DOI 10.70286/EOSS-12.01.2026.003.145-148

JUSTIFICATION FOR DEVELOPMENT A METHODOLOGY FOR ASSESSING THE MILITARY AND SCIENTIFIC (SCIENTIFIC AND TECHNOLOGICAL) POTENTIAL OF A COUNTRY IN THE CONTEXT OF RUSSIAN-UKRAINIAN WAR

Iliashov Oleksandr
Doctor of Military Science, Professor
Laureate of the Boris Paton National Prize of Ukraine
Shcherban Kostiantyn
PhD student
Defence Intelligence Research Institute

Abstract. The full-scale armed aggression of the Russian Federation against Ukraine has demonstrated that modern military threats are determined not only by the quantity and quality of weapons and military equipment, but increasingly by a state's military scientific and technological potential. The adversary's ability to generate, adapt, and rapidly implement advanced technologies has become a decisive factor in contemporary warfare. This paper substantiates the relevance and necessity of developing a comprehensive methodology for assessing the military scientific (scientific and technological) potential of a country under conditions of armed confrontation. Particular attention is paid to the role of scientific research and development in shaping military capabilities, long-term strategic intentions, innovation dynamics, and the capacity for rapid force buildup, including in the areas of unmanned systems, electronic warfare, artificial intelligence, hypersonic weapons, space technologies, and cyber capabilities. The authors propose a methodological approach that integrates qualitative and quantitative indicators of scientific potential, including technological self-sufficiency, innovation capacity, and defense-oriented R&D dynamics. It is suggested to develop an analytical assessment model based on fuzzy logic and probabilistic scenario forecasting, an integrated scientific potential index, a multi-level scale for categorizing countries' scientific potential, and a set of key indicators.

Keywords: aggression, methodology of assessing, potential, scientific and technological.

Introduction. Following the onset of the full-scale armed aggression against Ukraine, it became evident that military threats are shaped not only by the adversary's weapons and military equipment, but also, to a significant extent, by its technological, innovative, and scientific capabilities. Taking into account the experience gained in the war against our state, the Russian Federation (hereinafter referred to as the RF) is

developing new ground-based and maritime drone systems, electronic warfare and air defense systems, intensifying hypersonic and nuclear testing and development, advancing artificial intelligence technologies for target reconnaissance and engagement, modernizing space systems, and pursuing other related capabilities.

Research Findings. Assessment of a country's military scientific (scientific and technological) potential is a critical element of the national security system, strategic planning, and military governance. For Ukraine, this need is of particular importance given the prolonged armed aggression of the Russian Federation, which actively exploits scientific and technological achievements in the development of weapons, military infrastructure, and information operations. The necessity to monitor scientific potential is driven by the following key factors:

a) Scientific potential directly determines a state's military capabilities. Modern weapons development, the creation of communication systems, precision-guided munitions, unmanned systems, electronic warfare (EW) assets, satellite systems, data analysis algorithms, and artificial intelligence are all based on scientific research and engineering development. Consequently, sixth-generation wars are, first and foremost, wars of high technology. If an adversary possesses a high level of R&D, it is capable of more rapidly developing new weapons systems, modernizing military equipment, adapting to countermeasures, and implementing innovations in military command, control, and logistics. Therefore, analysis of the scientific potential of the Russian Federation enables forecasting the emergence of new threats and trends in warfare, including in the areas of hypersonic weapons, missile technologies, nuclear energy, intelligence and artificial intelligence, unmanned systems, stealth technologies, and others.

b) Scientific potential is an indicator of long-term strategic military and political intentions. Any state invests in scientific fields it considers priorities for the future. In the case of the Russian Federation, these include nuclear technologies, missile and space programs, electronic warfare systems, hypersonic systems, artificial intelligence, robotic ground and maritime platforms, and cyber capabilities. By tracking the dynamics of investments (state budgets), the activity of scientific centers (laboratories), publications, key patents, and university programs, it is possible to determine which areas of defensive or offensive development may yield results in the coming years, which technological gaps are being addressed, and what types of wars or operations the state is preparing for in the short- and long-term perspective.

c) Scientific potential determines an adversary's ability to rapidly build up military power. Even if the current technical level of the Russian Federation appears stable, it is critically important to assess whether it can scale production, accelerate development rates, and modernize weapons during wartime. States with a strong scientific base are able to rapidly establish new production facilities, launch new technological lines, develop new models of drones, missiles, and air defense systems, and implement import substitution of critical technologies without which continued armed aggression against Ukraine would be difficult. This capability was demonstrated

by the Russian Federation after 2022: international sanctions slowed development but did not paralyze it, as Russia retained a substantial internal scientific and technological infrastructure.

d) Scientific potential determines the adversary's capabilities in cyberspace and information operations. The Russian Federation actively invests in artificial intelligence, influence algorithms, modeling of social processes, information control systems, and cyber-attack systems. Without understanding these scientific resources, it is impossible to assess its capacity for strategic information operations, forecast cyberattacks, or build effective protection of critical infrastructure.

e) Scientific potential determines the ability to create precision weapons and weapons of mass destruction. A country with a strong scientific (research) and industrial base in fundamental fields such as plasma physics, nuclear energy, materials science, chemistry, biochemistry, biotechnology, and cybernetics possesses the potential to expand nuclear programs, develop new types of munitions, and create chemical or biological means of destruction. The Russian Federation has an extensive network of nuclear research centers, uranium enrichment facilities, and research reactors, which constitutes a critical factor in assessing its potential and forecasting threats.

f) Scientific and technological potential is one of the most accurate indicators of future military aggression. Prior to any armed aggression, states increase investments in R&D, expand networks of research institutions, intensify patenting activity in military and dual-use fields, and establish state programs for the development of advanced and emerging technologies. For example, the Russian Federation significantly increased military R&D funding after 2008, which preceded the aggressions of 2014 and 2022. China is pursuing similar steps with regard to Taiwan. Such scientific and technological indicators serve as early-warning markers of invasion and preparation for so-called "special military operations."

g) Assessment of scientific potential enables identification of an adversary's vulnerabilities. For Ukraine, in the context of prolonged resistance to the armed aggression of the Russian Federation, this is strategically important, as it allows identification of technologies and materials on which Russia is critically dependent, sectors lacking sufficient human resources, research areas that may represent bottlenecks, and programs that are insufficiently funded. This, in turn, enables forecasting areas where Russia will be unable to develop further, shaping national investment priorities, and exerting influence through sanctions and technology restrictions.

Conclusions. The authors propose the development of a Methodology for Assessing the Military and Scientific (Scientific and Technological) Potential of a Country, which would combine qualitative and quantitative indicators, including the level of scientific research, technological self-sufficiency, innovation capacity, the dynamics of innovation in the defense sector, and other indicators and components defined by national strategic documents. It is proposed to develop an analytical model

(algorithm) for assessing the military scientific (scientific and technological) potential of a country using fuzzy logic methods and probabilistic scenario forecasting; to develop an integrated index for determining scientific potential; to create a scale of scientific potential levels of countries (from Level I to Level V); and to identify key indicators of scientific potential. Such a Methodology will enable the timely identification of trends in changes in the level of threats to the national security of Ukraine, forecasting the level of scientific potential of countries, and forming well-founded forecasts of the development of the security environment around Ukraine, thereby increasing the effectiveness of Ukrainian defence intelligence units.

References

1. Semenenko, O., Voronchenko, I., Moskalenko, I., Abramova, M. & Kharitonov, K. (2021). Methodological approach to assessment of the ability of the national economy to provide a sufficient level of defense potential. Social Development and Security, 11(5), 133–145. URL: https://www.paperssds.eu/index.php/JSPSDS/article/view/375.
2. Tkach, M. & Hrytsyuk, Y. (2023). Analysis of methods for assessing the military and economic potential (national power) of states. Social Development and Security, 13(4), 12–xx. https://paperssds.eu/index.php/JSPSDS/article/view/570.
3. Nesterinko, O.V., Polishchuk, V.B. & Zharinov, S.S. (2023). Methodological aspects of updating the evaluation of scientific institutions in the context of state support. Nauka i Naukoznavstvo, 4(122), 78–96. URL: https://nasu-periodicals.org.ua/index.php/sofs/article/view/8688
4. Moskalenko, I. (2025). Methodology for Assessing the Ability of a National Economy to Ensure Its Defense Potential: Structural and Logical Scheme and Algorithm. Social Development and Security. URL: https://paperssds.eu/index.php/JSPSDS/article/view/914.
5. Mykytyuk, P. & Mykytyuk, Y. (2024). Management of the development of critical technologies and their significance in the defence capacity of Ukraine. Economichnyy analiz. URL: https://www.econa.org.ua/index.php/econa/article/view/5787.