations become not only a foundation of

ГУЛЯЄВА Наталія

 <https://orcid.org/0000-0002-7184-0803>

д. е. н., професор,
професор кафедри маркетингу
Державного торговельно-економічного
університету
вул. Кіото, 19, м. Київ, 02156, Україна
n.gulyaeva@knute.edu.ua

ВАВДІЙЧИК Ірина

 <https://orcid.org/0000-0002-2787-0327>

к. е. н., доцент,
доцент кафедри економіки
та фінансів підприємства
Державного торговельно-економічного
університету
вул. Кіото, 19, м. Київ, 02156, Україна
i.vavdiichyk@knute.edu.ua

МЕЛЬНИК Вікторія

 <https://orcid.org/0000-0001-5512-536X>

к. е. н., доцент,
доцент кафедри економіки
та фінансів підприємства
Державного торговельно-економічного
університету
вул. Кіото, 19, м. Київ, 02156, Україна
v.melnyk@knute.edu.ua

**ІНВЕСТИЦІЙНІ ДЕТЕРМІНАНТИ
СТАЛОГО РОЗВИТКУ ТА
КОНКУРЕНТОСПРОМОЖНОСТІ
В ТОРГІВЛІ**

Визначаючи стратегічну роль сфери торгівлі особливо в умовах повномасштабного вторгнення РФ, підкреслено значення її інвестиційної діяльності як ключового інструменту збереження і зміцнення конкурентоспроможності, забезпечення її сталого економічного розвитку в цілому і в розрізі окремих бізнес-одиниць. Висунуто гіпотезу, що інвестиційна активність виступає ключовим інструментом сталого економічного розвитку та зміцнення конкурентоспроможності підприємств торгівлі України, є невід'ємною складовою стратегічних моделей сучасного бізнесу, модулятором траєкторії його сучасного руху. За умови сприятливої інвестиційної стратегії зазначені взаємозв'язки стають не лише основою стабільності, а й джерелом синергії, що здатна



stability but also a source of synergy that enhances the trade sector's resilience, ensures its integration into global value chains, and increases its social and economic efficiency. The study reveals the impact of investment on enterprise adaptability, innovation capacity, the achievement of sustainable economic development, and the strengthening of competitiveness during crisis periods affecting the country's economic system as a whole. To test the hypothesis, general scientific research methods were applied, including formalization, historical analysis, abstraction, general logical methods (analysis, synthesis, induction, and deduction), generalization, and ascent from the abstract to the concrete, along with specific social and economic methods based on the dialectical approach to understanding the essence of development processes in accordance with the object and subject of the study. The study draws on scientific works by domestic and foreign scholars on investment, sustainable economic development, and the formation and assessment of enterprise competitiveness, as well as materials from the State Statistics Service of Ukraine and the National Institute for Strategic Studies. The research analyzes indicators of the sustainable economic development of Ukraine's trade sector and characterizes a theoretical investment model for ensuring the competitiveness and sustainable economic development of trade enterprises under conditions of crisis distortions and the restoration of economic equilibrium in business activity.

Keywords: investment, trade sector, sustainable economic development, competitiveness, capital investment, innovation, performance, business unit, business processes, investment resources, investment risks.

JEL Classification: E22, L81, O11, R11.

Introduction

Trade is an organic component of a country's economy that performs the final stage of capital turnover within the system of social production by ensuring a functional connection between producer and consumer through the recognition of products' marketability and their movement across all segments of demand in the commodity market. It is precisely this functional completion of all stages of capital movement within the economic system that allows trade to be regarded not only as a specific mechanism for satisfying the basic consumer needs of the population, but also as a powerful economic element in gross domestic product formation, the budget process, and the solution of employment problems, thereby ensuring socio-economic stability.

посилювати стійкість торговельного сектору, забезпечуючи його інтеграцію у глобальні ланцюги створення нової вартості та підвищення рівня його соціально-економічної ефективності. Розкрито вплив інвестицій на адаптивність підприємств, їхню здатність до інновацій та забезпечення сталого економічного розвитку, зміцнення конкурентоспроможності у кризові періоди функціонування всієї господарської системи країни. Для перевірки гіпотези застосовано загальнонаукові методи дослідження: формалізація, історичний, абстрагування, загальнологічні (аналіз, синтез, індукції, дедукції), узагальнення і сходження від абстрактного до конкретного, специфічні соціально-економічні методи на базі діалектичного підходу пізнання сутності процесу розвитку відповідно до об'єкта і предмета. Інформаційною базою дослідження слугували наукові праці вітчизняних та закордонних науковців з проблематики інвестування, сталого економічного розвитку, формування та оцінки конкурентоспроможності підприємств, матеріали Державної служби статистики України, Національного інституту стратегічних досліджень. Проаналізовано індикатори сталого економічного розвитку торговельної галузі України, охарактеризовано теоретичну інвестиційну модель забезпечення конкурентоспроможності та сталого економічного розвитку підприємств торгівлі України в умовах кризових деформацій та відновлення економічної рівноваги у діяльності бізнесу.

Ключові слова: інвестиції, торговельна галузь, сталий економічний розвиток, конкурентоспроможність, капітальні вкладення, інновації, результативність, бізнес-одиниця, бізнес-процеси, інвестиційні ресурси, інвестиційні ризики.

Under martial law, the importance of trade has increased significantly due to the reassessment of its role as the main supplier of essential goods to the population, especially in frontline areas and combat zones, as well as a humanitarian actor in the implementation of social relations and state policy aimed at protecting the population in wartime.

The full-scale invasion of the Russian Federation into Ukraine caused significant deformation of the trade system, which at the beginning of the hostilities was characterized by a high level of quality in commodity supply to the population, as well as by the formation of the industry by economic entities with a practically optimal profile and specialization of activity. Product saturation, technological advancement in customer service, sound marketing justification of the main commodity strategies, material and logistical support, and the formation of commercial relations based on rationality, competitive advantages, and entry into new promotional formats and activities according to modern criteria of their own KPIs, as well as the modernization of models for assessing competitive positions in the external environment and trajectories of their development, formed a platform of resistance to destructive aggression and ensured the survival potential of the industry.

Even before the introduction of the legal regime of martial law, the survival potential of trade had been formed based on anti-crisis management models already in use, acquired adaptation mechanisms for force majeure scenarios, and state support, which introduced legislative and regulatory measures to strengthen motivation not only to preserve or restore lost positions, but also to return to strategic development ambitions. The state's efforts are tangible and aimed at forming a strategic roadmap for restoring the competitiveness of the Ukrainian economy in connection with its industrial structure, within which economic development as a process structurally covers the stages of preserving capacities, sustainable economic growth, and achieving competitive rates of economic development.

Accordingly, trade, as an important economic component, must follow this path and experience the effects of the investment multiplier and accelerator as objective mechanisms of investment support for economic development, reflected in the effectiveness of capital investment and the formation of potential for further investment. Investments as a key factor and instrument of sustainable development in modern economic systems are examined in studies by Ukrainian scholars, particularly in relation to global challenges, turbulence in the operating environment under martial law, competitive dynamics, and changes in assessment metrics and regulatory conditions. The attention of both foreign and domestic scholars is focused on individual factors that contribute to sustainable development and enterprise competitiveness.

The article by Cui and Brychko (2023) is devoted to a comprehensive analysis of the implementation of an entrepreneurial management style in the context of the sustainable development of enterprises and to the development of a new method for assessing the effectiveness of the investment process according to the innovation vector, taking into account the dynamic nature of external influences. The authors examine in detail the relationship between operational and

strategic innovation management, emphasizing the importance of integrating these components to ensure the effective functioning of the enterprise in the long term. The authors also note the systemic nature of the impact of innovations on enterprise activities, which necessitates the use of new methods for assessing their effectiveness and integrating the innovation block into the overall strategy of sustainable economic development. In general, the study shows that the coordination of operational innovations in the strategic dimension is a key condition for successfully ensuring the sustainable economic development of enterprises, and that a comprehensive approach to innovation management contributes to their effective implementation in line with current requirements and long-term market competitiveness.

Se and Lin (2022) investigated the impact of business organization efficiency on enterprise competitiveness and on the state of ensuring sustainable development. In particular, they analyzed the impact of sustainable development goals and investment strategies on the organizational efficiency of automobile companies in China and noted the mediating role of this factor in building the relationship between sustainable development goals, investment strategies, and overall organizational efficiency.

In the work of Gutierrez-Broncano et al. (2024), the concept and mechanism of the influence of a hybrid strategy on the performance of small and medium-sized businesses through the prism of innovation are revealed. The authors emphasize that the combination of different strategic approaches on an organic basis allows enterprises to respond promptly to external changes, in particular by strengthening innovation potential and increasing the efficiency of its functional implementation and, as a result, competitiveness. Particular attention is paid to the role of the ability to adapt quickly as a key factor in ensuring the sustainability of business models in a dynamic market environment. The conclusions presented in the article are recommendatory for Ukrainian trade enterprises, for which the implementation of innovative solutions and the development of adaptive competencies act as basic investment tools for ensuring sustainable development and strengthening competitive positions.

Kannan and Gambetta (2025) analyzed the impact of technology on the effectiveness of the sustainable development process in small and medium-sized enterprises. The authors identify key factors that determine the sustainable development of an enterprise: organizational context, technological capabilities, innovation, knowledge management, and practices for implementing a sustainable development strategy. The researchers emphasize that technology plays a leading role in the transformation of SMEs, ensuring the integration of the sustainable development process into the enterprise business model while increasing resource efficiency and strengthening competitive advantages.

In the same segment of scientific research, Gumenyuk and Tkachev (2024) focused on the features of financing the sustainable development of the country's economy as a whole and of its individual components, in particular in the context of the possibilities of using financial engineering products alongside the

widespread introduction of digital technologies, which should support intensive investment processes under traditional financial support schemes or in project financing models. The authors prove that emphasis on the investment approach to substantiating the basic principles of ensuring sustainable development of the system simultaneously ensures its economic, social, and environmental well-being.

Berdar et al. (2024) emphasize that the key factor in the recovery of the Ukrainian economy in the post-war period is investment with a strong innovative component. It is the innovative nature of future investments that should accelerate the economic development of individual business entities, contribute to a significant increase in labor productivity and job creation, form powerful competitive trajectories, and systematically bring the Ukrainian economy to strong competitive positions. Based on the analysis of the innovative activity of modern enterprises under conditions of military upheaval, the authors emphasize the role of state support and identify areas for its necessary strengthening in the proactive period and in the future.

It is in this context that the conclusions of Ustymenko (2024) are formed, who considers the active pragmatic position of the state in supporting small and medium-sized businesses at all levels of management, which implement investment support strategies along innovation trajectories, to be the main means of increasing the competitiveness and economic stability of Ukrainian enterprises under conditions of military upheaval. The author identifies the main barriers as limited access of enterprises to financial resources and the insufficient readiness of businesses to cooperate with innovation producers, both at the stage of ordering innovations and at the stage of implementing already developed projects. The low level of business communication throughout the functional environment acts as an inhibiting factor in the process of integration with international economic systems and markets, as well as in effective interaction with state institutions.

The same problem is considered by Atamas (2023), who analyzes the current state of investment activity in Ukraine, highlighting domestic and international aspects, the prospects for increasing the level of investment attractiveness of the economy, and the starting positions in this process today. The inclusion in a comprehensive analytical model of the problems of forming the investment potential of the economy based on the assessment of factors and main risks lends the author's conclusions scientific credibility and argumentative value in other areas of investment analysis.

Investments as the main way out of the crisis state of the Ukrainian economy are defined by Legkostup and Sainchuk (2022), who formulate the main tasks of this process in the direction of improving the investment climate, in particular through motivating and stimulating state influence.

The issues of the objective needs of the Ukrainian economy and the importance of foreign investment are convincingly and illustratively raised in the publication by Krekhivskyi and Salikhova (2022). They argue for the possibilities of foreign investment, emphasizing its ability to accelerate modernization processes and technological innovation as the basis for the

resource needs of Ukrainian business. The authors stress the need to include foreign investment in national development plans, which will contribute to the concentration of capital, including that of foreign investors, in ensuring post-war recovery and its direction toward industry, which generates a significant multiplier effect in the economy.

The issue of investment support for the processes of economic systems emerging from crisis, the formation of a stable basis for sustainable economic growth, and the development of the Ukrainian economy is actively covered in scientific journalism and in materials from scientific and scientific-practical conferences of various levels and scales, both in macroeconomic aspects and in a sectoral context, especially about individual economic units. While maintaining the general principle of the uniqueness of the investment dimension in the process of implementing development strategies, scholars focus on the features of such processes in different sectors of the economy: differences in the sources of generating net cash flows as returns on investments; the specifics of mobilizing investment resources; the nature of target functions and economic constraints in models for estimating the cost of attracting them and optimizing structure; as well as models for maximizing the effect of investments through optimally formed investment programs and in developing investment risk management policies, etc.

The results of modern scholarly understanding of sustainable economic development processes, as well as their active scaling and deepening, make it possible to assert that a new paradigm for managing these processes is being formed, within which there is an obvious need for scientific assessments and applied models of functional blocks for solving this main problem.

The article puts forward the hypothesis that investment activity is a key tool for sustainable development and for increasing the competitiveness of Ukrainian trade enterprises, an integral component of strategic models of modern business, and a modulator of the contemporary development trajectory. Under a favorable investment trajectory, these relationships become not only the basis of stability but also a source of synergy that can enhance the resilience of the trade sector, ensuring its integration into global value creation chains and increasing its social and economic efficiency. To test the hypothesis, general scientific methods were used: formalization, historical analysis, abstraction, general logical methods (analysis, synthesis, induction, deduction), generalization, and ascent from the abstract to the concrete, as well as specific socio-economic methods based on the dialectical approach to understanding the essence of the development process in accordance with the object and subject of the study. The information base of the study included scientific works by domestic and foreign scholars on investment, sustainable development, and the formation and assessment of enterprise competitiveness, as well as materials from the State Statistics Service of Ukraine and the National Institute for Strategic Studies.

The main part of the article consists of two sections: the first analyzes indicators of the sustainable development of Ukraine's trade sector, and the second describes a modern investment model for ensuring the competitiveness and sustainable economic development of Ukrainian trade enterprises.

1. The investment paradigm for sustainable economic development of Ukraine's trade sector under martial law

Trade, as a branch of the national economy that is directly exposed to the external environment and depends on how the quality of its activities is assessed, must not only establish competitive product benchmarks but also ensure a high technological standard of trade service provision, adequate equipment with modern technical means in attractive configurations, and convenience for consumers in obtaining these services. The ability of an enterprise to quickly introduce innovative tools into trade processes, find new technological solutions, and use know-how is one of the main sources of strengthening competitiveness, and, according to the study, this capacity not only persists under martial law but also continues to develop.

In addition to destruction caused by shelling, loss of goods, and the outflow of human resources to safer regions or abroad, Ukrainian trade enterprises face problems related to insurance and cost reimbursement, pressure on the use of their own reserves, the need to maintain working capital, and the preservation of the current operational capacity of personnel. When a trading business operates under such conditions, financial and economic mechanisms become unbalanced; paradoxically, however, enterprises strengthen their potential for survival and future development through an innovative approach. E-commerce and omni-channel trade are developing rapidly, logistics routes are being rationalized in terms of delivery volume and cost intensity, and enterprise management systems are increasingly incorporating modern technologies based on the digitalization of accounting, cost, and organizational indicators of commercial transactions, and models for analyzing and planning financial and economic performance under current financial and management accounting standards adopted by the enterprise.

The depth of the destruction of the Ukrainian economy and the estimated losses during the full-scale invasion of the Russian Federation have been assessed in numerous publications by statistical and analytical institutions in Ukraine and abroad. In a study prepared by the World Bank Group, the Government of Ukraine, the European Commission, and the UN, the amount of losses and, accordingly, the cost of post-war reconstruction in Ukraine as of the end of 2024 was estimated at almost USD 524 billion, which exceeds previous estimates by USD 38 billion. The housing sector, transport, energy and mining facilities, trade, and industry were most affected. In the regional dimension, the most affected were Donetsk, Luhansk, Kharkiv, Kyiv, Chernihiv, and Zaporizhzhia regions. According to the study (World Bank, 2024), the direct damage to Ukraine at the time of the assessment amounted to almost USD 176 billion.

Due to the destruction, the pace of Ukraine's economic dynamics achieved in the pre-war period was lost. In addition to the destruction of infrastructure, a crisis in the logistics sector and, most importantly, a decrease in solvent demand in the domestic market were added. Experts consider the prerequisites that have developed in the realities of martial law to be the starting point for reviving the Ukrainian economy and bringing it to a

competitive position in terms of such tasks as restoring the infrastructure complex, developing the logistics system in general and with reference to the specifics of industries, strengthening energy security, stimulating domestic demand in commodity markets, etc. This involves the targeted concentration of financial resources, both public and private, as well as opportunities to attract external donor assistance, in particular within the framework of existing mechanisms and European instruments (Plan for the Ukraine Facility 2024–2027, n. d.), for the reproduction of locomotive sectors of the economy to launch the entire contour of social production into sustainable processes of economic development.

Capital investments in such conditions acquire a system-forming significance, contributing to ensuring macroeconomic stability and financial self-sufficiency of the state. Investment resources are especially in demand in such strategically important sectors of the economy as transport and digital infrastructure, energy, agro-industrial complex, dual-use industry, trade and services, which should systematically form a competitive national production complex on new technological platforms, function effectively in conditions of acquiring a sufficient margin of economic security, and ensure sustainable development of territories.

The prerequisite for the upward movement of the Ukrainian economy in the future is the increase in gross fixed capital accumulation in all chains and at all sites of social production. This focuses on the real processes of investment in fixed assets and resources and ensures the dynamics of economic growth. Investments in fixed capital with innovative content are a means of increasing labor productivity on a modernized production base, as well as the creation of high-tech jobs, achieving product quality in the metrics of progressive standards, benchmarks according to the criteria of competitiveness in the national and global markets.

Analyzing the dynamics of the level of gross fixed capital accumulation in Ukraine in 2020–2024 (in % of GDP) (*Figure 1*), it should be noted that the presence of a cyclical nature of fluctuations in parameters with an increase in the base of deviations as a manifestation of the sensitivity of the investment environment to foreign policy and economic shocks.

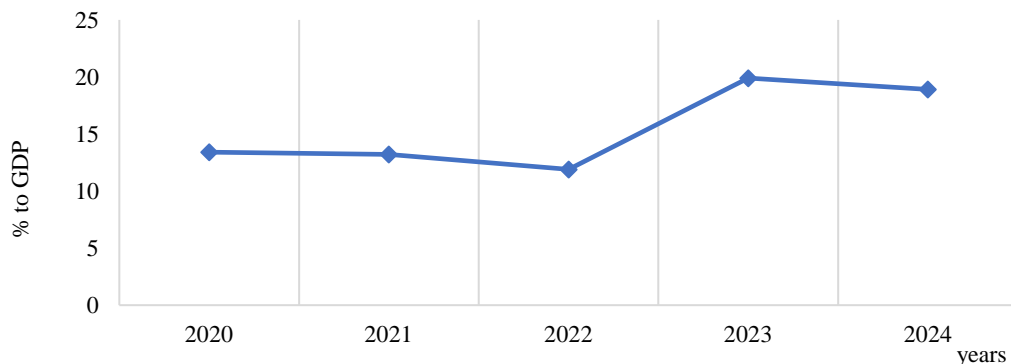


Figure 1. Level of Gross Fixed Capital Formation in Ukraine, 2020–2024

Source: Compiled by the authors based on data from the State Statistics Service of Ukraine (n. d.).

During the COVID-19 pandemic in 2020–2022, there was a gradual decrease in this indicator, and with the invasion of the Russian Federation in 2022, private investment declined almost critically due to difficulties in accessing financial resources and the curtailment of project self-financing programs because of the direct threat of losing investments. However, in 2023, a sharp increase in this indicator was recorded, which coincided with the launch of international support programs, the mobilization of grant and blended financing within the framework of the Ukraine Facility initiative, as well as the implementation of national investment incentive programs, in particular, state guarantees for investment projects. The fluctuations in the share of capital investment in 2024, while remaining significantly higher than in the previous war years, were mainly caused by organizational factors and did not destroy the general model of investment support for stabilization processes and the formation of development potential in the country.

The change in investment dynamics in 2024 can also be cautiously interpreted as a transformation of processes from emergency recovery of critical industries to a gradual transition to strategic development of the economy in a systemic structure. The key reason for the growth of gross fixed capital formation in Ukraine at this time was the urgent need to mobilize resources into the defense-industrial complex to ensure national security and focus the production sector on military needs. At the same time, such an investment structure forms a unique basis for the development of technologies in the defense sector, which can become a driver of post-war economic development and strengthen the country's export potential.

The main factors in the restoration of investment activity in the economy were the priority financing of capital investments in the defense-industrial complex and in the restoration of destroyed infrastructure. These initiatives were implemented primarily through state funding. An important supporting factor was the assistance of international partners, in particular in the restoration of social infrastructure (schools, kindergartens, hospitals, bomb shelters), as well as transport infrastructure (roads, bridges, etc.). Investment activity in the corporate sector of the economy also gradually increased (Bazylyuk et al., 2025).

Analysis of the dynamics of capital investments by type of economic activity in Ukraine in 2020–2024 allows us to identify key trends in the change in investment activity in conditions of prolonged high economic turbulence caused by both internal structural challenges and shocks caused by a full-scale invasion. Overall, the volume of capital investments increased from UAH 419.8 billion in 2020 to UAH 534.4 billion in 2024 (*Figure 2*), which can be considered signs of a gradual recovery of the economy after the crisis shocks associated with the COVID-19 pandemic and the destruction during wartime. A feature of the process is that investment activity in Ukraine was mainly manifested in strategically important sectors of the economy. However, the intensity of growth by type of economic activity is uneven, as indicated by obvious imbalances in the structure of aggregate capital investments.

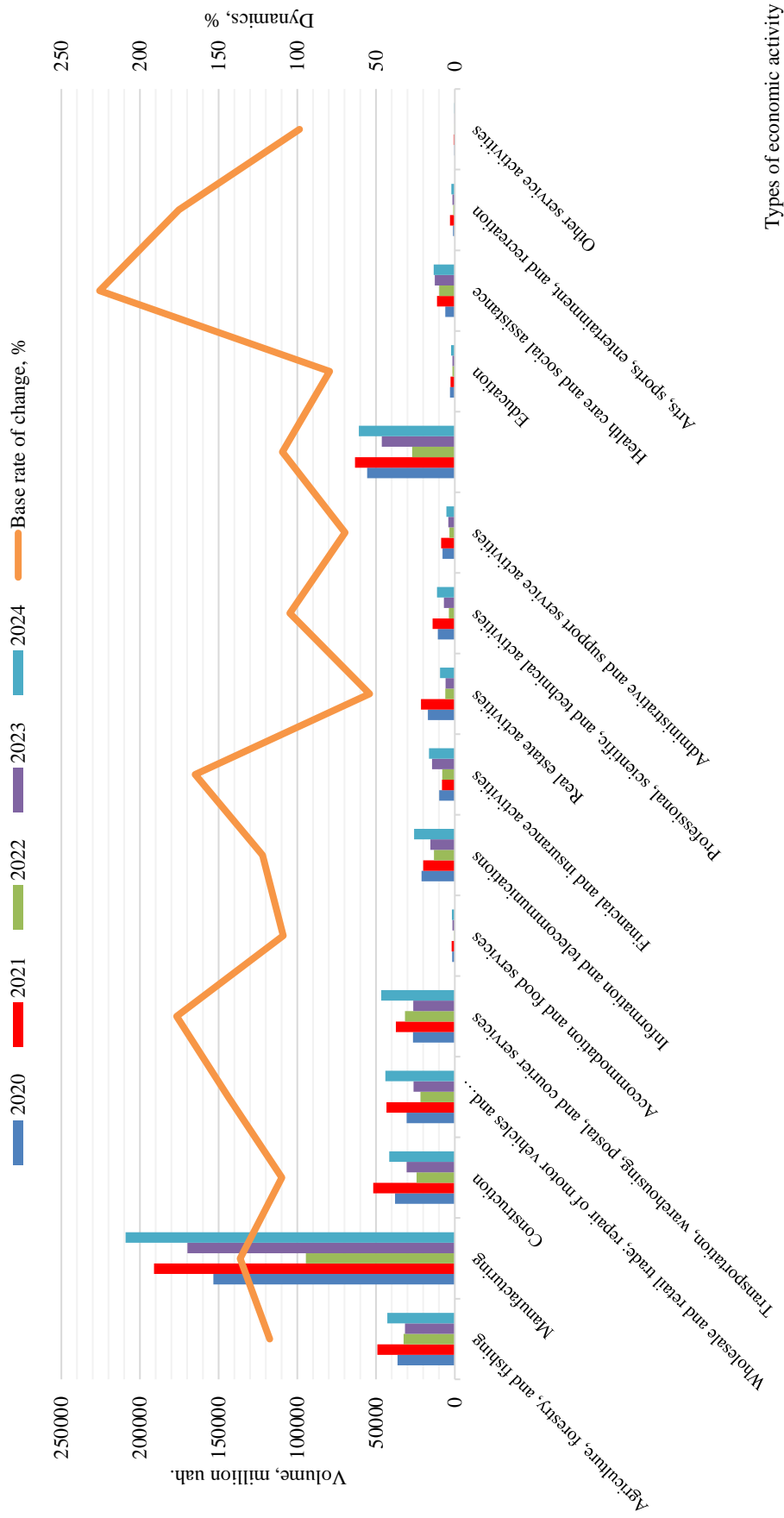


Figure 2. Capital investments of Ukrainian business entities by economic activity for 2020–2024

Source: Compiled by the authors based on data from the State Statistics Service of Ukraine (n.d.).

According to the increasing intensity of investment activity, the following sectors of the country's economy can be identified: agriculture (118%), industry (136%), and construction (110%), where state policy aimed at supporting production potential and ensuring the country's food security is implemented. The state's efforts to ensure the harmony and systematic nature of economic development programs are manifested in the growth of investments in information and telecommunications (122%) and financial activities (165%) under digitalization and financial infrastructure modernization projects, including for the post-war period. Thus, the generalized structural characteristics of capital investments over the past five years indicate an update of the system of priorities: strengthening the investment impact on the development of the medical, financial, trade, and industrial sectors, which are experiencing an increased burden in the processes of adapting the economy to martial law conditions and forming the potential for recovery in the post-war period.

2. Competitiveness and sustainable development of Ukrainian trade enterprises: an investment model for ensuring

The preservation of acquired competitiveness and the restoration of economic development potential under current conditions of adaptation of the national economy to the effects of external military aggression and global economic challenges depend almost directly on the real intensity of trade enterprise activity. Trade, as an important component of the country's economic complex, plays a system-forming role in shaping the consumer market according to the structure of population demand, supporting economic activity in the regions, and ensuring fiscal stability.

Under conditions of unpredictable shocks and turbulence in the operating environment, trade enterprises require the implementation of modern mechanisms for preserving and developing competitive advantages in the long term. The multitude of destabilizing factors complicates traditionally constructed schemes of strategic planning and operational management for business entities, and these models must be supplemented with parameters formalized in functional dependencies and, in essence, with new matrices of determinants.

In current trade practice, modern automated systems for managing trade turnover and marketing models for processing and applying big data to forecast demand are being used increasingly widely. This reflects both investments already made, domestic and foreign, and the objective need for substantial further investment in these areas. The effectiveness of investment in strengthening the ability of Ukrainian trade enterprises to survive and maintain their development potential under martial law is confirmed by rising labor productivity, business expansion, and the creation of new jobs. In other words, it is reflected in the development of human capital according to modern quality criteria, stronger integration ties with foreign partners, greater

export-import potential, and the accumulation of a reserve of economic security and competitiveness.

Therefore, investments in the trade sector allow us to preserve and simultaneously develop an important element of the country's economy, which ensures the systematic functioning of its economic mechanism, the stability of the market both internally and externally.

The statistical profile of the assessment of the activities of Ukrainian trade enterprises from 2020 to 2024 does not reveal the stability of the trends in the change of indicators, since the analytical array is constantly supplemented with data on current factors that either stimulate or inhibit their development, which expands the field of analysis and requires additional tools to ensure comparability (*Table 1*).

Table 1

The dynamics of key performance indicators of Ukrainian trade enterprises for 2020–2024

Indicator	2020	2021	2022	2023	2024
Wholesale turnover of wholesale enterprises, UAH billion	2462.60	3377.40	2768.30	3382.00	3477.22
Rate of change in wholesale turnover of wholesale enterprises, %	–	137.15	81.97	122.17	102.82
Retail turnover, UAH billion	1201.60	1443.80	1396.30	1855.40	2171.98
Rate of change in retail turnover, %	–	120.16	96.71	132.88	117.06
Retail turnover of retail enterprises, UAH billion	868.3	1044.5	971.1	1248	1511
Rate of change in retail turnover of retail trade enterprises, %	–	120.29	92.97	128.51	121.07
Number of operating trade enterprises, units	98369.00	97038.00	67395.00	79577.00	н/д
Rate of change in the number of operating trade enterprises, %	–	98.65	69.45	118.08	–
Residual value of fixed assets and intangible assets of trade enterprises (as of the end of the year), UAH billion	228.60	240.70	260.60	277.50	н/д
Rate of change in the residual value of fixed assets and intangible assets of trade enterprises, %	–	5.29	8.27	6.49	–

Source: compiled by the authors based on data from the State Statistics Service of Ukraine (n. d.).

The analysis of the dynamics of key indicators of trade enterprise activity in 2020–2024 covers periods of large-scale crisis phenomena in Ukraine, including the COVID-19 pandemic, economic turbulence, logistical distortions in commodity supply, and direct destruction and losses during martial law. Nevertheless, the industry survived and retained its motivation for development. Overall, retail turnover increased from UAH 1 201.6 billion in 2020 to UAH 2 171 billion in 2024. This can be regarded as evidence of the preservation and growth of domestic consumption and demand, as well

as of the flexibility of retail businesses in adapting trade service technologies through online sales, the development of delivery methods, and the implementation of marketplace systems. At the same time, these indicators were also influenced by inflation. In addition, the number of operating trade enterprises declined during the same period, especially in 2022, when the rate of decline reached 15.3%. Some enterprises found themselves in zones of active hostilities or occupation, while others relocated to safer regions and have not yet achieved economic certainty. The moderate pace of this decline confirms the sector's strong capacity for survival. Another positive signal for assessing the prospects of sustainable economic development is the increase in the residual value of fixed and intangible assets, which rose from UAH 228.6 billion to UAH 277.5 billion in 2023.

According to the general assessment of investment activity in trade, its selected directions should be specified: infrastructure renewal and strengthening enterprise potential through an innovative approach, modernization of management systems, etc. Thus, despite the real threat of destruction and losses, the trade sector demonstrates signs of a gradual transition to a transformational economic model based on the structural adaptation of commodity policy, equipping enterprises with new-generation technical means, and the modernization of models for assessing competitiveness and implementing them according to the criteria of innovative content and substantiation of the target level of economic security.

In this context, modern concepts of sustainable development of economic systems, built on the criteria of balance of economic interests, environmental and social responsibility, and the efficiency of their functioning, acquire special importance.

In this methodological construction, the implementation of the principles of ensuring sustainable economic growth and development of economic systems is declared as a tool for increasing their competitiveness, the effect of which is manifested in changing the parameters of activity by highlighting such abilities as adaptability, innovation, and efficiency in responding to the challenges of a dynamic market environment.

According to Pylypenko (2020), sustainable development is one of the most important factors in ensuring the competitiveness of an enterprise in modern business conditions in the strategic management paradigm, which the author structurally defines as a formed sequence of qualitative changes in characteristics in the current and long-term periods according to the target function of systemic interconnection in a balanced mechanism for managing the development of the economic, social and environmental subsystems of an enterprise in response to the challenges of the external environment.

The above definition is quite widely supported in modern scientific discourses and allows us to generalize approaches and build the following

essential characteristic of the process: sustainable economic development of an enterprise is a process of long-term balanced upward movement of the economic system with the transition to higher phases of the life cycle based on achieving target rates of economic growth with the simultaneous formation of a sufficient level of economic security and social responsibility, coordination of the interests of all subjects of interaction in the external environment based on a substantiated model of operational adaptability.

Therefore, the ability of an enterprise to quickly adapt to changes in the external environment and restore the economic balance of the system ensures the preservation of competitive positions and the strengthening of long-term competitiveness.

In the context of the concept of sustainable economic development of an enterprise, the functional capacity of the system is ensured by the following integral elements: production, personnel, marketing, financial, and investment dominant spheres, which are organic components of the mechanism for forming long-term and stable efficiency and competitiveness of a business entity according to reasonable standards of presence in the market.

Among the listed components, the investment dominant sphere is of particular importance, the key purpose of which is to update the technological base of activity, increase production potential, introduce new business models, increase energy efficiency and environmental safety, develop human capital according to modern quality criteria, etc. Investments create unique competitive advantages that may be unavailable to other market players in the short term.

Thus, investment activity with innovative content is not only a condition for sustainable economic growth and development, but also a determining factor in strengthening the competitive position of an enterprise that has already formed a high technological level, flexibility in view of the instability of the operating environment. The need for investment in the trade industry is constantly growing, despite the stresses of martial law. Direct restoration of the material and technical base, its modernization, innovative transformations of the management system, digitalization of business processes, development and implementation of modern logistics projects and infrastructure, technological modernization, and equipping of end-user service processes are generalized characteristics of the directions of capital investment in trade.

From the point of view of today's planning for the restoration of the industry according to modern standards, the above benchmarks constitute a map of investment support directions in the strategic field of development, which takes into account the potential progress of scientific and technological progress and the possibility of significantly expanding and deepening the innovativeness of the content, changing the metrics for assessing competitive advantages.

Figure 3 presents the dynamics of investment volumes in non-current assets of trade enterprises in 2020–2024, with a division into tangible and intangible components. A general analysis of their volumes in 2020–2024 proves the validity of a number of important conclusions regarding the transformation of the industry’s investment behavior in conditions of deep economic and security challenges. Thus, during the period under study, significant fluctuations in the volumes of capital investments were observed, which reflect the business response to crisis processes – the COVID-19 pandemic, the full-scale invasion of the Russian Federation, the destruction of infrastructure, and the decline in the purchasing power of the population as the main factor in the development of trade.

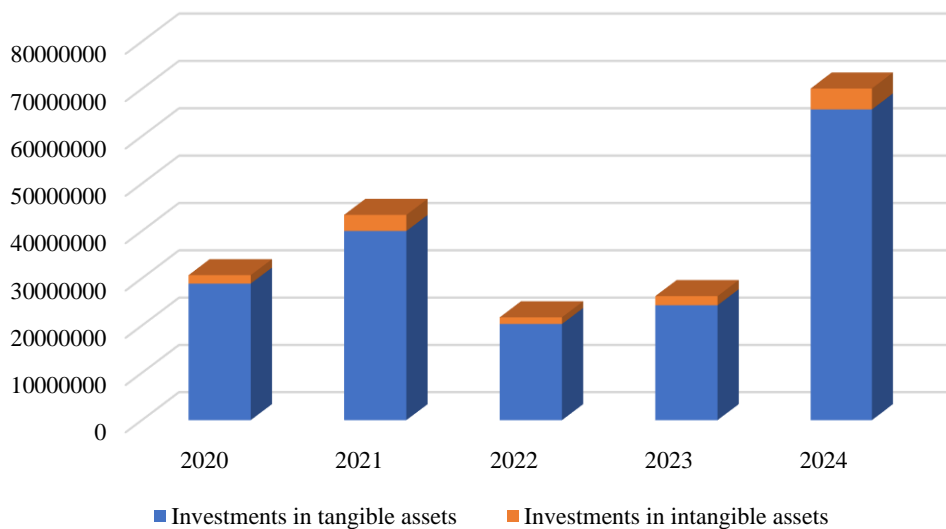


Figure 3. Structural characteristics of investments in the "trade" sector by volume of investments in tangible and intangible non-current assets in Ukraine in 2020–2024, in %

Source: compiled by the authors based on data from the State Statistics Service of Ukraine (n. d.).

The recovery of investment activity became evident in 2024: the volume of investments in the industry exceeded UAH 80 million, almost twice the level of previous years. Clear signs of gradual business recovery emerged, supported during this period by the state, international partners, and the institutional framework of the country’s economic governance. Logically, the main volume of investments was directed toward the development of tangible assets, given enterprises’ urgent need to restore their material and technical base, infrastructure capacity, and logistical support for trade operations. Characteristic of this period is not merely the replacement of lost fixed assets, but also the implementation of development projects based on both extensive and intensive approaches and on modern criteria of

efficiency and innovation. At the same time, the relatively balanced structure of investments in the intangible assets of retail enterprises in 2020–2024 (see *Figure 2*), where their share remains significant and fluctuates within 5–7%, indicates that the industry has maintained its strategic course toward supporting intangible factors that strengthen competitiveness, including digital technologies, modern software, branding and marketing modernization, and innovations in business management.

Maintaining the relative stability of such investments, even during periods of economic turmoil, indicates an already formed strategic orientation of enterprises toward a long-term competitive trajectory: expanding their segment of presence in the commodity market while maintaining a stable position of competitive advantages, introducing innovative means of forming a stable consumer audience, and developing effective models of commercial interaction with counterparties under agreements, etc. That is, the choice of innovative investment instruments is an indicator of the transition of the trade business to a model of sustainable economic development based on the functioning of intangible assets as a component of the balanced movement of the economy as a whole.

Thus, the development of trade enterprises in recent years demonstrates examples of combining short-term needs for material renewal with long-term investments in the intangible factor of strengthening competitiveness, which corresponds to the concept of sustainable development of management systems and strengthens the position of the trade sector in a turbulent economy.

As statistics show, trade solves these tasks in the absolute majority of analysis periods on the basis of self-financing of investment activities, which significantly restrains the pace of investment growth (*Table 2*).

Table 2

The sources of financing for capital investments by economic activity type
"Wholesale and retail trade; repair of motor vehicles and motorcycles"
in Ukraine for 2020–2024

Source	2020		2021		2022		2023		2024	
	Amount, UAH million	Share, %	Amount, UAH million	Share, %	Amount, UAH million	Share, %	Amount, UAH million	Share, %	Amount, UAH million	Share, %
Local budget funds	2.13	0.01	44.60	0.10	–					
Own funds of enterprises and organizations	28865.49	94.08	42722.25	98.42	21216.57	97.45	25942.85	98.83	43161.77	97.74
Bank loans and other loans, UAH million	1713.21	5.58	634.34	1.46	533.75	2.45	277.69	1.06	904.77	2.05

End of Table 2

Source	2020		2021		2022		2023		2024	
	Amount, UAH million	Share, %	Amount, UAH million	Share, %	Amount, UAH million	Share, %	Amount, UAH million	Share, %	Amount, UAH million	Share, %
Investment companies, funds, etc., UAH million	–		4.73	0.01			–			
Total	30683.20		43405.91		21772.37		26249.67		44158.74	

Source: compiled by the authors based on data from the State Statistics Service of Ukraine (n. d.).

Although the analysis of the dynamics of the volume and structure of capital investments in Ukraine’s trade sector during 2019–2023 shows growth in 2024 by 1.44 times compared with 2020, when investment support for the sector was provided mainly by the own funds of enterprises and organizations, the share of which consistently exceeds 94% of the total volume of capital investments, there remains a high inherited dependence of the intensity of investment development processes on the internal financial capabilities of the business entities themselves.

The share of bank loans and other loans during the studied period fluctuated within the range of 2 to 6%, and this is an insufficient level of use of debt instruments in financing innovation processes to support the pace of economic development.

Thus, the modern model of investment support for the activities of business entities in trade is mainly self-financed, which at the same time limits the possibilities of accelerating structural transformations of the sector and necessitates the improvement of state incentive mechanisms and attracting institutional investors.

From the perspective of sustainable development, the expansion of the share of real investments in intangible assets reflects the current adaptation of the trade sector and its modification in accordance with modern innovation models and existing realities of activity, and also actualizes the need to reassess its own market position and the trajectory of its expansion with a sufficient margin of competitiveness, despite the deep uncertainty of the prospects for activity and the aggressiveness of external factors.

The positive dynamics of capital investments, maintaining a focus on the innovation component, as well as the growth of the total volume of investments in 2024, according to the general assessment, are a sign of real processes of restoring economic activity, increasing the investment capacity of Ukrainian trade enterprises and creating prerequisites for them to acquire a margin of competitiveness in the long term based on sustainable economic development.

The statistical view of the strength of investments in the trade business and the level of their innovation (Table 3) supports the previous conclusions and demonstrates a clearly expressed positive trend in increasing investment

and innovation activity in the industry. Over the five years, the volume of investments in enterprises increased by 23.3%. This is undoubtedly evidence of growing investor confidence in the Ukrainian trade sector, its rising investment attractiveness, and its orientation toward development and modernization.

Table 3

Indicators of investment attraction and innovation utilization
by Ukrainian trade enterprises for 2019–2023

Indicator	2019	2020	2021	2022	2023
Volume of investments in trade enterprises, UAH billion	59.6	63.0	66.4	69.8	73.5
Share of trade enterprises that implemented innovations, %	13.2	14.5	15.7	16.3	17.1
Number of innovation projects in the trade sector, units	263	278	295	310	328
Volume of expenses for innovations in the trade sector, UAH billion	5.2	5.7	6.1	6.5	7.0

Source: Compiled by the authors based on data from Statista (n. d.).

In addition, positive changes should be noted directly in the innovation activity. The share of enterprises implementing innovations has increased significantly, which indicates business adaptation to modern technological challenges, the introduction of digitalization across operational processes, and the formation of clear contours of competitiveness in domestic and foreign markets. Indirect evidence of the achievement of a new quality of enterprise functioning through innovative activity is provided by the statistics on the implementation of innovative projects in the trade sector, the number of which steadily increased during the period under study (see *Table 3*).

The parameters of this process are detailed by data on the steady increase in spending on innovations in trade, which can be considered evidence of a strategic reorientation of Ukrainian trade enterprises toward modernization of the technological support process, optimization of operational schemes, and the introduction of new business models. According to the general assessment, these trends are regarded as a sign of the gradual strengthening of the investment potential of the Ukrainian trade sector, according to the innovation principle and the content of activity reform.

The obtained study results of the processes of Ukrainian trade enterprises' competitiveness formation and the prerequisites for their sustainable economic growth in the realities of martial law can be considered a verification of theoretical management models already accepted by science and practical business in this segment of financial and economic activity.

General and special methods for assessing enterprise competitiveness, as adopted in theoretical and applied interpretation, are based primarily on the assessment of the investment support for this direction of managerial influence. Thus, according to the positions shown in *Figure 4*, it is possible to formalize the content of the enterprise's areas of activity in projection onto the content of the objects for assessing its competitiveness, the place of investments in ensuring their required level, the implementation tools, as well

as metrics for measuring the impact on the parameters of matrices describing the quantitative characteristics of the competitive position and for forecasting its development in the future.

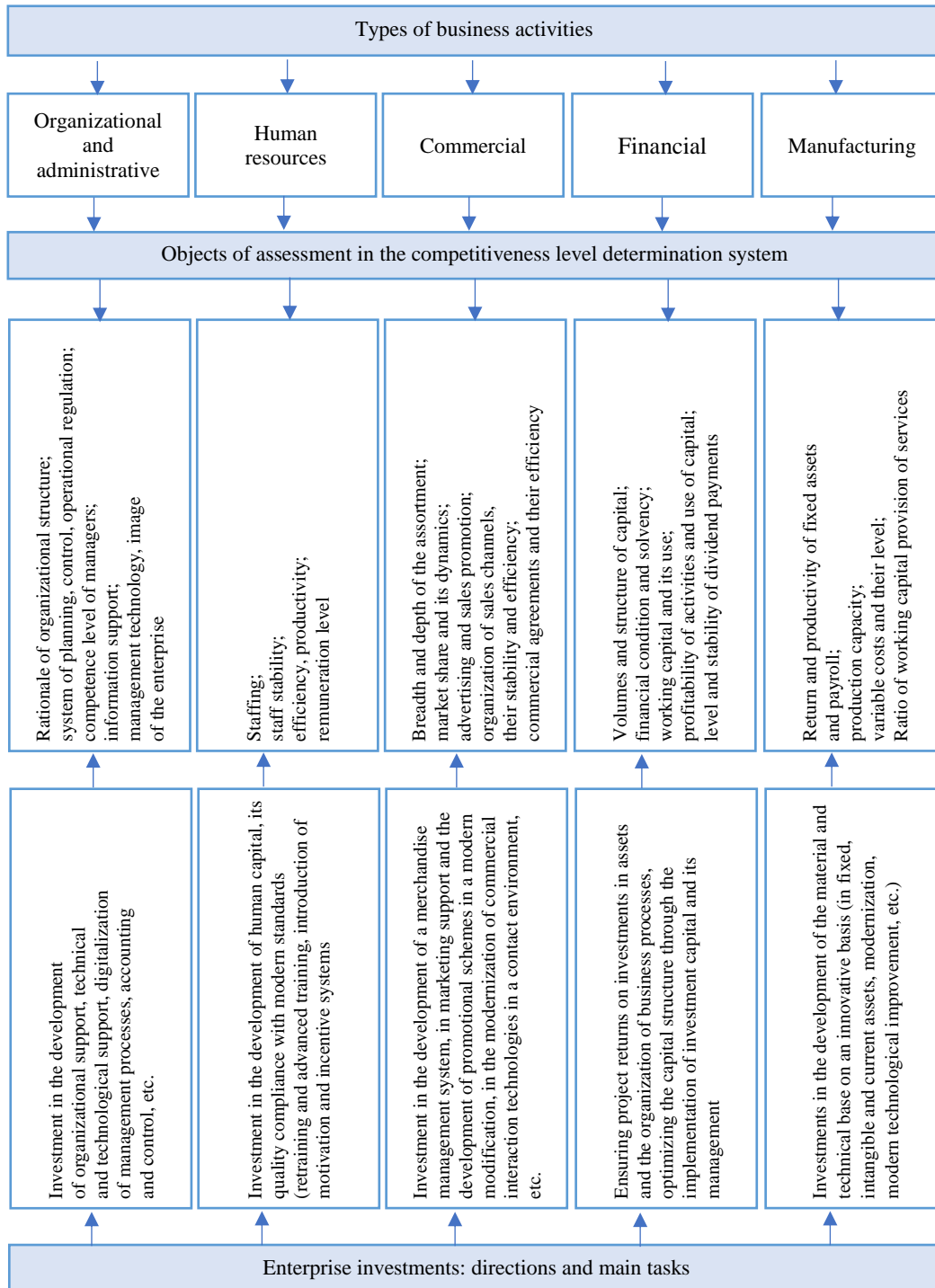


Figure 4. Investment support for the competitiveness of a retail enterprise by business area and assessment criteria

Source: compiled by the authors.

The issue of the investment dimension of enterprise economic growth processes in the context of ensuring target growth rates is most convincingly formalized in the economic and mathematical interpretation of Damodaran (2025). In generalized form, the model has a linear equation expressing the dependence of the target rates of enterprise economic development in period n on the level of capitalization of retained earnings received in period $n-1$, considered a potential source of reinvestment, and on the level of return on the enterprise's equity in the same period $n-1$:

$$g_n = b \cdot ROE,$$

where: g_n is constant rate of profit growth;
 b is a level of capitalization of retained earnings;
ROE means return on equity.

If the acquired return on equity (ROE) in the period $n-1$ was 8%, and according to the current policy of the enterprise, 40% of the net profit received is capitalized, then in the subsequent period, this can ensure the rate of economic growth $g_n = 8 \cdot 0.4 = 3.2\%$.

Both the theoretical position of modern scientists regarding factor dependencies, their formalization in economic and mathematical models, and the obtained results of the systemic analysis of the state and prospects for the development of Ukrainian trade enterprises in the realities of martial law coincide in a methodological approach, which allows us to predict with a certain degree of confidence the development trajectories of this economic system, examining the nature and content of the factors generated by the operating environment in conditions of force majeure, overcoming the crisis, restoring the ability to sustainable economic growth and development, increasing competitiveness with access to stable competitive positions in the market.

Conclusions

The full-scale invasion by the Russian Federation became the direct cause of the destruction of the asset base of the trade sector of the Ukrainian economy. This led to substantial direct business losses and deformation of the economic system, shifting the enterprise operating paradigm from developmental to adaptive and anti-crisis; disrupting commercial activity through breaks in logistics chains and supply channels; weakening commodity supply; and reducing trade turnover because of infrastructure damage and declining household solvency.

The results of the study show that, despite a severely adverse exogenous operating environment, enterprises in the sector demonstrated high adaptability and resilience, quickly reorienting themselves toward innovative technological platforms and new business models in order to preserve their competitiveness and maintain a strong position in the market.

Strategic efforts to modernize the material and technical base and to introduce digital technologies and innovative approaches to the management of trade enterprises under these difficult conditions have created, in resource and instrumental terms, the potential for the sustainable development of the industry.

In the context of the above, Ukrainian trade enterprises are gradually transforming their organizational and economic mechanisms in accordance with modern standards and development criteria, laying the foundation for intensive growth rates and implementing maximization programs with a transition to a dynamic model of long-term economic development.

The generalization of theoretical approaches to assessing the prerequisites, means, and models for ensuring sustainable economic development of economic systems, their features during a crisis period, and the results of research into the real processes of the trade industry functioning under force majeure conditions as a segment of the Ukrainian economy allow us to formulate its definition in theoretical terms as a process of long-term balanced movement of the system based on achieving target rates of economic growth with the simultaneous formation of a sufficient level of economic security and social responsibility, as well as coordination of the interests of all subjects of interaction based on a substantiated model of operational adaptability.

In addition to the methodological tools for managing this process, the main principles of its implementation have been formulated: adaptability, innovation, and responsiveness to the challenges of the market environment. Maintaining enterprise competitiveness is organically ensured by providing the system with an economic drive based on models of sustainable economic growth and development, supporting the stability of the acquired competitive position under conditions of post-war recovery and management based on modern paradigms for governing these processes in peacetime.

Investment activity is a key tool for sustainable development and increasing the competitiveness of Ukrainian trade enterprises, an integral part of strategic models of modern business, and a modulator of the trajectory of modern movement.

The proposed hypothesis concerning the leading role of enterprise investment activity in ensuring sustainable economic development and competitiveness, its indispensability within modern strategic business models, and its function as a modulator of the contemporary development trajectory—through strengthening the stability of the trade sector, supporting integration into global value creation chains, and increasing socio-economic efficiency – is confirmed. It was found that the creation of a flexible mechanism for taking internal and external factors into account determines the enterprise's specific investment needs, which at this stage correspond to a policy of adaptation to dynamic changes in the economic environment and are subsequently filled with the parameters of resource provision for

sustainable economic development. The investment trajectory aimed at achieving target rates of economic development thus becomes a source of greater sustainability and competitiveness, as illustrated by the organic relationship between the areas of investment influence and the objects used to assess the system's competitive potential.

Despite the dynamics of factors influencing the effectiveness of the economic system, both in terms of content and in terms of the strength of the impact on the features of the tools for solving problems of functioning in the face of new challenges by means of investment response, these issues require further research in the field of financial engineering and economic management of the system according to the criteria for achieving target rates of sustainable economic development and the level of competitiveness.

REFERENCES / СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ

Atamas, O. (2023). Investment activity in Ukraine: current realities. <i>Economy and society</i> , (54). https://doi.org/10.32782/2524-0072/2023-54-42	Атамас, О. (2023). Інвестиційна діяльність в Україні: реалії сьогодення. <i>Економіка та суспільство</i> , (54). https://doi.org/10.32782/2524-0072/2023-54-42
Bazylyuk, Ya., Vlasenko, R., & Vlasyuk, O. et al. (Eds.). (2025). <i>Economic security of Ukraine in conditions of high military risks and global instability: expert and analytical report</i> (Ya. Zhalila, general ed.). Kyiv: NISD. https://doi.org/10.53679/NISS-analytrep.2025.03	Базиліук, Я., Власенко, Р., & Власюк, О. та ін. (Ред.). (2025). <i>Економічна безпека України в умовах високих воєнних ризиків та глобальної нестабільності: експертно-аналітична доповідь</i> (Я. Жаліла, заг. ред.). Київ: НІСД. https://doi.org/10.53679/NISS-analytrep.2025.03
Berdar, M., Kot, L., Martyniuk, L., Yevtushevska, O., & Sapachuk, Y. (2024). Challenges and prospects of innovation and investment development of enterprises in the post-war period. <i>Economics of Development</i> , 23(2), 27–37. https://doi.org/10.57111/econ/2.2024.27	
Cui, X., & Brychko, A. (2023). Innovation management of the enterprise in the context of sustainable development. <i>Financial and Credit Activity: Problems of Theory and Practice</i> , 5(52), 208–221. https://doi.org/10.55643/fcaptp.5.52.2023.4147	
Damodaran, A. (2025). <i>Investment Valuation: Tools and Techniques for Determining the Value of Any Asset</i> (4th ed., University Edition). Wiley. 1136 p.	
Gutierrez-Broncano, S., Linuesa-Langreo, J., Rubio-Andres, M., & Angel Sastre-Castillo, M. (2024). Can hybrid strategy improve SME performance? The role of innovation and adaptive capacity. <i>European Journal of Innovation Management</i> , 27(9), 173–197. https://doi.org/10.1108/ejim-07-2023-0566	
Humeniuk, Ya, & Tkachov Z. Investments in sustainable development: global practice and prospects for Ukraine. <i>Economy and Society</i> , (67). https://doi.org/10.32782/2524-0072/2024-67-62	Гуменюк, Я., & Ткачов, З. (2024). Інвестиції у сталий розвиток: світова практика та перспективи для України. <i>Економіка та суспільство</i> , (67). https://doi.org/10.32782/2524-0072/2024-67-62
Kannan, S., & Gambetta, N. (2025). Technology-driven sustainability in small and medium-sized enterprises: A systematic literature review. <i>Journal of Small Business Strategy</i> , 35(1), 129–157. https://doi.org/10.53703/001c.126636	
Krekhivskiyi, O., & Salikhova, O. (2022). Post-war modernization of industry: internal and external resources. <i>Foreign trade: economics, finance, law</i> , 6(125), 83–104. https://doi.org/10.31617/3.2022(125)06	Крехівський, О., & Саліхова, О. (2022). Повоєнна модернізація промисловості: внутрішні та зовнішні ресурси. <i>Зовнішня торгівля: економіка, фінанси, право</i> , 6(125), 83–104. https://doi.org/10.31617/3.2022(125)06
Legkostup, I. I., & Sainchuk N. V. (2022). Current state of investment activity in Ukraine: domestic and international aspects. <i>Economy and society</i> , (46). https://economyandsociety.in.ua/index.php/journal/article/view/2075 https://doi.org/10.32782/2524-0072/2022-46-56	Легкоступ, І. І., & Сاینчук Н. В. (2022). Сучасний стан інвестиційної діяльності в Україні: вітчизняний та міжнародний аспекти. <i>Економіка та суспільство</i> , (46). https://economyandsociety.in.ua/index.php/journal/article/view/2075 https://doi.org/10.32782/2524-0072/2022-46-56

<i>Plan for Ukraine Facility 2024–2027.</i> (n. d.). https://www.ukrainefacility.me.gov.ua/wp-content/uploads/2024/03/plan-ukraine-facility.pdf	<i>План для Ukraine Facility 2024–2027.</i> (б. д.). https://www.ukrainefacility.me.gov.ua/wp-content/uploads/2024/03/plan-ukraine-facility.pdf
Pylypenko, S. (2020). Strategic management of the enterprise based on the concept of sustainable development. <i>Economy and society</i> , (21). https://economyandsociety.in.ua/index.php/journal/article/view/33?utm	Пилипенко, С. (2020). Стратегічне управління підприємством на засадах концепції сталого розвитку. <i>Економіка та суспільство</i> , (21). https://economyandsociety.in.ua/index.php/journal/article/view/33?utm
Se, Y., & Lin, C. (2022). The impact of investment strategies and sustainable development goals on organizational performance: The mediating role of organizational climate. <i>Entrepreneurship and Sustainability Issues</i> , 10(1), 2101017. https://doi.org/10.1080/1331677X.2022.2101017	
<i>State Statistics Service of Ukraine.</i> (n. d.). https://www.ukrstat.gov.ua	Державна служба статистики України. (б. д.). https://www.ukrstat.gov.ua
<i>Statista.</i> (n. d.). eCommerce – Ukraine. https://www.statista.com/outlook/dmo/e-commerce/ukraine#revenue (accessed July 11, 2025).	
Ustymenko, M. (2024). Optimisation of the strategy of state support for small and medium-sized enterprises at the regional level through investment and innovation measures. <i>Scientific Bulletin of Mukachevo State University. Series Economics</i> , 11(4), 120–132. https://doi.org/10.52566/msu-econ4.2024.120	
World Bank. (2024). <i>Ukraine: Fourth Rapid Damage and Needs Assessment (RDNA4), February 2022 – December 2024.</i> https://documents1.worldbank.org/curated/en/099022025114040022/pdf/P1801741ca39ec0d81b5371ff73a675a0a8.pdf	

Conflict of interest. The authors declare that they have no financial or non-financial interests in the subject matter or materials discussed in this manuscript and no affiliation with state bodies, organizations, or commercial entities that have a financial interest in, or financial conflict with, the subject matter or research presented in the manuscript. Given that one of the authors is affiliated with the institution that publishes this journal, which may give rise to a potential conflict of interest or concerns about bias, the final decision on publication of this article, including the selection of reviewers and editors, is made by members of the Editorial Board who are not employees of this institution.

The authors received no direct funding for this research.

Guliaieva, N., Vavdiichyk, I., & Melnik, V. (2026). Investment determinants of sustainable development and competitiveness in trade. *Scientia fructuosa*, 3(167), 225–247. [http://doi.org/10.31617/1.2026\(167\)13](http://doi.org/10.31617/1.2026(167)13)

Received by the editorial office 29.08.2025.

Sent for revision 12.10.2025.

Accepted for printing 07.11.2025.

Published online 19.06.2026.