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Research into the competitive environment of enterprises in the Ukrainian arms market

Abstract. The increasing role of the competitive environment in shaping the strategic resilience of enterprises within Ukraine's defence industry complex under martial law necessitates a thorough analysis. The aim of the study was to identify the specific features of market conditions in the arms production sector and to assess the competitive environment of national enterprises. The study applied methods of comparative analysis, statistical evaluation, synthesis, and scientific generalisation. The source base consisted of official statistical data from SIPRI (Stockholm International Peace Research Institute) and data on the revenue of Ukrainian arms producers using the Ukrainian analogous online platform Clarity Project. It was established that in 2023, the Herfindahl-Hirschman Index for thirteen leading enterprises of Ukraine's Defence Industry Complex (DIC) was 2,167.63, indicating a high concentration of production. The Gini Index for the income indicators of these companies reached 0.4935, pointing to a moderate unevenness in their distribution. The composition of the core of the Ukrainian arms market in 2023 remained unchanged relative to 2022. It included four leading enterprises, which indicated a stabilisation of competitive struggle in 2022-2023. In 2024, the Herfindahl-Hirschman Index for the thirteen DIC leaders was 2,791.384, demonstrating an increase in production concentration. The Gini Index (by income) for the leading enterprises rose to 0.5656765, indicating a slight increase in the unevenness of their distribution. A change in the market's core composition was recorded: compared to 2023, a fifth enterprise, based on arms market share, joined it, indicating increased competition. Asymmetry between the contractual volumes of state orders and the production capabilities of enterprises was also identified. The logistical infrastructure remained insufficiently developed, which limited the speed of supplying military units with equipment and resources. Separately, a shortage of qualified personnel and reliance on imported components were noted. The research results can be used in defence planning, for improving state procurement mechanisms, and for coordinating cooperation with international partners in the field of security and armaments

Keywords: global instability; security; Ukraine's defence industry; concentration; segmental structure; order contracting; military expenditure

INTRODUCTION

In the context of the full-scale war in Ukraine, the issue of determining the potential of the national defence industry and the logistical mechanisms for supplying the arms market has gained particular significance as a component of the state's security strategy. Instability in contracting, breaks in supply chains, export restrictions, and the risks of illegal arms trafficking create a need for an analytical assessment of the market structure and its level of functional adaptation to armed conflict conditions.

O. Sokhatskyi (2020) investigated the peculiarities of military expenditures in conditions of escalating geopolitical risks and the transformation of the vector of international conflicts. The author argued for the "hybrid" nature of modern conflicts and defined the essence of asymmetrical wars, categorised military expenditures as defence and security expenditures related to the development of the state's military organisation; it was proposed to distinguish expenditures on international activities aimed at preserving peace.

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Y.B. Khanyk & M.L. Danilovich-Kropyvnytska (2021) analysed the volumes of military goods exports in quantitative and material terms, their geographical structure, and the export authorisations for various economic entities under relatively stable conditions before the armed conflict in Eastern Ukraine and during its escalation from 2014. Based on the research results, it was concluded that to expand arms markets and establish its political status as a state, Ukraine should continue to develop state marketing policy through participation in domestic and foreign exhibitions and advertising military goods in specialised Ukrainian publications.

M. Zhyrokhov & M. Maksymchuk (2021) and T. Belyalov & A. Liumanov (2024) outlined the development trends of private business in the Ukrainian arms market. The authors noted the growth of the private sector's share in the structure of the Ukrainian arms market, which intensifies the trends of escalating competition from private arms producers. The authors F. Zhuravka *et al.* (2021) investigated the prospects for Ukraine's integration into the global arms market to secure its armed forces. The authors noted that an adequate level of integration into the global arms market, achieved through maximising arms exports, requires a controlled security environment. Scholars T. Kim *et al.* (2022) revealed modern trends in the global arms market from the perspective of solving the global problem of peace and demilitarisation. The authors argued that an increase in militarisation is currently observed due to high international tensions worldwide, hence there is an indefinite postponement of resolving the global problem of peace and demilitarisation. The impact of economic motivation, as the interest of private companies in increasing arms production and sales for profit, is assessed by the authors as significant, and thus all marketing means are used to promote arms in markets.

T.I. Kim & Yu.M. Ukrainets (2022) investigated the state of the military-industrial complex in the modern world economy. Based on a comparative analysis of country rankings by main economic indicators, global competitiveness indices, and military strength index, the authors show that the largest military-industrial complexes belong to representatives of all three types of countries. It is proven that military power is determined by the level of economic development, the level of military expenditures, participation in international arms trade, and the use of new technologies of the Fourth Industrial Revolution in arms production. The authors noted that excessive growth of the military-industrial complex increases the risks of militarisation and threats of large-scale military actions, which requires control and restrictions by international institutions.

N.Ie. Seliuchenko & T.B. Danylovych (2023) compared EU countries by GDP volumes and military expenditures per capita. It was concluded that in most countries, these indicators correlate. As a result of grouping countries, three clusters were obtained. Ireland forms a separate cluster as it has the largest GDP and one of the lowest military expenditures per capita. The second cluster contains 11 countries and has the highest values of statistical indicators. The third cluster includes 14 countries. In the defence sector, the implementation of innovations is intensifying, which increases its attractiveness for private investors. V.H. Hornyk & O.L. Yevmeshkina (2023) revealed the specifics of forming and implementing military policy as part of Ukraine's defence policy. The essence of the state's military policy, its subject composition, and the objects of military policy were disclosed. An analysis of strategic planning documents for the state's military policy was carried out. The functions of modern military policy were reviewed. The main emphases of Ukraine's military policy in the post-war period were summarised. A conclusion was drawn regarding the need to maintain technological redundancy, long-term provision, and cybersecurity management within the state's military policy system.

Authors O.B. Poltoratskyi & Yu.V. Lutsenko (2024) revealed the principles of combating crime in the context of global security policy. When studying foreign experience in combating crime in Italy, attention was drawn to the fact that major criminal offences include, among others, illegal arms trafficking. When examining the activities of organised crime in the USA, it is noted that the main areas of organised crime activity include terrorism using weapons. The specificity of crime, such as its transnational and global nature, was noted. O.V. Danyliuk (2024) conducted a study of the risk measurement system related to the possible hidden influence by hostile countries through the prism of ensuring national security. It was found that most NATO and EU countries lean towards the American model of control and countering foreign influence. Criteria for assessing the degree of threat of hidden external influence were determined. The importance of possessing information necessary for a correct assessment of the degree of risk was emphasised, and it was noted that the criminalisation of hidden influence is an important element of the national security system.

The issue of the specifics of the arms market development in Ukraine is under-researched given the active hostilities in Ukraine and requires further investigation, including from marketing and logistics perspectives. Therefore, the aim of the study was to analyse the structure and dynamics of the competitive environment in the Ukrainian arms market, and to characterise the key factors influencing the formation of its conjuncture in wartime conditions. The objectives of the study were: to assess the production potential and logistical support of the armed forces of Ukraine in wartime conditions; to assess the concentration of the competitive environment of enterprises in the Ukrainian arms market under disruptive conditions; to analyse the segmental structure of the Ukrainian arms market.

MATERIALS AND METHODS

A systematic method was used to study the Ukrainian arms market during the war as a complex system in terms of analysing the demand for weapons and potential factors influencing it, studying industry competitors and assessing the concentration of the arms market, and identifying

opportunities for business development and expansion. A problem-oriented method was used to identify the main problems and issues of economic development of the arms market in Ukraine during a period of economic uncertainty, which made it possible to identify the key aspects of the problematic development of the arms market. At the initial stage of the analysis, relevant enterprises were selected based on the Classification of Economic Activities (CEA), where the corresponding codes were identified that provide for activities related to the production of arms in Ukraine. The method of statistical information analysis was applied in the process of analysing the dynamics of the economic development of the arms market in Ukraine, which allowed for conclusions about the state of the arms market and the formation of directions for its development. During the assessment of the Ukrainian arms market capacity and the revenue of individual arms producers within it, data published by SIPRI (Stockholm International Peace Research Institute) were used, specifically regarding the revenue of the TOP-500 global arms market leaders, volumes of Ukrainian arms and military equipment exports and imports, and defence expenditures (Mathew *et al*., 2025).

To calculate the Herfindahl-Hirschman and Gini indices (HHI), conduct ABC-analysis, and determine the market concentration ratio, financial indicators of net income (revenue) for 2023-2024 of the TOP-13 leading enterprises in the Ukrainian arms market, selected by the criterion of revenue volume (over 2 billion UAH), were used. These enterprises include: Limited Liability Company "Ukrainian Armoured Vehicles", Public Joint-Stock Company "Motor Sich", Limited Liability Company "SPETS-KOM-SERVIS", Private Joint-Stock Company "Scientific and Production Association "Praktyka", Joint-Stock Company "Company of Aviation and Rocket-Technical Machine-Building", Limited Liability Company "Production-Innovation Company "DEVIRO", LLC "Screentech", Limited Liability Company "Kyiv Armoured Plant", Limited Liability Company "Scientific and Production Enterprise of Chemical Products", Limited Liability Company "UKROP", State Enterprise "Design Bureau "Pivdenne" named after M.K. Yangel", Limited Liability Company "Def C", and State Enterprise "Production Association Southern Machine-Building Plant named after O.M. Makarov." The preliminary list of companies was formed based on open market participant information from the analytical resource Clarity Project (n.d.).

To calculate the Lind Index and the market concentration ratio of the five largest companies (CRC_5), net income indicators for 2022-2024 of the top five enterprises from the list of TOP-13 leading enterprises by revenue volume were used, as well as data on the total capacity of the Ukrainian arms market (in billion UAH), the official exchange rate of the US dollar of the National Bank of Ukraine, the number of employees in the industry, and expenses for innovation and development (National Bank of Ukraine, 2025). The methodology for calculating the Herfindahl-Hirschman, Gini, and Lind indices was taken from the official methodological document of the Antimonopoly Committee of Ukraine (2020). The Herfindahl–Hirschman Index (HHI) was calculated to analyse the level of concentration and competition in the Ukrainian arms market, allowing for an assessment of how much it is controlled by a few large players or distributed among many small entities, using the formula:

$$HHI = \sum_{i=1}^{N} S_1^2, \quad (1)$$

where s_i – market share of the i-th arms producer, %; n – TOP-13 enterprises. An Herfindahl-Hirschman Index value below 1,000 indicates insignificant concentration in the Ukrainian arms market, in the range of 1,000 to 1,800 – moderate concentration, and above 1,800 – high concentration. An increase in HHI indicates growing risks due to a decrease in the level of competition and potential price increases. If the number of companies analysed increases, the Herfindahl-Hirschman Index value will decrease. The market share of leading enterprises is determined by the formula:

$$\chi i = \frac{Ri}{M}, \quad (2)$$

where χi – market share held by the enterprise in the Ukrainian arms market, UAH ths.; M – capacity of the Ukrainian arms market, UAH ths. Capacity is determined considering the total share of leading enterprises during 2022-2024. To determine the number of dominant enterprises, the Lind Index is calculated using the formulas:

$$IL = \frac{1}{k-1} \times \sum_{m=1}^{k-1} l_m, \quad (3)$$

$$lm = \frac{\frac{1}{m}\sum_{m=1}^{m} q_i}{\frac{1}{k-m}\sum_{m+1}^{k-m} q_i}, \quad (4)$$

where k – number of largest enterprises (TOP-13 enterprises selected); m – number of largest enterprises from k large ones; Lm– ratio of the average share of m largest (out of k largest) enterprises to the average share of the remaining (k - m) enterprises. The index is calculated until the value $Lm + 1 > Lm$, indicating a "disruption of the continuity of the L indicator" and the appearance of a small enterprise share in the arms market. To determine the market concentration index, the formula is used:

$$CR = \sum_{i=1}^{m} R_i. \quad (5)$$

To assess the unevenness of enterprise incomes, the Gini Index is applied using the formula:

$$S = 1 - 2 * \sum_1^p z_c * Sumq_c + \sum_1^p z_c * q_c, \quad (6)$$

where χi – share of the i-th arms producer in the total from the TOP-13 enterprises; yi – share of the arms producer.

RESULTS AND DISCUSSION

The active phase of the war in Ukraine since February 2022 has prompted a review of strategic directions for the arms market's development, particularly an increased need for the complementary development of weapons systems. Concurrently, high-tech air defence systems and heavy weaponry capable of countering advanced drones

require intensified development. Diversification of arms production and supply sources involving enterprises from related industries (e.g., shipbuilding), the development of logistics supply chains with the involvement of civilian market operators, and the intensification of the IT sector for integrating artificial intelligence into innovative drone development have all become crucial. There is also a growing need to control illegal arms trafficking, driven by the accumulation of domestic arms stockpiles and cross-border trade. At the same time, the market demonstrates increased capacity due to demand exceeding supply, heightened competition in the government procurement segment, and the expansion of the defence sector, which as of 2024, encompasses approximately 500 enterprises and 300,000 employees.

The situation in Ukraine's defence sector during 2022-2024 has provoked an exacerbation of various types of competitive struggle in the Ukrainian arms market. This includes competition from foreign manufacturers for producing weapons themselves and supplying them to Ukraine; between Ukrainian state and private producers; for contracting Ukrainian capacities; for types of armaments based on procurement depending on quality and price levels, delivery logistics, and other forms of competition. It should be noted that the competitive struggle to enter the Ukrainian arms market in the production segment involves approximately 100 concerns from 20 countries worldwide. For example, notable concerns include Rheinmetall and Krauss-Maffei Wegmann (Germany), military companies BAE Systems, Babcock (Great Britain), the Franco-German arms group KNDS, and armoured vehicle manufacturer Roshel (Canada).

The gap between Ukrainian production capabilities and the volumes of potential arms procurements from the Ministry of Defence of Ukraine amounts to 9 billion USD (as of 2024). This gap leads to complex socio-economic disparities in the arms market, related to staff reductions, investment curtailment, stagnation in innovation development, and heightened competition, primarily in the procurement sphere. In view of the above, the degree of arms market concentration in the arms procurement segment was assessed (using formula (5)). Formula (5) was applied to determine the market concentration index. The study of the segmental structure, in terms of assessing procurement concentration (using the Herfindahl-Hirschman Index, formula (1)), allows avoiding the consideration of several enterprises belonging to a single economic entity and treating them as independent enterprises (Table 1).

Table 1. Identification of market concentration coefficients and the Herfindahl-Hirschman Index for the arms market using the example of TOP-13 enterprises in 2023

No.	Enterprise	Revenue (bln. UAH)	Share, % of total	*CR*, %	Share of TOP-13	*CR*, %	Groups A, B, C	*HHI*
1	LLC "Ukrainian Armoured Vehicles"	32.4	29.53	29.53	42.68	42.68	A	1,821.58
2	PJSC "Motor Sich"	8.5	7.75	37.28	11.21	53.89	A	125.66
3	LLC "SPETS-KOM-SERVIS"	6	5.47	42.75	7.91	61.8	A	62.57
4	PJSC "NVO "Praktyka"	4.8	4.38	47.13	6.33	68.13	A	40.07
5	JSC "Company of Aviation and Rocket-Technical Machine-Building"	4.1	3.74	50.87	5.40	73.53	A	29.16
6	LLC "Production-Innovation Company "DEVIRO"	3	2.73	53.6	3.95	77.48	A	15.60
7	LLC "Screentech"	2.9	2.64	56.24	3.82	81.3	B	14.59
8	LLC "Kyiv Armoured Plant"	2.5	2.28	58.52	3.29	84.59	B	10.82
9	LLC "Scientific-Production Enterprise of Chemical Products"	2.5	2.28	60.8	3.29	87.88	B	10.82
10	LLC "UKROP"	2.4	2.19	62.99	3.16	91.04	B	9.99
11	State Enterprise "Design Bureau "Pivdenne" named after M. K. Yangel"	2.3	2.10	65.09	3.03	94.07	B	9.18
12	LLC "Def C"	2.3	2.10	67.19	3.03	97.1	C	9.18
13	SE "PA Southern Machine-Building Plant named after O.M. Makarov"	2.2	2.01	69.20	2.90	100	C	8.41
-	TOP-13	75.9	69.20	-	100	-	-	2,167.63
-	Market capacity	109.71	100.00	100	-	-	-	-

Note: CR – cumulative ratio

Source: calculated by the author based on financial statements of enterprises obtained using the Clarity Project analytical platform (n.d.)

It has been established that LLC "Ukrainian Armoured Vehicles" is the leader in the arms market by revenue, with a 29.53% share, which is 3.8 times higher than that of its closest competitor, PJSC "Motor Sich" (7.75%). Thus, the concentration of power in the largest producer accounts for 29.53% of the market power of all enterprises, of which there are 500 as of 2023. The concentration of power in the TOP-4 is *CR* = 47.13%, or 6 out of 10 points

on the concentration assessment scale. The cumulative share of the TOP-13 enterprises in the arms market is 69.20%, while the remaining 487 enterprises collectively hold 30.8%, with the share of individual enterprises being below 2%, allowing their share to be disregarded in further calculations.

The Herfindahl-Hirschman Index for the 13 largest enterprises in 2023 was 2,167.63, receiving a rating of 5 out of 10 on the assessment scale. The absolute value of the Herfindahl-Hirschman Index at 2,167.63 indicates a high concentration in the arms production segment in Ukraine and the presence of asymmetry in the market under study. Focusing on the TOP-13 enterprises allowed for assessing the share of the largest player – LLC "Ukrainian Armoured Vehicles" – which amounted to 42.68%, exceeding the permissible limits for a single enterprise's market share and indicating a potential threat to the competitive environment. Conducting an ABC analysis of the participant structure allowed for grouping enterprises by their contribution to revenue. Thus, Group A included six enterprises with a cumulative share of 77.48%: LLC "Ukrainian Armoured Vehicles", PJSC "Motor Sich", LLC "SPETS-KOM-SERVIS", PJSC "NVO "Praktyka", JSC "Company of Aviation and Rocket-Technical Machine-Building", and LLC "Production-Innovation Company "DEVIRO". Group B comprised five enterprises with a cumulative share of 16.59%: LLC "Screentech", LLC "Kyiv Armoured Plant", LLC "Scientific-Production Enterprise of Chemical Products", LLC "UKROP", and SE "Design Bureau "Pivdenne" named after M. K. Yangel". Group C included two enterprises with a 2.9% share – LLC "Def C" and SE "PA Southern Machine-Building Plant named after O.M. Makarov".

In light of these results, it is appropriate to proceed with forming directions for strategic cooperation with enterprises in each group. This requires a comparative analysis of the results of ABC structuring within groups of arms manufacturers, followed by identifying their strengths and weaknesses. In developing strategic cooperation directions, it is important to consider factors influencing its depth – product quality and production processes, pricing specifics, the level of state regulation, tender practices, marketing strategies, etc. Applying a systemic approach enables the creation of an adaptive model of interaction with each group of enterprises, which must be constantly updated in accordance with changes in the security environment and market dynamics. Group A requires a special approach; its representatives, given the guarantees of product realisation during the war, are not obliged to maintain inventory, which allows avoiding unproductive storage costs. However, increased control over the number of manufacturers in this group and the accuracy of sales forecasting are necessary. For Group B enterprises, it is important to prevent the accumulation of surplus armaments, and Group C should be transformed by removing companies with potential losses and facilitating the transfer of more effective participants to higher categories. The results of the Herfindahl-Hirschman Index calculation (formula (1)) based on the performance of the TOP-13 enterprises in 2024 are presented in Table 2. Formula (5) was used to determine the market concentration index.

Table 2. Identification of market concentration coefficients and the Herfindahl-Hirschman Index for the arms market using the example of TOP-13 companies in 2024

No.	Enterprise	Revenue (bln. UAH)	Share, % of total	*CR*, %	Share of TOP-13	*CR*, %	Groups A, B, C	*HHI*
1	LLC "Ukrainian Armoured Vehicles"	58.248	23.09	23.09	50.18	50.18	A	2,517.87
2	PJSC "Motor Sich"	9.191	3.64	26.74	7.92	58.1	A	62.71
3	LLC "SPETS-KOM-SERVIS"	8.901	3.53	30.27	7.67	65.77	A	58.82
4	LLC "Production-Innovation Company "DEVIRO"	7.564	2.99	33.27	6.52	72.28	A	42.48
5	PJSC "NVO "Praktyka"	7.472	2.96	36.23	6.44	78.72	A	41.45
6	LLC "Screentech"	6.458	2.56	38.79	5.56	84.29	B	30.96
7	JSC "Company of Aviation and Rocket-Technical Machine-Building"	4.038	1.60	40.39	3.48	87.77	B	12.10
8	LLC "Kyiv Armoured Plant"	2.5	0.99	41.39	2.15	89.92	B	4.64
9	LLC "Scientific-Production Enterprise of Chemical Products"	2.5	0.99	42.38	2.15	92.07	B	4.64
10	LLC "UKROP"	2.4	0.95	43.33	2.07	94.14	B	4.28
11	SE "Design Bureau "Pivdenne" named after M.K. Yangel"	2.3	0.91	44.24	1.98	96.12	C	3.93
12	LLC "Def C"	2.3	0.91	45.15	1.98	98.10	C	3.93
13	SE "PA Southern Machine-Building Plant named after O.M. Makarov"	2.2	0.87	46.02	1.89	100	C	3.59
-	TOP-13	116.06	46.02	-	100	-	C	2,791.384
-	Market capacity	252.18	100	100	-	-	-	-

Source: calculated by the author based on financial statements of enterprises obtained using the Clarity Project analytical platform (n.d.)

It has been established that LLC "Ukrainian Armoured Vehicles" remains the leader in the arms market by revenue for the second consecutive year in 2024, with a 23.09% share, which is 6.34 times higher than that of its closest competitor, PJSC "Motor Sich" (3.64%). This means that the concentration of power in the largest producer accounts for 23.09% of the market power of all enterprises in the arms market, which number 500 as of 2024. The concentration of power in the TOP-3 (with a share exceeding 3%) in the arms market is *CR* = 30.26%, or 6 out of 10 points on the concentration assessment scale. The cumulative share of the TOP-13 enterprises in the arms market is 46.02%, while the remaining 487 enterprises collectively hold 53.98%, with the share of individual enterprises being below 3%, allowing their share to be disregarded in further calculations. The Herfindahl-Hirschman Index for the 13 largest enterprises in 2024 was 2,791.384, receiving a rating of 5 out of 10 on the assessment scale. The absolute value of the Herfindahl-Hirschman Index at 2,791.384 indicates a high concentration in the arms production segment in Ukraine and the presence of asymmetry in the market under study.

Focusing on the TOP-13 enterprises in 2024 (which are taken as 100% for the purposes of further analysis) allowed for assessing the share of the largest enterprise among them – LLC "Ukrainian Armoured Vehicles", which transforms into 50.18%. This does not allow the arms market to be considered safe for maintaining normal competition, given the exceeding of the permissible cumulative market share for TOP-1; TOP-2; TOP-3; and TOP-4 enterprises in the market. The application of the ABC analysis methodology for structuring the procurement segment into groups in 2024 showed that Group A of the TOP-13 included 5 enterprises (LLC "Ukrainian Armoured Vehicles"; PJSC "Motor Sich"; LLC "SPETS-KOM-SERVIS"; JSC "Company of Aviation and Rocket-Technical Machine-Building"; LLC "Production-Innovation Company "DEVIRO" and PJSC "Scientific and Production Association "Praktyka") with a cumulative share of 78.73% by revenue from the TOP-13. Group B included 5 enterprises (LLC "Screentech"; JSC "Company of Aviation and Rocket-Technical Machine-Building"; LLC "Kyiv Armoured Plant"; LLC "Scientific and Production Enterprise of Chemical Products"; LLC "UKROP") with a cumulative share of 15.41% by revenue, accounting for 38.46% by quantity in the TOP-13. Group C included 3 enterprises – SE "Design Bureau "Pivdenne" named after M.K. Yangel"; LLC "Def C"; SE "PA Southern Machine-Building Plant named after O.M. Makarov" with a cumulative share of 5.85% by revenue in the TOP-13. To assess the concentration of the Ukrainian arms market using the Linda index, it was decided to analyse the TOP-5 enterprises that could potentially enter the core of the arms market. For this purpose, the revenue of the leading companies was analysed, and based on this, their market shares were assessed, which are used to evaluate the Lind Index (Table 3).

Table 3. Analysis of changes in net income of the top 5 enterprises, thousand UAH

No.	Enterprise	2022	2023	2024	2023/2022	2024/2023
1	LLC "Ukrainian Armoured Vehicles"	13,079,235	32,423,502	58,238,390	2.48	1.80
2	PJSC "Motor Sich"	10,466,608	8,554,789	9,190,995	0.82	1.07
3	LLC "SPETS-KOM-SERVIS"	3,221,301	6,048,359	8,900,875	1.88	1.47
4	PJSC "NVO 'Praktyka'"	1,342,576	4,824,744	7,472,228	3.59	1.55
5	JSC "Company of Aviation and Rocket-Technical Machine-Building"	1,911,510	4,144,075	3,011	2.17	0.0007
	Other enterprises	1,758,770	53,714,531	317,694,501	30.54	5.91
	Capacity	$3{,}178\times10^4$	$10{,}971\times10^4$	$40{,}150\times10^4$	3.45	3.66
	For reference:					
1	Official exchange rate of the US dollar (average for the period), UAH/USD	32.34	36.57	40.15	1.13	1.10
2	Number of employed persons, thousand people	250	300	300	1.2	1.0
3	Expenditure on innovation and development, billion UAH	2.5	12	39	4.8	3.25
4	GDP growth rate				5.3	2.9

Source: calculated by the author based on financial reporting data obtained from Clarity Project (n.d.) and data from the National Bank of Ukraine (2025)

The dynamics of revenue changes for the top five companies in the arms market in 2023 shows the highest growth in PJSC "NVO 'Praktyka'" – 3.59 times, which allowed to take fourth place in 2023 with revenues of UAH 4,824,744 thousand; LLC "Ukrainian Armoured Vehicles" – 2,479 times, which helped take the leading position in the arms market with revenues of UAH 32,423,502 thousand; LLC "SPETS-KOM-SERVIS" – 1,877 times, which allowed to rank third with revenues of UAH 6,048,359 thousand. PJSC "Motor Sich", despite a decline in revenue to 0.81 (or UAH 8,554,789 thousand), ranks second in the rating. The capacity of the arms market grew in 2024 to UAH 401.500 billion, an increase of 3.66 times compared to 2023. Expenditures on innovation and development grew significantly in 2024, reaching UAH 39 billion, or 3.66 times higher than in 2023. Based on data on the revenue of the top five leaders and the capacity of the arms market, their shares were determined using

formula (2). The results of the calculations of the shares of enterprises and the analysis of the dynamics of changes in the shares of the top five enterprises in the arms market are presented in Table 4.

Table 4. Analysis of changes in the share of the top 5 companies, %

No.	Enterprise	2022	2023	2024	2023/ 2022, bps	2024/ 2023, bps
1	LLC "Ukrainian Armoured Vehicles"	41.16	29.56	14.51	-11.60	-15.05
2	PJSC "Motor Sich"	32.93	7.80	2.29	-25.14	-5.51
3	LLC "SPETS-KOM-SERVIS"	10.14	5.51	2.22	-4.62	-3.29
4	PJSC "NVO 'Praktyka'"	4.23	4.40	1.86	0.17	-2.54
5	JSC "Company of Aviation and Rocket-Technical Machine-Building"	6.01	3.78	0.0008	-2.234	-3.78
	Market concentration index CRC_5	94.47	51.05	20.8808		
	Other enterprises	5.53	48.95	79.13	43.42	30.18
	Capacity	100	100	100	-	-

Note: bps – basis points
Source: calculated by the author based on data from Table 3

According to Table 4, in 2022-2024, the shares of the top five companies in the arms market changed most significantly in the direction of decline for PJSC "Motor Sich" and LLC "Ukrainian Armoured Vehicles" (-25.14 percentage points and -11.6 percentage points, respectively); The most stable indicators were demonstrated by PJSC "NVO "Praktyka" at +0.17. The top five defence industry companies accounted for 20.88% of the arms market in 2024. Among the five leaders, there is a negative trend in market share growth, as reflected in the market concentration index. In particular, the total share of the five leading companies (CRC_5) is undergoing significant transformations – from 94.47% – thanks to complete dominance in the market under review based on the results of 2022, to 51.05% based on the results of operations in 2023, and to 20.88% in 2024. High market concentration index values in 2022 indicate a high level of concentration during this period and testify to the stable oligopolisation of the arms market. The sharp decline in the market concentration index in 2024 indicates the emergence of a competitive environment in the arms market, which is confirmed by an increase in the number of arms producers in 2022-2024 (by 20%), as well as by the growth in innovation spending and rapid development during this period (by 15.6 times). The Lind Index (formula (3), formula (4)) served as a tool for verifying the range of participants for the purposes of identifying oligopoly in a given period of time (Table 5).

Table 5. Analysis of the dynamics of the Lind Index for the TOP-5 companies

No.	Enterprise	2022	2023	2024	Deviation 2023/2022, bps	Deviation 2024/2023, bps
1	for TOP-2 enterprises, IL2	124.99	378.97	633.62	253.98	254.65
2	for TOP-3 enterprises, IL3	278.23	391.60	510.92	113.37	119.32
3	for TOP-4 enterprises, IL4	392.51	400.83	478.66	8.33	77.83
4	for TOP-5 enterprises, IL5	381.14	339.88	224.17	-41.26	-115.71
5.						

Source: calculated by the author based on data from Table 4

According to Table 5, "disruption of the continuity of indicator L" (Lm + 1 > Lm) was observed at level L5 in 2022-2023. This means that in 2022, the core of the arms market included four most profitable enterprises (LLC "Ukrainian Armoured Vehicles"; PJSC "Motor Sich"; LLC "SPETS-KOM-SERVIS"; JSC "Company of Aviation and Rocket-Technical Machine-Building"), which formed a strong oligopoly. In 2023, the core of the arms market consisted of four enterprises: LLC "Ukrainian Armoured Vehicles"; PJSC "Motor Sich"; LLC "SPETS-KOM-SERVIS"; and PJSC "NVO "Praktyka", with a market type approaching an oligopoly. In 2024, no "disruption of the continuity of the L indicator" was recorded, which means that all five leading enterprises entered the core of the arms market. The next tool for studying the concentration of the Ukrainian arms market was to assess the inequality in the distribution of income among the leading producers in the studied market by calculating the Gini Index (formula (6)) (Table 6).

Table 6. Calculation of the Gini Index for the TOP-13 enterprises, 2023

No.	Enterprise	x_i	y_i	Differentiation index, $\frac{y_i}{x_i}$	$\Sigma(x_i)$	$\Sigma(y_i)$	$x_i y_i$	$x\Sigma(y_i)$
1	LLC "Ukrainian Armoured Vehicles"	0.0769	0.0290	0.3770	0.0769	0.0290	0.0022	0.0022
2	PJSC "Motor Sich"	0.0769	0.0303	0.3939	0.1538	0.0593	0.0023	0.0046
3	LLC "SPETS-KOM-SERVIS"	0.0769	0.0303	0.3939	0.2308	0.0896	0.0023	0.0069

Table 6. Continued

No.	Enterprise	x_i	y_i	Differentiation index, $\frac{y_i}{x_i}$	$\Sigma(x_i)$	$\Sigma(y_i)$	$x_i y_i$	$x\Sigma(y_i)$
4	PJSC "NVO 'Praktyka'"	0.0769	0.0316	0.4108	0.3077	0.1212	0.0024	0.0093
5	JSC "Company of Aviation and Rocket-Technical Machine-Building"	0.0769	0.0329	0.4277	0.3846	0.1541	0.0025	0.0119
6	LLC "Production-Innovation Company "DEVIRO"	0.0769	0.0329	0.4277	0.4615	0.1870	0.0025	0.0144
7	LLC "Screentech"	0.0769	0.0382	0.4966	0.5385	0.2252	0.0029	0.0173
8	LLC "Kyiv Armoured Plant"	0.0769	0.0395	0.5135	0.6154	0.2647	0.0030	0.0204
9	LLC "Scientific-Production Enterprise of Chemical Products"	0.0769	0.0540	0.7020	0.6923	0.3187	0.0042	0.0245
10	LLC "UKROP"	0.0769	0.0634	0.8242	0.7692	0.3821	0.0049	0.0294
11	SE "Design Bureau 'Pivdenne' named after M. K. Yangel"	0.0769	0.0791	1.0283	0.8462	0.4612	0.0061	0.0355
12	LLC "Def C"	0.0769	0.1121	1.4573	0.9231	0.5733	0.0086	0.0441
13	SE "PA Southern Machine-Building Plant named after O.M. Makarov"	0.0769	0.4268	5.5484	1.0000	1.0001	0.0441	0.0769
-	Total	1.0000	1.0001	-	-	-	0.0882	0.2973
	Gini index	**0.4935**						

Source: calculated by the author based on data from Table 4

According to the calculations in Table 6, the Gini index (S) based on the income levels of the top 13 companies in the arms market in 2023 was 0.4935. This indicator reflects the degree of deviation of the actual distribution of income of the top 13 companies in the arms market from the line of their uniform distribution and indicates an income stratification indicator close to the average for the top 13 companies studied. Similarly, the results for 2024 show a slight excess of the average income stratification index of the top 13 companies studied (S = 0.5656765), interpreted by the Gini Index (formula (6). (Table 7).

Table 7. Calculation of the Gini Index for the TOP-13 enterprises, 2024

No.	Enterprise	x_i	y_i	Differentiation index, $\frac{y_i}{x_i}$	$\Sigma(x_i)$	$\Sigma(y_i)$	$x_i y_i$	$x\Sigma(y_i)$
1	SE "PA Southern Machine-Building Plant named after O.M. Makarov"	0.0769	0.0189	0.245774	0.0769	0.0189	0.0014534	0.0014534
2	LLC "Def C"	0.0769	0.0198	0.257477	0.1538	0.0387	0.0015226	0.002976
3	SE "Design Bureau "Pivdenne" named after M.K. Yangel"	0.0769	0.0198	0.257477	0.2308	0.0585	0.0015226	0.0044987
4	LLC "UKROP"	0.0769	0.0207	0.269181	0.3077	0.0792	0.0015918	0.0060905
5	LLC "Scientific-Production Enterprise of Chemical Products"	0.0769	0.0215	0.279584	0.3846	0.1007	0.0016534	0.0077438
6	LLC "Kyiv Armoured Plant"	0.0769	0.0215	0.279584	0.4615	0.1222	0.0016534	0.0093972
7	JSC "Company of Aviation and Rocket-Technical Machine-Building"	0.0769	0.0348	0.452536	0.5385	0.157	0.0026761	0.0120733
8	LLC "Screentech"	0.0769	0.0556	0.723017	0.6154	0.2126	0.0042756	0.0163489
9	PJSC "NVO "Praktyka"	0.0769	0.0644	0.837451	0.6923	0.277	0.0049524	0.0213013
10	LLC "Production-Innovation Company "DEVIRO"	0.0769	0.0652	0.847854	0.7692	0.3422	0.0050139	0.0263152
11	LLC "SPETS-KOM-SERVIS"	0.0769	0.0767	0.997399	0.8462	0.4189	0.0058982	0.0322134
12	PJSC "Motor Sich"	0.0769	0.0792	1.029909	0.9231	0.4981	0.0060905	0.0383039
13	LLC "Ukrainian Armoured Vehicles"	0.0769	0.5018	6.525358	1	0.9999	0.0385884	0.0768923
	Total	1	1	-	-	-	**0.0768923**	**0.2556079**
			Gini Index					**0.5656765**

Source: calculated by the author based on data from Table 4

Thus, in 2023-2024, the income distribution among producers in the Ukrainian arms market was close to average, specifically 0.4935 and 0.5657 respectively. On the other hand, adhering to a functional approach, the absence of systemic economic inequality and stratification deprives economic entities of motivation for economic development and upward mobility (of assets, human resources, innovation, logistical support), as leading enterprises are unable to actively ensure innovative development and scientific research, nor to commercialise technological novelties. The

application of the Gini Index methodology for assessing the concentration of the Ukrainian arms market does not account for the level of shadow economy, which could lead to significant distortion of the real picture of inequality. However, given the state's high interest as a stakeholder in the active development of the sector under study during wartime, the level of the shadow economy in the DIC is expected to be extremely low. The growth rates of revenue for the TOP-5 DIC producers, as shown in Table 3 for the period 2022-2024, do not exceed Ukraine's GDP growth rates during this period, indicating that the country's positive economic growth does not hinder the reduction (mitigation) of income inequality among producers in the Ukrainian arms market and does not cause its deepening. Rational fiscal policy of the state, through instruments such as progressive tax rates and tax benefits, is intended to further reduce (mitigate) inequality.

However, the leaders of the Ukrainian arms market, by the laws of competition, will at some point exert pressure and displace smaller enterprises from the market, which exacerbates inequality (digital, informational) in the arms market. Wartime conditions create demand for arms, leading to an increase in the number of private companies with limited working capital for effective economic activity, outside of state support, access to resources, professional segregation of workers, etc. In such a case, producers in the Ukrainian arms market with low income levels should be classified as institutions of economic development that polarise the Ukrainian arms market (by revenue) and do not impede the restructuring of the Ukrainian market towards eliminating market asymmetries. For example, this refers to asymmetries in the levels of economic, institutional, or technical and technological achievements. Consequently, an exacerbation of intra-industry imbalances and an increase in structural disproportions in the Ukrainian arms market, which hinder innovative development, will be observed.

If the state of economic stability (post-war period) and the functioning of all registered enterprises in the Ukrainian arms market are considered, and thus the restoration of enterprises' ability to carry out export activities, then the studied group of 13 leading DIC enterprises will create the largest part of inequality, and, in the context of assessing the competitive state of the Ukrainian arms market, may adversely affect the overall competitive state. For example, by applying high prices or retaining technological and other types of innovations. This could lead to a limitation of choice for consumer organisations and a loss of competition in the Ukrainian arms market. However, during wartime, under conditions of exclusive application of tender trade and socially responsible business, the expectation of loss of competition in this market is minimised.

During the period of economic uncertainty, the Ukrainian arms market, from the perspective of assessing concentration levels, has been under-researched. Instead, the dominant majority of scientific research has focused on studying trends in the arms market's development and influencing factors, as well as institutional functions in the context of ensuring security. Among the studies on the problems of developing the Ukrainian arms market and its place in the global arms market, the works of scholars such as V.M. Behma & N.M. Skliar (2014) should be highlighted, who identified the content and specifics of the complex of economic and legal risks of export control from the perspective of the state's military-economic security. The authors revealed the positive and negative aspects of Ukraine's export control system. Factors for the emergence of risks in the organisation of export control, their potential threats, and the possibility of influencing the level of defence financing were identified.

N.E. Avanesova (2016) provided definitions of risks and main threats to the economic security of Ukraine's defence industry. The author identified factors for the emergence of risks and threats to the economic security of the defence industry in the process of creating a mechanism for preventing the negative consequences of globalisation and their neutralisation. S.V. Haidu (2023) outlined the content of the state's political function in conditions of increased external and internal threats during martial law, outlined the prerequisites for institutionalisation and the need for forming legal practices of Ukraine's proactivity in terms of influencing the global information space with clear and unified narratives, and intensifying the use of public diplomacy instruments on the path to ensuring the stability of its development.

T. Kim *et al.* (2022) investigated the global arms market and stated that the production and sale of weapons, and the provision of military services worldwide, constitute a fairly concentrated and monopolised sphere of the world economy, but they did not conduct a quantitative assessment of the global arms market using index methods. O. Sokhatskyi (2020) argued for the specifics of asymmetric wars and the use of not only classical political and military methods and tools for their resolution, but also unconventional influencing factors, which include informational, economic, sociological influence, etc. The author notes that the basis for solving this problem is, first of all, a re-evaluation of the essence of international conflicts and the peculiarities of their manifestation in modern conditions, research into the components of military expenditures, and their role in ensuring the country's defence capability in the new realities.

J.P. Dunne & R.P. Smith (2016) investigated the arms market in the period 1990-2013 and identified it as relatively unconcentrated compared to other industries, due to internal preferences when national governments make procurements. The authors summarised that in the near future, Russia and China could pose serious international competition to the USA as the largest player in the global arms market and noted that economic forces contribute to increased competition, however, the result of concentration is determined precisely by political forces in the industry. According to the authors' research, the shares of the five largest arms manufacturers in 1990-2011 grew from 22% to 43% in 1999, and then decreased to 35% in 2011. The share of the 20 largest companies increased from 58% to 74% and then

decreased to 68%. During the period 1990-2001, the HHI concentration index in the arms market more than doubled – from 200 to 500, after which it decreased again. In 2011, the HHI was similar to 1996 and stood at 350, equivalent to 28 firms. The authors concluded that the observed changes in concentration in the defence industry followed the rise and fall of demand in an industry with high fixed costs.

L. Scarazzato *et al.* (2024) studied the concentration of the TOP-100 global arms producers and noted that the Herfindahl-Hirschman Index, after peaking in 2002 at 500 (when assessing company shares as percentages), began to decline and reached a minimum value of 300 in 2017 under the influence of a significant wave of consolidation (excluding China) that began in the 1990s. Further decline is explained by J.P. Dunne & R.P. Smith (2016) as a probable result of the increasing significance of new arms manufacturers globally. The levelling of Herfindahl-Hirschman Index values in 2015 could have been related to the emergence of Chinese companies. Since 2018, the Herfindahl-Hirschman Index has again begun to grow, despite the lack of data on arms production by Russian manufacturers. The authors concluded that arms sales revenues in 2022 for the TOP-100 producers showed a decline, contrary to expectations caused by increased geopolitical tension and the anticipated need for countries to replenish and modernise their military equipment. It is expected that from 2023 onwards, global military expenditures will increase (Tian *et al*., 2024). The authors note that the unprecedented growth in military expenditures is a direct response to the global deterioration of peace and security, as priorities for military power create risks of forming action-counteraction spirals in conditions of further exacerbation of the geopolitical situation and security. F. Dorn *et al.* (2024) note that geopolitical risks affect the resilience of economies through increasing needs for issuing new debt obligations or raising taxes to finance the continuous growth of defence expenditures. The authors note that many European countries received significant peace dividends after the end of the Cold War. During the same period, welfare states grew to an extent that was not supported by overall economic development. Furthermore, in an economically challenging environment, European governments face trade-offs as they also need to invest in transforming their economies and making them more competitive, which complicates the dilemma in resolving trade-offs to maintain an increased level of military expenditure.

H. Duginets & K. Nizheiko (2024) noted that the international arms market is characterised by a high level of transnationalisation, and the problem of data latency regarding the real scale of production and trade. Price competition among arms manufacturers can be detrimental, and monopolistic market structures may be optimal. The authors noted a strong national bias, and viewed the trend towards globalisation (as a decrease in bias towards the country of origin) as a factor influencing the decrease in the number of companies in the military sector and the growth of concentration.

The deterioration of global security against the backdrop of major armed conflicts, the growth of global military expenditures, environmental disturbances, and other challenges put pressure on international stability and intensify confrontation between major powers. Disputes about the form of international order depend on the balance between the legitimacy of its rules and norms, as well as the distribution and exercise of power. As S.T. Wezeman (2024) noted, the international order is designed to regulate and limit armed conflicts, but the effectiveness of its implementation is weakened by both disagreements and rivalries between leading powers, and the specifics of many modern conflicts, as well as the actions of key governments and their leaders. The author determined that the path to developing international order must be based on the high effectiveness of international institutions and international humanitarian law, at the core of which cooperation must become a key element of security.

Since arms production is most often carried out by companies involved in both military and civilian production, it has some unique characteristics that distinguish it from other types of production. Firstly, it is the production of means of violence, which has led to it being under a higher level of state control and regulation than other types of production. Secondly, although to some extent the military industry operates under the same economic conditions as the industrial sectors of which it is a part, the fact that the government of the country of origin is the sole or primary buyer of many products leads to a monopsonistic market and special government-industry relations, which have given the military industry quite different characteristics from those of commercial production.

CONCLUSIONS

According to the results of a study of 13 leading enterprises of the Ukrainian defence-industrial complex (DIC), there will be a high concentration of production in 2023 and further growth in the concentration of arms production in 2024 (as identified by the Herfindahl-Hirschman Index, which was 2,167.63 and 2,791.384 in 2023-2024, respectively).

Analysis and assessment of the stratification of their incomes indicated moderate income inequality in 2023 and a slight increase in income inequality among leading producers in 2024 (as the Gini Index was 0.4935 in 2023 and 0.5656765 in 2024). The composition of the core arms market remained unchanged in 2022-2023, consisting of four leading companies, which indicated a stabilisation of competition in 2022-2023. However, in 2024, competition in the sector intensified, allowing the fifth largest company in terms of market share to enter the core of the arms market.

Six leading enterprises of the Ukrainian defence industry in 2023 and five leading enterprises in 2024 were recognised as strategic in terms of performance dynamics. However, when identifying further strategic areas of cooperation with groups A and B, it is necessary to take into account significant factors influencing the closeness of cooperation, such as "bottlenecks" in the logistics of

ensuring the quality of processes and the quality of defence products, the need to form a pricing policy based on the concept of institutionalising marketing (when forming international cooperation), levels of state regulation of the sector, trends in the development of defence tender procurement, marketing strategies of arms manufacturers taking into account the concept of partnership marketing, etc. The individualisation of cooperation strategies with each of the A, B, and C groups of arms manufacturers, based on a systematic approach, should be based on the principles of monitoring and proactive response in accordance with market changes, state needs, and the requirements of arms consumers.

The increase in the share of private enterprises in the structure of the defence industry and the competitive pressure of the top five leaders in the Ukrainian arms market pointed to the growing influence of economic motivation for the production and sale of weapons in Ukraine. Since low-income producers in the Ukrainian arms market are classified as economic development institutions that polarise the Ukrainian arms market and create new market asymmetries, a further exacerbation of intra-industry imbalances and structural disparities has been noted. The asymmetry between the contractual volumes of state orders and the production capacities of enterprises was exacerbated by the underdevelopment of the logistics infrastructure, which limited the speed of supplying military units with equipment and resources. Separately, a shortage of qualified personnel and dependence on imported components were noted. Further research could include a qualitative and quantitative assessment of the risks of marketing and logistics activities of participants in the Ukrainian arms market in order to eliminate potential obstacles when developing effective strategies for promoting their products on the international arms market.

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Дослідження конкурентного середовища підприємств на ринку озброєнь України

Анотація. Зростаюча роль конкурентного середовища у формуванні стратегічної стійкості підприємств оборонно-промислового комплексу України в умовах воєнного стану зумовлює потребу в його ґрунтовному аналізі. Метою дослідження було визначити особливості ринкової кон'юнктури у сфері виробництва озброєнь і провести оцінку конкурентного середовища національних підприємств. У роботі було застосовано методи порівняльного аналізу, статистичного оцінювання, синтезу та наукового узагальнення. Джерельну базу становили офіційні статистичні дані SIPRI (Стокгольмський міжнародний інститут дослідження проблем миру, дані щодо виторгу українських продуцентів озброєнь при використанні української аналітичної онлайн-платформи Clarity Project. Встановлено, що у 2023 році індекс Херфіндаля-Хіршмана для тринадцяти провідних підприємств Оборонно-промислового комплексу України (ОПК) склав 2167,63, що свідчило про високу концентрацію виробництва. Індекс Джинні за показниками доходів цих компаній досяг рівня 0,4935, вказуючи на помірну нерівномірність їх розподілу. Склад ядра українського ринку озброєнь у 2023 році відносно 2022 року залишився незмінним. До його складу увійшли чотири провідні підприємства, що засвідчило стабілізацію конкурентної боротьби у 2022-2023 рр. У 2024 році індекс Херфіндаля-Хіршмана для тринадцяти лідерів ОПК склав 2791,384, що засвідчило зростання концентрації виробництва. Індекс Джинні (за доходом) для підприємств-лідерів зріс до показника 0,5656765, засвідчуючи незначне зростання нерівномірності їх розподілу. Було зафіксовано зміну складу ядра ринку: у порівнянні з 2023 роком до нього увійшло п'яте за часткою ринку озброєнь підприємство, що свідчило про посилення конкуренції. Також було виявлено асиметрію між контрактними обсягами державних замовлень та виробничими можливостями підприємств. Логістична інфраструктура залишалася недостатньо розвиненою, що обмежувало швидкість забезпечення військових частин технікою та засобами. Окремо було зафіксовано дефіцит кваліфікованих кадрів і залежність від імпортних комплектуючих. Результати дослідження можуть бути використані в оборонному плануванні, для вдосконалення механізмів державних закупівель та координації співпраці з міжнародними партнерами у сфері безпеки й озброєнь

Ключові слова: глобальна нестабільність; безпека; оборонна промисловість України; концентрація; сегментна структура; контрактування замовлень; військові витрати