

Impact of martial law on public investment in innovation

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Abstract. The study aimed to examine the degree of influence of martial law on investment activity in innovative project development. The methodological approach was based on analysis, synthesis and generalisation. The study determined a significant negative impact of the introduction of martial law in Ukraine on the processes of attracting investment from the state in various innovative areas. The study determined that the most promising areas of investment during the introduction of martial law in the country are the agricultural sector and construction. The least promising areas of activity for potential investors are the information technology industry, as well as heat and power supply. In addition, government bonds are one of the most common areas of investment funds. Domestic government bonds in wartime should be addressed quite reliably because their profitability is guaranteed directly by the state. After the introduction of martial law in Ukraine, military bonds became widely popular. The study determined that the yield on such securities can reach 18.5% per annum. The study noted a substantial increase in state budget expenditures (from UAH 1,490,258.9 million in 2021 to UAH 4,486,682.7 million in 2024) with an increase in defence spending (from 8.6% in 2021 to 66.1% in 2025). All of this is occurring in the context of a growing state budget deficit during the martial law period. At the same time, a sharp decline in investment in innovation was noted in Ukraine due to a significant increase in the risk of loss of funds from potential investors as a result of the impossibility of implementing investment projects during the hostilities and the suspension or complete shutdown of business structures that were able to fully implement these projects before the war. The factors that influenced the possibility of attracting public investment in the field of innovation by the state during the war were identified to find ways to effectively implement innovative development measures after the end of hostilities

Keywords: development prospects; financial borrowings; effective solutions; external aggression; economic instability; innovations

Introduction

In the context of martial law, the state faces a need to create effective mechanisms to support economic development, particularly in areas focused on the creation of new technologies, products and solutions. In a situation of political instability, increased risks and significant redistribution of budgetary resources, investment attractiveness is significantly reduced, which negatively affects the dynamics of scientific and technological progress. At the same time, the development of innovative solutions and the introduction of modern technologies are the key factors in ensuring the competitiveness of enterprises, strengthening their adaptability to crisis challenges and creating sustainable models of operation. Attracting capital to develop and implement new solutions is a prerequisite not only for maintaining market positions but also for expanding the country's economic potential.

S.O. Perminova *et al.* (2024) studied the issues of innovation activity in Ukraine during the external armed aggression. According to the authors, the current period of Ukraine's history is characterised by substantial challenges in various spheres of life and requires a rapid response and ensuring the national defence capability, as well as security in the production, information and economic spheres. At the same time, V.V. Bilyk (2022), in an analysis of the state regulation of investment activity, noted that the possibility of such regulation is of great importance at the current stage of economic development and in the context of Ukraine's European integration vector. Further progress of the country is impossible without scientific and technological progress in industry and the modernisation of its management system. However, during the armed conflict, attracting public investment in innovation becomes largely impossible or even more difficult, as there is a real threat of losing the invested funds without any prospect of their further return.

At the same time, A. Kostruba (2024), who explored various aspects of managing investment activities in Ukraine during the war, pointed out that following Russia's armed invasion of Ukraine in February 2022, nearly all innovative and business operations aimed at attracting investment were halted. By 2025, businesses across all sectors are undergoing recovery from numerous difficulties, including a volatile security environment, damaged infrastructure, supply chain disruptions, and a highly unpredictable business climate. T.O. Gutsan & O.M. Melnikova (2024) analysed the main trends affecting Ukraine's investment appeal under martial law. The authors emphasise that assessing a company's level of investment attractiveness is a crucial factor for potential investors when making decisions about investing in its development. In a highly competitive global investment market, the introduction of martial law in the country negatively affects the investment attractiveness of individual enterprises and entire industries, largely levelling the investment attractiveness of enterprises and minimising the prospects for innovation in various fields (Lyndyuk *et al.*, 2023).

O.P. Podtserkovny & D.V. Zyatina (2023) addressed a wide range of issues of stimulating investment in the development of innovations in wartime. The study noted that under martial law, society faces the issues of supporting and stimulating innovation and investment activities in various fields. These conditions force Ukrainian businesses to operate, constantly looking for opportunities to attract investment, while these opportunities are decreasing, as the number of investors willing to risk financial resources in a situation of increased risk of losing investments is significantly narrowing.

In turn, a research group consisting of O.M. Mykhailyk & Y.V. Birak (2023) in an analysis of problematic issues

of building investment and innovation activities of enterprises under martial law highlighted that since the proclamation of martial law, significant changes have occurred in the sphere. The awareness and responsibility of business entities in the use of funds for the development of domestic enterprises has significantly increased. This was determined by the active educational activities of the state and professionals in this area. Based on in-house experience, various enterprises gradually introduced various areas of development and invested in the development of innovative solutions and technologies. The imposition of martial law reduced investment and business activity, pushing some enterprises to the brink of closure and forcing others to cease operations in a situation where they could not attract investment in development (Gavrysh *et al.*, 2024).

M. Nehrey & R. Finger (2024) examined the issues of assessing the impact of the Russian invasion on Ukrainian agriculture in the context of the problems of further attracting investments in the activities of enterprises in this sector of the country's economy. According to the authors, at the beginning of the armed conflict, Ukrainians were forced to deal with significant food shortages and limited access to medicines and other essential products. The deterioration of the situation in the national economy reduced investment activity, which suspended innovative projects and the cancellation of public investment in many areas of activity. G. Allard *et al.* (2022) analysed a wide range of issues related to the impact of political instability on national systems that shape technological development, in particular under martial law. The authors highlighted that such systems have a much greater potential in politically stable countries, while in unstable ones – the probability of their effective functioning is significantly reduced. Therefore, according to the authors, the introduction of martial law significantly limits the possibility of attracting public investment in the relevant areas, as there are no appropriate conditions for the active implementation of projects in this area.

Despite considerable research on the general assessment of the impact of martial law on the investment climate, the issue of attracting public capital to innovative projects in crisis conditions is still understudied. In particular, there is a lack of studies analysing the structure of public investment, the priority areas of its allocation, and the assessment of the effectiveness of such financing during the war.

The study aimed to highlight the prospects for obtaining investment from the state in the context of martial law in the country. The objectives of the study were to compare the investment opportunities of the state before the introduction of martial law and during its operation, as well as to identify the optimal investment areas after the end of hostilities.

Materials and Methods

The materials of this study are legal and regulatory acts governing the investment policy of Ukraine in the field of innovation projects. In addition, to analyse the foreign experience of the impact of martial law on attracting investment in the field of innovation, the materials of the

scientific study by A. Saran & K.S. Yildirim (2023), which covers the relevant experience of South Korea, as well as the data of the statistical report dedicated to a similar situation in Israel, were analysed (Bakushinskaya, 2024).

The general provisions of the Law of Ukraine No. 40-IV "On Innovative Activity" (2002), the Resolution of the Cabinet of Ministers of Ukraine No. 1351-r "On Approval of the Strategy for the Development of Innovative Activity of Ukraine for the Period until 2030" (2024), as well as the general provisions of the State Programmes to Support Innovation Activities were analysed (Ministry of Economy of Ukraine, 2023). In addition, an analysis of the State Budget Reports of Ukraine (n.d.) for 2021-2024 was conducted, which was used to compare changes in the balance of revenues and expenditures of the state budget of Ukraine before and during the introduction of martial law. This analysis identified the most promising areas of investment in Ukraine during the martial law period (2022-2024), as well as the key areas of public investment in the development of innovative projects in the country. The analysis method in the theoretical study identified the key prerequisites for public funding of investment projects in the field of innovation during the war, as well as the factors affecting the probability of implementation of such projects.

In addition, the study conducted a comparative analysis of the losses of the region's largest enterprises in terms of assets, including public joint stock company Ukrainian Power Machines, Philip Morris Ukraine, and state enterprise Malyshev Factory. This analysis estimated the scale of economic losses in an industrially important region of Ukraine, which is critical for justifying the priority of investment support from the state. To process this data, a method of comparative analysis of the volume of losses was used, which identified priority areas of funding in the post-war recovery process, considering the regional characteristics of the Kharkiv region.

The synthesis method was used to identify the key factors that complicate the full implementation of innovation projects in the field of innovation development directly during the introduction of martial law in the country. At the same time, this method identified the main factors that made it impossible to implement innovative projects in Ukraine during the introduction of martial law, as well as the risks closely related to this. This determined the prospects for the implementation of innovative projects related to the need to obtain investment funds from the state in the post-war period, when there will be a need to rebuild the national infrastructure, which, in turn, requires the involvement of effective innovative solutions.

The generalisation method was used to outline a wide range of issues related to the possibility of attracting investment funds from the state in the development of innovative projects in various sectors of the economy. The key factors that most significantly affect the prospects of attracting innovations from the state for the creation and implementation of innovations in any sphere are identified. In addition, the prospects for the implementation of

innovations in various economic spheres after the end of hostilities and the lifting of martial law, after all the necessary measures aimed at the post-war recovery of the country have been taken, are identified. The key advantages of attracting investment funds from the state for the development and implementation of investments in innovative areas, as well as the implementation of investment projects aimed at the country's infrastructure after the lifting of martial law, were identified.

The combination of the identified research methods established the sequence of processing of public investment funds allocated for the development of innovations and to assess the prospects for implementing such a scheme directly during martial law. This identified the key circumstances that make it impossible to implement innovative projects in various fields within the specified period, while at the same time determining the probability of full implementation of these initiatives after the end of the war.

Results

The state's policy on the development of innovations in various areas is based on the previous experience of implementing similar projects and its effective implementation in the current environment. The current problems that are to be solved through the introduction of innovations and the potential of the innovations being developed and implemented in the future are also substantial (Schot & Steinmueller, 2018). Receiving the necessary amount of investment funds from the state for the development and implementation of investments significantly contributes to the rapid economic development of the country, acting as a catalyst for important economic changes in various areas.

According to the official data of the State Budget Reports of Ukraine (n.d.) for the period 2022-2024, an

annual allocation of UAH 2,717.275 million is planned for the development and implementation of state projects in the field of innovation. They will be allocated following the procedure established by the Interagency Commission for State Investment Projects. The greatest attention is paid to the priority areas defined in the Procedure for Selecting State Investment Projects. These areas of investment are social and cultural; healthcare; environmental protection; transport; fuel and energy; functioning of public authorities and provision of relevant services.

Based on the Law of Ukraine No. 40-IV "On Innovative Activity" (2002), innovative products are the results of research and (or) development that are competitive and meet the requirements of the said Law. At the same time, according to the Resolution of the Cabinet of Ministers of Ukraine No. 1351-r "On approval of the Strategy for the Development of Innovative Activity of Ukraine for the Period until 2030" (2024), the national financial support for the development of innovative products is provided to cover the following costs: salaries of employees and specialists in certain industries; payment for advisory services; costs of purchasing and maintenance of the necessary equipment; general promotion costs.

The regulatory framework of Ukraine, which defines the key aspects of attracting public investment in innovation, was developed based on the standards of the European Bank for Reconstruction and Development (World Bank, 2022). Accordingly, the selection of investment projects for investment in Ukraine is also based on the scheme developed by the European Bank for Reconstruction and Development. Figure 1 shows a diagram of the practice of preparing and selecting innovative projects to attract public investment for their development according to the European Bank for Reconstruction and Development.

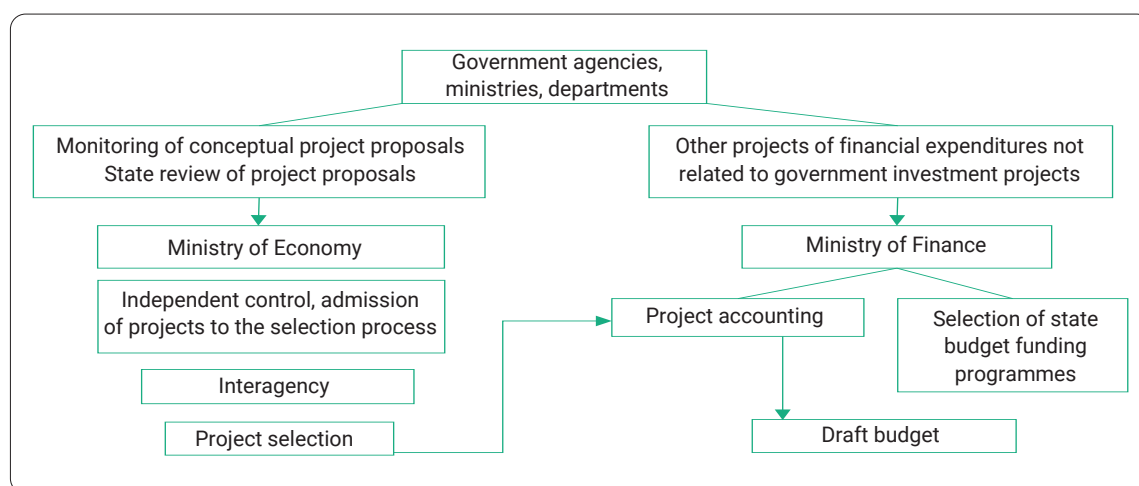


Figure 1. Practice of preparation and selection of innovative projects for attracting public investment for their development

Source: World Bank (2022)

According to the data presented in Figure 1, there is an established procedure for the preparation and selection of

innovation projects in Ukraine, as well as a reserve path. The reserve path is also fully legal when state budget funds are

used. In any case, the selection of projects is the responsibility of an interagency commission, which determines the feasibility of attracting public funds for their development. It is this commission that also determines the sequence of financing innovations from the state budget. Funding is allocated following the planned state budget expenditures for

each current year. This practice is recommended by the European Bank for Reconstruction and Development for all European countries and is successfully applied in Ukraine. As noted above, public innovation in any area is financed from the budget. Table 1 shows the data on state budget revenues and expenditures in Ukraine from 2021 to 2025.

Table 1. Income and expenditures of the state budget of Ukraine for the period 2021-2025 (for 2025, the figures are predicted by the authors)

Year	Total revenues (million UAH)	Total expenses (million UAH)	Share of defence spending (%)
2021	1,296,852.9	1,490,258.9	8.6
2022	1,787,395.6	2,705,423.3	42.2
2023	2,671,998	4,014,418.1	52.3
2024	3,122,713.4	4,486,682.7	51.5
2025	283,224.9	353,779.1	66.1

Source: State Budget Reports of Ukraine (n.d.)

The values presented in Table 1 indicate a gradual increase in the total expenditures of the state budget of Ukraine during 2021-2024 (from UAH 1,490,258.9 million in 2021 to UAH 448,668.7 million in 2024). The study also revealed a significant increase in the percentage of annual public spending on defence (from 8.6% in 2021 to 66.1% in 2025). These indicators indicate a significant increase in public defence spending during the introduction of martial law in the country, which significantly limits the ability to invest in other areas of the state budget, including the financing of innovative projects. Moreover, during the studied period, the state budget deficit of Ukraine has been steadily growing, from UAH 186,908.3 million (3.42% of gross domestic product in the last pre-war year 2021 to -1,350,614.1 (24.71% of gross domestic product) in 2024 (State Budget Reports of Ukraine, n.d.).

In 2021, the EU launched the Horizon Europe initiative to support the EU's research and development

initiatives. This initiative provides funding for research and development in the field of innovation, as well as the implementation of innovative projects in various industries. An annual investment of EUR 100 billion from the EU budget is planned for the period 2021-2027. Of this amount, EUR 2.4 billion was allocated to Euratom's nuclear research programme, and 3.6 billion EUR was reserved for an umbrella investment fund called InvestEU. After accounting for 2% annual inflation in 2018, HorizonEurope's funding was EUR 86.6 billion (Kelly, 2018).

To conduct a comparative quantitative analysis, Table 2 presents statistics on the state budget expenditures for economic activities in Ukraine from 2021 to 2025 (before the introduction of martial law, and during its duration). Notably, the share of funding for innovative projects does not exceed 10-15% (Budget Declaration for..., 2022).

Table 2. State budget expenditures of Ukraine for economic activities (including investments in innovations) for the period 2021-2025

Years	Expenditure on economic activity (billion euros)	Expenditure on innovation (billion euros)	Share of innovations in total expenditures on economic activity (%)	Number of financed projects	Primary areas of support
2021	6.4537022	0.96	15	7234	IT, artificial intellect, construction, agricultural sector
2022	3.4415546	0.36	10.5	3456	Construction, agricultural sector, military bonds
2023	5.4404086	0.59	11	5184	Construction, agricultural sector, military bonds
2024	5.7169068	0.58	10.3	5243	Construction, agricultural sector
2025	0.2914406	0.0297	10.2	268	Construction, agricultural sector

Note: for 2025, the figures are predicted by the authors

Source: State Budget Reports of Ukraine (n.d.)

According to Table 2, a substantial decline in state budget expenditures occurred after the introduction of martial law in the country. The total amount of expenditures on economic activity in Ukraine, including innovations, from 2021 to 2025 does not exceed EUR 22 billion, which is not comparable to the amount of funding for innovations in the EU under the Horizon Europe initiative (EUR 100 billion). At the same time, the share of investment in innovation in Ukraine does not exceed EUR 2.4 billion. In addition, the share of innovation in total economic expenditures before the introduction of martial law decreased significantly, from 15% in 2021 to 10.2% in 2025. In addition, the total volume of funded investment projects decreased from 7,234 in 2021 to 5,243 in 2024 and 268 in 2025, with only construction and the agricultural sector remaining among the promising investment areas by 2025. It is the introduction of martial law in the country that has become the main factor preventing the state from providing stable funding for innovation development.

The experience of South Korea in stimulating innovation activity during the 1950-1953 war demonstrated that with the invasion, the volume of agricultural production, which at that time was the basis of the national economy, significantly decreased. After the end of hostilities and the introduction of the "land reform" in 1956, the country gradually managed to move to an industrial society with the partial elimination of large landowners and the redistribution of capital. In the long run, this helped to attract public investment in industrial development, which eventually contributed to the country's high level of economic development (Saran & Yildirimer, 2023).

Similar trends were observed in the Israeli economy since the outbreak of hostilities in the country. According to a report prepared by RISE Israel, a research and policy institute, in cooperation with the Israeli Association of Advanced Industries, in 2024, there was a 6% decrease in public investment in start-ups compared to 2023. In addition, the 10 largest investments made in the first nine months of 2024 accounted for 47% of total capital invested in various sectors of the economy, compared to about a quarter of the capital in 2023. Less than 50% of public investment in 2022 was repeated (Bakushinskaya, 2024). According to analysts, the situation will only improve after the end of hostilities, when the risk of losing invested funds is eliminated (Hryhorian, 2024).

Any war causes significant destruction, which prevents the full development of the national economy for a certain period. The imposition of martial law in a country caused by the outbreak of war inevitably causes significant changes in the way of social life and the usual course of economic processes. Investment in construction was very profitable before the war, but after the introduction of martial law in Ukraine, the demand for real estate has significantly decreased. This is due to the possibility of losing real estate as a result of hostilities and the inability to predict the approximate timing of the end of hostilities.

However, after the end of hostilities and the lifting of martial law, demand for real estate will recover as the risk of loss decreases and the country's infrastructure begins to be rebuilt on a large scale.

Significant prospects for investment in the agricultural sector are due to the impossibility of destroying land as such as a result of hostilities. The development of investment in the agricultural sector occurs mainly in those areas where there have been no active hostilities and no large-scale damage to residential and non-residential real estate.

At the same time, according to the programmes to support innovation activities adopted in Ukraine as of the beginning of 2025, the following areas of investment in support of innovation are relevant: the state support programme "Affordable loans 5-7-9%"; the programme "Ukraine: Sustainable Innovations in the Bioenergy Value Chain"; and the pilot project to provide financial support to start-ups in Ukraine, including in the field of information technology, on a competitive basis. In turn, the implementation of the "affordable loans 5-7-9%" programme aims to: develop entrepreneurship by increasing the production of innovative products, as well as introducing innovations to create new jobs at existing enterprises; implement measures to localise epidemics and prevent their spread (in particular, COVID-19 caused by the SARS-CoV-2 coronavirus); refinance debts in Ukrainian banking structures on loans to business entities. The state support programme "Ukraine: Sustainable Bioenergy Value Chain Innovations" is funded by the European Bank for Reconstruction and Development and the Global Environment Facility. The project aims to attract investments in the development of innovative bioenergy technologies, as well as innovative projects aimed at using agricultural residues to create bioenergy value chains.

A pilot project to provide financial support to start-ups in Ukraine, including those in the information technology sector, on a competitive basis, involves holding competitions for start-ups at the initial stages of obtaining financial support, with further monitoring of the effectiveness of the investment funds provided (Ministry of Economy of Ukraine, 2023). During the introduction of martial law in the country, investment activities aimed at developing innovative products and technologies in various spheres of economic life are associated with significant risks and are significantly complicated. However, even in such conditions, attracting investment from the state in the development of innovative products and technologies is extremely important in terms of stimulating the activities of manufacturing enterprises and creating a healthy competitive environment (Mykhailik & Birak, 2023). Figure 2 shows a flowchart that reflects the relationship between the key areas of public investment in innovation during the introduction of martial law in Ukraine. This flowchart shows the main trends in the mutual influence and interconnection of these investment areas, which was used to assess the prospects of innovation markets in Ukraine in various fields.

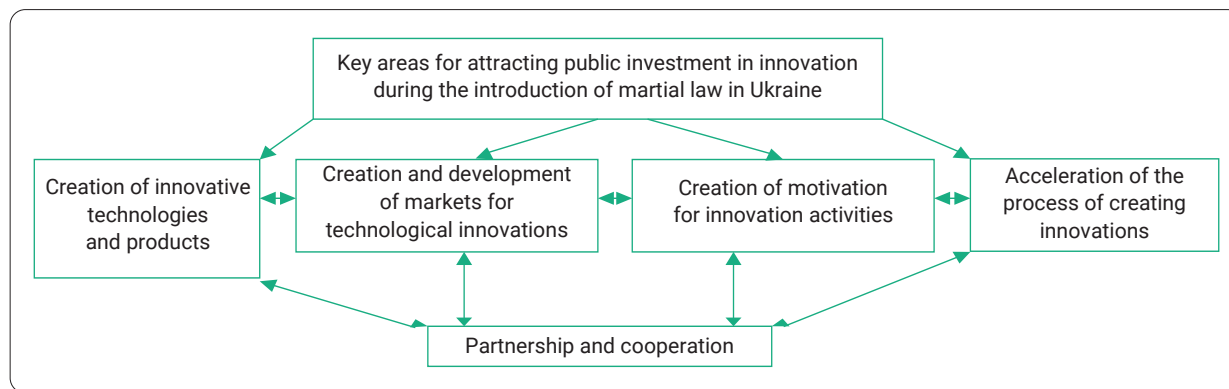


Figure 2. Key areas of public investment in innovation during the introduction of martial law in Ukraine

Source: O.M. Mykhailiyk & Y.V. Birak (2023)

The interconnection between the key areas of investment by the state in the development of innovations is determined by the following factors. The creation of new technologies and products implies the need for innovative means of production, services or technological solutions that can be used during the war or sold profitably after its end. For instance, this could be the production of food products, innovative medical equipment, or innovative developments in the field of military protection.

The creation of markets for technological innovations and their further development is driven by a sharp decline in demand for the main products of manufacturing companies, due to political and economic instability in the country, as well as the resulting lack of funds to purchase goods from potential consumers. These factors are prompting companies to actively seek opportunities to export products to other markets or adjust current orders to compensate for the fall in demand for their products.

The imposition of martial law in the country as a result of Russian aggression has caused a significant reduction in the volume of investments in the development of enterprises located in the combat zone, or even the termination of the existence of these enterprises. This is determined by the uncertainty of the fate of these enterprises, as well as the inability to predict the development of events and the state of the markets for their products in the medium and long term. In addition, during the martial law period, the costs of ensuring the security of their property and individual employees increase significantly. This may be reflected in investments in the development of security systems, as well as the purchase of security equipment and the creation of security units.

The introduction of martial law significantly reduces the amount of public funds that can be allocated for the development of innovative projects in any area. The possibilities of obtaining investment funds by other means, including through lending or other financial sources are also significantly deteriorating. Financial institutions are aware of the high risk of such transactions, and therefore mostly refuse to provide investment funds to enterprises.

The imposition of martial law also caused a drop-in investment activity of many companies due to a significant

increase in business risks caused by the hostilities, as well as resource constraints and lack of motivation to develop in the current situation. Since the start of the full-scale invasion of Ukraine, a significant number of investment projects in various industries have been closed or frozen. This applies even to the information technology sector, which was highly developed in the country in the pre-war period (Khoma & Vorobiy, 2023).

This is especially relevant for start-ups, as most innovative projects were launched or planned before the war. In Ukraine, the main obstacle to their development was the almost complete absence of customers who formed the demand for the final product, so the creation of startups in Ukraine is aimed at finding customers from foreign markets (United States, Europe, Asia, etc.), which greatly simplifies the process of obtaining investment funds and bringing certain tasks and programmes to mass production (Kroitor, 2023). To address this situation, in 2018, Ukraine created the Ukrainian Startup Fund (2022), which aimed to attract investor funds and then invest them in innovative projects. After the introduction of martial law, a significant number of start-ups, as well as their founders, went to defend the country as part of the military forces, territorial defence units and the information technology army of Ukraine, so the Fund is unable to provide the full, necessary funding for the development of innovations.

The outbreak of hostilities in Ukraine has caused significant damage to many of the country's infrastructure facilities. According to information received from the Ministry of Environmental Protection and Natural Resources, there have been large-scale attacks on critical infrastructure in the country since the introduction of martial law. A solar power plant was destroyed in Merefa, Kharkiv region, and one of Europe's largest salt deposits in Soledar, Donetsk region, was almost destroyed by a massive missile strike. In 2022 alone, more than 100 medium and large enterprises were destroyed in six regions of Ukraine: Kyiv (17% of infrastructure damage), Donetsk (17%), Zaporizhzhia (14%), Kharkiv (13%), Luhansk (10%), and Mykolaiv (8%) (Hryhorian, 2023). By the end of 2022, the total amount of

damage from these losses is estimated at around USD 140 billion. The consequences of environmental pollution after this destruction will be evident for years.

Figure 3 shows a comparative analysis of the damage to the largest enterprises in the Kharkiv region in terms of assets in 2022 as a result of hostilities in the region.

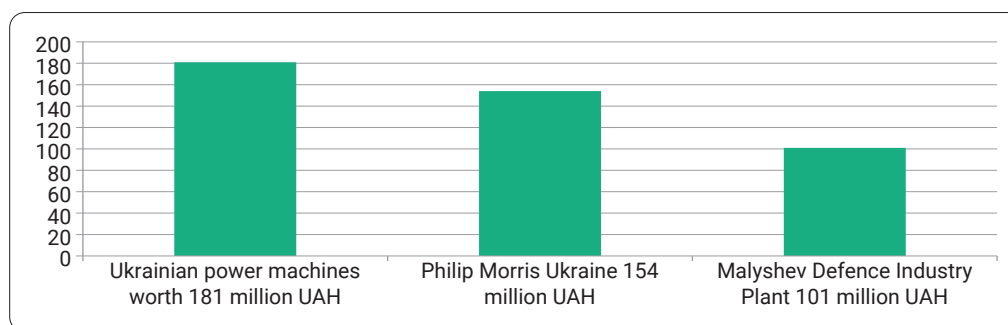


Figure 3. Damage to the largest enterprises in the Kharkiv region in terms of assets in 2022 as a result of hostilities in the region

Source: O. Hryhorian (2023)

According to the data presented in Figure 3, in 2022, losses due to hostilities among the largest enterprises in the Kharkiv region in terms of assets were as follows: Ukrainian Power Machines – UAH 181 million, Philip Morris Ukraine – UAH 154 million, Malyshev Defence Industry Plant – UAH 101 million. In the current situation in this region, public investment funds are directed primarily at restoring the losses incurred by enterprises during the hostilities and the introduction of martial law in the country, rather than at developing innovative projects in various fields. Public investment in innovation can only be directed after the infrastructure of enterprises has been restored, and whether it is possible to implement investment projects of this kind. Following the Decree of the President of Ukraine dated 21 April 2022 No. 266/2022, the National Council for Post-War Reconstruction of Ukraine developed a series of measures within 24 working groups to restore and develop Ukraine after the end of hostilities and the lifting of martial law in the country. In the context of the implementation of this initiative, a list of proposals for priority reforms and strategic measures, and draft legislative acts was created, the adoption and further, systematic implementation of which is necessary to improve the effectiveness of work on the restoration of Ukraine during the war period, as well as after the end of active hostilities and the lifting of martial law (Hryhorian, 2023).

The commercial structures that comprise the various potential investors almost always lack the financial capacity and regulatory framework for collecting and processing information that is typical for public institutions (Kraus *et al.*, 2023). Therefore, regional investment market players have significantly fewer sources of information: official web portals and Internet resources directly owned by state and regional government agencies; scientific publications; information from trade or any other commercial publications; reference materials; media advertising; information obtained from firms and business circles that perform market research and sell the information obtained;

presentation events: exhibitions, open days; credit or investment ratings of individual regions; private meetings, as well as networking and communication between employees of enterprises. The underlines the higher efficiency and expediency of attracting public investment in the development of innovative areas compared to investments received from other investors.

Attracting public investment funds to develop innovations always involves several stages. Firstly, preliminary monitoring of potential projects that could be relevant in terms of their development is conducted to further implementation of investment solutions. Secondly, those projects are selected for which certain tax benefits can be determined in the future during their further implementation (Davies, 2005). Such a scheme of interaction between the state, which allocates funds for the implementation of innovations, and the final executors excludes possible mistakes in the use of investment funds and make the process of innovation implementation as safe as possible. However, during martial law, the situation changes dramatically, as it becomes completely impossible to guarantee certain tax vigilance from the state during the implementation of innovative projects. Moreover, the source of funding may be extremely limited due to the combination of factors identified above.

Since the outbreak of hostilities in Ukraine, the volume of investment funds has significantly decreased, even between countries of geopolitically distant blocs, which indicates difficulties with the implementation of any economic projects during the war and the declaration of martial law. In the current situation, the implementation of innovations is impossible, as the persistence of geopolitical tensions and the tightening of trade restrictions during the war prevent the quality implementation of investment projects. At the same time, amid the many challenges posed by Russia's ongoing full-scale invasion, there are still opportunities to attract investment in many areas of the national economic and

social life. Ukraine has a large consumer market, a highly educated and competitive labour force, and even rich natural resources (Ivanov *et al.*, 2020). The Ukrainian government continues to create appropriate legislation and regulations to capitalise on this potential through numerous completed or ongoing governance and economic reforms designed to bring Ukraine into line with current European Community standards and improve the business climate (U.S. Department of State, 2024). During the martial law period (2022-2025), there is every reason to expect that hundreds of billions of dollars of investment funds from governments, international financial institutions and the private sector will be attracted during Ukraine's post-war recovery, creating a wealth of investment opportunities.

For example, this concerns the attraction of public investment in the creation and advancement of innovations within the energy sector. Since mid-2021, global energy prices have been consistently rising, as the post-pandemic recovery has led to heightened tensions in the energy market. These trends were especially evident in Europe, where Russia's invasion of Ukraine exerted extraordinary pressure on the region's energy market: between 23 February 2022, the day before the invasion, and 31 July of the same year, European wholesale prices for gas and electricity surged by 115% and 237%, respectively (Ferriani & Gazzani, 2023). Therefore, potential investments in the development of alternative energy sources are of great promise, as they create the prospect of obtaining the necessary amount of cheap energy in a situation where there is a steady upward trend in the price of electricity produced by conventional means.

At the same time, global practice demonstrated that with the outbreak of war in Ukraine on 24 February 2024, uncertainty and turmoil in world markets were observed (Patel *et al.*, 2023). As a result, there has been a significant reduction in potential investment opportunities in various areas, both for private investors and for the prospects of attracting public investment in the development of various sectors. This applies to investments in the development of environmental innovations and green technologies, such as solar energy, the use of alternative sources of electricity, environmentally friendly methods of waste disposal, etc. In addition, the situation is complicated by significant uncertainty in global financial markets, as well as growing concerns about its potential consequences for the global economy and financial systems (Zeinedini *et al.*, 2024). The ongoing war has brought about not only immediate economic repercussions for Ukraine, including the imposition of martial law and various adverse effects of the conflict. Overall, the situation has led to a sharp rise in the volatility of energy and agricultural commodity prices, as well as instability in global financial markets. The crisis has highlighted the fragility of international supply chains, especially in the energy and food industries, resulting in inflationary pressures and growing economic uncertainty across numerous regions.

The war in Ukraine has greatly intensified economic risks throughout Europe. Among the numerous consequences

of this development was the collapse of Silicon Valley Bank in March 2023 – the second largest bank failure in U.S. history – followed by the downfall of Silvergate and Signature Banks, mounting credit risks, and the bankruptcy of Credit Suisse. This chain of events has fuelled rising commodity prices and heightened uncertainty in global economic markets. Furthermore, the conflict altered the relationship between idiosyncratic volatility and market portfolio volatility even prior to the outbreak of hostilities (Saliman & Le Squot, 2024). The war's impact on the global economy, including the EU, has been substantial. Before the onset of hostilities and the imposition of martial law, Ukraine was the EU's third-largest supplier of agricultural and food products, while Russia accounted for nearly 45% of the gas market by the end of 2021 (Semenenko *et al.*, 2021). Geopolitical instability triggered declines in stock markets, a trend that persisted across all major global financial centres until September 2022. At the same time, the conflict poses a threat to global food security due to reduced export capacity from Ukraine, labour shortages, and limited access to fertilisers (Wang *et al.*, 2023). The situation can only improve significantly after the end of hostilities and the lifting of martial law when the economy in Ukraine and the EU stabilises and there are opportunities to attract public investment in the development of innovative projects.

To attract public investment in the development of innovative projects, it is necessary to establish a special stabilisation fund in Ukraine after the war to stimulate investment in the development of innovative projects and investment support for start-ups. This will stabilise the state investment policy in the field of innovation support and systemise the distribution of investment funds for their efficient use.

Discussion

The research demonstrated that the introduction of martial law substantially decreased the prospects for attracting public investment in the development of innovation. T.P. Wisniewski & S.K. Pathan (2024) analysed the impact of changes in the external political environment, which leads to the introduction of martial law in a country, on the ability to attract investment in the development of innovations. According to the researchers, it is impossible to attract long-term investment in the country's economy after the declaration of martial law, as there are no guarantees of return on investors' funds. In addition, it is impossible to attract public investment in the field of innovation, as there are no prerequisites for the implementation of innovative projects in such conditions. The opinion of the researchers fully correlates with the results of the current study, as during the introduction of martial law due to hostilities, the risks of loss of funds by potential investors increase, and the possibility of receiving investment funds from the state decreases while the state budget expenditures on defence of the country increase.

A. Nowinska & T.R. Olesen (2024) concluded from the Russian Ukrainian war in the context of the dynamics of

interstate military confrontation and its impact on attracting investment in economic development. According to the researchers, wars between individual states should be regarded as much more dynamic and destructive to institutional conditions compared to all types of conflicts directly related to the use of violence. The introduction of martial law in a country as a result of the war significantly limits the ability of the state to attract investment in any economic sphere, and for a certain period makes it impossible to fully develop the country's economy (Meleshchenko, 2024). The conclusions of the authors coincide with the results of the presented scientific research, since during the introduction of martial law in a country, full economic development is impossible for a certain period since the volume of public expenditures by expenditure items undergoes significant changes during the introduction of martial law.

A similar topic was addressed by T.T. Luu & D.P. Pham (2024) in a study of the impact of American military aggression on the decline in investment activity in the Vietnamese economy in 1960-1975. According to the researchers, this war significantly changed the economic landscape of Vietnam, as large-scale bombing caused huge damage to the country's infrastructure, transport, and industry, making it impossible for the national economy to develop for a long time by attracting foreign and public investment. This does not coincide with the results of the current study, as the restoration of Vietnam's infrastructure after the war was achieved precisely by attracting foreign investment aimed at ensuring the country's further economic development, although during the fighting and the introduction of martial law in the country, all this was completely impossible. In addition, in Ukraine, during the introduction of martial law, there has been a steady decline in public investment in innovation, which makes it impossible to develop innovation until the end of hostilities.

X. Cai *et al.* (2024) addressed the probability of geopolitical risks affecting the probability of martial law in a particular country and the associated drop-in investment activity at the state level. The researchers noted that geopolitical risk has a significant economic impact on government and corporate actions, contributing to a sharp drop-in investment activity in many economic sectors. In addition, the escalation of such risks mostly has a negative impact on the country's overall investment potential in the long run. The conclusions of the scientists fully coincide with the results obtained in the presented study, because the potential of any country in terms of attracting public investment in development directly depends on the presence and level of geopolitical risks associated with the possibility of escalation of the war and the introduction of martial law in the country, which affects the ability to raise funds from the state budget for the development of innovative projects. C.V. Nguyen *et al.* (2024), in their research on the long-term impacts of war on foreign direct investment and economic growth, emphasised that the outcomes of war are devastating – including the destruction of physical

infrastructure, environmental harm, the erosion of economic and political institutions, and loss of human life. According to the authors, the forced introduction of martial law in the country as a result of the outbreak of war can be explained by the presence of significant dangers to activities in various spheres of society and the economy, including. This greatly complicates the implementation of state investments in economic development and innovation. The study results could be expanded based on the findings of the current study, as military bonds backed by developments in the field of military innovation can still be profitable for some time after the introduction of martial law in the country and the impossibility of receiving investment funds from the state.

Researchers M. Ahad *et al.* (2024) examined various aspects concerning the establishment of a secure economic environment between European environmental, social, and governance initiatives and the energy sector amid the Russian-Ukrainian war. Their study pointed out that with the imposition of martial law in Ukraine due to Russian aggression, the supply of Russian gas across the country declined significantly, eventually coming to a complete halt. As a result, the possibility of implementing innovative projects in the economy was practically minimised by the introduction of state investments, which, according to the researchers, is a prominent example of the negative impact of martial law on the development of investment processes. The conclusions correlate with the current study in the context of assessing the impact of martial law on the prospects for investment development in Ukraine, but they could be expanded, as the termination of gas supplies through the territory of Ukraine also negatively affected the prospects for innovative development of the economies of many European countries, which is essential in the absence of funds in the state budget of the country necessary for the development of innovations. J. Bijanska & N. Wodarski (2024) conducted a joint study of a wide range of issues related to the impact on the investment climate in the field of hard coal mining due to the introduction of martial law in Ukraine. The authors highlighted that after the introduction of martial law, the country stopped implementing innovative methods of switching from coal to renewable energy sources. In their view, this is an indication of the negative impact of martial law on the prospects of attracting investment in innovative projects directly from the state, especially in the context of the use of hard coal as a raw material in the energy sector of Ukraine has significantly decreased since its introduction. The opinion expressed by the researchers is consistent with the results obtained in the study, since public investment in the development of any economic programmes during martial law is quite problematic because there is a risk of losing these funds, and their amount is generally limited, especially in the context of the growing budget deficit in the context of martial law.

At the same time, the study by S. Kumar *et al.* (2023) addressed several problematic issues of finding the

necessary balance between existing approaches to creating investment strategies for the distribution of commodity prices during the Russian Ukrainian war. According to the researchers, economic and political unrest has a complex impact on the economies of all countries of the world, mostly complicating or making it impossible to fully develop any economic sphere. This applies to the opportunities to attract investment in the development of innovative areas that contribute to the development of the country's economy and the creation of favourable conditions for the interaction of various business structures. The conclusions of scientists should be supplemented since not all unrest in politics and the economy leads to the introduction of martial law in the country, so the interaction of business structures in the country may be possible under any circumstances, another thing is that its effectiveness may differ significantly when there is a possibility of attracting investment funds from the state, or when there is no such possibility in a situation where significant amounts of state budget funds are directed to the national defence.

F. Gursoy (2012) addressed a wide range of issues related to changes in the investment climate in the country during the introduction of martial law and after the war was over. The researcher highlighted that political instability is a substantial problem for attracting investment in any country. The imposition of martial law as a result of external aggression causes a situation that makes it impossible to fully develop the country's economy, hinders the processes of borrowing foreign investment in the economy and the growth of investment attractiveness of individual enterprises and certain economic sectors in general (Ilychok *et al.*, 2024). The author's conclusions are fully consistent with the results obtained in the study, since during martial law and hostilities, potential investors will not invest in projects that involve huge risks of losing their investments, and the national budget does not have sufficient funds to finance innovations.

Thus, the discussion of the results of this research, in the context of their comparison with the results of the research of other scientists who have studied the problems of the impact of martial law on the prospects for attracting investment in the development of innovations, showed their correspondence in key points. In particular, the positions of the studies coincide regarding the impossibility of fully investing in innovative projects during hostilities in the country and the high probability of losing the invested funds. In addition, a comparison of the results of the studies confirms the fact that during military operations in the country, a significant part of the state budget is allocated to defence, which forces a temporary suspension of innovation funding until martial law is lifted.

Conclusions

The study determined that the introduction of martial law in the country has a negative impact on the prospects of receiving investment from the state by any entity

developing innovative projects. The current situation is explained by the presence of significant risks of losing investment funds as a result of hostilities in the country, as well as economic instability, accompanied by the destruction of infrastructure and the inability to implement investment projects in full.

In Ukraine, legislation provides for the possibility of receiving investment funds from the state for the development and implementation of innovative projects in various fields. The sequence of financing investment projects in the field of innovation is established by the European Bank for Reconstruction and Development recommendations and has been successfully tested in several European countries, including Ukraine. However, the introduction of martial law in the country saw a significant increase in defence spending (from 8.6% in 2021 to 66.1% in 2025) amid a persistent state budget deficit before and during the war. This negatively contributes to the prospects for public investment in innovation during martial law and largely prevents investment development of the economy.

Since the introduction of martial law in Ukraine, the most promising areas for investment by the state have been the agricultural sector and construction. In the first case, this is attributable to the impossibility of destroying land as such as a result of hostilities or during the post-war restoration of territories. The prospects of investing in construction are explained by the mandatory return of demand for real estate after the end of hostilities and the lifting of martial law, as well as the need to restore the country's destroyed infrastructure. However, as for the prospects for investment in the development of innovative projects by the state, they will be extremely low until the martial law is lifted. This is attributed to many factors, including the lack of qualified personnel required to implement innovative projects. The situation can only improve dramatically after the end of hostilities, which will facilitate the lifting of martial law and the launch of the process of restoring the country's infrastructure. The experience of other countries (Israel, South Korea) shows that in this case, there will be a wide range of opportunities to receive investments in the development of innovative projects aimed at creating conditions for the revival of the country's economic potential, provided there is no risk of losing investment funds.

Prospects for further research in the area determined by the subject matter of the presented work are predetermined by the need to find effective means of implementing innovative projects in difficult conditions caused by the introduction of martial law in the country, as well as the allocation of funds for these projects by the State.

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Conflict of Interest

None.

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Вплив воєнного стану на державні інвестиції в інновації

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Анотація. Метою дослідження було вивчення ступеня впливу воєнного стану на інвестиційну активність у сфері розвитку інноваційних проектів. Методологічний підхід базувався на аналізі, синтезі та узагальненні. У результаті дослідження встановлено значний негативний вплив введення воєнного стану в Україні на процеси залучення інвестицій з боку держави в різні інноваційні сфери. За результатами дослідження визначено, що найбільш перспективними сферами інвестування під час запровадження воєнного стану в країні є аграрний сектор та будівництво. Найменш перспективними сферами діяльності для потенційних інвесторів є галузь інформаційних технологій, а також тепло- та електропостачання. Крім того, державні облігації є одним з найпоширеніших напрямків інвестування фондів. До облігації внутрішніх державних позик у воєнний час слід ставитися досить надійно, оскільки їх дохідність гарантується безпосередньо державою. Після запровадження воєнного стану в Україні широкої популярності набули військові облігації. Дослідження визначило, що дохідність за такими цінними паперами може сягати 18,5 % річних. У дослідженні відзначено суттєве зростання видатків державного бюджету (з 1,490,258,9 млн грн у 2021 році до 4,486,682,7 млн грн у 2024 році) зі збільшенням видатків на оборону (з 8,6 % у 2021 році до 66,1 % у 2025 році). Все це відбувається в умовах зростання дефіциту державного бюджету в період воєнного стану. Водночас в Україні спостерігається різке скорочення інвестицій в інноваційну сферу через значне зростання ризиків втрати коштів потенційних інвесторів внаслідок неможливості реалізації інвестиційних проектів під час воєнних дій та призупинення або повної зупинки діяльності бізнес-структур, які мали змогу повноцінно реалізовувати ці проекти до війни. Визначено фактори, які вплинули на можливість залучення державних інвестицій в інноваційну сферу державою під час війни для пошуку шляхів ефективної реалізації заходів інноваційного розвитку після завершення бойових дій

Ключові слова: перспективи розвитку; фінансові запозичення; ефективні рішення; зовнішня агресія; економічна нестабільність; інновації