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THE INFLUENCE OF CRITICAL RISKS ON THE MECHANISM OF DEFENCE RESOURCE MANAGEMENT

ABSTRACT

The continuation of warfare in the territory of the country causes many economic, environmental and social problems. That is why it is important to study the influence of critical risks on the mechanism of managing defence resources, which the state's ability to withstand in difficult times and to ensure the protection of state borders depends on. The main purpose of the paper is the evaluation of scientific and practical principles of determination and analysis of critical risks in the defence industry.

Subject to the foregoing, the paper investigates the main scientists' approaches to the definition and classification of critical risks, which affect the mechanism of defence resource management. It also provides a multiple-factor analysis of critical risks, which affect the mechanism of defence resource management. An effective system for managing critical risks that affect the mechanism of defence resource management was developed in the work. It gives recommendations aimed at reducing the degree of influence of critical risks on the mechanism of defence resource management.

The study uses general and special methods of scientific research, in particular, the method of scientific abstraction to timely find and use in practice the indicators of evaluation of critical risks and effective methods of their reduction; the methods of comparative and structural factor analysis to evaluate the indicators under study; the method of logical generalization to provide directions and recommendations for reducing the influence of critical risks on the defence resource management system.

The paper is the first to comprehensively analyze the influence of critical risks on the mechanism of defence resource management. The authors highlighted the concepts of responding to critical risks that influence the mechanism. The practical importance of the paper is that the introduction of an effective critical risk management system will allow improving the efficiency of this mechanism.

Keywords: control, critical risks, defence resources, mechanism of management, management decisions, multivariate analysis, recommendations

JEL Classification: E60, E69, O11, P43

INTRODUCTION

Under the modern circumstances existing in the country, namely the continuation of warfare, the disruption of logistical connections, the failure and liquidation of many companies, problems in various economic sectors, the problem of formation and effective management of existing and attracted defence resources becomes of particular relevance. The introduction of an effective mechanism of defence resource management facilitates enhancing the state's ability to effectively resist military aggression. This will improve international cooperation in this area and help Ukraine to be an integral part of the international security system. However, some critical risks can arise during the management of defence resources that lead to unpredictable costs. So, it is expedient to consider the direct influence of critical risks on the mechanism of defence resource management and to determine methods of their evaluation and neutralization. All critical risks are accompanied by the uncertainty of the external environment, includ-

ing political, social and economic conditions. The external environment is uncertain because it depends on many variables that cannot be predicted, and therefore this research topic is important and relevant.

LITERATURE REVIEW

The warfare that continues in the territory of Ukraine has caused the emergence of several systemic and non-systemic risks that have negative effects on the economic security and further development of the country. It is worth noting that economic security for a country is an important subsystem of the national security. It involves the protection of both the economy and the population from external and internal threats, which forms the prerequisites for social and economic development. Note that with the beginning of the war, the role of the country's economic security grows, which allows the country to continue its liberation struggle. It is the economy of Ukraine that has suffered the most during the war, and its losses refer not only to people's lives, but also to the destruction of infrastructure facilities, defence sector companies, business facilities, and the entire production industries. With every day the war goes on, the costs caused by the destruction increase, which leads to the emergence of new risks, including critical risks. Therefore, it is worth investigating the essence of the term "critical risks" and their relationship with the mechanism of defence resource management [1].

Most scientists consider critical risks in the context of their interaction with the activities of a specific company, therefore their influence on the mechanism of defence resource management is still studied insufficiently. Thus, in his research, R. Humeniuk substantiates a system for managing critical risks as the process of their detection and evaluation, as well as an analysis of the possibility of the emergence of financial expenses in various uncertain situations [2]. At the same time, the main signs of critical risks are the financial nature of a random event and the fact that these risks lead to disruption of financial performance. I. Tomashuk and I. Tomashuk consider the essence of critical risks in terms of their influence on the activities of a company, however, the paper gives a classification of factors that affect their level, which can be used to substantiate the influence of critical risks on the mechanism of defence resource management [3]. Z. Hbur made a detailed analysis of risks caused by the war, including critical risks, and their influence on economic security [4]. The monograph examines in detail the risks and threats that affect economic security and therefore the mechanism of defence resource management, of which the following should be singled out: business closure, logistics problems, external and internal population migration, increased defence spending, problems with export, destruction of military infrastructure, corruption risks affecting the timing of financial assistance.

And Ye. Pashchenko focuses in his research on the theoretical principles of control of systemic risks right in the Ministry of Defence of Ukraine and the Armed Forces of Ukraine. The author notes that risks can take different forms, and so the Ministry of Defence of Ukraine and the Armed Forces of Ukraine have established procedures to identify, analyze and manage critical risks [5]. At the same time, monitoring and improvement of critical risk management mechanisms are important components of effective control of critical risks. N. Koval considers the process of managing critical risks in the context of Ukraine's integration into the global financial space [6]. The author singled out trends in the development of the financial market in modern conditions and areas of minimization of critical risks.

So, having considered all scientific approaches to the determination of the essence of the term "critical risk," we can point out that this term means a risk primarily related to a certain probability of a loss of financial resources. They are mostly related to changes in the financial market and economy, in particular, to changes in exchange rates, interest rates, the industry, and the borrower. In the context of the management of defence resources, critical risks mean an economic category that includes an evaluation of the probability of a loss or reduction of one of the resources subject to the uncertainty of the factors affecting it.

AIMS AND OBJECTIVES

The purpose of the study is to highlight the scientific and theoretical foundations of the process of managing critical risks in the general mechanism of defence resource management, to analyze its efficiency and to provide recommendations to reduce risks in this mechanism. So, the objective of this study is to:

- investigate the main scientists' approaches to the definition and classification of critical risks, which affect the mechanism of defence resource management;
- carry out a multiple-factor analysis of critical risks and their quantification, which affect the mechanism of defence resource management;
- develop an effective system for managing critical risks that affect the mechanism of defence resource management;

- consider the concept of critical risk evaluation that affects the process of substantiation of managerial financial decisions in the defence sector;
- give recommendations aimed at reducing the degree of influence of critical risks on the mechanism of defence resource management.

METHODS

The main methodological base of the paper is the fundamental provisions from the analysis of modern concepts of critical risk management in the mechanism of defence resource management and the scientific achievements of domestic and foreign scientists in this area.

Various methods were used during the study, in particular:

- the methods of logical generalization and scientific abstraction in the process of generalizing approaches to discovering effective indicators and methods of critical risk evaluation;
- the methods of comparative and structural factor analysis for evaluating the obtained actual values of all involved indicators and their comparison with standards;
- the methods of induction and deduction, which are used to investigate general provisions regarding the evaluation of critical risks and their influence on the mechanism of defence resource management;
- the statistical, economic and mathematical methods of scenario analysis of the influence of critical risks on the mechanism of defence resource management for their further optimization.

RESULTS

The process of analyzing critical risk includes their diagnostics using methods such as the method of statistical analysis, empirical method, observations, and the method of analytical generalization. It provides an opportunity to outline the potential influence of a critical risk on the mechanism of defence resource management and the likelihood that a threat will be detected in time. Evaluation of critical risks includes the collection of analytical information, the processing of the received data, and their qualitative and quantitative analysis.

The first stage includes an analysis of critical risks based on the following measures:

1. Diagnostics of critical risks in the form of detection of their sources, determination of the main risk factors, their classification, and evaluation of the role of each of these factors. The process of detection includes the classification and detailing of the influence of critical risks on the mechanism of defence resource management.
2. Quantitative evaluation of critical risks, including the definition of each of the considered risks with the selection of specific indicators. This stage allows determining quantitative values of the possible probability of emergence of risks and their consequences, that is, it includes a quantitative evaluation of the degree of influence of critical risks on the mechanism of defence resource management.
3. Determination of the sequence of further actions based on the general evaluation of critical risks [7]. Controlling critical risks involves taking measures that include full or partial elimination of these risks. These measures include the avoidance of critical risk, that is its actual evasion, the minimization of critical risks due to preventive activities, and the localization of these risks by using administrative means of influencing them by carrying out operations for their diversification [8].

The main risks affecting the mechanism of defence resource management for 2024 are as follows:

1. The continuation of warfare in the territory of Ukraine, which causes negative consequences for the economic sector as a whole, including the mechanism of defence resource management, since the escalation of hostilities causes a decrease in the country's production potential and the loss of human resources without the possibility of recovery.
2. Man-made disasters manifested in the continuing destruction of infrastructure facilities, military units, and defence sector companies, which directly affect the level of provision of defence resources and the possibility of continuing the protection.

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3. Disruption of logistics connections both inside and outside the country, that is the continuation of cargo transportation blockades at the border together with restrictions on maritime shipping routes negatively affect the foreign trade balance, which leads to changes in the exchange rate and acceleration of inflation processes.
4. External political risks lead to a reduction of general volumes of international support and harm not only the financial stability but also the defence capability of the country.
5. Social tension and aggravation of protests in society manifested in higher levels of unemployment, psychological instability in society, and the growth of protest moods in the country [9].

Scientific research by domestic and foreign scientists has a lot of approaches to the classification of critical risks, mostly in terms of the performance of business entities and the adoption of managerial decisions. However, the issue of the influence of critical risks on the mechanism of defence resource management remains open [10]. To deepen the considered interpretation of the essence of the term "critical risks," we will consider their classification by ordering and generalizing the existing scientific approaches, which allows the evaluation of all critical risks that have a significant influence on the mechanism of defence resource management while taking into account the following signs (Figure 1).

Thus, in terms of the emergence sources, all possible critical risks are divided into external and internal. Internal critical risks include risks that may arise during the functioning of the defence sector and affect indicators of the effectiveness of the use of defence resources [11]. These risks include the risks shown in Figure 1 and the risks of liquidity, stability, turnover, and profitability, as well as the risk of loss of opportunities. As to the external critical risks, it is worth noting that they include risks that depend on the military, economic and political situation in the country, that is, on the level of inflation, on the level of assistance from international partners, on the level of prices for the necessary resources that are used during the formation of defence resources [12].

Important critical risks that influence the mechanism of defence resource management are given in Table 1.

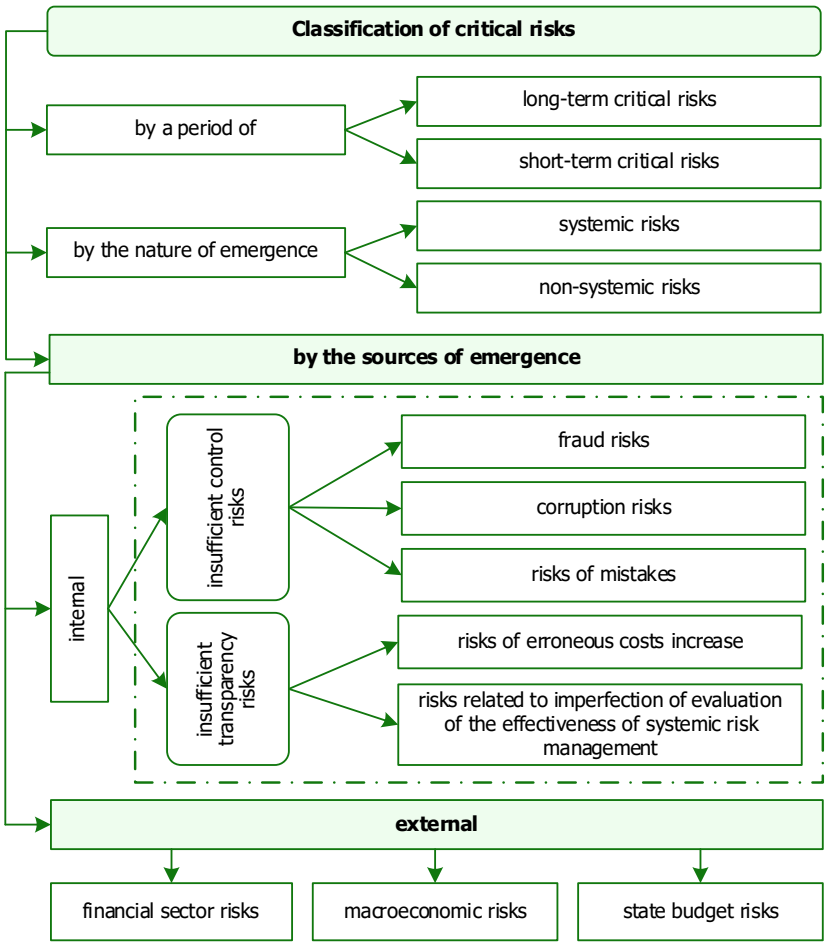

Figure 1. Classification of the Main Critical Risks that Affect the Mechanism of Defence Resource

Table 1. Characterization of the main critical risks to the mechanism of defence resource management. *(Source: [11, 12])*

Risk types	Evaluation and causes of the possible emergence of critical risks
Macroeconomic risks	Macroeconomic risks are financial risks of a systemic nature. These risks do not depend on the defence resource management system and arise at the macroeconomic level. These risks include inflation, currency, investment, interest, and tax risks that change depending on macroeconomic conditions. To reduce the amount of losses from the level of systematic risks, it is necessary to timely respond to changes in macroeconomic parameters and to form an effective management mechanism.
Risks that directly affect the mechanism of defence resource management	The emergence of new challenges that affect the mechanism of defence resource management, leading to such consequences as the loss of a part of defence resources, increased need for some resources in the process of attracting additional resources; decrease in production volumes and receipt of defence resources, increase of average prices for energy carriers, raw and other materials, problems with logistics, loss of sales markets.
Insolvency risk	Due to the continuation of the war, the deterioration of the performance of the defence sector, and the uneven supply of military equipment and international aid, there may be the risk that state bodies, companies and other entities in the defence sector will not be able to fulfil their obligations and functions.
State budget risks	The dependence of the state budget and financing of the defence sector on international aid entails critical risks that manifest in the untimely or incomplete receipt of the aid, which leads to a decrease in budget expenses, in particular, on the defence sector; additional money emission, which affects the level of prices for defence resources and the ability to timely pay monetary allowance to servicemen and make other mandatory payments.
Insufficient transparency risks	The efficiency and effectiveness of the mechanism of defence resource management, as well as the possibility of its optimization, depend on the chosen method of evaluation. However, there are a number of critical risks affecting the mechanism of defence resource management that were not taken into account in the methodology or emerged as a result of unforeseen events due to the hostilities.
Insufficient control risks	They arise as a result of noncompliance with current laws, violation of the principle of transparency, and inefficient managerial decisions in the process of managing defence resources.

At the next stage, it is worth investigating the general provisions of the concept of responding to critical risks, which affect the mechanism of defence resource management. Analysis of the maximum level of negative influence of critical risks on the mechanism of defence resource management involves designing several alternatives for the development of various situations, under which the main target indicator to be forecast is calculated under pessimistic and optimistic scenarios. A possible deviation between the planned level of the target indicator and its main value under a pessimistic scenario is a determination of the risk amount being evaluated under this approach [13]. It is worth noting that the value of the target indicator in the worst-case scenario vanishes. In this regard, the process of developing a pessimistic scenario is carried out with an appropriate level of criticality and care. This concept is given in Figure 2.

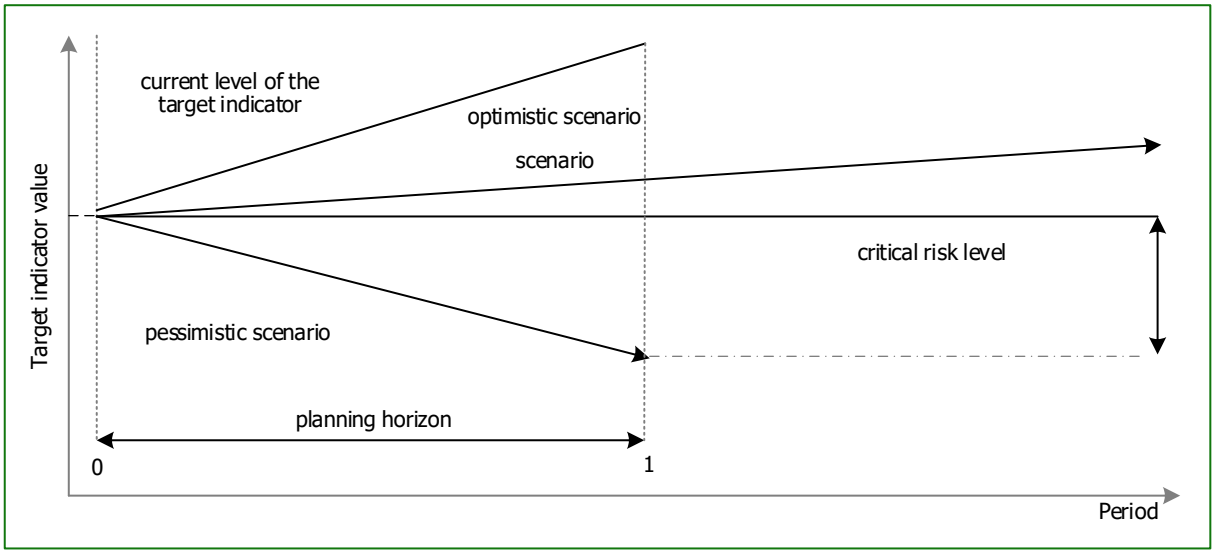

Figure 2. Analysis of a Critical Risk as the Maximum Level of Negative Deviation. *(Source: [13])*

The method of analyzing the probable level of negative deviation has a lot in common with the above approach to quantitative evaluation of critical risks. This approach involves consideration of a critical risk as the difference between the level and the value of the financial indicator under a probable scenario of the development of events. It is worth noting that

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most partial models only formalize the process of approving managerial decisions subject to the critical risk arising from the concept above. The graphical representation of this concept is shown in Figure 3.

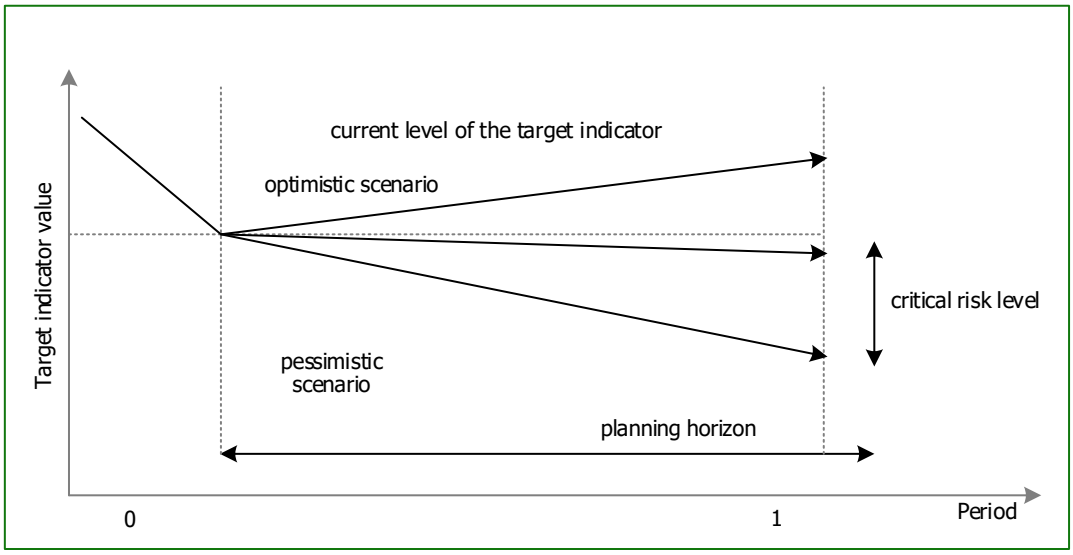

Figure 3. Analysis of a Critical Risk as the Maximum Level of Negative Deviation. *(Source: [13])*

Another approach to quantifying a critical risk is using the method of evaluation of its deviation. It is worth noting that the spread of this concept is connected with the active development of information technologies. In some cases, partial models (for example, VaR) are recommended for business entities at the legislative level (Figure 4).

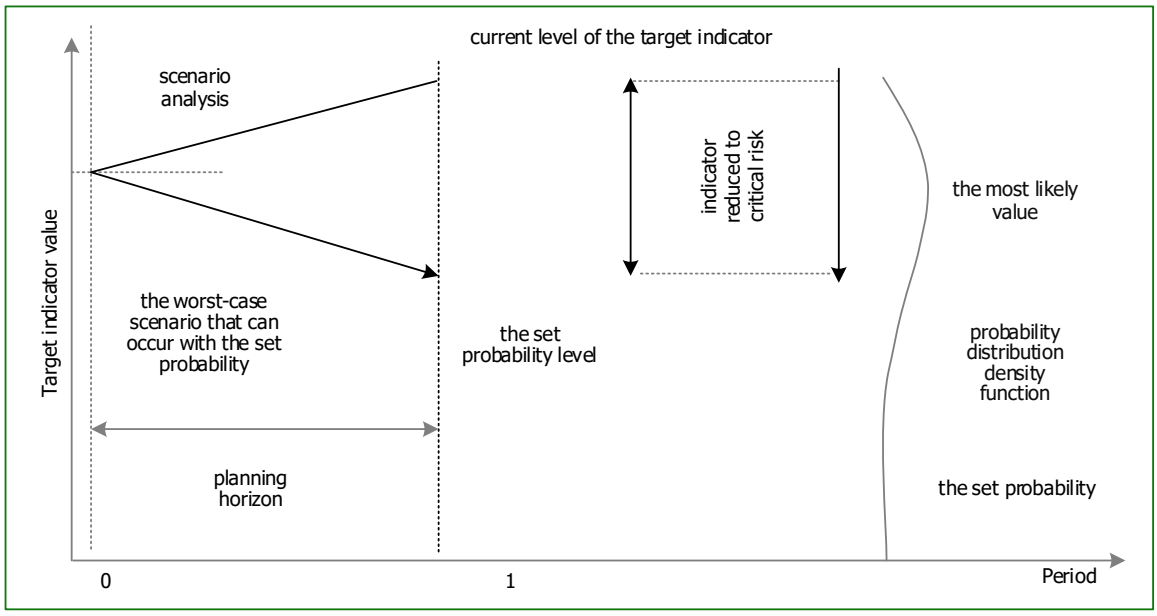

Figure 4. Analysis of Deviation for Critical Risk. *(Source: [13])*

The effectiveness of the above concepts of evaluation of critical risks and substantiation of managerial decisions in the mechanism of defence resource management primarily depends on the awareness and informational support of managers of all critical risks. At the same time, it is worth singling out the set of problems faced by a financial manager. These problems should include the value of financial data, which may change over time due to changes in the content and availability of this information. In the vast majority of cases, the owners of financial data do not understand its value, data must be accumulated from independent sources, the number of information channels and flows significantly increases, which sufficiently complicates the management of this information, the anonymous creation, global access and consumption of financial information, form new threats and opportunities to ensure financial management and the formation of a new model of critical risk management [14].

The degree of critical risk can be influenced through the process of formation and further implementation of the chosen strategy, and the use of principles and means for the formation of an effective mechanism of defence resource management. Therefore, to effectively manage critical risks, a universal concept should be formed to provide an opportunity to optimize the adoption of a rational managerial decision. It is worth noting that the proposed concept is a basic one, which will provide an opportunity to form its own, unique model for critical risk management in the mechanism of defence resource management based on that concept [15]. To build an effective critical risk management mechanism, an appropriate concept should be formed that will include the process of forming and implementing a general critical risk management strategy depending on the selection of the risk level or the management method, as well as an outline of methodical and information support for the processes that will allow optimizing managerial decisions (Figure 5).

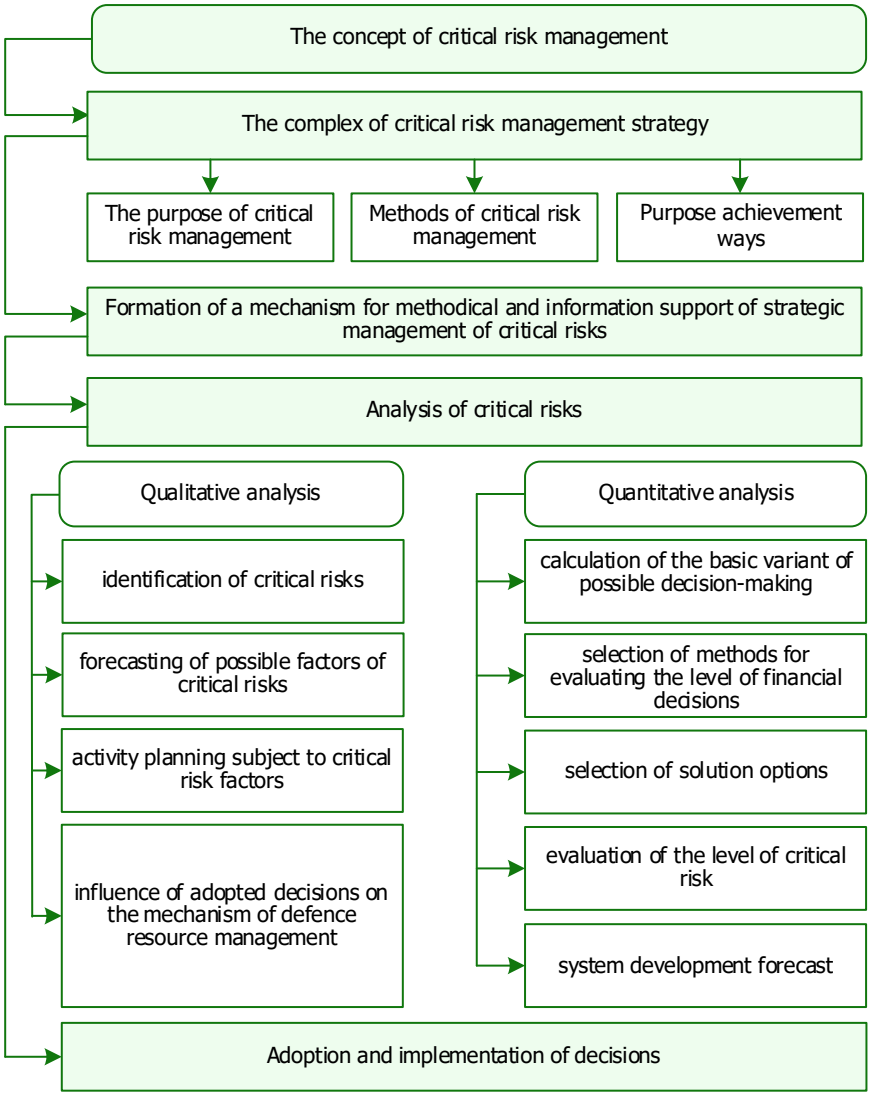

Figure 5. The concept of Critical Risk Management in the Mechanism of Defence Resource Management.

Note that the level of critical risk is calculated in several ways, in particular, the most common of them is as follows:

$$CR = RP * LA \quad (1)$$

where CR is the corresponding critical risk level; RP is the probability of the emergence of this critical risk; LA is the amount of possible financial losses in the case of the implementation of this risk.

An important task of risk management in the mechanism of defence resource management is the formalization of the management object for a specific type of defence resources, which involves:

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- formation of the "register of critical risks," detection of all critical risks, both internal and external, which affect the mechanism of defence resource management, including data on the cause-and-effect relationships between critical risks and "maps of critical risks," in other words, determination of the probability and level of danger;
- singling out each critical risk being included in the general register of critical risks and calculation of their possible amounts and consequences of losses;
- evaluation of proneness to critical risk for each type of defence resource;
- creation of a system of critical risk response priorities;
- development of a critical risk management system, namely planning and provision of financial resources for the implementation of measures related to critical risk management, analysis of the overall effectiveness of the critical risk management mechanism, monitoring of changes in critical risks, reporting on critical risk management, as well as periodic training of employees in risk management [16].

Methodological support of critical risk management in the mechanism of defence resource management at the strategic level can be optimally implemented through a control system formed based on the following principles: meeting the defence resource management strategy, dynamism and quantitative orientation of the overall control system, meeting the methods of planning and analyzing critical risk parameters, adaptive nature, intelligibility of the system and cost optimization.

So, the system of critical risk management in the mechanism of defence resource management is a system of influence on all types of risk, which allows for avoiding or minimizing negative consequences. Considering the fact that the effectiveness of the general critical risk management system in the mechanism of defence resource management depends on the above components, specific approaches in the process of their functioning should be used.

The main task of controlling critical risks in the mechanism of defence resource management is methodical, information and analytical support of risk management in the process of identification of critical risks. Note that information and analytical support have the form of constant analysis of external sources of information for the detection of possible risks. This support must provide management with a clear picture of the economic processes that take place in the country, in the industry and all the structures concerned.

Let us proceed to the quantitative evaluation of specific critical risks according to the groups defined in Table 1. One of the macroeconomic risks that should be analyzed is the inflation index, which directly affects the mechanism of defence resource management, since prices for the main defence resources and the level of state allotments for defence may change depending on the level of inflation (Figure 6).

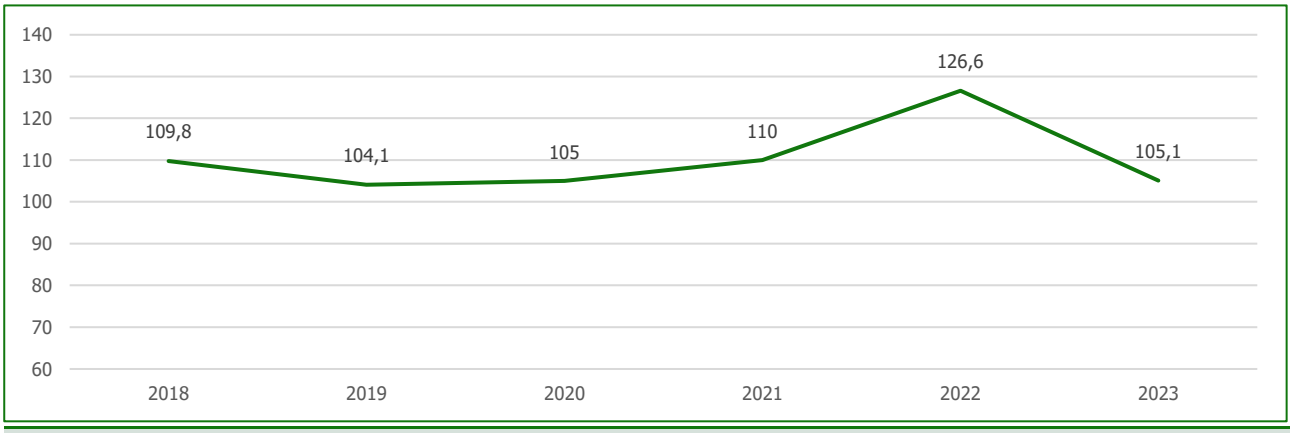

Figure 6. Inflation Index in Ukraine in 2018–2023. *(Source: [17])*

As we can see, the inflation index has significantly increased with the beginning of warfare in Ukraine, from 110% in 2021 to 126.6% in 2022. It had stabilized at the end of 2023 at 105.1%. However, it was inflation that caused the rise in the price for basic defence resources and the prices for other types of resources indirectly transferred to the defence sector [17].

The exchange rate also affects the mechanism of defence resource management, influencing the level of prices for some types of defence resources, and the level of inflation in the country as a whole. The exchange rate for 2018–2023 is shown in Figure 7.

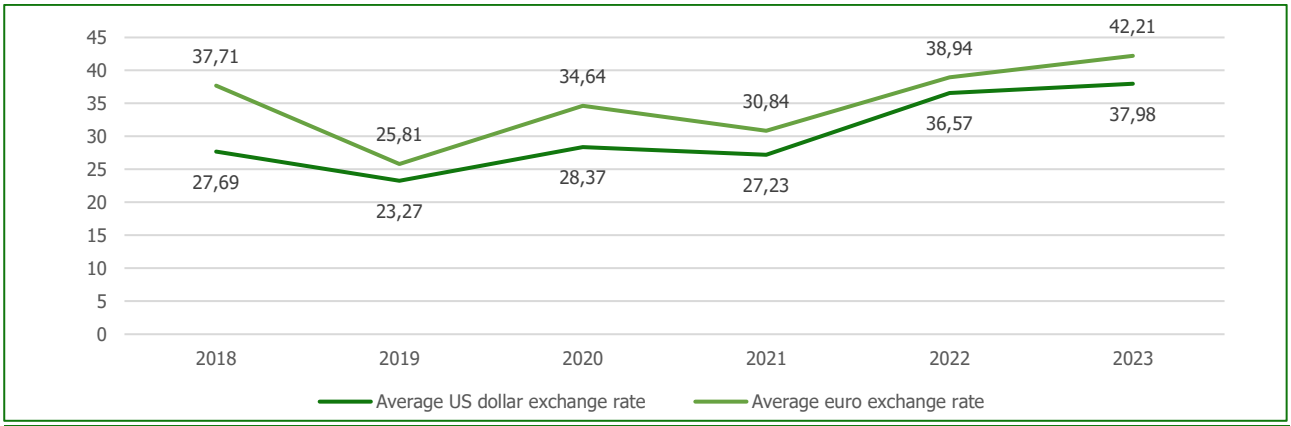

Figure 7. Exchange Rate in Ukraine in 2018–2023. *(Source: [17])*

The exchange rate has significantly increased with the beginning of the war and has reached its maximum at the end of 2023. Thus, the USD exchange rate at the end of 2023 is UAH 37.98, and the euro exchange rate is UAH 42.21 [17].

Critical risks that directly affect the mechanism of defence resource management also include the destruction of a large part of the transport, industrial, and residential infrastructure, in particular, military infrastructure. Thus, as of September 1, 2023, the economy of Ukraine has suffered a total of UAH 151.2 billion of direct losses due to destruction and damage to buildings and infrastructure. In addition, prices in the world energy markets have significantly increased due to the destruction of energy infrastructure, and prices for diesel fuel have also grown, as shown in Figure 8.

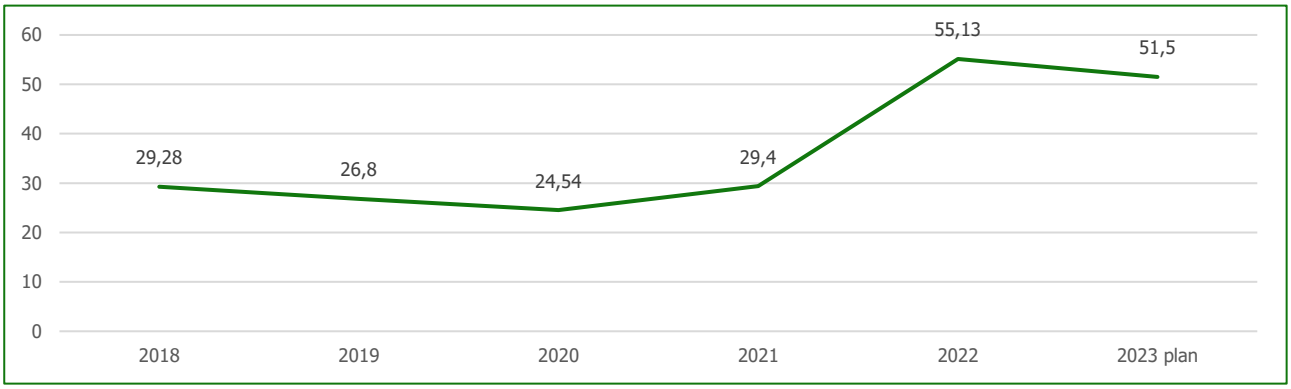

Figure 8. Diesel Fuel Price in Ukraine in 2018–2023. *(Source: [17])*

The price for diesel fuel in Ukraine during the research period has increased from UAH 29.28 in 2018 to UAH 51.5 in 2023, which directly affects the cost of material resources included in the general system of defence resources [18].

As to the critical risks related to the state budget, it is worth noting that the main critical risk is the risk of an increase of the national debt, the history of which for recent years is shown in Figure 9.

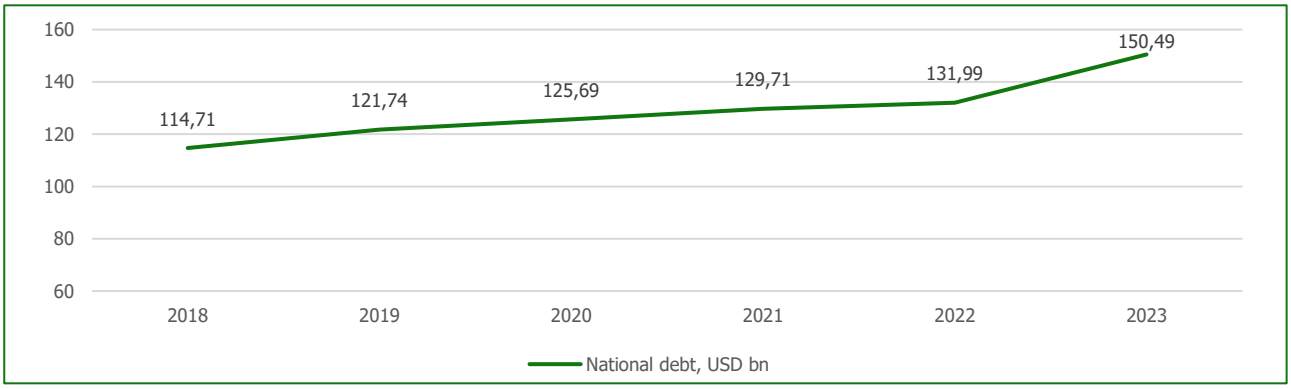

Figure 9. National Debt in Ukraine in 2018–2023. *(Source: [17])*

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During the analyzed period, national debt has increased from USD 114.71 billion in 2018 to USD 150.49 billion in 2023. Gross foreign debt includes both external national debt, in particular, the debt of the government and the National Bank, and the debt consisting of debts of banks, joint-stock companies and national companies [18].

Insolvency risks are related to the growth of insolvency of various companies due to significant destruction, debt increase, solvency decrease, and complication of logistics connections, which forces the companies to wind up their activities.

Evaluation of critical risks due to lack of transparency has become much more complicated since there is no access to reports of all companies in the defence sector under martial law. However, we can show the history of defence spending during the period under study (Figure 10)

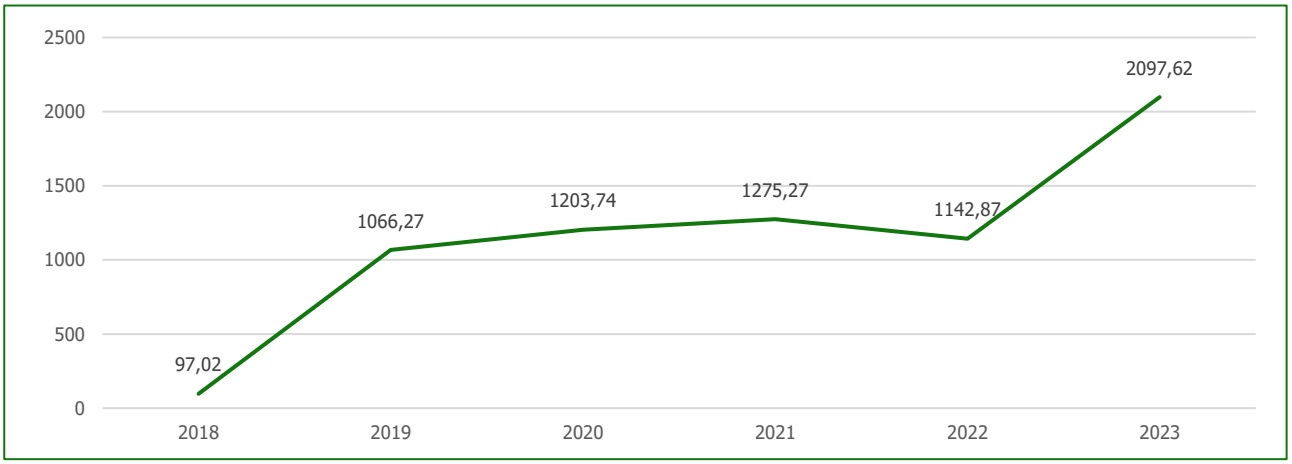

Figure 10. Defence Spending in Ukraine in 2018–2023. *(Source: [17])*

As we can see, defence spending during the research period has increased from UAH 97.02 billion in 2018 to UAH 2,097.62 billion in 2023. Furthermore, 2022 and 2023 show the highest specific weight of defence spending, 42.24% and 52.25%, respectively [18].

The mechanism of defence resource management is also affected by changes in export-import operations, as shown in Figure 11.

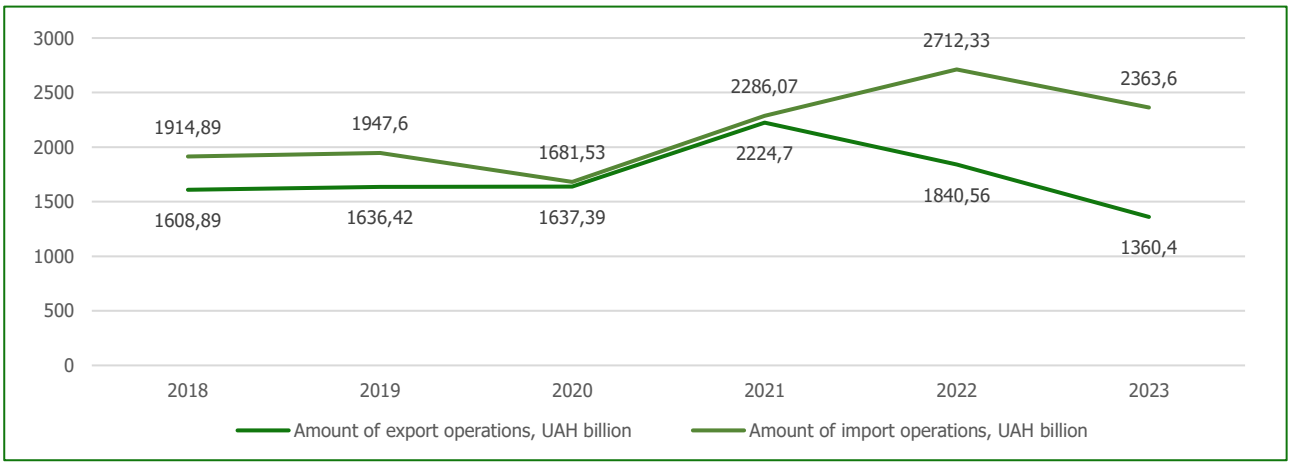

Figure 11. Dynamics of Export-Import Operations in Ukraine in 2018-2023. (*Source: [17]*)

In 2023, the total volume of exports increased, but, in value terms, it decreased to UAH 1360.4 billion. Therefore, work is underway to open a corridor in the Black Sea and on the Danube, as well as negotiations with Poland to unblock the border. As for imports, it should be noted that, in 2023, it amounted to UAH 2,363.6 billion [19]. Most of all, Ukraine imports fuel, essential military goods that are not publicized, UAVs, and medicines.

We will assess critical risks by interviewing experts (50 people) in this area. The survey was conducted in the form of a questionnaire, according to which the critical risk factors that affect the mechanism of defence resource management were structured. On this basis, these critical risks can be ranked by the probability of occurrence and the level of impact on the

mechanism of defence resources management. The main results of the survey with the corresponding representation of the total number of respondents' opinions on the impact of a particular critical risk factor on the mechanism of defence resources management are presented in Table 2.

Table 2. Results of the Survey on the Impact of Critical Risks on the Defence Resource Management Mechanism.

Critical risks	Risk level				
	Insignificant	Low	Medium	High	Critical
1. Changes in the inflation index	6	8	10	11	15
2. Changes in the exchange rate	4	8	13	13	12
3. Change of diesel fuel	2	10	14	13	11
4. Changes in the national debt	12	11	12	9	6
5. Changes in defence expenditures	13	17	11	7	2
6. Changes in export and import operations	11	20	13	3	3

The next stage involves assigning values from 1 to 5 to each individual degree of impact of the critical risk factor, with "1" having a minor impact (up to 5 people), "2" — from 6 to 10 people, "3" — from 11 to 15 people, "4" — from 16 to 25 people, and "5" — more than 25 people. Based on this, a weighted average is calculated (Table 3).

Table 3. Assigning the Degree of Impact of Systemic Risks on the Defence Resource Management Mechanism.

Critical risks	Risk level					Weighted average value
	Insignificant	Low	Medium	High	Critical	
1. Changes in the inflation index	2	2	2	3	3	2.4
2. Changes in the exchange rate	1	2	3	3	3	2.4
3. Change of diesel fuel	1	2	3	3	3	2.4
4. Changes in the national debt	3	3	3	2	2	2.6
5. Changes in defence expenditures	3	4	3	2	1	2.6
6. Change of export and import	3	4	3	1	1	2.4

Using the same methodology, we will estimate the probability of occurrence of each of the critical risks in the mechanism of defence resources management (Table 4).

Table 4. Results of the Survey on the Probability of Critical Risks Affecting the Defence Resource Management Mechanism.

Critical risks	Probability of occurrence				
	Insignificant	Low	Medium	High	Very high
1. Changes in the inflation index	6	7	12	18	7
2. Changes in the exchange rate	2	8	19	15	6
3. Change of diesel fuel	2	9	16	14	9
4. Changes in the national debt	17	11	10	7	5
5. Changes in defence expenditures	11	17	8	8	6
6. Changes in export and import operations	9	17	14	6	4

As you can see, the probability of most critical risks occurring is medium, but the probability of changes in the inflation index, the exchange rate and the cost of diesel fuel is quite high. At the next stage, it is reasonable to represent the assignment of the appropriate degree of critical risk occurrence. This should be done in a similar way to outlining the degree of their direct impact (Table 5).

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Table 5. Assigning the Probability Degree of Occurrence of Systemic Risks on the Defence Resource Management Mechanism.

Critical risks	Risk level					Weighted average value
	Insignificant	Low	Medium	High	Very high	
1. Changes in the inflation index	2	2	3	4	2	2.6
2. Changes in the exchange rate	1	2	4	3	2	2.4
3. Change of diesel fuel	1	2	4	3	2	2.4
4. Changes in the national debt	4	3	2	2	1	2.4
5. Changes in defence expenditures	3	4	2	2	2	2.6
6. Changes in export and import operations	2	4	3	2	1	2.4

Based on the calculated data in Table 3 and Table 5, we will build a map of critical risks that affect the mechanism of defence resource management (Figure 12).

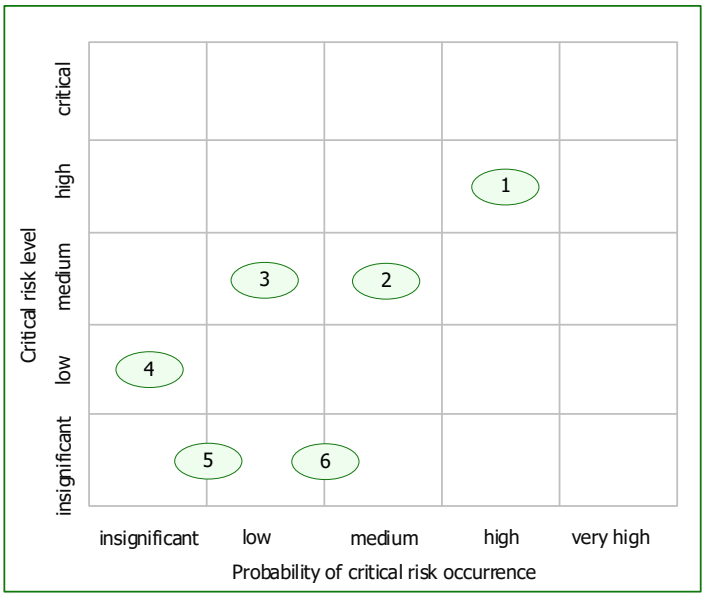

Figure 12. Map of Critical Risks Affecting the Defence Resource Management Mechanism.

However, it is worth considering the main provisions of risk management, which prove the fact that the identification process does not take into account the change in people's attitudes towards critical risks, depending on the stage of the economic cycle, which causes overestimation or underestimation of critical risks. This situation has arisen due to the fact that all critical risk management concepts are based on the assumption that human behaviour is rational when making management decisions.

Therefore, the main task of controlling critical risks at this stage is to identify pitfalls and correct the results. It should be noted that these pitfalls include the following: Underestimation of critical risks when planning the defence budget for the next year. In addition, these pitfalls include the belief of employees that all critical risks can be predicted, but changes in exchange rates and diesel prices cannot always be calculated to identify trends. Therefore, the map of critical risks will be adjusted to account for these pitfalls in Figure 13.

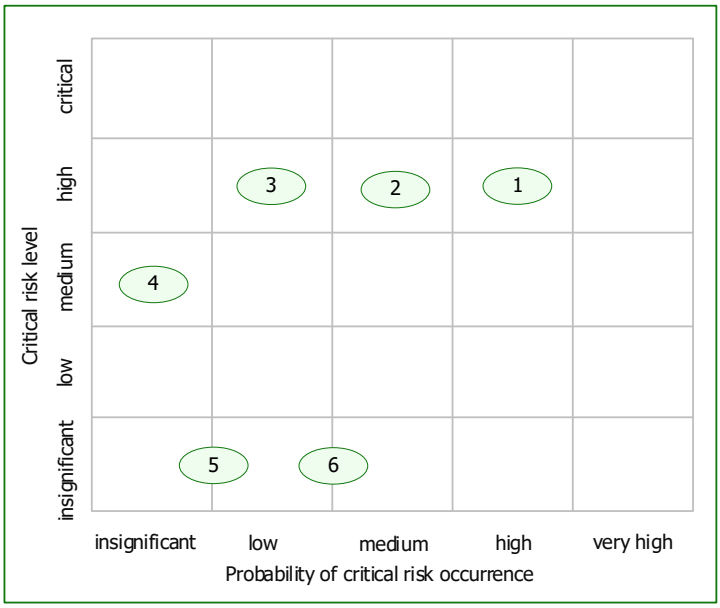

Figure 13. Map of Critical Risks Taking into Account Pitfalls Affecting the Defence Resource Management Mechanism.

On the basis of the studied map of critical risks, taking into account subjective and objective reasons, we can generalize the conclusion that the synergy between the factors that influence their size and occurrence allows to effectively neutralize them. When identifying critical risks, behavioural and rational approaches should be applied to maximize the approximation of state forecasts. It is worth noting that the developed map of critical risks can be used not only for quantification and management system of these risks but also to define indicators for external users. The next step is to assess in practice the systematic and unsystematic risks that affect the mechanism of defence resource management [20].

In order to calculate CFaR of cash flows, the following basic approaches should be used:

1. Analytical, i.e., parametric, covariance or delta normal approach.
2. Historical, also called the historical modelling method, which is included in the group of full valuation methods, in contrast to the non-parametric approach.
3. Monte Carlo, i.e., the method of simulation, which is a non-parametric approach.

The basis for using the analytical method of calculating the CFaR is the assumption of a normal distribution law for the average yield, which is widely used in mathematical statistics. Let's calculate the trends in GDP, defence expenditures, and national debt in Table 6.

Table 6. Assessment of CFaR by the Analytical Method of the Main Indicators that Affect Defence Expenditures.

Indicator	GDP, UAH billion	The national debt, UAH billion	Increase in import operations, UAH billion
The last value, UAH	4,078.4	150.49	1,003.2
Maximum amount, UAH.	4,363.58	150.49	1,003.2
Minimum amount, UAH.	3,083.41	114.71	44.14
Weighted arithmetic average, UAH.	3,814.23	129.04	432.94
Standard deviation, UAH	393.18	11.10	373.71
Normalized mode, UAH	1.40	1.93	1.53
Normalized median, UAH	3,842.12	127.7	308.59
Quantile of normal distribution (95%)	4,460.94	147.29	1,047.64
CFaR threshold (95%), UAH.	3,599.29	122.98	228.65
Absolute value of CFaR, UAH (95%)	479.11	142.97	953.04

The above CFaR shows that there is a 95% probability that defence expenditures will change next year:

- since the GDP will not exceed UAH 479.11 billion, it may drop to UAH 3,599.29 billion;

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- national debt will not exceed 142.97, i.e., it will not fall below 122.98;
- the increase in import-export operations will not exceed 953.04, in other words, it will not fall below UAH 228.65 billion.

The task of controlling critical risks in this situation, with the exception of information support, is to timely develop and implement measures aimed at avoiding critical risks, as well as to coordinate the actions of the units responsible for this. It is worth noting that the analytical method in assessing critical risks has a fundamental flaw, in particular, the assumption of a normal distribution law for defence expenditures.

As for the historical modelling method, it should be noted that it makes it possible to assess critical risks outside the probability distribution of the risk factors under study, but requires a sufficient statistical database for each of these factors. It is based on the assumption that fluctuations in financial market conditions and the generated critical risk factors are relatively stationary, in other words, it is assumed that during the study period of position holding, fluctuations in the general market conditions will follow the same patterns as in the previous period. Compared to the analytical method, this method does not use historical information to obtain predicted values of covariance and variance. The overwhelming number of observations of financial instruments makes it possible to obtain the necessary data. The accuracy of calculating the CFaR according to the historical modelling method depends on the total number of observations and the presence of extreme fluctuations in defence expenditures [20].

In practice, the Monte Carlo method is often used to obtain the distribution of the expected cost. It is a procedure, by which a mathematical model of a financial indicator is subjected to statistical forecasts using a computer. Using specific laws of distribution of variables, it is possible to obtain not a single value, but a distribution of the main indicators of critical risks in order to build and highlight the possibility of probability distribution. The flexibility and illustrative nature of this method is one of the reasons why it is popular among analysts.

Given the fact that the Monte Carlo method requires a significant number of tests, it is also considered to be a statistical test method. It has the following advantages: It does not require regularity assumptions, except for quadratic integration, which can be useful when there are complex functions and regularity properties that are not easy to specify; it provides for a procedure in the multidimensional case when numerical integration is not applicable and can be easily used without prior analysis of the problem and with few restrictions.

When describing the main approaches to the Monte Carlo simulation process, researchers distinguish between iterative and non-iterative methods, emphasizing that it is necessary to deviate from standard approaches during simulation. An important positive aspect of the Monte Carlo simulation method is that it can be applied directly to more than one risk factor.

It is worthwhile to assess the critical risk that affects the defence expenditures using the Monte Carlo method for the analyzed period. To do this, you first need to calculate the average value and standard deviation of defence spending. For the period of 2018–2023, the average value of defence expenditures is UAH 956.60 billion, and the average deviation is UAH 637.35 billion.

Based on the calculated data using the Oracle Crystal Ball software, we can estimate the critical risk that arises from the direct change in defence expenditures with certain frequencies and probabilities (Table 7).

Table 7. Data Calculated by Monte Carlo Simulation.

Indicators	Value
Number of tests	10,000
Main value	956.60
Median	1,172.5
Mode	-
Standard deviation	637.35
Dispersion	2,227.46
Asymmetry	-0.3434
Excess	2.3610
Coefficient of variation	194.25%
Minimum	97.02
Maximum	2.097
Average standard error	0.95

From the above Table, we can summarize the conclusion that the main value of defence spending for the period under study is UAH 956.60 billion, with a probability of 95%, the CFaR is UAH 2.36 billion, i.e., the critical risk is estimated at UAH 637.35 billion, which depends on various factors.

Since the two risks were analyzed using the Monte Carlo method and the analytical method, the currency risk should be analyzed using the historical method. It is worth noting that systemic risk should be assessed in the short term, as the exchange rate is specified by quite high volatility. The calculation of the CFaR for UAH/USD will make it possible to provide thoughtful requests for the purchase or sale of currency in the foreign exchange market on the interbank market [36].

Using the historical data of the UAH/USD exchange rate from January 01, 2024, we will assess the currency risk using the method of historical modelling. It is worth noting that when modelling foreign exchange markets in the process of assessing systemic risks, daily values are used, which makes it possible to correctly predict the exchange rate (only for a short-term period (1–14 days) (Figure 14).

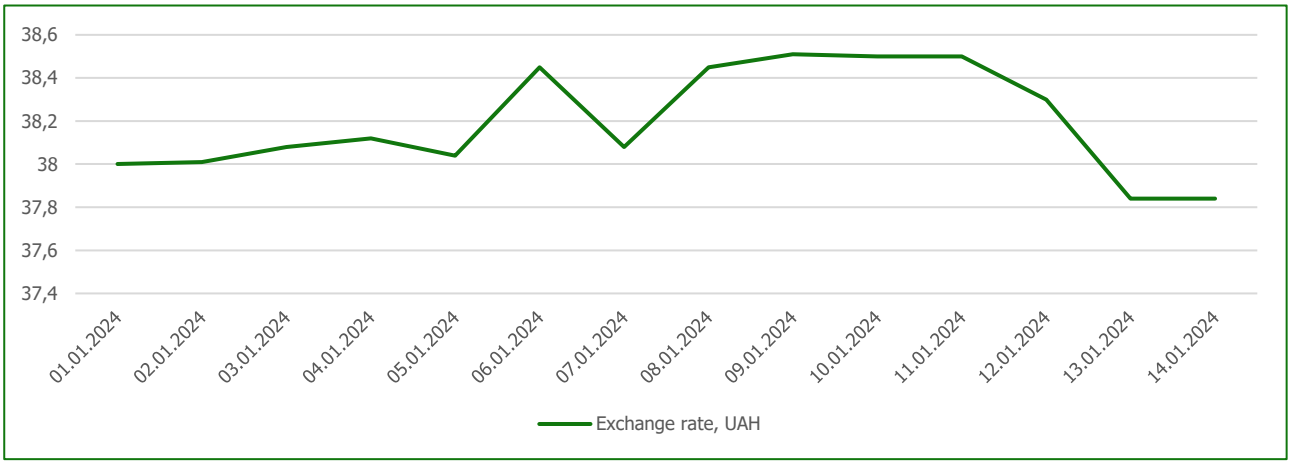

Figure 14. Changes in the Exchange Rate (USD) for the Period of 01.01.24–14.01.24. *(Source: [21])*

The Table calculates the exchange rate that has a 95% probability on the specified day, which does not exceed the official NBU exchange rate and VaR, which shows the maximum possible losses that affect defence expenditures per USD 1. The latter has a 95% probability [21].

Table 8. Var Analysis by the Historical Exchange Rate Method.

Indicator	Exchange rate (USD)
Weighted arithmetic average, UAH	38.19
Standard deviation, UAH	0.25
Quantile of normal distribution (95%)	38.60
VaR value (95%), UAH	38.06

It is worth noting that the distinctive feature of the previous calculations is that the data obtained as a result of applying different methods differ, which shows the incorrectness of using the analytical method for calculating currency VaR.

The assessment of critical risks has shown that using a critical risk control tool such as VaR (CFaR), it is possible not only to quantitatively analyze risks but also to effectively search for opportunities to minimize them. The calculation of CFaR for the main types of defence expenditures opens up opportunities for manoeuvring in the procurement of related goods in such a way as to maximize the difference between their prices.

The main task is to effectively control critical risks that affect the defence resource management system: collecting, timely analyzing and updating statistical information, updating CFaR indicators every month for defence expenditures, updating VaR indicators every day for the established exchange rate (USD), controlling the recommendations provided, preparing the appropriate reporting form, and monitoring the market and internal environment of the defence resource management mechanism.

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DISCUSSION

The need for this study is caused by the fact that, in the context of the ongoing war, the mechanism of defence resource management is affected by many risks, both internal and external. The financial capacity of the country to withstand the danger depends on their impact. This study is complicated by the uncertainty of the external environment, including political, economic and social conditions that directly affect the mechanism of defence resource management.

We agree with the approaches of such scholars as I. Pashchenko [5] and N. Koval [6] that it is necessary to focus on controlling critical risks in order to identify, analyze and effectively manage them in time in the context of Ukrainian integration into the global financial space. Valuable developments in this area are the studies of I. Tomashuk [3], I. Tomashuk [3] and Z. Hbur [4] directly consider the impact of critical risks on the operation of the enterprise and economic security, taking into account the conditions caused by the war.

At the same time, the authors do not focus on the mechanism of defence resource management, the impact of critical risks on its effectiveness and the concept of critical risk management. Therefore, our study is important and relevant because it focuses on these issues and provides for a practical assessment of the impact of certain risks on the defence resource management mechanism.

CONCLUSIONS

The article revealed in detail the scientific and theoretical foundations of the process of managing critical risks in the general mechanism of defence resource management, performed an analysis of its efficiency and provided recommendations to reduce risks in this mechanism. The study investigated the main scientists' approaches to the definition and classification of critical risks, which affect the mechanism of defence resource management, in particular, their own definition was singled out in the context of the management of defence resources. Thus, in the context of the management of defence resources, critical risks mean an economic category that includes an evaluation of the probability of a loss or reduction of one of the resources subject to the uncertainty of the factors affecting it. A multiple-factor analysis of critical risks and their quantification, which affect the mechanism of management of defence resources was also conducted, namely, risks such as macroeconomic risks, risks that directly affect the mechanism of defence resource management, insolvency risk, state budget risks, insufficient transparency risks, insufficient control risks. The authors developed an effective system for managing critical risks that affect the mechanism of defence resource management.

Thus, based on our analysis, we can make the following recommendations to reduce the impact of critical risks on the mechanism of defence resource management:

1. To develop a new methodological apparatus for responding to critical risks affecting the mechanism of defence resources management.
2. To develop a program for managing critical risks of the enterprise and institutions of the defence sector, organization of the risk management process within departments in each structural unit.
3. To ensure the implementation of the critical risk management program, participate in the process of diagnosing risk factors for the formation of an effective mechanism for defence resources management, develop recommendations for optimizing the degree of risk, etc.
4. To conduct regular audits to control the financial statements of defence-related structural units.

Since hostilities in the country continue, this study will be relevant in the future because new risks are constantly emerging, which need to be quickly and effectively responded to an appropriate management decisions taken.

ADDITIONAL INFORMATION

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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ВПЛИВ КРИТИЧНИХ РИЗИКІВ НА МЕХАНІЗМ УПРАВЛІННЯ ОБОРОННИМИ РЕСУРСАМИ

Продовження воєнних дій на території країни спричиняє багато економічних, екологічних і соціальних проблем. Тому важливим питанням постає дослідження впливу критичних ризиків на механізм управління оборонними ресурсами, від яких залежить спроможність держави вистояти в скрутні часи та забезпечити захист державних кордонів. Основною метою дослідження є оцінка науково-практичних засад визначення й аналізу критичних ризиків в оборонній царині.

З урахуванням зазначеного, в статті досліджуються основні підходи науковців до визначення поняття й класифікації критичних ризиків, які впливають на механізм управління оборонними ресурсами. Крім того, проведений багатофакторний аналіз критичних ризиків, які впливають на механізм управління оборонними ресурсами. Розроблено ефективну систему управління критичними ризиками, що впливають на механізм управління оборонними ресурсами. Наведені рекомендації, які спрямовані на зниження ступеня впливу критичних ризиків на механізм управління оборонними ресурсами.

У дослідженні використані загальні та спеціальні методи наукового дослідження, зокрема метод наукової абстракції – для того щоб вчасно виявити й використати на практиці показники оцінки критичних ризиків та ефективні методи їх зменшення; методи порівняльного й структурно-факторного аналізу – для проведення оцінки досліджуваних показників; метод логічного узагальнення – для наведення напрямів і рекомендацій відносно зменшення впливу критичних ризиків на систему управління оборонними ресурсами.

У статті вперше комплексно проаналізовано вплив критичних ризиків на механізм управління оборонними ресурсами. Автори розкрили концепції реагування на критичні ризики, що мають вплив на цей механізм. Практичне значення дослідження полягає в тому, що запровадження дієвої системи управління критичними ризиками дозволить підвищити ефективність цього механізму.

Ключові слова: багатофакторний аналіз, контроль, критичні ризики, механізм управління, оборонні ресурси, рекомендації, управлінські рішення

JEL Класифікація: E60, E69, O11, P43