ELABORATION OF A METHOD FOR THE STRATEGIC ANALYSIS OF THE DEVELOPMENT OF THE ARMED FORCES

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ELABORATION OF A METHOD FOR THE STRATEGIC ANALYSIS OF THE DEVELOPMENT OF THE ARMED FORCES

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Abstract

Previous research has shown the need to increase the validity of the strategic decisions taken to determine (clarify) the strategy for developing the capabilities of the Ukrainian Armed Forces in the long term. It is necessary to elaborate a multi-criteria method for the strategic analysis of the development of the Armed Forces, based on statistical data obtained from the results of the defence reform and the defence review, minimising the use of expert judgments. To elaborate this method a conceptual approach was used, which combines choosing priority areas for developing the capabilities of the Armed Forces and a recursive way of organising the computing process. The process involved the creation of a system of indicators and performance criteria, their weight coefficients, and recursive and objective functions for constructing a mathematical model for synthesising the results of the strategic analysis of the development of the Armed Forces. The method of strategic analysis of the development of the Armed Forces using the recursive method of organising the computational process (SADAF-RW) produces objective assessments and the expected effect of implementing the chosen strategy for making strategic decisions. It is aimed at improving the state of readiness and capabilities of the Armed Forces in the long term, minimising the use of expert judgments. The method can be used in the elaboration of a scientific and methodological apparatus for assessing the effectiveness of strategic planning for the development of the Armed Forces since it is based on the principles of objectivity of assessments, consistency, and effectiveness of strategic decisions.

Keywords: method, strategic analysis, Armed Forces, defence reform, defence review.

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ELABORACIÓN DE UN MÉTODO PARA EL ANÁLISIS ESTRATÉGICO DEL DESARROLLO DE LAS FUERZAS ARMADAS

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Resumen

Con base en estudios previos se identificó la necesidad de aumentar la validez de la toma de decisiones estratégicas para determinar (aclarar) la estrategia de desarrollo de las capacidades de las Fuerzas Armadas en el largo plazo. Se identificó la necesidad de elaborar un método multicriterio para el análisis estratégico del desarrollo de las Fuerzas Armadas basado en datos estadísticos sobre los resultados de la reforma y revisión del sector de la defensa, minimizando el uso de juicios de expertos. Para la elaboración del método se utilizó un enfoque conceptual que combina las etapas seleccionadas de elección de áreas prioritarias para el desarrollo de las capacidades de las Fuerzas Armadas y una forma recursiva de organización del proceso de cómputo. El proceso involucró el desarrollo de un sistema de indicadores y criterios de desempeño, sus coeficientes de peso, funciones recursivas y objetivo para construir un modelo matemático que sintetice los resultados del análisis estratégico del desarrollo de las Fuerzas Armadas. El método de análisis estratégico del desarrollo de las Fuerzas Armadas mediante el método recursivo de organización del proceso computacional (SADAF-RW) permite obtener valoraciones objetivas y el efecto esperado de implementar la opción estratégica elegida para la toma de decisiones estratégicas. Está dirigido a mejorar el estado de preparación y capacidades de las Fuerzas Armadas en el largo plazo, minimizando el uso de juicios de expertos. El método puede ser utilizado en la elaboración de un aparato científico y metodológico para evaluar la eficacia de la planificación estratégica en el desarrollo de las Fuerzas Armadas, ya que se basa en los principios de objetividad de las evaluaciones, consistencia y eficacia de las decisiones estratégicas.

Palabras clave: método, análisis estratégico, Fuerzas Armadas, reforma de la defensa, revisión de defensa.

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Introduction

The changing security environment, the existing challenges, and the current military threats to the Ukrainian state require the Ministry of Defence and the General Staff of the Armed Forces to pay special attention to strategic decision-making during the defence review. Making strategic decisions to determine the strategy for the development of the Armed Forces in conditions of partial uncertainty and risks is one of the most urgent practical problems of strategic planning for the capabilities-based development of the Armed Forces. Incorrect strategic decisions in the future can negatively affect the level of readiness and capabilities of the Armed Forces to defend the state, protect its sovereignty and territorial integrity, and lead to inefficient use of budget funds.

The elaboration of rational strategic decisions based on quantitative assessments to determine an effective strategy for developing the capabilities of the Armed Forces in the long term cannot be conducted without the use of mathematical methods and tools of strategic analysis. The terms "rational", "objective", and "effective", chosen for this study, are interdependent and this is not accidental. "Rational" characterises a strategic decision made to solve the problems of the Armed Forces using indicators and criteria for effectiveness.[1] "Objective" means the use of mainly statistical and mathematical data and calculations, and a minimum of expert assessments and judgments to determine an effective strategy for developing the capabilities of the Armed Forces. "Effective" characterises the expected positive effect of the implementation of the chosen strategy based on a strategic analysis of the development of the Armed Forces.

Strategic analysis for the development of the Armed Forces is one type of strategic analysis, namely a comprehensive study of the current state and strategy for the development of the capabilities of the Armed Forces according to the parameters that determine their future state. Strategic analysis for the development of the Armed Forces should be conducted during defence reform, defence review, and other strategic planning procedures. Contradictions in the construction and development of the Armed Forces are caused by not using the method of strategic analysis, which will consider statistical data and minimise the involvement of experts. This method

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[1]   Hasan Hüseyin Turan, Sondoss Elsawah, Fatemeh Jalalvand, and Michael J. Ryan, "Solving Strategic Military Workforce Planning Problems with Simulation-Optimization", *The 2020 IEEE Symposium Series on Computational Intelligence, SSCI,* (2020): 1620-1625, https://doi.org/10.1109/SSCI47803.2020.9308483; Samuel Knafo, "Neoliberalism and the Origins of Public Management", *Review of International Political Economy* 27, no. 4 (2020): 780-801, https://doi.org/10.1080/09692290.2019.1625425.

should allow making rational strategic decisions to determine the strategy for developing the capabilities of the Armed Forces in the long term, while considering resource risks. Certain formalisation of the strategic analysis for the development of the Armed Forces of Ukraine, as well as the definition of a long-term strategy for the development of different types and branches of the Armed Forces is already laid down in legal regulations and military standards.[2]

Thus, during the defence review it is customary to assess the state and readiness of the Defence Forces to perform tasks related to the defence of the country, the state of their comprehensive logistical support, and of their available capabilities.[3] The defence review is commonly conducted in compliance with the following principles: objectivity, systematic measures, scientific validity, etc. The procedure for organising and implementing the defence planning in the Ministry of Defence of Ukraine, the Armed Forces of Ukraine, and other components of the defence forces was approved in 2020.[4] This procedure defines the authorities involved and the sequence of actions for the organisation of this process and the implementation of certain procedures (capacity assessment, risk management, development of programmes and plans, etc.) in the defence forces.

Also, the military security strategy of Ukraine was approved in 2021[5], one of whose priorities is to increase the level of combat readiness, and the capabilities of the Armed Forces of Ukraine, as well as of other components of the defence forces to perform tasks as intended. A military standard was also established and approved in 2020[6], defining the procedure for elaborating strategies for the development of a separate branch of the Armed Forces. It defines the necessary initial data to elaborate strategies (results of the defence review, budget, etc.), those responsible

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[2]   Cabinet of Ministers of Ukraine, Resolution No. 941, "Procedure for Conducting a Defense Inspection by the Ministry of Defense", (2018), http://zakon.rada.gov.ua/laws/show/941-2018-%D0%BF (accessed June 28, 2022); Ministry of Defense of Ukraine, Order no. 484, "The Order of Organization and Implementation of Defense Planning in the Ministry of Defense of Ukraine, the Armed Forces of Ukraine and other Components of the Defense Forces: Approved" (2020), http://zakon.rada.gov.ua/laws/show/z0196-21#Text (accessed June 27, 2022); President of Ukraine, Decree no. 121, "On the Decision of the National Security and Defense Council of Ukraine" (2021), https://zakon.rada.gov.ua/laws/show/ 121/2021 # Text (accessed June 28, 2022); MSS 01.040.008, "Defense Planning. Strategies for the Development of Species, Certain Types of Troops (Forces) of the Armed Forces of Ukraine (Strategic Vision for the Long Term). The Procedure, Frequency of Development, Approval and Amendments (Clarifications) to the Document" (2020), http://www.mil.gov.ua/content/mil_standard/katalog_vst_11_20.pdf (accessed June 29, 2022).

[3]   Cabinet of Ministers of Ukraine, Resolution no. 941.

[4]   Ministry of Defense of Ukraine, Order no. 484.

[5]   President of Ukraine, Decree no. 121.

[6]   MSS 01.040.008. "Defense planning".

for the elaboration, deadlines for developing draft strategies, etc. However, there are no fixed methodological foundations (statistical methods, assessment methods, approaches, and other tools of strategic analysis) for determining options for strategic decisions, which creates a problematic situation when performing this complex strategic task.[7]

The purpose of this study is to elaborate a method for the strategic analysis of the development of the Armed Forces. To achieve this purpose, the following tasks were set forth:

- Formulate a research hypothesis for solving the problems of strategic planning for the capabilities-based development of the Armed Forces.

- Elaborate a mathematical model for synthesising the results of the strategic analysis of the development of the Armed Forces.

Literature Review

During the defence review, it is customary to use general scientific methods based on expert assessments and strategic analysis to assess possible scenarios for the emergence and development of crisis situations in the military, etc.[8] It is also customary to use different methods of analysis, such as SWOT analysis, the Delphi method, the hierarchy analysis method, the scenario method, the trend analysis method, the decision tree methodology, the brainstorming method, comparison etc.[9]

For risk assessment the most used methods are[10]:

- The scenario method (which develops several scenarios for implementing the solution). Most commonly, scenarios are limited to optimistic, pessimistic, and realistic.

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[7]   Palinchak, Mykola, Myroslava Tsalan, Kateryna Brenzovych, Anatolii Kucher, Tomas Kajanek, and Martin Gress. "Competitiveness as the Basis of EU Regional Policy: Smart Specialization and Sustainability." *European Journal of Sustainable Development* 10, no. 4 (2021): 227-239.

[8]   "Capacity-Based Recommendations for Defense Planning in the Ministry of Defense of Ukraine and the Armed Forces of Ukraine: Approved (2017)", http://www.mil.gov.ua/content/other/Recommendationson_CBP_120617 (accessed June 30, 2022).

[9]   Alberto José Ferrari Puerta, "The Concept of Just War throughout the Ages", *Novum Jus* 15, no. 1 (2021): 91–115; Choi Sun-O and Kim Jong-Bae, "National Defense Cloud Strategy", *The Proceedings - 2021 21st ACIS International Semi-Virtual Winter Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing (SNPD-Winter),* (2021): 87-89, https://doi.org/10.1109/SNPDWinter52325.2021.00026.

[10] Alfonso Camelo Heyder, "Transformation of the Dynamics of Confrontation in the Armed Conflict", *Novum Jus* 5, no. 1 (2011): 55–78.

- The decision tree methodology (there are a finite number of solutions and options for risk occurrence). This method is especially useful when a decision depends on previous ones and affects the development of future events.

- The simulation modelling method (based on obtaining sequences of random numbers, which are risk values). This method simulates many implementations–one-time situations, provided that a particular solution option is selected, and possible values of quality criteria are calculated.

- The method of reliable equivalents (expert correction of the situation depending on the subjective assessment of probabilities). The use of probability coefficients makes decision-making arbitrary and with a formal approach can lead to serious errors in the management process.

- The sensitivity analysis method (analyses factors that separately influence the decision). It allows the identification of the critical variables with the greatest impact on making effective decisions.

These general scientific methods of expert assessment and strategic analysis differ in their purpose, essence, objects, subjects, stages sequence and content, criteria, indicators, etc. However, all of them, explicitly or implicitly, necessarily include the stage of assessing the options for strategic decisions.[11] Expert assessment methods conduct a strategic analysis of the development of the Armed Forces based on the subjective opinion of experts, the results of which may vary depending on various factors (current situation, awareness, etc.). Considering the above, the use of methods of strategic analysis for the long-term development of the Armed Forces remains an urgent practical and scientific problem.

The problem of the objectivity and rationality of strategic decision-making in the areas of defence and military construction has already been considered in the literature, but not solved constructively. In the management literature, ten main scholarly traditions have been identified, which differ in their fundamental view of the strategic management process, have certain shortcomings, and have a specific character in the development and choice of strategy.[12] The complexity of the problem of forming and choosing a strategy for the development of the Armed Forces lies in the fact that its qualitative solution requires the use of multi-criteria optimisation methods

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[11] Alessandra Massa and and Giuseppe Anzera. "The Platformization of Military Communication: The Digital Strategy of the Israel Defense Forces on Twitter". *Media, War and Conflict,* (2022), https://doi.org/10.1177/17506352221101257.

[12] Ricardo Antonio Cita-Triana and Camilo Alberto Quintero Jiménez, "Security Perspectives: Analysis of Crime-Prevention Strategies in Usme", *Novum Jus* 5, no. 2 (2011): 103–128.

to find the maximum and minimum value of the objective function. However, the mechanism for making strategic management decisions in the field of defence and military construction has not yet been sufficiently developed and is ambiguously interpreted in the scientific literature.

In the theory, the national security strategy of the state has been defined as an official set of strategic tasks, measures, actions, and other strategic decisions established by the state[13]. Strategic decisions are those that are complex, large-scale, and with a high level of generalisation and aggregation, aimed at ensuring the protection of national values and national interests and achieving certain national goals. It can be agreed that the defence review and the comprehensive review of the security and defence sector are components of more general processes, such as strategic planning and national security management. Therewith, it is disputable that the defence review is carried out in the interest of developing a strategic defence bulletin.[14] First, the strategic defence bulletin[15] is a strategic document based on the results of the defence review, secondly, it highlights the strategic decision to develop the defence forces in the long term (with strategy).

Massa and Anzera proposed a method for substantiating options for national security strategic decisions, which is not specific of this field.[16] Generating alternative solutions (from three to nine) is usually carried out using special procedures and methods such as brainstorming, Zwicky methods, analogue methods, etc. However, the above method does not comply with the principle of objectivity of assessments, due to the use of expert assessment methods, reducing the objectivity of the process.

Saganyuk et al.[17] consider the existing methodological approaches to determining the strategic development goals of troops (forces) for the development of a strategic defence bulletin based on the results of the defence review. They note that strategic goals must meet certain requirements for measurement (goals must have a quantitative expression); clarity, necessity, and sufficiency; attainability; time parameters; and consistency with the management hierarchy. Defining strategic goals also follows a sequence in a general top-down form. Therewith, the indicators,

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[13]   Massa, "The Platformization of Military Communication".
[14]   President of Ukraine, Decree no. 240, "On the Decision of the National Security and Defense Council of Ukraine" (2016). http://zakon.rada.gov.ua/laws/ show / 240/2016 # Text (accessed June 27, 2022).
[15]   President of Ukraine, Decree no. 240, Law of Ukraine No. 2469-VIII. "On the national security of Ukraine" (2018). http://zakon.rada.gov.ua/laws/show/2469-19 (accessed June 29, 2022).
[16]   Massa, "The Platformization of Military Communication".
[17]   Fedir Saganyuk, Andriy Nalivayko, Anatoliy Pushnyakov, and Mudrak Yuriy, "Approaches to Determining the Strategic Goals of the Development of Troops (forces) for the Formation of the Strategic Defense Bulletin of Ukraine", *Collection of Scientific Works of the Ivan Chernyakhovsky Center for Research and Development* 3, no. 67 (2019): 6-8.

criteria, and functions by which it is customary to determine the strategic goals for the development of troops (forces) are not given.

Some studies[18] have developed practical recommendations for the application of methods for making strategic management decisions (strategic analysis), which are grouped into seven groups depending on the objects of research. In these studies, it has been noted that the adoption of strategic management decisions cannot be imagined without conducting a strategic analysis, which was considered as the performance of the corresponding management function, focused on the future, and having a high level of uncertainty. Therewith, the researchers did not provide practical recommendations on the application of the existing methods for other management operations and the procedures for making strategic management decisions (identifying possible ways to solve the problem and assessing and choosing the best option).[19]

Tagirova[20] has described the conceptual foundations of strategic analysis and the methods for grouping and forecasting objects in it. This author notes that strategic analysis is a research process that never stops, closely related to the life cycle of the strategy. Its stages form a closed loop:

- Action analysis.

- Opportunity analysis.

- Execution analysis.

- Modernisation analysis.

- Analysis of experience.

This proposed sequence of stages cannot be applied in the strategic analysis of the development of the Armed Forces, as it contains duplicate stages (stages 3 and 5) and needs to be adjusted. Several articles[21] have examined the essence, approaches,

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18 Rodolfo Albán Guevara, "Civil Society in the Promotion and Protection of Democracy in the Americas". *Novum Jus* 3, no. 1 (2009): 263–294; Alsu Tagirova. "From Crisis Management to Realignment of Forces the Diplomatic 'Geometry' of the 1969–1978 Sino-Soviet Border Talks", *Journal of Cold War Studies* 24, no. 1 (2022): 116-154, https://doi.org/10.1162/jcws_a_01027.

19 Palinchak, Mykola, Olena Zayats, and Viktoria Bokoch. "The APEC integrated competitive force index." *Baltic Journal of Economic Studies* 6, no. 4 (2020): 118-124.

20 Tagirova, "From Crisis Management to Realignment".

21 Enrique Cáceres Mendoza, "Transitional Justice and Right to Integral Reparation: An Approach to the Colombian Case". *Novum Jus* 7, no. 2 (2013): 55–87, https://doi.org/10.14718/NovumJus.2013.7.2.2; Saganyuk, "Approaches to determining the strategic goals".

and stages of the strategic analysis in enterprise management, and the forms and mechanism of its implementation. Methods of variant analysis, creative thinking, and expert assessments, and methods of forming an economic portfolio at the stage of strategic planning have been proposed. Therewith, the possibility of using a group of economic and mathematical methods (mathematical programming, mathematical analysis, etc.) has not been investigated, and the proposed algorithm and mechanism for conducting strategic analysis does not allow making rational strategic decisions.

In other articles[22], strategic analysis is considered as a comprehensive study of positive and negative factors that can affect the economic situation of the research object in the future, including ways to achieve strategic goals. This research has noted that strategic analysis can be used to formulate a comprehensive strategic plan for the development of the object, while providing a scientifically based, comprehensive, and timely support for strategic decision-making. However, these authors have ignored the question of the principles of strategic analysis and the objectivity of strategic decision-making.

Calabrese et al.[23] considered the strategic manipulation of weight information in the TOPSIS MADM method in two scenarios:

1. Completely unknown weight information, i.e., the decision maker does not provide any weight information.

2. Incomplete weight information, i.e., the decision maker provides only partial information about preference over attributes.

The authors noted that a person who makes a strategic decision can manipulate information about the weight of the selected scenarios to substantiate a certain order of rank categories of alternatives that are of interest. Therefore, a decision-making procedure based on a genetic algorithm has been developed to solve the nonlinear programming model (MINLP). However, the proposed genetic algorithm does not allow processing constant and variable parameters to determine (refine) the strategy for developing the capabilities of the Armed Forces based on performance criteria.

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[22] Strategic Analysis – The Basis of Strategic Enterprise Management: Models and Methods of Decision Making in Analysis and Audit (2020). http://pidru4niki.com/1856080840761/buhgalterskiy_oblik_ta_audit/strategich-niy_analiz_osnova_strategichnogo_upravlinnya_pidpriyemstvom (accesses June 29, 2022).

[23] Armando Calabrese, Roberta Costa, Nathan Levialdi, and Tamara Menichini, "Integrating Sustainability into Strategic Decision-Making: A Fuzzy AHP Method for the Selection of Relevant Sustainability Issues", *Technological Forecasting and Social Change* 139, (2019): 155-168.

Džeko et al. proposed to use the fuzzy analytic hierarchy process (AHP) to select those sustainability issues that are most relevant for strategic planning and management. [24] The authors proposed applying the AHP method in practice, through a step-by-step procedure, and they also discussed its usefulness as a management tool for strategic decision-makers. The method facilitates directly involving diverse types of stakeholders and integrating the principle of sustainability into strategic decision-making. Therewith, it does not allow integrating the principles of objectivity, consistency, rationality, and positive effect of strategic decision-making.

Džeko et al. also presented the main stages concerning the new multicriteria SNAP method and its ERA metamodel. [25] The SNAP method combines two methods, namely analytic network process (ANP) and social network analysis (SNA). The integration of these two methods has reduced some of the deficiencies that occur when applying ANP. The role of the ERA-SNAP metamodel is twofold: it helps to understand the steps of SNAP and is also the basis for developing potential support for SNAP software. Therewith, the SNAP method and its ERA metamodel are not suitable for synthesising the results of strategic analysis of the development of the capabilities of the Armed Forces due to the specific features of their use.

Toledo Gandarias and Otegi Olaso[26] present a method for making strategic decisions based on the maturity of company management, that is, based on the organization's competencies and procedures to implement projects. This method considers the relationship between three aspects: the maturity level of the main stakeholders (customer and contractor), the complexity of the project, and the success of the project. It also provides additional information for making decisions when new business opportunities arise and trust between the client and contractor is low. Therewith, this method of making strategic decisions is not based on the principles of objectivity, consistency, rationality, and positive effect.

Kadoic et al. developed a method for making strategic decisions in higher education[27], which considers the importance of criteria for decision-making. A measure describing

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[24]   Mišo Džeko, Nikola Kadoic and Željko Dobrovic, "Metamodeling SNAP, a Multi-Criteria Method for Effective Strategic Decision Making on E-learning Issues" (2019), https://www.researchgate.net/publication/333402136_Metamodeling_SNAP_a_Multi-Criteria_Method_for_Effective_Strategic_Decision_Making_on_e-Learning_Issues (accessed June 30, 2022); Calabrese, "Integrating sustainability".

[25]   Džeko, "Metamodeling SNAP".

[26]   Nerea Toledo Gandarias and Jose Ramon Otegi Olaso. "A Novel Method for Strategic Decision Making Based on Project Management Maturity", *Dyna* 94, no. 1 (2019): 12-54.

[27]   Nikola Kadoic, Nina Begičević Redep, Blaženka Divjak, "A New Method for Strategic Decision-Making in Higher Education", *Central European Journal of Operations Research* 26, no. 3 (2018): 611-628.

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how strong a particular criterion is in terms of influences/dependencies is based on the degree of centralisation, one of the most fundamental measures of centrality. However, when determining the importance of criteria, the requirements (limitations) for constructing a mathematical model and synthesis stages are not considered.

Garg developed a new model of decision-making with probabilistic information and the use of immediate probabilities for aggregating information in the environment of a fuzzy Pythagorean set.[28] In this model, existing probabilities were changed by introducing the positional character of the decision-maker using an ordered weighted average operator. However, the positional character of a person when making decisions can negatively affect the level of readiness and capabilities of the Armed Forces due to the subjectivity of assessments.

Also, other authors have proposed a method for strategic analysis before decision-making to choose an effective strategy[29]. These authors presented examples of choosing strategies and demonstrated its feasibility and practicality. However, it is impossible to choose rational strategic decisions using interval-considerable fuzzy information about the level of readiness and capabilities of the Armed Forces.

Quiñones Páez et al.[30] present an aggregation method for decision-making using induced aggregation operators and a maximum and minimum level index. Its main advantage is that it can assess complex ordering processes, representing complex relationships of the character of the decision maker, such as psychological or personal factors. The method considers only the subjective attitude and degree of optimism of the decision-maker in the decision-making process.

Korendovich[31] presents expert methods for multi-criteria analysis of military systems for several strategies to support decision-making about the most acceptable option. Using the methods of expert assessments and analytical methods, this author proposes to solve a wide range of practical problems of rational choice of military means. However, the use of scores by experts in practice carries the risk

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[28]   Harish Garg, "Some Methods for Strategic Decision-Making Problems with Immediate Probabilities in Pythagorean Fuzzy Environment", *International Journal of Intelligent Systems* 33, no. 4 (2018): 687-712.

[29]   Karan Godara, "Crime of Aggression: Expanding the Relatively Narrow Parameters of Article 8 Bis of the Rome Statute", *Novum Jus* 13, no. 2 (2019): 145–159, https://doi.org/10.14718/NovumJus.2019.13.2.8; Garg, "Some Methods for Strategic Decision-Making".

[30]   Julio Quiñones Páez, Pablo Ignacio Reyes Beltrán, Ivonne Patricia León, "The Armed Forces of Colombia in Peacekeeping Missions: Prospects and Opportunities in the Post-Agreement Context", *Novum Jus* 16, no. 1 (2022): 279–306, https://doi.org/10.14718/NovumJus.2022.16.1.12.

[31]   Viktor Korendovich, "Application of Multicriteria Analysis for Priority Choice", *Collection Sciences Proceedings of the Ivan Chernyakhovsky National Center for Social Studies* 2, no. 60 (2017): 129-136.

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of choosing the most acceptable option based on the judgments of experts, who may change their opinion depending on the specific situation, awareness, and the influence of other factors.

Other authors have studied the content of strategic decisions in conditions of uncertainty and risk[32], like the features and technology of strategic decision-making in a dynamic business environment. This allows the identification of typical risks at the different stages of taking managerial decisions and the methods for their optimisation. These stages are considered when determining the procedure for strategic analysis of the development of the Armed Forces.

Rusnak et al. analyse national and foreign experiences in capabilities-based defence planning and present five detailed stages for defence planning.[33] The fifth stage is to assess the results every two to three years by conducting a review of the capabilities of the Armed Forces to monitor the implementation of the tasks related to the development of capabilities. However, it is not disclosed how and by what methods the results of the selected stages will be assessed for making strategic decisions to determine the strategy for developing the capabilities of the Armed Forces.

Other researchers have studied the relevance for this subject of mathematical methods and models with economic branches[34]. Mathematical models, in particular those based on elementary mathematical methods, are used in economic calculations when substantiating resource needs, accounting for production costs, and developing plans and projects. The general properties of the model are clarified, which are chosen to be considered when developing and checking the adequacy of the mathematical model for synthesising the results of strategic analysis of the development of the Armed Forces, and when substantiating the possibility of its practical use.

Other studies have presented models and methods for calibrating and testing the line-of-sight firepower of the Armed Forces (LOS) as one of the main components of capacity-based planning in the field of Armed Forces development[35]. The sizing

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[32] Alevtyna Voronina and Olena Kopyl, "Making Strategic Decisions in Conditions of Uncertainty and Risk", *Young Scientist* 1, no. 1 (2016): 12-44.

[33] Ivan Rusnak, Anatolii Petrenko, Andrii Yakovenko, Ihor Romanyuk, and Valerii Kokhno, "Capability-Based Defense Planning: Features and Implementation Prospects", *Science and Defense* 2 (2017): 3-10.

[34] Jairo Vladimir Llano, "Notes for Understanding Contemporary Colombian Armed Conflic", *Novum Jus* 5, no. 2 (2011): 9–27.

[35] Andrzej Najgebauer, Ryszard Antkiewicz, Dariusz Pierzchata, and Jarostaw Rulka, "The Computational Intelligence Methods for the Armed Forces Capabilities Allocation Problem", *2018 IEEE Symposium Series on Computational Intelligence (SSCI)*: 1723-1730, https://doi.org/10.1109/SSCI.2018.8628787; Ben Schram, Elisa Canetti, Robin Orr, and Rodney Pope, "Risk Factors for Injuries in Female Soldiers: A Systematic Review", *BMC Sports Science, Medicine and Rehabilitation* 14, no. 1 (2022), https://doi.org/10.1186/s13102-022-00443-z.

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and testing model includes a mathematical description of the LOS fire rating for the various components of the Armed Forces, the weapon unit, the carrier unit, and the reference module. These results can be used for subsequent studies on the distribution of components of the Armed Forces in response to a threatening scenario.

Finally, several studies have confirmed the relevance of elaborating a method of strategic analysis for the development of the Armed Forces[36], based on the principles of objectivity, consistency, and rationality of strategic decisions.

Materials and Methods

This study assumes that the method of strategic analysis for the development of the Armed Forces should rely on the principles of objectivity, consistency, rationality, and positive effect. Objectivity will be ensured by minimising the use of expert assessments and maximising the use of statistics from the results of defence reform and defence review to develop options and make rational strategic decisions. Consistency will be ensured by using a recursive method of organising the computational process, source data, and assessment results for selected stages.

Rationality will be ensured by applying a system of effective criteria and indicators, a target function to determine (clarify) the strategy for developing the capabilities of the Armed Forces, which will have a positive effect after its implementation. The positive effect of implementing the strategy for developing the capabilities of the Armed Forces will be provided by the expected increase in the level of readiness of the Armed Forces, considering resource risks. The strategy for developing the capabilities of the Armed Forces is a model of defence reform for a certain period, aimed at acquiring the necessary capabilities for the Armed Forces to guarantee the performance of tasks according to possible scenarios.

The previously proposed conceptual approach to the selection of priority areas for the development of the capabilities of the Armed Forces and other components

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36   Oleh Surkov, "The Essence and Role of Strategic Planning in the Fields of Defense and Military Construction", *Collection of Scientific Works of Military Academy* 1, no. 13 (2020): 152-157; Oleh Surkov, "Conceptual Approach to the Choice of Priority Areas for the Development of Capabilities of the Armed Forces of Ukraine and Other Components of the Defense Forces", *Collection Sciences Proceedings of the Ivan Chernyakhovsky National Center for Social Studies* 2, no. 63 (2018): 39-45; Oleh Surkov, Oleksandr Safronov and Andrii Romanyuk, "Methodical Approach to Determining the Strategy and Criteria for Achieving Joint Defense Capabilities of the Armed Forces and Other Components of the Defense Forces". *Collection Sciences Proceedings of the Ivan Chernyakhovsky National Center for Social Studies* 2, no. 69 (2020): 47-52.

of the defence forces[37] consists in applying recursion to certain stages, ordered by level of detail. It considers the relationship between the necessary input and output information for calculations and support for making rational strategic decisions on determining priority areas.

The conceptual approach includes stages for defining (clarifying) strategic goals, necessary capabilities, necessary resources, a promising model (structure), and priority areas, which are conventionally grouped into two assessment procedures. The first procedure allows obtaining the necessary data and assessment results to determine the optimal ratio of the required resources and the maximum result. The second procedure selects specific values of the characteristics of the prospective structure (model) and capabilities of the Armed Forces, and ways to achieve them through the choice of priority areas.

Thus, mathematical modelling of the synthesis of the strategic analysis results of the development of the Armed Forces is usually conducted using this conceptual approach. A mathematical model is a set of mathematical relations that link the initial characteristics of the state of a physical object with input information, initial data, and restrictions imposed on the functioning of the object.[38] The purpose of mathematical modelling is to identify rational strategic solutions, assess the effect, determine the properties of the system (sensitivity to changes in the values of characteristics, etc.) and establish the relationship between the characteristics of the system.[39] The strategic analysis of the development of the Armed Forces provides for an optimisation approach to determine the effective version of the strategy in the long term in conditions of partial uncertainty and risks. The implementation of the chosen strategy should contribute to the achievement of the necessary capabilities of the Armed Forces during defence reform.

An analysis of the experience of constructing mathematical models and conducting computer modelling allowed setting requirements for a mathematical model for synthesising the results of strategic analysis of the development of the Armed Forces and determining the sequence of actions[40]:

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[37] Surkov, "Conceptual Approach".

[38] Vitalii Zatserkovny, Ivan Tishaev, and Vsevolod Demydov, *Research methodology* (Nizhyn: NDU, 2017), 236; Joseph Coffey and Klaus von Schubert, *Defense and Detente: U.S. and West German Perspectives on Defense Policy* (Taylor and Francis, 2022): 1-324, https://doi.org/10.4324/9780429036163.

[39] Kamel Moniri, "A Comparative Study of the Pattern of Human Resource Forces Defending the Country through the Transformation Military Service to the Professional Army", *Geopolitics Quarterly* 18, no. 65 (2022): 254-296.

[40] Surkov, "Conceptual Approach".; Petro Pavlenko, Serhii Filonenko, Oleh Cherednikov, and Viacheslav Treityak, *Mathematical Modeling of Systems and Processes* (Kyiv: NAU, 2017), 392.

- The mathematical model is based on recursion (a method of organising a computational process), which should make it possible to obtain consistent necessary source data with accuracy and reliability.

- The synthesis of the results of a strategic analysis of the development of the Armed Forces should be reduced to minimal time spent and objective assessments.

- The structure of the mathematical model should consist of blocks (stages) that allow processing (assessing, analysing) statistical data, forming solutions, and choosing an effective strategy for developing the capabilities of the Armed Forces.

- The structure of a mathematical model should allow adjusting its structure (be classical), changing the input data, indicators, and criteria, depending on the goal set.

- Software and hardware tools should ensure the fast creation of an operational computer model.

The procedure for the strategic analysis of the development of the Armed Forces is generally conducted in the following stages[41]:

1. Definition (refinement) of the strategic objectives for the development of capabilities of the Armed Forces. This allows the collection and generalisation of the necessary input data $I_{in}(1)$, namely the results of the defence reform and the defence review to determine (clarify) the strategic goals. The number of specific strategic goals should be small (from 3 to 9)[42] with clearly defined time limits.

2. Determining the necessary capabilities of the Armed Forces that require maintenance, development (modernisation), creation (procurement), and disposal, to release the necessary resources. Input information $I_{in}(2)$ will be the results obtained during the defence reform and defence review to assess the available and necessary capabilities (operational, combat, special), in the form of spreadsheets. Based on the analysis of the ratio of available to necessary capabilities of the Armed Forces, numerical values of their sufficiency and criticality are obtained.

3. Determining the necessary resources (human, technological, material, financial) for the development (clarification) of the defence budget. This allows to determine the necessary resources to achieve the necessary capabilities of the Armed Forces. The input information $I_{in}(3)$ will be the results of the defence

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41 Surkov, "Conceptual Approach"; Surkov, "Methodical approach".
42 Massa, "The platformization of military communication".

reform and defence review. Risks are assessed when analysing the state's resource capabilities to meet the needs of the Armed Forces.

4. Defining (specifying) the priority areas for the development of the capabilities of the Armed Forces. Allows the determination of priority areas for the development of the necessary capabilities of the Armed Forces in the long-, medium-, and short-term. The input information $I_{in}(4)$ will be the results of the defence reform and defence review. It consists of determining the ratio of the required resources and achieving the maximum result (effect) by period.

5. Determining the implementation effectiveness of the chosen version of the strategy for developing the capabilities of the Armed Forces in the long term. Input information $I_{in}(5)$ will be the solutions for stages $1-4$ ($I_{sol}(1-4)$), which are identified during the defence reform and defence review. Strategic decisions are made based on criteria for the effectiveness of the strategy for developing the capabilities of the Armed Forces.

The defined sequence of stages 1-4 of the procedure of strategic analysis for the development of the Armed Forces is ordered by importance (from greater to lesser), and is applied to the system of criteria and generalised indicators of performance assessment.

The structure of the mathematical model for synthetizing the strategic analysis results of the development of the Armed Forces includes the following elements[43]: the object of modelling is a strategy for the development of the capabilities of the Armed Forces for the long term; constant parameters –values that remain unchanged during the entire modelling; variable parameters –values that need to be found when solving the problem using mathematical modelling; complex performance criteria –an indicator of the effectiveness of the strategy, whose value at the maximum significance of the target function determines the rationality of solutions for given conditions, that is, the effective value of the variable parameters of the model; restrictions –areas of possible values under given specific conditions of the strategy which is analysed and for which the best (rational) strategic decision is calculated; and *target functions*, which link performance criteria to variable and constant parameters.

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[43] Pavlenko, *Mathematical Modeling,* 392.

Results and Discussion

In the process of constructing a structural diagram of the mathematical model for finding rational solutions $I_{sol}(1-5)$, variable parameters $I_{in}(1-5)$ $I_{out}(1-5)$ are determined that will give the functions Y_{1-5}, Z_{1-5} a minimum value to obtain the maximum effect of the objective function $\bar{E}$.

The block diagram of the mathematical model for the synthesis of the strategic analysis results of the development of the Armed Forces is shown in Figure 1.

The block diagram of a mathematical model (Figure 1) characterises the selected stages of the strategic analysis for the development of the Armed Forces and the information relationships between input, output, and internal parameters in the form of a recursive algorithm. To obtain the maximum effect from determining (clarifying) the strategy for developing the capabilities of the Armed Forces in the long term, it is necessary to choose a system of indicators and criteria for the effectiveness of this strategy.

Figure 1. Block diagram of a mathematical model for synthesising the strategic analysis results of the development of the Armed Forces
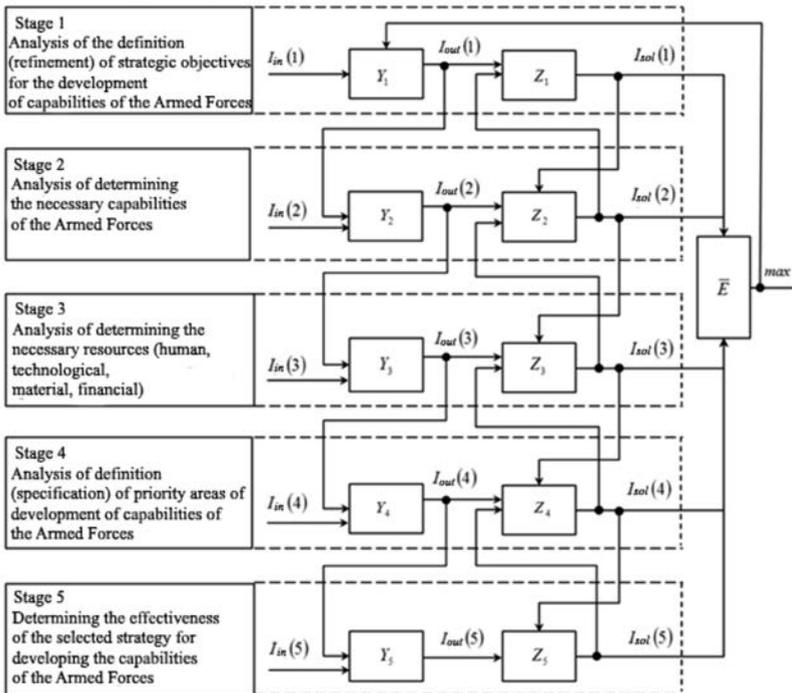
The strategy for developing the capabilities of the Armed Forces is a model of defence reform for a certain period, aimed at achieving the necessary capabilities of the Armed Forces to guarantee the performance of tasks according to possible scenarios. Considering the above general requirements, it is customary to assess the effectiveness of the defence reform and the strategy options according to a system of performance criteria based on generalised indicators and selected considering certain stages:

- Comprehensive performance criterion $-CC_p$ a rule that allows correlating strategy options that are characterised by diverse performance and making a targeted choice of strategy from a set of acceptable ones.

- Effectiveness criterion $-C_e$ a rule that allows correlating the results of defence reform, which are characterised by diverse effectiveness, and making a targeted choice of strategic goals from a set of acceptable ones. It has a significance of 4 points.

- Criticality criterion $-C_c$ a rule that allows correlating options for determining the necessary capabilities, which are characterised by diverse performance, and making a targeted selection of them from a set of acceptable ones. Has a significance of 3 points.

- Risk acceptability criterion $-C_{ra}$ a rule that allows correlating variants of expenditure volumes that are characterised by diverse performance and makes a targeted selection of them from a set of acceptable ones. It has a significance of 2 points.

- Consistency criterion $-C_{co}$ a rule that allows correlating variants of priority areas that are characterised by diverse performance and making a targeted selection from a set of acceptable ones. Has a significance of 1 point.

The selected criteria are used to determine the weight coefficients (C_n) during the analysis of solution options at the 5th stage, through the ratio of their total amount to the corresponding score: $C_1 = \frac{4}{10} = 0.4$; $C_2 = \frac{3}{10} = 0.3$; $C_3 = \frac{2}{10} = 0.2$; $C_4 = \frac{1}{10} = 0.1$. The sum of the weighting coefficients is -1.0 (dimensionless value), which indicates the objectivity and correctness of the definition.
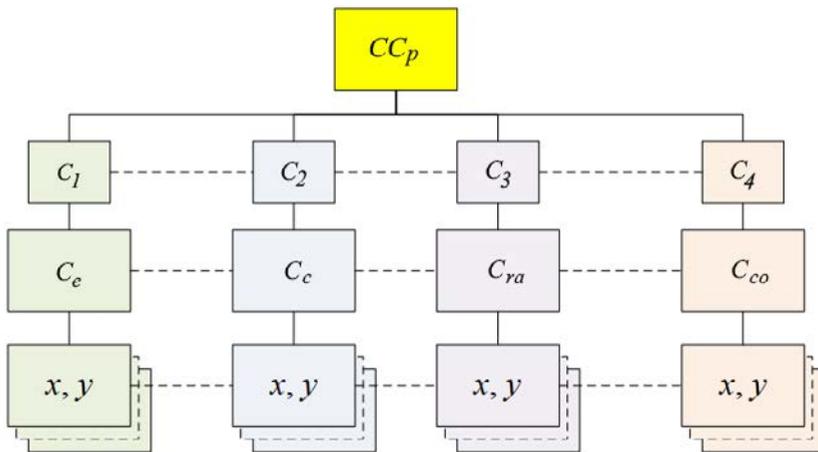
Therefore, the selected performance criteria are based on generalised indicators that characterise the results obtained at the selected stages and have weight when choosing an effective strategy option. The structural elements of complex and generalised

indicators are constant and variable quantitative and qualitative indicators (x, y), which characterise[44]:

- quantitative values (the number of defined and completed strategic and operational goals, tasks, activities, etc.).

- qualitative values (quality of tasks, events, etc.).

- time values (actual deadlines for execution and implementation are also defined).

- cost values (planned and actual cost of execution, preparation, maintenance, etc.).

The system of indicators and criteria for the effectiveness of the strategy for developing the capabilities of the Armed Forces is shown in Figure 2.

Figure 2. System of indicators and criteria for the effectiveness of the strategy for developing the capabilities of the Armed Forces

It is advisable to conduct the selection of quantitative and qualitative indicators (x, y) to assess partial and generalised indicators with factor analysis, which will allow to consider the selected performance criteria (Figure 2) and to choose an effective strategy. To analyse the effectiveness of defence reform and strategy options, fixed values of performance criteria that characterise the increase in the effect are adopted (Table 1).[45]

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[44]   Surkov, "Conceptual Approach".
[45]   Surkov, "Methodical Approach".

Table 1. The value of the criteria for the effectiveness of defence reform and strategy options

Criterion value CC_P, C_e, C_C, C_{ra}, C_{co}	Effect ($\bar{E}$)
Satisfactory (pessimistic option)	0.3
Medium (preferred option)	0.5
High (optimistic option)	≥ 0.7

The defence reform or the chosen version of the strategy for the development of the Armed Forces will be considered effective, and strategic decisions will be considered rational, provided that (Table 1) their implementation has a positive effect for the Armed Forces of at least 0.3. This will allow achieving the expected increase in the level of readiness and capabilities of the Armed Forces of at least 30% (positive effect) for a certain period of the implementation of the strategy for the development of the capabilities of the Armed Forces.

Strategic analysis of the development of the Armed Forces is a process of reducing uncertainty and minimising resource risks in determining (clarifying) a strategy for developing the capabilities of the Armed Forces in the long term. The process conventionally includes two components: the first is a sequence of analysis stages in which initial data are obtained based on the assessment results; the second is the choice of specific solutions and options for achieving the desired effect.[46] The procedure for determining (clarifying) the strategy for developing the capabilities of the Armed Forces can be expressed as:

$$\bar{E} = f(I, F) \tag{1}$$

where: $\bar{E}$ is a comprehensive generalised indicator that represents the level of effect of the selected strategy option; I is an information component that describes the necessary input and output data, the solutions, and other information; F is a procedural component that includes recursive functions. It is accepted that the information component characterised by dimensional values will be reduced to dimensionless values during the calculation through the ratio of available to required values.

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[46]   Moniri, "A Comparative Study".

Recursive functions should include[47]:

- Settlement procedures.

- Logical procedures.

- Heuristics.

Heuristics is a method of solving a problem based on informal rules of experienced experts (specialists), which will reduce the number of calculations or the time to obtain the result when algorithmic methods are useless. Converting an information component into team information for decision-making (Figure 1) is characterised by the expression:

$$\bar{E} = I_{in} \rightarrow I_{sol} \qquad (2)$$

The initial function for determining the effect level of the selected strategy option can be characterised by the expression:

$$\bar{E} = f(T, I_{in}, I_{out}, I_{sol}, Y, Z) \qquad (3)$$

To find rational solutions for the selected stages of analysis, directly dependent functions are defined:

$$I_{sol} = Z\{Y(I_{in}) \rightarrow \exists I_{sol}\} \qquad (4)$$

Input information of the 1st stage $I_{in}(1)$ is composed by variable parameters that characterise the quantitative, qualitative, time, and cost values of the selected quantitative and qualitative indicators for assessing and constructing a recursive function Y_1:

$$Y_1 = f[x_{11},\ldots, x_{1n}], \qquad (5)$$

where $x_{11},\ldots, x_{1n}$ are quantitative and qualitative indicators for assessing the results of defence reform and defence review to determine (clarify) strategic goals.

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[47]   Rusnak, "Capability-based Defense Planning".

Quantitative and qualitative indicators are generally calculated by the method of scale comparisons[48] through the ratio of homogeneous values (quantitative, qualitative, time, and cost):

$$x_{1i} = \frac{x_{ai}}{x_{ri}} \text{ if } i = \overline{1, n} \tag{6}$$

where x_{1i} is the dimensionless value obtained from the assessment results, x_{ai} the actual value, and x_{ri} the standard (required) value.

The calculated quantitative and qualitative indicators $(x_{11},\ldots,x_{1n})$ are summarised in tables, for example, those defined in the recommendations[49] for summarising and analysing the results obtained. As initial 1st stage data, $I_{out}(1)$, the results of achieving strategic goals are used:

$$I_{out}(1) = Y_1[I_{in}(1)] = f[y_{11},\ldots,y_{1m}] \tag{7}$$

where $y_{11},\ldots,y_{1m}$ are the results of achieving strategic goals and defence reform in general.

Input information $I_{in}(2)$ will be the results obtained during the defence reform, the defence review to assess the security environment, and the available and necessary capabilities (operational, combat, special) in the form of calculation tables.[50]

The set of input information of the second stage, $I_{in}(2)$, as well as the initial data of the 1st stage, $I_{out}(1)$, form the structure and range of variable parameters for constructing a recursive function Y_2:

$$Y_2 = f[I_{in}(2), I_{out}(1)] \tag{8}$$

As initial second stage data, $I_{out}(2)$, a set of necessary capabilities of the Armed Forces that need to be maintained, developed, and created will be obtained:

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48   Moniri, "A Comparative Study".
49   Ministry of Defence of Ukraine, "Capacity-Based Recommendations for Defense Planning in the Ministry of Defense of Ukraine and the Armed Forces of Ukraine: Approved (2017)", http://www.mil.gov.ua/content/other/Recommendationson_CBP_120617 (accessed June 30, 2022).
50   Ministry of Defence of Ukraine, "Capacity-Based Recommendations"; General Staff of the Armed Forces of Ukraine, Recommendation no. 604/224, "On the Organization of Capability Assessment in the Armed Forces of Ukraine" (2017), http://search.ligazakon.ua/l_doc2.nsf/link1/RE32903.html (accessed June 30, 2022).

$$I_{out}(2) = Y_2[I_{in}(2), I_{out}(1)] = f[y_{21},\ldots,y_{2m}] \qquad (9)$$

where $y_{21},\ldots,y_{2m}$ is the set of necessary capabilities of the Armed Forces.

Input information $I_{in}(3)$ will be the results from the defence reform and defence resource planning review.

The set of input information of the third stage, $I_{in}(3)$, and the initial data of the second stage, $I_{out}(2)$, form the structure and range of variable values for constructing a recursive function Y_3:

$$Y_3 = f[I_{in}(3), I_{out}(2)] \qquad (10)$$

As initial third stage, data $I_{out}(3)$, a set of necessary resources (human, technological, material, financial) for the development (clarification) of the defence budget will be obtained:

$$I_{out}(3) = Y_3[I_{in}(3), I_{out}(2)] = f[y_{31},\ldots,y_{3m}] \qquad (11)$$

where $y_{31},\ldots,y_{3m}$ is the set of necessary resources (human, technological, material, financial).

Set of input information of the fourth stage, $I_{in}(4)$, and the initial data of the third stage, $I_{out}(3)$, form the structure and range of variable values for constructing a recursive function Y_4:

$$Y_4 = f[I_{in}(4), I_{out}(3)] \qquad (12)$$

As initial fourth stage data, $I_{out}(4)$, a set of forces and means and organisational structures to determine priorities for the development and creation of new capabilities of the Armed Forces will be obtained:

$$I_{out}(4) = Y_4[I_{in}(4), I_{out}(3)] = f[y_{41},\ldots,y_{4m}] \qquad (13)$$

where $y_{41},\ldots,y_{4m}$ – is the set of forces and means and organisational structures to be maintained, developed, and created.

Set of input information of the fifth stage, $I_{in}(5)$, and the initial data of the fourth stage, $I_{out}(4)$, form the structure and range of variable values for constructing a recursive function Y_5:

$$Y_5 = f[I_{in}(5), I_{out}(4)] \tag{14}$$

As initial fifth stage data, $I_{out}(5)$, a set of data for determining the priority of developing and creating new capabilities of the Armed Forces in the long- and medium-term, considering certain necessary capabilities and resources, will be obtained:

$$I_{out}(5) = Y_5[I_{in}(5), I_{out}(4)] = f[y_{51}, \dots, y_{5m}] \tag{15}$$

where $y_{51}, \dots, y_{5m}$ is the set of data for prioritising the development and creation of new capabilities of the Armed Forces.

Through the consolidated recursive functions Z_{1-5}, feedback is provided with the results of the previous stages (Figure 1), for the development of draft decisions at stages 1–5 $I_{sol}(1)$– $I_{sol}(5)$:

$$I_{sol}(1) = Z_1[I_{out}(1), I_{sol}(2)] \tag{16}$$

$$I_{sol}(2) = Z_2[I_{out}(2), I_{sol}(1), I_{sol}(3)] \tag{17}$$

$$I_{sol}(3) = Z_3[I_{out}(3), I_{sol}(2), I_{sol}(4)] \tag{18}$$

$$I_{sol}(4) = Z_4[I_{out}(4), I_{sol}(3), I_{sol}(5)] \tag{19}$$

$$I_{sol}(5) = Z_5[I_{out}(5), I_{sol}(4)] \tag{20}$$

The condition for the completion of the recursion by the recursive functions (5) – (20) are the constant parameters, the values of which are determined by the performance criteria and consist in establishing the maximum effect ($\bar{E} = \bar{E}max()$). It is customary to determine the maximum effect based on the target function:

$$\bar{E} = f(\bar{P}_e \cdot c_1 +, \ \bar{P}_c \cdot c_2 + \bar{P}_{ra} \cdot c_3 + \bar{P}_{co} \cdot c_4) \rightarrow \max \tag{21}$$

where $\bar{P}_e$ is a generalised indicator that determines the level of definition (clarification) of the strategic goals for the development of the capabilities of the Armed Forces; $\bar{P}_c$ is a generalised indicator of the necessary capabilities of the Armed Forces; $\bar{P}_{ra}$

is a generalised indicator of the required resources $\bar{P}_{co}$ is a generalised indicator of the definition (coordination) of the priority development areas; and c_1, c_2, c_3, c_4 are the calculated weight coefficients of the selected performance criteria.

As draft decisions in stages 1–5, $I_{sol}(1)$–$I_{sol}(5)$, a coherent set is obtained: defined (clarified) strategic goals; necessary capabilities and resources; priority areas for developing the capabilities of the Armed Forces to determine (clarify) the strategy. Therefore, steps 1–5 (Figure 1) need to be repeatedly referred until rational and consistent solutions are obtained for the selected stages and the maximum (from a certain minimum) effect is achieved. It should be noted that the results of calculations obtained using the corresponding mathematical model for synthesising the strategic analysis results of the development of the Armed Forces cannot be the only basis for making strategic decisions. They are only a basis for an official to make a final strategic decision.

The developed method is based on the objectivity of assessments, consistency, and effectiveness, which allows increasing the rationality of strategic decision-making in determining the strategy for developing the capabilities of the Armed Forces in the long term. The originality of the developed method of strategic analysis of the development of the Armed Forces lies in the following factors:

- The use of statistical data, selected indicators, performance criteria, and a recursive method allows assessing strategic decision options for selected stages and systematising them to get the maximum effect.

- It differs from the well-known expert methods of strategic analysis in that the proposed mathematical model for synthesising the strategic analysis results of the development of the Armed Forces produces objective assessments and the expected effect of the strategy.

- It provides a reasoned, more accurate and qualitative result for assessing the quantitative and qualitative characteristics of decisions made to improve the level of readiness and capabilities of the Armed Forces in the long term.

- Based on the results of several stages of strategic analysis of the development of the Armed Forces this method identifies the most rational decisions during strategic planning, minimising the use of expert judgments.

Thus, it can be asserted that it is possible to use the method of strategic analysis of the development of the Armed Forces (SADAF-RW) in the elaboration of a scientific and methodological apparatus for assessing the effectiveness of strategic planning

for the development of the Armed Forces. Further research will be devoted to the elaboration of a comprehensive methodology for determining the strategic goals and priority areas for developing the long-term capabilities of the Armed Forces using the resulting method.

Conclusions

A method of strategic analysis of the development of the Armed Forces was developed based on the principles of objectivity, consistency, the rationality of strategic decisions, and positive effect.

A classical mathematical model of synthesis of the strategic analysis results of the development of the Armed Forces was built for making rational strategic decisions on the selected stages and, accordingly, the system of effective indicators and criteria. This is a flexible model, in which the indicators and criteria can be updated depending on the number of analysis stages. Also, their weight coefficients are calculated considering the priority of the selected stages. Therefore, the model allows a strategic analysis of the development, not only of the Armed Forces, but also of other components of the defence forces, or of defence forces in general. The criteria are based on generalised indicators that characterise the selected solutions by analysis stages. Changing the character of the stages allows determining the appropriate criteria and calculating the weighting factors according to their importance.

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