

DOI: 10.55643/fcaptp.3.56.2024.4366

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Received: 01/03/2024

Accepted: 06/06/2024

Published: 30/06/2024

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DEVELOPMENT OF THE DEFENCE INDUSTRY OF UKRAINE TO ENSURE NATIONAL SECURITY

ABSTRACT

The national defence industry concentrates on military, electronic, information and space technologies. In the near future, Ukraine's defence industry may become one of the most knowledge-intensive industrial sectors of the economy. Accordingly, the purpose of the study is to assess the capacity of Ukrainian defence enterprises to produce weapons and military equipment to ensure national security. The research aims not only to assess the problems of the defence industry under martial law but also to ensure the effective development of the defence industry sectors by identifying priority areas of funding.

It was found that the current state of the Ukrainian defence industry does not meet the current realities of the time, especially in the context of Russia's full-scale invasion of Ukraine. The provision of equipment and weapons to military units is at a low level. It is found that the renewal of modern models of weapons and military equipment of the Armed Forces of Ukraine, before the full-scale invasion, was less than 1%, which in turn did not allow to compensate for the rate of ageing of existing weapons. The authors suggest ways to support the development of Ukraine's defence industry, in particular, through the creation of a Defence Industry Development Fund.

The authors propose to create a Defence Industry Development Fund using public and private sources of funding not prohibited by the legislative framework of Ukraine, which will expand the capabilities of defence industry enterprises to produce weapons and military equipment. The creation of a system of multi-level continuous education in the defence industry and long-term conditions for the sustainable development of the defence industry's human resources will allow to engage in capacity building and reach a new level of support for the Armed Forces of Ukraine through the implementation of NATO standards.

Keywords: development, armaments, military equipment, NATO standards, profitability, innovation, investment, defence industry enterprises

JEL Classification: H56, H57, K23, L69, O33

INTRODUCTION

Ukraine is highly industrialized, with a highly educated and technically advanced population. During the Soviet era, it had a strong military industry and continued to be a major arms exporter after independence.

Nowadays, when market relations in Ukraine are gaining ground, it is necessary to use the advantages of a market economy to create new economic conditions for the defence industry and to break through the industry. Recent years have been difficult for the defence sector. And it's not just the reduction in state military orders. The process of structural reforms in the defence industry has been slow and controversial. The illusion persisted that obsolete and technically outdated products would be in demand by the state and that defence companies could continue to operate without regard to such a category as economic efficiency. The structure of the defence industry is still archaic and does not meet the current military and political objectives of the state. It should not be forgotten that today Ukraine faces new threats that place fundamentally different, higher demands on the reliability of national defence than before. Obviously, in the

new environment, the state must clearly define its interests and priorities in the defence industry.

It should be noted that the defence industry enterprises are one of the players in the defence industry market, while the state is another important player, which makes this market specific and important. The state acts as both a buyer and a regulator that determines the rules of the game and the parameters for the development of domestic support for high-tech knowledge-intensive production in the defence industry. This places special demands on the development of state policy. Despite the fact that the specific problems of the defence industry market and the defence industry complex have been sufficiently studied, it must be admitted that no comprehensive analysis of the patterns of formation of the defence industry market and the specifics of the functioning of defence industry enterprises has been carried out.

LITERATURE REVIEW

The study of the state of the domestic defence industry, trends that influenced the decline and further development are considered in the scientific research of domestic scientists, among which are the works of V. Begma [1], U. Zelinska-Vatamaniuk [2], S. Kulytskyi [3], S. Slobodanyk [4], A. Savitskyi [5], P. Tolok [6], V. Shemaiev [7], and others.

V. Begma [1] in his study considers the implementation of the military-technical policy of the state by introducing a mechanism for three-year planning of the state defence order, which will allow to develop medium-term planning of the economic development of the state and the possibility of forecasting the costs of the country's defence capability. U. Vatamaniuk-Zelinska [2] examines the problems of financing the needs of the defence sector in Ukraine and notes that during the military operations on the territory of Ukraine, the expenditures of the State Budget of Ukraine for the needs of the Armed Forces of Ukraine have increased, which in turn has affected the growth of GDP, however, insufficient attention is paid to the issue of attracting capital investments in the development of innovative developments in the defence sector. S. Kulytskyi [3] argues that today Ukraine has created conditions for the economic and organisational development of the defence industry and the production of dual-use products. In addition, he draws attention to the growing needs of national defence and security in the context of the military threat from Russia, which provided more favourable circumstances for expanding the scale of financing the development of the defence industry and related industries and productions in Ukraine, both by the state and private capital. S. Slobodanyk [4] in his scientific work considers the development of the domestic defence industry in combination with TNCs, since these companies form not only the investment component, joint production, and procurement technology, but also ensure the use of intellectual potential, which is a negative component in the development of the latest models of weapons and military equipment, export of military products to third world countries. A. Savitskyi [5] identifies in his study that the main problem in the development of the domestic defence industry is the lack of interaction between the defence industry and other sectors of the country's economy that could provide this industry with components and other components in the production of weapons and military equipment. P. Toloka [6] examines the interaction of the defence industry with external actors on the basis of partnership and cooperation, which in turn will strengthen the financial security of defence industry enterprises. At the same time, the problematic issues of the defence industry development in the context of increased military aggression by Russia and further economic development in the post-war period require additional scientific substantiation.

AIMS AND OBJECTIVES

The Ukrainian defence industry is moving from procurement to increasing its own arms production and forming strategic partnerships with foreign defence companies. Accordingly, the purpose of the study is to assess the capacity of Ukrainian defence enterprises to produce weapons and military equipment to ensure national security under martial law and to ensure the functional capabilities of the Ministry of Defence of Ukraine. In addition to this main objective, the study covers a number of specific tasks, namely:

- studying the peculiarities of the development of the defence industry under martial law;
- analyzing the financing of defence industry production;
- assessing the profitability of defence industry enterprises;
- identifying the problems that affect the development of the defence industry in Ukraine.

This research article aims not only to assess the problems of the defence industry under martial law but also to contribute to a broader understanding of how to ensure the effective development of defence industries by identifying priority areas for funding.

METHODS

The theoretical and methodological basis of scientific research is the provisions of the theories of capital, value, economic growth, and modern management concepts. The study is based on general scientific and special methods of scientific knowledge, which allowed to reveal the purpose and objectives of the work in the most thorough manner. The following methods were used in the research:

- terminological analysis - to specify the conceptual and categorical apparatus of the concept of the defence industrial complex and the defence industry;
- scientific generalisation - to substantiate the approach to identifying problems of the defence industry development;
- system analysis and synthesis - to substantiate the scientific approach to economic support and development of defence industry enterprises; methods of comparison and trend analysis - to study the trends in the domestic defence industry.

RESULTS

The National Defence Industry Complex (hereinafter referred to as the MIC) is a set of research and development, testing organisations and industrial enterprises that develop, manufacture, store, and put into service military and special equipment, ammunition, and ammunition mainly for state security agencies, for state security agencies, and for export. In other words, the defence industry is, on the one hand, a set of enterprises and organisations that cooperate with the Armed Forces of Ukraine, and on the other hand, a system of links and relations with the state, represented by the Ministry of Defence of Ukraine and other security agencies, and with enterprises that produce civilian products.

If we consider the concept of the defence industry, it is more narrowly defined and includes only the production of products for technical equipment of the Armed Forces and other military formations.

Being an organic part of the national economy and the defence industry, the defence industry operates under the same economic laws that determine the trends in the national and global economy. One of these trends is the constant growth in the cost of innovative goods and services. Moreover, in the context of defence production, this trend manifests itself in an "avalanche-like" manner, causing the cost of new military systems to rise.

The defence industry of Ukraine is represented by the State Concern "Ukrainian Defence Industry", which unites scientific institutions and industrial enterprises of 9 defence sectors, namely: defence industry (scientific institutions and enterprises that ensure the creation, production, repair, modernisation and disposal of weapons and military equipment), aviation industry, radio-electronic industry, shipbuilding industry, instrumentation and communications, ammunition industry, special chemical industry (Ukroboronprom, 2024).

The activities of the aircraft industry are the image of the country. The aircraft industry develops and manufactures all types of aircraft and helicopters, unmanned aerial vehicles, as well as airfield equipment in the military and transport segments. Ukraine is one of the most developed countries in terms of aircraft manufacturing. Today, Ukraine's aviation industry is facing challenges. Low levels of financial support from the state, a low technological base, and low competitiveness are all hindering its development. Therefore, to support the industry, the government developed and approved the State Target Scientific and Technical Programme for the Development of the Aviation Industry for 2021-2030. This 2030 Programme was supposed to ensure the creation of a competitive, integrated into the global aviation industry, integral aircraft manufacturing complex based on the enterprises of the aviation industry of Ukraine, which in turn would meet the needs of the state in modern aircraft and ensure its export to foreign markets. However, this 2030 Programme was not implemented in the context of Russia's full-scale invasion of Ukraine (Ukroboronprom, 2024).

Ukraine's aviation industry comprises approximately 60 companies. In addition to designing and manufacturing passenger and transport aircraft, Ukraine has a network of aircraft repair facilities, including those for the refurbishment of combat aircraft and helicopters. The centres of aircraft construction are Kyiv, Zaporizhzhia, Vinnytsia, Lviv, Lutsk, Mykolaiv, and Odesa.

The shipbuilding industry is a single multidisciplinary complex of enterprises and organizations engaged in the design and manufacture of surface ships and vessels of all types, nuclear and diesel-electric submarines, underwater vehicles and coastal infrastructure to support the functioning of the Navy. The shipbuilding industry has deteriorated significantly since Ukraine's independence, as the remaining shipyards require substantial financial support from the state budget or foreign investors interested in developing the industry to operate fully. The shipbuilding industry was most developed in Kherson

and Mykolaiv regions, as well as in Odesa city. Since the beginning of the full-scale invasion, these enterprises have been subjected to shelling, which in turn has had a negative impact on their further operation, as during the military operations on the territory of Ukraine, these enterprises provided repairs to the Ukrainian military fleet.

Radio-electronic industry. The industry develops and produces electronic components, communications equipment, telecommunications equipment, computers, microprocessors, microwave elements and special materials.

Ammunition industry. It develops and manufactures armoured vehicles, artillery systems, small arms, and air defence systems. The share of its products in the total volume of the complex is about 45%.

The special chemicals industry produces gunpowder, rocket fuel, chemical warfare agents and special chemicals.

Defence industry enterprises have a high territorial concentration in scientific and industrial complexes - scientific technopolises, which are a combination of research and development and production.

The location of the defence industry before Russia's invasion of Ukraine is shown in Figure 1.

Today, the defence industry is a complex economic system with its own specific features, a symbiosis of defence industries that are closely linked to other industries, an important segment of the state economy and one of the most important components of national security, which plays a strategic role in foreign policy.

The state of the domestic defence industry and the level of equipment and weapons provision to military units have long been out of step with the current realities of the times. The level of physically obsolete weapons and military equipment in the Armed Forces and other military formations is about 80%, which indicates that there is no renewal of weapons and military equipment.

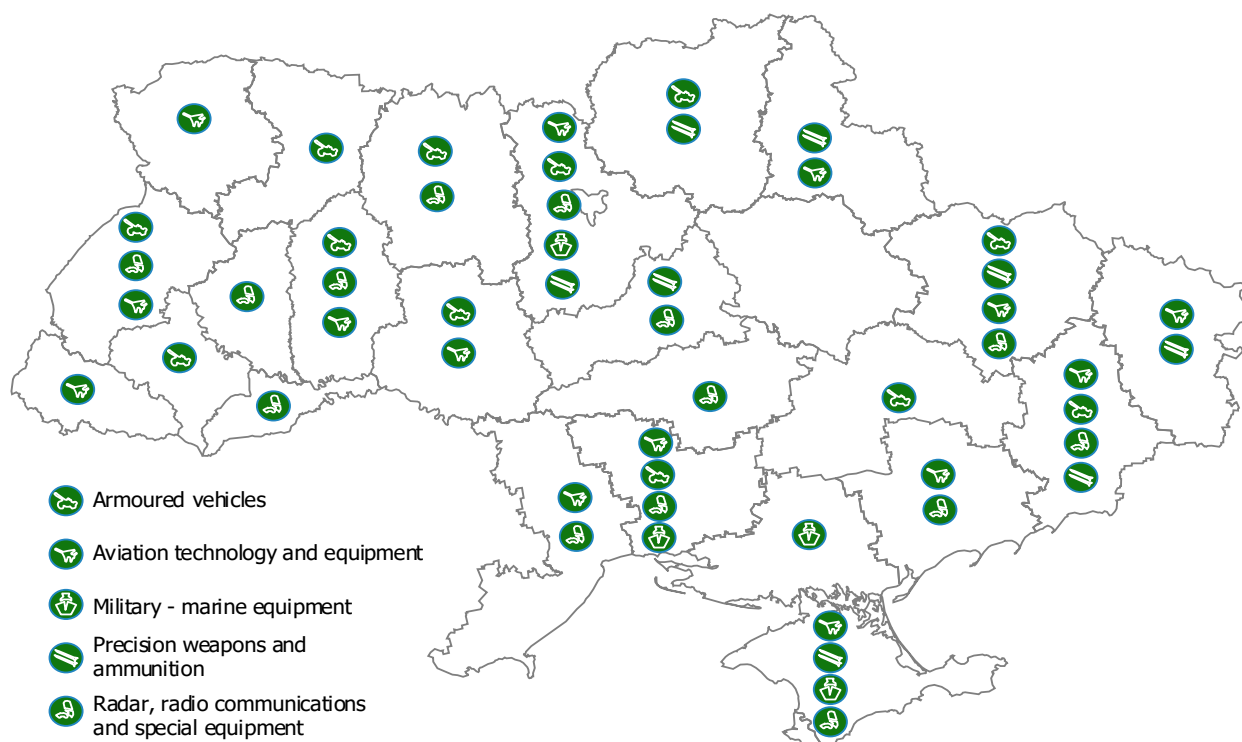


Figure 1. Location of the leading defence industry sectors in Ukraine. (Source: [8])

The weapons and military equipment that were developed and adopted by the AFU were procured unevenly, which did not meet the needs of the Armed Forces of Ukraine to ensure national security. However, despite the decline in the procurement of weapons and military equipment, the number of purchased weapons and military equipment almost doubled in 2016-2020 in the context of the military conflict in eastern Ukraine. Establishing rational proportions between different types of weapons is one of the requirements for the Armed Forces. It is worth noting that weapons and military equipment have their own service life. For example, armoured vehicles and artillery have 30-40 years of service, aircraft - 25-35 years, ships - 40-50 years, and electronic systems - 15-20 years, so to ensure a sufficient level of combat capability of the Armed Forces of Ukraine and compliance of the WME models with modern requirements, the Ministry of Defence of Ukraine must annually update the number of each type of WME in service in the troops. In the context of Russia's full-

scale invasion of Ukraine, the defence industry should increase the production of weapons and military equipment to ensure the effective operation of the Armed Forces in countering the enemy.

Production volumes of weapons, military equipment and other defence products are presented in Table 1.

Table 1. Production volumes of the defence industry of Ukraine in 2019-2021, UAH billion. (Source: [8])

	Armoured vehicles	Aviation technology and equipment	Military - marine equipment	Precision weapons and ammunition	Radar, radio communications and special equipment	Other companies
2019	4.3	6.8	12.7	3.4	2.2	-
2020	5.9	6.8	11.7	3.9	2.7	1.4
2021	5.9	8.6	15.7	4.6	2.8	1.5

In 2021, defence companies increased production of weapons, military equipment and other products by 32.6%: UAH 39 billion compared to UAH 29.4 billion in 2019. Thus, defence companies produced UAH 9.6 billion more than in 2019.

Over the years of Ukraine's independence, defence spending remained virtually unchanged from 1996 to 2001, averaging UAH 1.6 billion. If defence expenditures are correlated with GDP, they accounted for 2.1% of GDP until 2009. In 2009, the amount of spending reached 1% of GDP and remained at this level until 2014, when the war forced a reconsideration of attitudes towards the army and defence. With the outbreak of the military conflict in eastern Ukraine, exports of weapons and military equipment dropped significantly as weapons and equipment became in demand for defence, and since 2014, Ukraine has been importing weapons and military equipment from other countries for the first time.

The National Security Strategy of Ukraine envisages the formation of a budgetary policy in the security and defence sector that would ensure the effective allocation of financial resources for the development and operational activities of the security forces, which would be in line with the practice of financing NATO member states." The Law of Ukraine "On National Security of Ukraine" [11] determines the amount of annual budgetary funding for the security and defence sector. Funding is provided at the expense and within the limits of the funds specified in the law on the State Budget [22] for the respective year and must be at least 5% of the gross domestic product (hereinafter - GDP), of which at least 3% is allocated to finance the defence forces. Therefore, the above-mentioned regulatory documents are the basis for administrative and legal regulation of the financing of the security and defence sector, including the AFU [23]. In 2019-2021, the budgetary funding of the Ministry of Defence of Ukraine amounted to 2.1-2.4% of GDP (Table 2).

Table 2. Funding for the Ministry of Defence of Ukraine in 2019-2023. (Source: [22,23])

Years	Amount of financing, UAH billion	Year-on-year increase	USD exchange rate, UAH	The volume of financial assets in USD, USD billion	Year-on-year increase	GDP, USD billion	% of GDP
2019	101.1	1.2	27.68	2.7	0.9	153.8	2.4
2020	116.6	1.2	23.29	5.0	1.9	155.6	3.2
2021	120.1	1.03	28.6	4.2	0.9	200.1	2.1
2022	920.5	7.7	27.21	33.8	8.1	160.5	21.1
2023	1131.8	1.2	36.57	30.9	0.9	-	-

Table 2 shows an increase in the amount of funding for the Ministry of Defence of Ukraine in national currency, but in terms of USD, this amount was only about USD 2.5-2.9 billion. The actual state of financing of public expenditures on the Armed Forces until 2022 shows not only insufficient amounts of the State Budget of Ukraine allocated for the specified purposes but also serious imbalances in their structure - the defence budget of Ukraine has never been a development budget capable of ensuring reliable defence capability of the state.

Before the full-scale invasion, the rate of annual renewal of the main models of the Armed Forces of Ukraine was less than 1%, which in turn did not allow to compensate for the ageing of the existing weapons. This was primarily due to insufficient funding for the defence forces. Re-equipment with new weapons and military equipment should be massive, but the capabilities of the domestic defence industry are limited [18-20]. Therefore, there is an objective need to involve not only state-owned enterprises but also private ones in the production process on the basis of public-private partnerships. Private

enterprises are more open to innovative changes in production and have a young scientific potential that can ensure the production of new models of weapons and military equipment to meet the requirements of the current security situation.

Since 2023, Ukraine has been producing more weapons than before Russia's full-scale invasion of Ukraine in 2022, despite the aggressor country's efforts to damage the Ukrainian defence industry (Figure 2, Table 3).

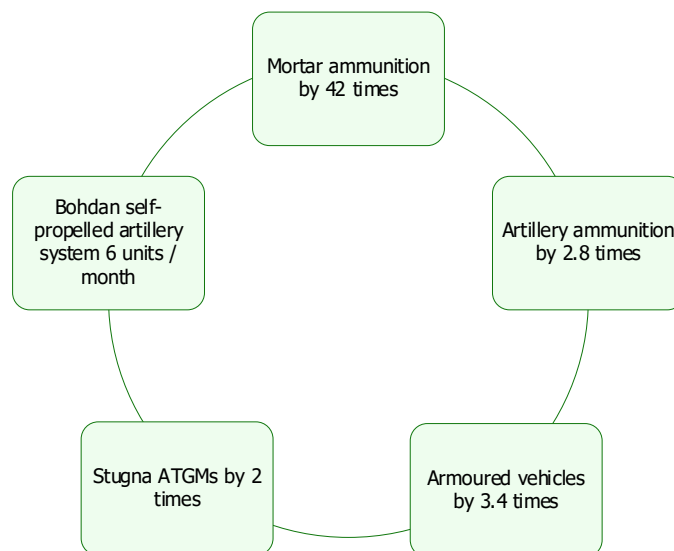


Figure 2. Ukraine's defence industry in 2022-2023. (Source: [8])

Table 3. Performance of Ukroboronprom enterprises in 2022-2023. (Source: [8])

Indicator	2022	2023	Dynamic, %
Revenue, UAH billion	42	79	88.1
Manufactured and repaired products, thousand units	52	637	1118.7

In the first year of the full-scale war, Ukroboronprom's enterprises managed to increase their revenue by 88% - from UAH 42 billion to approximately UAH 79 billion. 2022 was the year of involvement in the production of weapons and military equipment private producers. Their share quadrupled in 2023. In addition, Ukroboronprom enterprises have increased their capacity to repair and manufacture defence products. In 2023, 637,000 units were repaired and manufactured, compared to only 52,000 in 2022.

In 2023, Ukroboronprom managed to increase the production of mortar ammunition by 42 times and artillery ammunition by 2.8 times. In particular, Ukraine began producing ammunition for small arms, 73 mm, 125 mm, VOG-17, VOG-25 shells, and ammunition for drones (Ukroboronprom, 2024).

Today, the domestic defence industry produces the following types of weapons and ammunition:

- *artillery and heavy ammunition.* Ukraine has started producing 155 mm shells in small quantities. These rounds are NATO standard ammunition used in 155 mm guns supplied by the West. Ukraine's defence industry has never been the first to launch new production lines for 82 mm and 120 mm mortars, 122 mm artillery shells and 125 mm tank ammunition for T-64, T-72 and T-80 tanks outside of Ukraine;
- *armoured vehicles.* International assistance to Ukraine has helped to increase the production of armoured personnel carriers. Thus, as of December 2023, the production of armoured personnel carriers has increased almost 5 times. However, this equipment is repaired in Ukraine;
- *drones.* The production of unmanned aerial vehicles in Ukraine has increased during the full-scale Russian invasion. As of January 2024, there were more than 200 companies involved in the production in Ukraine. In addition, more than 50 state-owned and privately owned enterprises are engaged in the production of various ammunition for unmanned aerial vehicles;
- *electronic warfare.* Since 2014, Ukraine has been producing electronic warfare systems and continues to invest in the development of specialized electronic warfare systems. Ukraine is developing specialized electronic warfare systems to protect the Ukrainian army from Russian drones.

The defence industry is one of the priority institutions of the modern economy. Post-industrialization has had a direct impact on the formation of processes and results of enterprises' activities. In particular, post-industrialization has influenced the formation of capital formation of defence enterprises. The scientific knowledge that shapes the innovation policy of the state and enterprises determines the specifics of management and defines organizational business processes. It is business processes that change the scale of competition and consumer needs. In the context of globalization of economic processes, it is necessary to create and intensify changes in the methods of financial support at all stages of economic relations. The peculiarities of capital formation of defence and industrial enterprises are determined by such components as intelligence, innovation and sustainable development, "which accordingly changes the management focus and priorities for the development of business structures aimed at long-term economic growth. In research by V. Hmyria & S. Polyakh [9] current trends in the structure of economic change in favour of an increase in the share of the service sector do not imply a proportional decrease in the role of the industrial sectors, since "the material base of modern production remains and will remain the foundation on which new social and economic processes are developed".

The growth rate of defence production in 2023 compared to 2010 is due, on the one hand, to low sales figures in 2010, which were the result of the 2008 crisis, and, on the other hand, to the growing interest of investors in opening defence industry enterprises in Ukraine since 2014. It should be emphasized that, although the intensification of foreign investors is certainly a very positive step for the development of the domestic economy, the Ukrainian market attracts investors with cheap labour, meaning that the country is actually selling man-hours rather than intellectual products, which, even in such a knowledge-intensive industry as the defence industry, indicates a resource-oriented development model.

The main factor that ensures a sufficient level of return on operating capital is the profitability of defence sales, which was insufficient to ensure a positive value of the spread of profitability of product sales. Thus, the maximum value of the ratio of the actual level of profitability of product sales to the critical level in 2014-2022 for aircraft manufacturing enterprises was 0.39, for land vehicles - 0.23, for enterprises producing ammunition, high-precision weapons, and air defence - 0.74 (Table 4). In fact, the values of the product sales spread signal the state of competitiveness, which, according to the presented results of capital investment, is quite critical. Thus, if we characterize the activities of enterprises in the context of the studied types of industrial activity, the aircraft construction enterprises that were export-oriented until 2014 were the leaders of industrial production in terms of product sales, but in 2015-2022, their performance was characterized by a predominantly downward trend.

Table 4. Indicators of the defence companies' profitability spread in 2014-2022. Note: calculated at a net profit (loss). (Source: [9])

Indicators	2014	2015	2016	2017	2018	2019	2020	2021	2022
1. Spread of profitability on sales of products, %									
aircraft manufacturing companies	-5.46	-6.03	-4.34	-5.73	-13.11	-9.96	-7.22	-4.99	-5.08
enterprises for the production of land vehicles	-11.82	-10.51	-16.80	-16.86	-27.74	-25.03	-10.76	-9.41	-6.13
enterprises producing ammunition, high-precision weapons, and air defence	-50.21	-15.64	-26.10	-49.45	-158.4	-24.09	-9.45	-4.65	-4.04
2. Profitability (+) (loss (-)) on sales of products, %									
aircraft manufacturing companies	-2.85	-2.47	-7.32	-6.25	-17.67	-15.92	-2.62	-2.38	0.20
enterprises for the production of land vehicles	1.16	1.04	2.82	2.50	-5.59	-4.16	-1.62	1.62	2.63
enterprises producing ammunition, high-precision weapons, and air defence	24.50	45.36	38.79	10.04	-94.42	-13.34	-0.56	3.64	3.60
3. Ratio of compliance of the actual level of return on sales with the critical level									
aircraft manufacturing companies	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
enterprises for the production of land vehicles	0.18	0.15	0.39	0.30	0.00	0.00	0.00	0.25	0.34
enterprises producing ammunition, high-precision weapons, and air defence	0.33	0.74	0.60	0.17	0.00	0.00	0.00	0.44	0.47

During the period under review, there was a steady downward trend in the exports of land vehicles and ammunition, high-precision weapons, and the air defence industry. The corresponding decrease in 2021 compared to 2010 was 81.82% and 38.84%. This situation can be explained as follows. The decline in the production and sales of defence products is certainly highly dependent on global market conditions, but the displacement of Ukrainian producers is directly related to the fact

that Ukrainian defence products are raw material-oriented and less competitive in terms of cost. "The peculiarity of domestic defence production is that Ukrainian enterprises produce the entire range of products with a high level of quality, which in turn requires a significant amount of investment" [9].

Investments in defence "production are directly related to the renewal and modernization of equipment and technologies, and experts estimate the state of physical and moral deterioration of the active part of the defence sector's fixed assets at 30-40%" [9].

Despite the identified problems in the development of the defence industry, it is advisable to take into account the fact that the share of defence products in Ukraine's GDP is 2.3%. Although this is a small figure, if we take into account related industries, this figure reaches 9.8%. Defence industry enterprises account for about a third of the country's export income (25% as of early 2022), i.e., "every third or fourth dollar".

The defence industry has a priority position in the world among other industries in terms of the number of people employed. Defence products account for almost 38% of the value of global industrial output, and the leading defence industry countries, which account for 80% of global defence exports, are the most economically developed countries in the world - the United States, Japan, Germany, France, the United Kingdom, Italy, and Canada. In Ukraine, the defence industry is traditionally characterized as the engine of the national economy, while the trends that determine the performance of defence industry enterprises are downward. The main reason for this situation is, first of all, the low level of competitiveness of domestic defence products, which leads to a downward trend in domestic demand for domestically produced equipment, as evidenced by growing exports. State budget defence expenditures started to grow in 2011. Thus, in 2011, expenditures totalled UAH 11.5 billion. In the following years, the amount increased, and with the Russian invasion of Donbas and the annexation of Crimea in 2014, there was a significant jump: in 2015, defence spending tripled to UAH 45.8 billion.

Unprecedented amounts of money were allocated for defence in the history of independent Ukraine during Russia's full-scale invasion of Ukraine: UAH 989.5 billion in 2022 and UAH 1.2 trillion in 2023. In 2022, national budgetary expenditures on defence amounted to 23% of GDP, and in 2023 it was 20% of GDP.

Since Ukraine's independence, and especially during the hostilities, the defence industry has faced a severe staff shortage. At the beginning of the full-scale invasion, about 30% of the defence industry's employees were ATO veterans. With the outbreak of hostilities, these specialists went to defend Ukraine's borders. Graduates of higher education institutions with a technical education are a potential labour resource for the defence industry, as young people are innovative and can ensure the efficient and cost-effective development of the defence industry.

The state of the domestic defence industry under martial law is characterised by the following challenges:

- the need to produce and stockpile ammunition, missiles, etc. Total losses from the destruction of enterprises and their production infrastructure in the defence industry exceeded UAH 100 billion;
- a decrease in, and in some regions a suspension of, investment activity by domestic and foreign investors as a result of the military threat;
- disruption of logistics links and supply chains for raw materials, supplies, and components, which exacerbated the existing problem of supplying domestic defence enterprises with elements that are not produced in Ukraine and are supplied from abroad;
- increased need for new models of weapons and military equipment to quickly meet the needs of the Armed Forces and repair the weapons and military equipment damaged as a result of hostilities against the background of insufficient readiness of the production and repair facilities of the defence industry;
- almost complete suspension of exports of finished products, components, military and dual-use units by defence companies;
- forced migration of human capital, which upset the balance of the labour force that could be involved in the production of defence products in the regional and sectoral context;
- lack of scientific, technical, production and technological base for the development and production of combat aircraft (aircraft, helicopters), air defence and space defence systems, and ammunition of various calibres.

One of the major challenges facing the domestic defence industry is saving on R&D costs. Today, the innovative development of the defence industry is influenced by innovative technological trends, trends in the global arms market, and the development of new adaptive forms of business organisation and management. For example, the development of the information and network economy, in which network or partnership structures and ecosystems rather than individual companies compete, the development of modern geoinformation technologies and information security concepts, and the

transition to a new level of robotisation of production and management processes. Obviously, for defence companies, the search for a new market niche or a new strategic direction is a much more complicated process than in other sectors of the economy. Experts point to the peculiarities of the products manufactured and the specifics of the market, the presence of large and highly specialised production facilities that complicate or make it impossible to flexibly re-profile, and the low level of responsiveness of management structures to market demands in the production of civilian products. An analysis of international experience shows that R&D expenditures in the national security and defence sector accounted for approximately 50% of total public spending on science (in the US - 54%, Israel - 60%, and China - 50%). Thus, there is a risk of losing the country's existing scientific and technical potential in the field of defence, which may result in the country's permanent dependence on foreign technologies.

In recent years, the most important fundamental documents have been prepared and adopted at the state level in the areas of national security and defence, which open up prospects for a qualitatively new stage of innovative development of the defence industry:

- The Law of Ukraine "On National Security" [11];
- The Law of Ukraine "On Peculiarities of Reforming State-Owned Defence Industry Enterprises"[12];
- Resolution of the Verkhovna Rada of Ukraine "On Supporting the Defence Industry of Ukraine under Martial Law"[13];
- Resolution of the Cabinet of Ministers "Some issues of providing defence industry enterprises with property on financial leasing terms"[14].

The organizational and economic mechanism for the development of innovations in the defence industry should simultaneously satisfy the interests of the state (customer), defence enterprises (executors) and society, both in terms of efficient spending of budget funds and stimulating the development of innovation.

In Ukraine, spending on R&D in the national security and defence sector in 2015-2021 was at the level of 0.25-0.45% of total spending on science, which indicates an insufficient level of financial support for the defence industry's innovation activities, and thus makes it impossible to carry out the latest developments in weapons and military equipment in full.

Today, "one of the key problems of the Ukrainian defence sector is that in recent years, in the context of military operations in the East and Russia's full-scale invasion of Ukraine, defence producers have not been able to fully reorient themselves from exporting to Russia to other countries. In this regard, the decline in industrial production was about 25 % of the level of 2013. the decline in exports to Russia is estimated at USD 7-13 billion per year (2015-2021). The defence industry was unprofitable in 2014-2016, with a loss in 2014-2016. The return to a profitable level starting in 2017 is associated with the growth of European investors' investments in the production of defence products in Ukraine. This is undoubtedly a positive development factor for Ukrainian defence producers, and it is worth noting that the production of electronics and aircraft and various components under tolling schemes from European countries is in demand. In other words, as already noted, the karma of "raw materials orientation" remains with domestic defence producers even in the knowledge-intensive sector of industrial activity - instead of "intelligence", we sell "man-hours" [9].

The martial law in Ukraine has increased the number of hybrid challenges, so there is a need to develop and maintain the capabilities of the state's defence industry through the procurement of weapons and military equipment, which will ensure the growth of the defence capability of the Armed Forces of Ukraine, which in turn will allow the defence sector to effectively transition to NATO and EU standards, as well as increase the level of material support for the military personnel of the Armed Forces of Ukraine.

Another component of the development of the defence industry is the transition of the Armed Forces of Ukraine to NATO standards. Relations between Ukraine and NATO are of great importance for the development of the country's defence industry and for ensuring peace and stability in the Euro-Atlantic area. Since the beginning of its independence, Ukraine has been building relations with NATO. In 1992, Ukraine joined the Euro-Atlantic Partnership Council. In 1994, Ukraine signed a framework agreement with NATO under the Partnership for Peace initiative, and in 1997, the Charter on a Distinctive Partnership between NATO and Ukraine was signed. NATO-Ukraine cooperation moved to a new level in 2014. The year 2015 marked the beginning of in-depth cooperation with NATO within the framework of the new edition of the Military Doctrine of Ukraine, the main narrative of which is to achieve full interoperability of the Armed Forces of Ukraine with the armies of NATO member states by 2020. Since 2015, the Armed Forces have been gradually implementing NATO standards. Before the full-scale war, the Ministry of Defence and the Armed Forces had implemented about 300 NATO standards and documents. Implementation of NATO standards helps to better manage and support the Armed Forces of Ukraine.

In addition, NATO standards will allow the defence industry to open up new opportunities for attracting investment and creating favourable conditions for the development, production and sale of weapons and military equipment, establishing military cooperation with NATO partners, as well as developing joint production and transferring to Ukraine technologies for the production of components and assemblies to complete weapons systems for the national armed forces.

DISCUSSION

In this research, we agree with the opinion of scientists on the development of the defence industry, namely, with Kulytskyi S. [3] on creating conditions for the economic and organisational development of the defence industry and the production of dual-use products, with the works of Slobodianyk S. [4] on the activities of the domestic defence industry in combination with TNCs, since joint production, procurement technology, intellectual potential ensure the development of the latest models of weapons and military equipment, export of military products, and However, there are still debates about the mechanism of solving the problem of modernising the production of military products, providing the industry with highly qualified specialists, and thus attracting investment in this sector.

The tasks of modernizing defence enterprises are not only about re-equipping these enterprises and renewing their human resources, although solving such problems is a priority for a number of enterprises. Very significant tasks include further diversification of defence enterprises, restoration of the subcontracting system by identifying weak links in the long chain of defence production and their restoration, increasing transparency of defence enterprises in terms of fair distribution of profits between contractors and, as a result, attracting private investment in the sector. These tasks lie in related industries, between the military and civilian sectors. The effectiveness of defence industry development largely depends on the skilful application of modern economic and management methods.

In 2021, the President of Ukraine signed Decree No. 372/2021 "On the Decision of the National Security and Defence Council of Ukraine of 18 June 2021 "On the Strategy for the Development of the Defence Industry of Ukraine" [15], which defines the priority areas of the state military-industrial policy, the goals of the defence industry reform and the expected results of their achievement, taking into account current threats and challenges.

In contrast to the old strategy, which aimed to achieve the necessary combat and mobilization readiness of the entire military organisation of the country at minimum cost, the goal of the new strategy should be to ensure reliable defence capability of the country at optimal resource expenditure. The goal of the new defence industry development strategy can only be achieved on the basis of a logistics approach. The issue of logistics support was not included in the cohort of scientific research by domestic scientists, so this problem is relevant in modern conditions. The analysis of the defence industry sectors from the perspective of the logistics approach is relevant, firstly, because the modern Ukrainian defence industry still bears the features of the former defence industry complex that existed during the Soviet Union and covered the entire economy of the country. In order to preserve the scientific and technological potential accumulated by the Ukrainian defence industry and, moreover, to use it to boost a socially oriented market economy, it is necessary to supplement the programme of verified conversion of defence-related enterprises with the introduction of logistics into their business practices. Secondly, the problem of the widespread use of logistics and logisticians in the production and commercial activities of defence and defence-oriented firms is also relevant because qualified logistics specialists are needed by any commercial or manufacturing enterprise. Almost every large Western company has a manager whose tasks include managing material flows and resources [1,3].

In Ukrainian companies, a middle manager is most often responsible for logistics. He or she deals with issues that may not be as global but are still no less important for the company, organizing the transport and storage of goods, managing procurement, sales, and controlling packaging. As for the majority of defence companies, they have virtually no qualified logisticians.

In addition, Resolution No. 776 of the Cabinet of Ministers of Ukraine "Some Issues of Providing Defence Industry Enterprises with Property on Financial Leasing Terms" of 7 July 2022 came into force [14]. Financial leasing in the Armed Forces of Ukraine, during the period of Ukraine's independence, was considered only from the perspective of housing. During Russia's invasion of Ukraine, defence industry enterprises located in the occupied territories lost their production facilities as a result of shelling or misappropriation and therefore cannot continue their operations in Ukraine. Therefore, the state has developed a mechanism to support such enterprises [5,9]. This resolution defines the mechanism for providing defence industry enterprises with technical means, special technological equipment, equipment and other property necessary for the preparation of production (repair, modernizations) of weapons, military or special equipment, gear or ammunition on the basis of financial leasing. Thus, the state intends to support defence industry enterprises that have moved from the temporarily occupied territory or lost their property in full with the necessary production lines to carry out their activities.

CONCLUSIONS

The problem of developing the defence industry and ensuring that the Ministry of Defence of Ukraine fulfils its functional capabilities is impossible without addressing urgent issues related to support for military manufacturers, funding for technical education, research and development in the military sciences, and others.

The National Security Strategy and the Strategy for the Development of the Defence Industry of Ukraine set out the country's defence and security objectives. One of the most important tasks is the transition to a new look of the Armed Forces of Ukraine. The new look of the Armed Forces should be matched by a new competitive look of the defence industry. In order to increase the competitiveness of defence industry organisations, technological, production, financial and human resources are being concentrated:

- creation of a system of multi-level continuous education in the defence industry and long-term conditions for the sustainable development of the personnel potential of the defence industry;
- formation of a system of training, retraining, professional development and consolidation of the personnel potential necessary for the defence industry to implement tasks aimed at ensuring the national security of Ukraine, sustainable industrial growth and competitiveness of the domestic industry, increasing investment attractiveness, innovation activity and competitiveness of defence industry organizations, implementation of targeted programs and strategies for the development of defence industries;
- ensuring that scientists, specialists and workers meet modern technological requirements and NATO standards;
- providing unsecured loans to defence industry organizations by second-tier banks and other credit institutions;
- subsidizing defence industry enterprises from the state budget and other sources not prohibited by law;
- financing of innovative and investment projects aimed at the modernization and renewal of fixed assets, technical re-equipment of production, introduction of modern technologies and equipment, organization of new production facilities, and acquisition of new technologies.

However, there are risks of a lack of long and cheap loans and financial instruments. In addition, financial development institutions or second-tier banks do not lend to the defence industry due to certain restrictions. Therefore, the scientific novelty of the study to solve this problem is the need to create a Defence Industry Development Fund, which can become an important element of the system of innovative support for the defence industry and, in fact, work as an effective mechanism to support defence industry enterprises.

The main objectives of the Fund are as follows:

- Increasing the competitiveness, market value and profitability of defence industry organizations;
- stimulating the development and implementation of the results of scientific and technological activities, innovative processes and technologies in the defence industry;
- participation in attracting investments in the country in the defence industry;
- development and implementation of strategic investment projects, modernization and diversification programs for defence industry organizations;
- assistance in the creation of laboratories, research centres, and technology parks in the defence industry.

Thus, the prospects for increasing the potential of the defence industry are primarily related to the possibilities of financing R&D within the framework of the defence order, as well as training personnel for the defence industry. At the same time, the timely attraction of necessary resources and effective implementation of tasks through the prism of well-organized project management will help to increase and develop the innovative potential of the Ukrainian defence industry.

Given the martial law in Ukraine, further research on the selected issues cannot be carried out in full, due to limited access to the information resource base. Therefore, further in-depth research on the development of the defence industry in Ukraine will be appropriate after the end of martial law.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

FUNDING

The Authors received no funding for this research.

CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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РОЗВИТОК ОБОРОННОЇ ПРОМИСЛОВОСТІ УКРАЇНИ ДЛЯ ЗАБЕЗПЕЧЕННЯ НАЦІОНАЛЬНОЇ БЕЗПЕКИ

Сьогодні вітчизняна оборонна промисловість концентрує в собі військові, електронні, інформаційні та космічні технології. У найближчій перспективі оборонна промисловість України може стати одним із наукомістких промислових секторів економіки. Відповідно, метою дослідження є оцінка спроможності українських оборонних підприємств виробляти озброєння та військову техніку для забезпечення національної безпеки. Наукове дослідження має на меті не лише оцінити проблеми оборонної галузі в умовах воєнного стану, але й забезпечити ефективний розвиток галузей оборонної промисловості за рахунок визначення пріоритетних напрямів фінансування.

Виявлено, що сучасний стан української оборонної промисловості не відповідає реаліям часу, а особливо в умовах повномасштабного вторгнення росії на територію України. Забезпечення технікою та озброєнням військових частин перебуває на низькому рівні. З'ясовано, що оновлення сучасними зразками озброєння та військової техніки ЗСУ до початку повномасштабного вторгнення складало менше 1%, що не дозволило компенсувати темпи старіння наявного озброєння. Запропоновано шляхи підтримки розвитку оборонної промисловості України, зокрема за рахунок створення Фонду розвитку оборонної промисловості.

Запропоновано створення Фонду розвитку оборонної промисловості за рахунок державних і приватних джерел фінансування, не заборонених законодавством України, що дозволить розширити можливості підприємств оборонної промисловості щодо виробництва озброєння та військової техніки. Створення в оборонній промисловості системи багаторівневої безперервної освіти й довготривалих умов для сталого розвитку кадрового потенціалу оборонно-промислового комплексу дозволить залучити до підтримки спроможностей і вийти на новий рівень забезпечення Збройних Сил України за рахунок упровадження стандартів НАТО.

Ключові слова: розвиток, озброєння, військова техніка, стандарти НАТО, рентабельність, інновації, інвестиції, підприємства оборонної промисловості

JEL Класифікація: H56, H57, K23, L69, O33