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ORIGINAL

Assessment and comparison of defense sufficiency levels of some countries of the world

Evaluación y comparación de los niveles de suficiencia defensiva de algunos países del mundo

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ABSTRACT

The article explores the evolving concept of security and defense, emphasizing recent EU initiatives that address a wide range of threats and aim to enhance national and European security through integrated and innovative approaches. The purpose of the study is to calculate and evaluate the defense capability levels of individual countries, explain them using the proposed approach, assess them within permissible limits, and compare various national economic sectors affecting the needs of the security and defense sector (SDS). The main research methods are empirical methods (analysis and synthesis), deduction, and graphic analysis. The article provides a schematic algorithm for assessing defense capability levels, introduces the use of a "need coefficient" for SDS calculations, and includes sector-specific data (using US indicators) on material and non-material values. It also suggests using an efficiency ratio to compare current and optimal defense capabilities. The level of defense capability of the countries was assessed according to the scales defined by the authors. Using a system of indicators, rather than a single complex indicator, provides a comprehensive view of defense sufficiency and allows for a detailed evaluation of its components. Thus, an approach is provided not only to determine the current and optimal levels of the country's defense capability, but also to assess the nature of the influence of individual branches of the national economy on ensuring the defense and security needs of the state (by area).

Keywords: Military Security; Optimal And Current Level; Range Of Values; Defense Sector; National Economy.

RESUMEN

El objetivo del estudio es calcular los resultados de los niveles de capacidad de defensa de los distintos países, explicarlos según el enfoque propuesto en este documento, evaluarlos teniendo en cuenta los límites permisibles y comparar los sectores de la economía nacional, áreas de un conjunto de valores, algunos de los cuales afectan a la satisfacción de las necesidades del sector de seguridad y defensa (SDS) de los países. Los principales métodos de investigación son los métodos empíricos (análisis y síntesis), la deducción y el análisis gráfico. Se ofrece una representación esquemática del algoritmo de evaluación de los niveles de capacidad de defensa; se propone la utilización del "coeficiente de necesidad" de los resultados de los cálculos por componentes del SDS; dentro de los sectores (utilizando como ejemplo los indicadores estadounidenses) de utilización de los valores materiales, no materiales de los sectores productivos y no productivos, se dan los

volúmenes relacionados con la satisfacción de las necesidades del SDS; se propone utilizar el coeficiente de eficacia para comparar los niveles actual y óptimo de la capacidad de defensa del país. El nivel de capacidad de defensa de los países se evaluó según las escalas definidas por los autores. De este modo, se proporciona un enfoque no sólo para determinar los niveles actual y óptimo de la capacidad de defensa del país, sino también para evaluar la naturaleza de la influencia de las distintas ramas de la economía nacional a la hora de garantizar las necesidades de defensa y seguridad del Estado (por áreas).

Palabras clave: Seguridad Militar; Nivel Óptimo y Actual; Gama de Valores; Sector de la Defensa; Economía Nacional.

INTRODUCTION

The concept of security comes from the Latin word "secures", which means "free from danger, fear, and threats" and includes traditional and non-traditional approaches to its provision.[1,2,3,4] Defense is defined as the main tool of a country for creating national security. This includes the use of force to repel an attack or an imminent threat of an attack directed against oneself, other persons or legally protected interests. In international law, self-defense means the inalienable right of a state to use force in response to an armed attack. However, it cannot be said that if the state is ready for appropriate self-defense, then the principle of defense sufficiency should also be ensured on its territory.[5,6,7,8,9]

Nowadays, the European Union (EU) is putting forward a number of initiatives in areas critical to their defense and security. Among them is the "Commission unveils significant actions to contribute to European Defense, boost innovation and address strategic dependencies",[10] which covers the entire range of challenges, from the conventional defense industry and equipment on land, at sea and in the air, to cybernetic, hybrid, and space threats, military mobility, the relevance of climate change; as well as a roadmap–on critical security and defense technologies.[11,12,13,14,15,16,17] These new initiatives are concrete steps towards a more integrated and competitive European defense, in particular, by strengthening cooperation within the EU, which helps increase the scale of tasks, reduce costs, and improve operational efficiency.

The update of the 2020 New Industrial Strategy "Updating the 2020 New Industrial Strategy: Building a Stronger Single Market for Europe's Recovery"[18] in May 2021 confirmed that technological leadership remains an important driver of EU competitiveness and innovation, especially in the field of critical technologies. The EU action plan for synergy between the civil, defense, and space sectors of February 2021 recognised the growing importance of breakthrough and enabling technologies originating from the civilian sector for the future security and defense of Europe, including the need to promote mutual enrichment and synergy between civil and defense technologies. However, the events after February 2022 made it clear that the priority development of one part of the branches (sectors) of the EU national economies over others does not ensure the implementation of the principle of defense sufficiency in general, both for the EU and for each state separately.[19,20,21,22,23]

Semenenko O et al.[24] and Egorov SN et al.[25] were engaged in the study of a logical and linguistic model for assessing the state of military and economic security of the state. They created their own approach to the organisation of military and economic security, which consists in developing an algorithm for an integral assessment function of the level of defense capability of the country without considering quantitative indicators that reveal the components of this structure. In turn, Lysiuk VS[26] and also Andriychuk et al.[27] analysed various approaches in the scientific doctrine regarding the definition of the concept of "defense sufficiency of the country". As a result, they came to the conclusion that it should be understood as the country's ability to effectively protect its own territorial integrity, sovereignty, national security, and citizens from external negative influences, in particular, aggression, terrorist acts, and aggressive foreign policy. In addition, they attributed the state's defense capability to its ability to withstand threats to internal security, such as armed conflicts within the country. Unlike previous researchers, Dzhuraieva O[28] investigated the functions of ensuring the national security of the modern state. She concluded that the main goal of developing a high-quality system of state security is to prevent the appearance and destruction of threats of various types, for example, violation of constitutional rights and freedoms or the harmony of the natural and anthropogenic environment. Thus, the researcher noted that there is no exhaustive list of functions for ensuring national security, and therefore, it is only possible to outline its main vectors, considering the dynamic development of society.

Based on the above, the purpose of the study is to reveal the main approaches and tools for ensuring the defense capability of different countries in modern conditions. The following tasks were outlined: to define the essence of security; to characterise the levels of defense ability in areas; to create a scale of levels of performance ratio.

METHOD

Based on the results of the analysis of initial data on some areas of the national economy that have an

impact on meeting the needs of the security and defense sector (SDS), the authors of this study used the method of deduction (the process of obtaining a conclusion from available information). Such considerations allow covering all available information and, with this approach, researchers usually confirm existing theories or test hypotheses used to reach conclusions that are considered to be true. With this logical approach, research is conducted from general ideas to specific conclusions: a hypothesis is formed, and then the evidence is collected to support it. Using this method, a schematic representation of the assessment of the levels of defense sufficiency of countries was developed and an understanding of the approach to combining indicators according to the corresponding ranges of values in accordance with the areas of meeting the needs of the SDS of Ukraine was obtained.[29]

In addition, the paper presents the results of research using graphical analysis (the optimal and current levels of US defense sufficiency are presented in a schematic and graphical representation). It is particularly useful for helping the reader process large amounts of data in an easy-to-understand format in the shortest possible time. Using such empirical methods as analysis and synthesis, the results of calculations of the levels of defense sufficiency of some countries (by area) were presented and their comparison was carried out, which allowed the authors to make their hierarchical systematisation. The last decade has shown not only to the EU countries, but also to the world, that their prosperity and development are cyclical, from ascents: in the absence of conflicts of any nature, to recessions: in the worst-case scenario – the conduct of military operations. World leaders not only understood the importance of ensuring the defense security of their own countries, but also the fragility of the bloc (allied) system and identified new problems both in ensuring military security and defense sufficiency. The lack of opportunities to compare the defense sufficiency of each country, ways to maintain and restore it, causes confusion in the solution of individual issues, even in long-term planning.

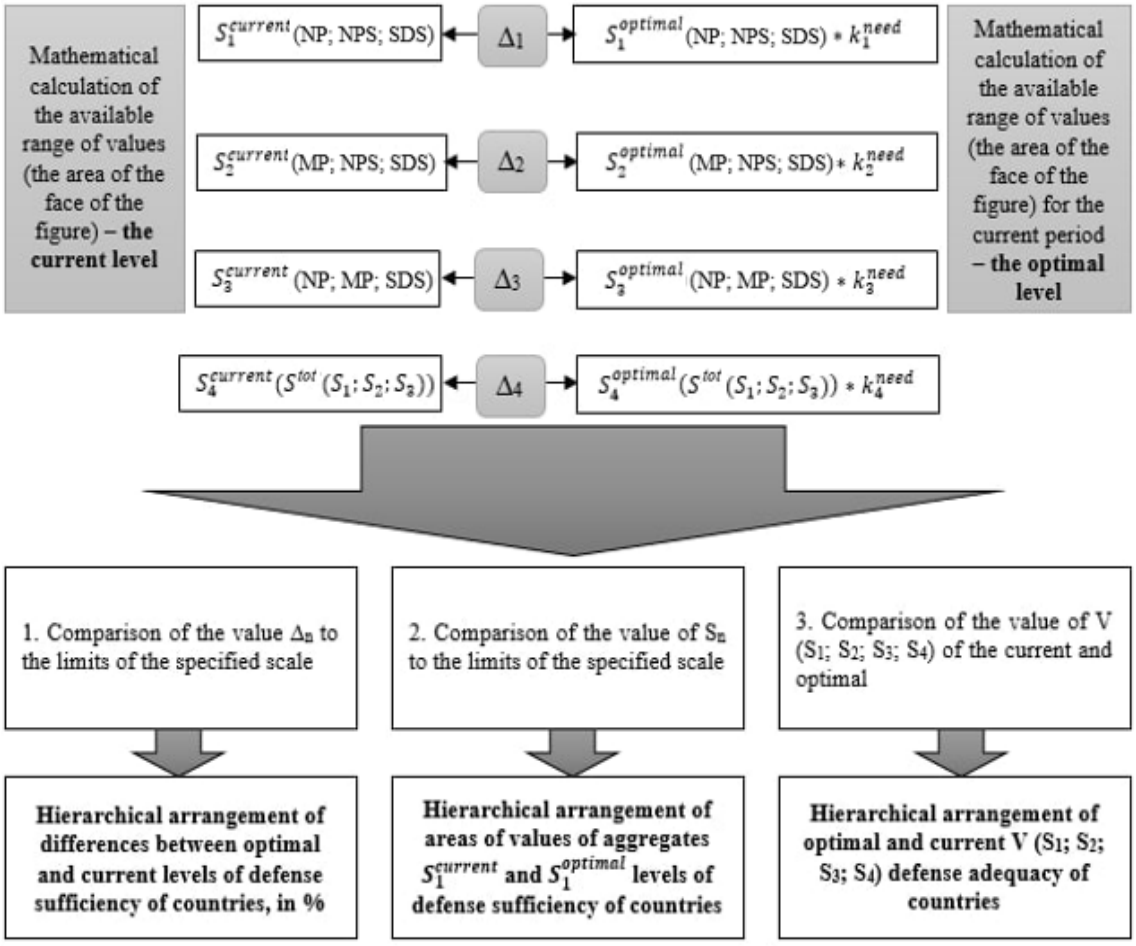

Figure 1. Schematic representation of the assessment of defense sufficiency levels of countries

Graphical methods are useful auxiliary tools for presenting formal results. According to the authors of this study, their insignificant use is underestimated and reduces the percentage of perception of materials of significant numerical volumes. The optimal level of national security is impossible without maintaining its functioning at the planned level. This allows the processes, in which the national economy as a whole is involved, to work with high efficiency, which is often economically and defensively feasible. Thus, the question of finding methods, approaches, and assessing the current level of defense sufficiency of countries, as well as the search

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for new ways and opportunities to achieve their optimal level, is now relevant and lacks a clear scientific basis. When analysing the situation and developing an approach to assessing the state of defense sufficiency after the invasion of the Russian Federation on the territory of Ukraine in February 2022, statistical data from the SDSs of the following countries were used: USA, Germany, France, China, Turkey, Poland, Romania, Hungary, Russia, Lithuania, Latvia, Estonia, Finland, Kazakhstan, Georgia, Moldova, Bulgaria, Sweden, and Ukraine.[30]

To solve the problem of comparison, the authors decided to outline the ranges of values of variations in the sets of components of the national economy that have an impact on meeting the needs of the SDS and make a comparison. In this case, the following aggregates are placed on the planes of the x (cost), y (amount), and z (result) coordinate axes: Δ1Δ2Δ4 – range of volumes and financial capabilities of material, non-material sectors for the needs of the SDS; Δ1Δ3Δ4 – range of volumes and financial capabilities of material, non-production sector for the needs of the SDS; Δ2Δ3Δ4 – range of volumes and financial capabilities of non-material, non-production sector for the needs of the SDS. In accordance with the initial data, a three-axis coordinate plane on the data sets of material, non-material production and non-production sectors that intersect and graphically have the form of a pyramid was obtained. The total volume of the figure is the current or optimal (depending on the requirements) defense sufficiency level of the country (figure 1).

When determining the optimal defense sufficiency level, the need coefficient (kneed) in this area was used, which was calculated in accordance with the data of the state request.

RESULTS

Table 1 shows the results of calculations of the demand coefficient for components of SDS.

Table 1. Results of calculating the need coefficient for components of SDS (kneed)

	Main components of SDS	k^{need} (material production - MP)	k^{need} (non-material production - NP)	k^{need} (non-production sector - NPS)	Total by sectors of the national economy
1	Ministry of Defense of Ukraine	0,15539	0,14122	0,14521	0,44182
2	State Transport Special Service	0,03942	0,02988	0,02365	0,09296
3	Ministry of Internal Affairs of Ukraine	0,05937	0,07885	0,08653	0,22476
4	National Guard of Ukraine	0,08727	0,14122	0,10865	0,33714
5	National Police of Ukraine	0,08869	0,07708	0,07896	0,24474
6	State Border Guard Service	0,12053	0,14122	0,10632	0,36807
7	State Migration Service of Ukraine	0,03728	0,01521	0,02366	0,07615
8	State Emergency Service of Ukraine	0,0395	0,04218	0,07563	0,15731
9	Security Service of Ukraine	0,08943	0,14122	0,05565	0,2863
10	State Security Administration of Ukraine	0,05394	0,04122	0,05633	0,15148
11	State Special Communications Service of Ukraine	0,06088	0,01218	0,07653	0,14959
12	Office of the National Security and Defense Council of Ukraine	0,07544	0,0455	0,05633	0,17726
13	Intelligence agencies of Ukraine	0,09285	0,09303	0,10654	0,29242

Thus, after determining the volume of use of material (Δ1) and non-material (Δ2) production, non-production sector (Δ3) relating to a part of the SDS (Δ4), the results obtained can be displayed on the data planes,[31] namely, the coordinates of the figure were obtained.[32] For example, data on determining the current level of US defense sufficiency are taken: Δ1 (2,1153; 0,8814; 0), Δ2 (2,6590; 4,4317; 0), Δ3 (1,0834; 3,9726; 0), Δ4 (0; 0; 6,4298).

$$X = x_j - x_i;\ Y = y_j - y_i;\ Z = z_j - z_i \quad (1)$$

Where: xi, yi, zi – coordinates of the point Δi; xj, yj, zj – coordinates of the point Δj.

Therefore, Δ1Δ2 (0,5437; 3,5503; 0); Δ1Δ3 (-1,0319; 3,0912; 0); Δ1Δ4 (-2,1153; -0,8814; 6,4298); Δ2Δ3 (-1,5756; -0,4591; 0); Δ2Δ4 (-2,659; -4,4317; 6,4298); Δ3Δ4 (-1,0834; -3,9726; 6,4298). To determine the area of the face of the figure, it is necessary to find the values of the modules of vectors:

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$$|a| = \sqrt{X^2 + Y^2 + Z^2} \quad (2)$$

$$|\Delta_1\Delta_2| = \sqrt{0.5437^2 + 3.5503^2 + 0^2} = \sqrt{12.90023978} = 3.592 \quad (3)$$

$$|\Delta_1\Delta_3| = \sqrt{0.0319^2 + 3.0912 + 0^2} = \sqrt{10.62033505} = 3.259 \quad (4)$$

$$|\Delta_1\Delta_4| = \sqrt{2.1153^2 + 0.8814 + 6.4298^2} = \sqrt{46.59368809} = 6.826 \quad (5)$$

$$|\Delta_2\Delta_3| = \sqrt{1.5756^2 + 0.4591^2 + 0^2} = \sqrt{2.69328817} = 1.641 \quad (6)$$

$$|\Delta_2\Delta_4| = \sqrt{2.659^2 + 4.4317^2 + 6.4298^2} = \sqrt{68.05257393} = 8.249 \quad (7)$$

$$|\Delta_3\Delta_4| = \sqrt{1.0834^2 + 3.9726^2 + 6.4298^2} = \sqrt{58.29763436} = 7.635 \quad (8)$$

$$S = \frac{1}{2}|a||b|\sin\gamma,\ \sin(\gamma) = \sqrt{1 - \cos(\gamma)^2} \quad (9)$$

To determine the size of the range of values Δ1Δ2Δ4:

$$\cos(\gamma) = \frac{0.5437*(-2.1153)+3.5503*(-0.8814)+6.4298}{\sqrt{12.90023978}*\sqrt{46.59368809}} = -0.175 \quad (10)$$

$$\sin\gamma = \sqrt{1 - 0.175^2} = 0.985 \quad (11)$$

$$S = \frac{1}{2}|\overline{A_1A_2} * \overline{A_1A_4}| \quad (12)$$

To determine the areas of the faces, it is necessary to find the coordinates of vectors:

$$\begin{matrix} i & j & k \\ 0.5437 & 3.5503 & 0 \\ -2.1153 & -0.8814 & 6.4298 \end{matrix} = 22.82771894 * i - 3.49588226 * j + 7.03073241 * k \quad (13)$$

$$S = \frac{1}{2}\sqrt{582.75714300044} = 12.07 \quad (14)$$

Including the volume of the pyramid built on vectors: Δ1 (X1; Y1; Z1), Δ2 (X2; Y2; Z2) and Δ3 (X3; Y3; Z3):

$$V = \frac{1}{6}\begin{bmatrix} x_1 & y_1 & z_1 \\ x_2 & y_2 & z_2 \\ x_3 & y_3 & z_3 \end{bmatrix} \quad (15)$$

$$V = \frac{1}{6}\begin{bmatrix} 0.5437 & 3.5503 & 0 \\ -1.0319 & 3.0912 & 0 \\ -2.1153 & -0.8814 & 6.4298 \end{bmatrix} = \frac{34.36239}{6} = 5.727 \quad (16)$$

$$\Delta = 34.36239 \quad (17)$$

According to the algorithm of the above calculations, it is possible to determine the size of each range of values, which is the object of research, and obtain the cost volumes (an integral indicator containing both the material and financial base) and the needs of the components of defense sufficiency in the relevant areas (table 2).

Table 2. Levels of US defense sufficiency by areas

Level	Δ1Δ2Δ4	Δ1Δ3Δ4	Δ2Δ3Δ4	V
Current	12,07	11,119	6,011	5,727
Optimal	12,202	11,283	6,276	5,913
Performance ratio	0,989	0,985	0,957	0,968

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The coordinate plane shows the results of calculating the areas of these sectors of the national economy, that part of it, the volume of which affects the US SDS, and also determines the total aggregate level of defense sufficiency by the volume of the resulting figure (pyramid) (figure 2).

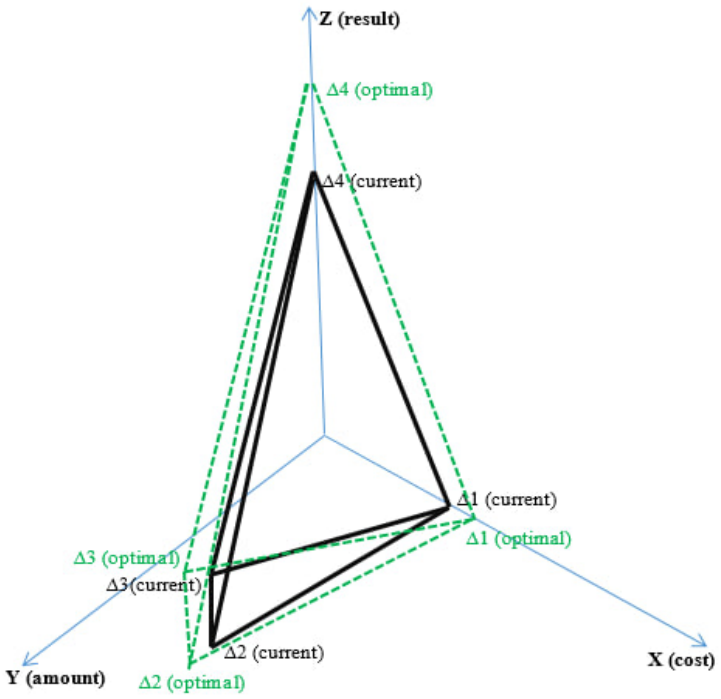

Figure 2. Optimal and current volumes of US defense sufficiency

According to the threshold values of the defense sufficiency assessment scale, the following result is obtained: Δ1Δ2Δ4>0,7, Δ1Δ3Δ4>0,7, Δ2Δ3Δ4>0,7, and V>0,9, which indicates a high level of defense sufficiency and the possibility of reaching the optimal level in 2023 (table 3).

Table 3. Defense sufficiency levels

Limit	Brief description of the defense sufficiency level
0,01-0,4	Low
0,41-0,65	Critical
0,651-0,75	Normal
0,751-0,999	High

Results of calculation of Δ1Δ2Δ4, Δ1Δ3Δ4, Δ2Δ3Δ4, and V for countries such as: China, France, Germany, Turkey, Poland, Romania, Finland, Finland, Hungary, Russia, Lithuania, Latvia, Kazakhstan, Georgia, Moldova, Bulgaria, Sweden, and Ukraine are shown in table 4.

Table 4. Defense sufficiency levels by area

Country	Level	Δ1Δ2Δ4	Δ1Δ3Δ4	Δ2Δ3Δ4	V
Germany	Current	13,033	3,991	10,372	3,494
	Optimal	13,285	4,433	12,432	3,779
	Performance ratio	0,981	0,9	0,834	0,924
France	Current	11,039	6,126	9,502	5,666
	Optimal	12,023	6,254	10,342	5,865
	Performance ratio	0,918	0,98	0,919	0,966
China	Current	3,87	4,638	1,696	1,208
	Optimal	4,02	4,863	1,98	1,464
	Performance ratio	0,963	0,954	0,857	0,825

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Turkey	Current	7,301	4,098	1,454	2,042
	Optimal	8,583	4,383	1,645	2,635
	Performance ratio	0,851	0,935	0,884	0,774
Poland	Current	5,635	3,047	1,486	1,695
	Optimal	5,82	3,263	1,628	1,785
	Performance ratio	0,968	0,934	0,913	0,95
Romania	Current	4,22	2,876	0,678	1,296
	Optimal	4,732	3,251	1,182	1,528
	Performance ratio	0,892	0,885	0,574	0,848
Hungary	Current	8,945	4,984	1,784	2,619
	Optimal	9,234	5.112	1,999	2,724
	Performance ratio	0,969	0,975	0,892	0,961
Russia	Current	10,876	4,034	1,204	2,686
	Optimal	14,263	6,723	2,874	3,977
	Performance ratio	0,763	0,6	0,419	0,675
Lithuania	Current	2,938	0,546	0,182	0,611
	Optimal	3,764	0,999	0,439	0,867
	Performance ratio	0,706	0,675	0,574	0,689
Finland	Current	7,845	4,934	1,753	2,422
	Optimal	8,222	5,634	2,753	2,768
	Performance ratio	0,954	0,876	0,637	0,875
Kazakhstan	Current	3,954	2,222	0,444	1,103
	Optimal	4,555	2,846	1,023	1,404
	Performance ratio	0,868	0,781	0,434	0,786
Georgia	Current	4,384	3,153	1,034	1,745
	Optimal	5,983	4,023	1,643	2,942
	Performance ratio	0,732	0,783	0,629	0,593
Moldova	Current	3,874	2,156	0,376	1,334
	Optimal	5,645	3,027	0,667	2,557
	Performance ratio	0,685	0,712	0,564	0,527
Bulgaria	Current	7,956	3,859	1,109	2,154
	Optimal	8,231	4,065	1,367	2,277
	Performance ratio	0,967	0,949	0,811	0,946
Sweden	Current	9,283	4,837	4,834	3,159
	Optimal	9,876	5,876	5,765	3,586
	Performance ratio	0,94	0,823	0,839	0,881
Ukraine	Current	5,867	2,859	0,601	1,555
	Optimal	9,756	5,987	2,307	3,008

Table 5. Scale of performance ratio levels

Limit	Brief description of defense sufficiency level
below 0,33	Absent
0,331-0,55	Critical
0,551-0,66	Low
0,661-0,71	Insufficient
0,711-0,81	Sufficient
0,811-0,999	High

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The value of the performance ratio is numerical evidence of the achievement by a certain country of its main goal – the optimal level of defense sufficiency in the corresponding sectors of the national economy. Acceptable value limits are shown in table 5.

The results obtained, which are not shown in tables 1-5, allow comparing:

- Current and optimal levels (including performance ratio) of material and non-material production sectors, which were used to meet the needs of the SDS of countries (as components of defense sufficiency).
- Current and optimal levels (including performance ratio) of material production and non-production sectors, which were used to meet the needs of the SDS of countries (as components of defense sufficiency).
- Current and optimal levels (including performance ratio) of non-material production and non-production sectors that were used to meet the needs of the SDS of countries (as components of defense sufficiency).
- Current and optimal levels (as well as performance ratio) of defense sufficiency of countries (pyramid volume – V).

By considering each area (Δ1Δ2Δ4, Δ1Δ3Δ4, Δ2Δ3Δ4), it became possible to compare not only the overall level of defense sufficiency of countries (V), but also the constituent segments that make it up – this creates an opportunity for a more detailed analysis of the essence of defense sufficiency (table 6).

Table 6. Hierarchy of countries by corresponding parameters in areas, from "max" to "min"

S(Δ1Δ2Δ4)	S(Δ1Δ3Δ4)	S(Δ2Δ3Δ4)	V	k_{result}	Defense sufficiency level
USA	USA	USA	USA	High	High
Germany	France	France	Germany	High	Normal
Hungary	Hungary	Poland	France	Sufficient	Normal
Poland	Georgia	Hungary	China	High	High
Bulgaria	China	Turkey	Turkey	Sufficient	Normal
China	Bulgaria	China	Poland	High	High
Finland	Turkey	Sweden	Romania	High	High
Sweden	Poland	Germany	Hungary	High	High
France	Moldova	Bulgaria	Russia	Insufficient	Normal
Georgia	Germany	Georgia	Lithuania	Insufficient	Low
Romania	Romania	Finland	Latvia	Insufficient	Normal
Kazakhstan	Finland	Romania	Finland	High	Normal
Moldova	Sweden	Latvia	Kazakhstan	Sufficient	Low
Turkey	Kazakhstan	Moldova	Georgia	Low	Normal
Lithuania	Latvia	Kazakhstan	Moldova	Critical	Normal
Russia	Russia	Russia	Bulgaria	High	Critical
Latvia	Ukraine	Lithuania	Sweden	High	Normal
Ukraine	Lithuania	Ukraine	Ukraine	Critical	Critical

The following conclusions can be drawn after analysing the data shown in table 6. Currently, countries such as the United States, France, and China have the highest performance ratio (V), while Ukraine, Sweden, and Bulgaria have the lowest. Since, in this case, the level of defense sufficiency is expressed in terms of the performance ratio of the components of the population, therefore, for a more detailed understanding of the results, it is advisable to consider the deviation of current from the optimal values of the volumes of material and non-material production, and non-production sectors, which meet the physical and financial needs of the SDS of countries. The smallest deviation between the areas of values of material and non-material production that were used to meet the needs of the SDS of countries is present in the following countries: USA, Hungary, and Poland; and the largest – Russia, Latvia, and Ukraine. Thus, despite the fact that France has a higher efficiency ratio, Hungary is closer to achieving results that are optimal for the range of values. According to these values, France is in the 9th place.

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The only country that not only ranks first in all the studied ranges of values, but also occupies the entire horizontal line in table 6 is the United States. This indicates a very high level of cooperation between the private and public sectors of the economy, competent state planning, and a high level of control. Before starting the calculations (table 6), one of the tasks set was to compare data from two competing countries, the United States and China, but the results obtained were rather unexpected. Not only is China the only country with Δ1Δ3Δ4>Δ1Δ2Δ4, but its components of defense sufficiency are not balanced in achieving their optimal values, which is the evidence of problems between the functioning of the national economy and the withdrawal of material and financial resources from it to meet the needs of the SDS. Countries like Georgia, Moldova, and Ukraine face significant issues with territorial integrity. Ukraine ranks nearly last, highlighting the need for an early end to hostilities and economic recovery. Russia, while 9th overall in defense sufficiency, shows signs of deterioration in key components, ranking 16th in specific elements. This suggests a gradual decline in defense capabilities by the end of 2023.

DISCUSSION

The issue of ensuring national security and defense of the state often arises is often raised in scientific papers. This is conditioned by various factors, both external and internal, that affect the technological and ideological foundations of the country's defense sufficiency. Thus, digitalisation, the appearance of new types of public relations, and the reform of the international market lead to changes in the state's defense policy.[33,34] There is a change in the level of defense sufficiency of society to ensure its proper protection and counteract potential threats. In particular, Horowitz D[35] and Grzebalska W[36] investigated international experience in the context of approaches to the organisation and use of defense resources. Horowitz D[35] pointed to the defense principles of Israel, where the highest decision-making body is the Cabinet of Ministers of Israel. He outlined the main vectors of defense policy and strategic planning of this country.

These include the adoption of the latest and most advanced types of military equipment; continuous improvement of the military resource management system; and ensuring a continuous mobilisation mechanism. At the same time, he noted that special attention in Israel is paid to the highest level of training of personnel, both main and reserve. The study involves using Israeli-developed automated control and communication systems, emphasizing the need to assess foreign weapons for maintenance and repair compatibility to avoid operational issues. Grzebalska W[36] highlights Poland's practice of fully automating monitoring processes for military equipment during combat, providing timely and visual information on unit conditions and resource needs. Both studies align in their focus on analyzing foreign practices and prioritizing electronic control for effective defense resource management.

Special attention should be paid to the studies by Reis J et al.[37] and D. Rusdiana et al.[38] which considered the significance and features of the defense industry. Reis J et al.[37] proved that the essence of this type of industry is not only the development and improvement of weapons, military and special equipment, but also its adaptation to modern constantly changing conditions. The comprehensive state policy in this area also allows creating and distributing competitive products for civil purposes [39]. Based on this, the researchers emphasise that the defense industry should not be limited to an exhaustive list of areas, in particular, exclusively the production of defense products, but should also contribute to the technological renewal of the economy as a whole.

This approach is explained by the fact that the types of products developed May differ significantly and, accordingly, have a dual purpose. The researchers point out that the main task of such enterprises is to diversify them in order to preserve the sectoral approach in the defense sector. Rusdiana D et al.[38] focus on transforming the military-industrial complex to address security risks and enhance national defense. They propose integrating defense enterprises into the international arms market to attract new technologies and investment, improving both defense capabilities and financial support. Their findings align with this study's emphasis on the role of the defense industry and the need for strategies that encompass defense, civilian, economic, and space sectors.

Unlike previous researchers, Odehnal J and Neubauer J[40] and also Paul Dunne J and Smith RP[41] analysed the structure and elements of the scale for assessing the degree of military and economic security of countries. In this case, Odehnal J and Neubauer J[40] pointed out that it depends on various factors and conditions of state security, which are formed from partial indicators. For the correct estimation of the level of military and economic security, it is necessary to consider such components as: the degree of security of military resources and units; the level of security of the corresponding resource skills during the selected period and special conditions; data on security by properties of the level is lower by a degree from the current one. The researchers argue that all these indicators should be combined into a single whole, and therefore be normative. Thus, it will be possible to determine the specific degree of security of the state's resource capabilities in the field of national security defense. The authorized person responsible for consolidating military and economic security indicators must accurately define and analyze these metrics over time. Dunne and Smith recommend using a fuzzy-set mathematical model to evaluate data stability and sensitivity to changes in input parameters. This model helps assess the effectiveness of military capabilities and resources, considering external factors. They conclude that a methodological approach based on fuzzy-set models is essential for evaluating military and economic

security, highlighting the importance of analyzing various indicators to understand overall security levels.

Based on the above, it should be pointed out that the scientific literature contains different approaches to the analysis of the issue of defense and protection of the national security of the state. Thus, some researchers reveal the theoretical foundations of this issue, while others investigate its problematic aspects. The general idea is to continuously improve the country's defense sector based on various methods, for example, attracting international experience, using advanced technologies, and conducting high-quality monitoring of military resources.

CONCLUSIONS

Evaluation of the performance of a part of the national security spheres that have an impact on meeting the needs of the SDS has many advantages: it opens up more opportunities for the activities of planning bodies, implements an integrated assessment system (audit, monitoring, control), and allows tracing the causal relationships between the elements under study. Conceptually important in determining and evaluating defense sufficiency, according to the authors, are the following points: the use of a system of indicators, rather than a single complex indicator, to characterise the essence of the population. This allows using a fairly wide range of characteristics, indicators or indicators of "state parameters", elements that best reflect their work, and in a certain way improve the result, since not only the general level of defense sufficiency is evaluated, but also its components (in the form of ranges of values); attention is drawn to whether the results achieved correspond to current and optimal goals (which is a very important stage in the audit of the state); not only the achieved, but also the future (optimal values) can be considered as potential competencies that can be used in defense and state planning. This allows considering the trends of further development of the situation in a certain way; estimation of the performance ratio, in this case, is a mathematical representation of the actual (current) values to the planned (optimal) ones, which allows providing a verbal assessment of the level of defense sufficiency in accordance with the scale proposed by the authors.

Thus, it is proposed to use this approach not only during the current performance audit (optimal level) of defense sufficiency and their comparison between countries, but also to improve the standards of defense and state planning and forecasting, which can increase the level of national security of the country in the long term. The subject of further research should focus on improving the approach given by the authors in the following areas: expanding the list of components of the SDS; defining a new method for presenting a graphical representation of optimal and current volumes of defense sufficiency considering each area - not aggregate range of values; developing recommendations on ways to increase defense sufficiency in accordance with the results obtained.

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