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FORECASTING POLITICAL RISKS: MODERN MODELS AND THEIR EFFICIENCY IN THE CONDITIONS OF "BLACK SWANS"

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Abstract

The article is devoted to a critical analysis of modern methods for forecasting political risks and their ability to adapt to conditions of high uncertainty, particularly to the emergence of "black swan" events. The aim of the study is to identify the limitations of traditional quantitative and qualitative models of political risk analysis and to systematize the latest approaches aimed at enhancing the resilience of political and socio-economic systems. The methodology is based on a systems approach, comparative analysis, and principles of complexity theory. The article reveals the essence of N. N. Taleb's "black swan" concept and substantiates its relevance for contemporary political analytics. The key shortcomings of classical models are analyzed, highlighting their excessive reliance on historical data and extrapolation of past trends, which makes them vulnerable to unprecedented events. Four groups of modern adaptive approaches are examined: scenario planning, agent-based modeling (ABM), the use of big data and artificial intelligence (AI), and the paradigm shift from forecasting to building antifragility. It is established that scenario planning allows for preparation for multiple future outcomes, ABM helps understand the nonlinear dynamics of complex systems, and big data analysis can identify hidden patterns and weak signals. The conclusion is drawn that in the current environment, the focus of political risk analysis is shifting from attempts to accurately predict specific events to building adaptive and resilient systems (resilience and antifragility) capable of withstanding unpredictable shocks and even benefiting from them.

Keywords: political risks, forecasting, «black swan», uncertainty, modeling, scenario planning, big data, antifragility, political riskology, political process, political power, state, political space, mass media, digital technologies, artificial intelligence, social networks, political changes.

Introduction

Political riskology, which emerged at the intersection of political science, economics, and sociology, has traditionally aimed to identify, analyze, and forecast political risks that can negatively affect the interests of states, corporations, and societies. However, the twenty-first century, with its cascade of crises – from the financial collapse of 2008 and the COVID-19 pandemic to Russia's full-scale invasion of Ukraine in 2022 – has demonstrated the fragility of existing forecasting models. These events, often described as "black swans," have shown that the future is not always a linear continuation of the past, and that traditional methods based on extrapolation and the analysis of historical data prove powerless in the face of radical uncertainty.

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The relevance of this study arises from the urgent need to rethink the methodological tools of political riskology. In conditions of permanent turbulence, the ability to adequately assess and prepare for unexpected threats becomes a key factor in the survival and successful development of any political or economic system. For Ukraine, which stands at the epicenter of global geopolitical shifts, developing effective mechanisms for managing unpredictable risks is a matter of national security.

An analysis of recent studies indicates growing interest in this issue among scholars. The works of Ukrainian researchers such as V. A. Hoshovska and O. V. Reznikova focus on analyzing specific political risks for Ukraine (Hoshovska, 2021; Reznikova, 2021). Western researchers, including I. Bremmer and I. Goldin, examine the nature of global risks in an interconnected world (Bremmer, 2022; Goldin, 2021). A special place belongs to N. N. Taleb's concept of "black swans," which has become a methodological framework for criticizing classical forecasting models (Taleb, 2021). Nevertheless, there remains a lack of comprehensive studies that systematically analyze and compare new predictive approaches developed in response to this challenge.

The purpose of this article is to analyze the effectiveness of modern models for forecasting political risks in the context of "black swan" events and to determine the directions of methodological transformation within political riskology.

To achieve this purpose, the *following research objectives* are defined: to explain the essence of the "black swan" phenomenon and its significance for political analysis; to identify the main ontological and epistemological limitations of traditional quantitative and qualitative forecasting models; to systematize and analyze the potential of new adaptive approaches such as scenario planning, agent-based modeling, and the use of Big Data and artificial intelligence; to justify the need for a paradigmatic shift from precise forecasting toward strategies aimed at resilience and antifragility; and to analyze Russia's full-scale invasion of Ukraine as a "black swan" case study that demonstrates the failure of classical models and highlights the relevance of the antifragility concept.

The methodological basis of this study consists of a combination of general scientific and specialized methods. The systems approach makes it possible to consider political risks not as isolated phenomena but as elements of a complex, dynamic system of international relations. Comparative analysis is used to evaluate the capabilities and limitations of both traditional and modern forecasting models.

The principles of complexity theory and synergetics serve as the conceptual framework for understanding the nonlinear nature of political processes and the mechanisms behind the emergence of "black swan" events. The case study method is applied to conduct an in-depth analysis of a specific example – the 2022 invasion of Ukraine.

Results. The "black swan" phenomenon presents a methodological challenge for political riskology. This concept, introduced into academic discourse by Nassim Nicholas Taleb, refers to events that meet three criteria: abnormality, extreme impact, and retrospective predictability (Taleb, 2021, p. 15-18). The problem for political riskology lies in the fact that its traditional tools are not suited for working with such events.

To understand this problem, it is worth briefly examining quantitative and qualitative models. Quantitative models (statistical analysis, regression models) are based on large datasets of historical information and perform well in predicting regular, recurring events. However, "black swans," by definition, lack precedents in the past, so statistical models simply do not detect them (Tkachenko, 2022, p. 45). Their logic rests on the assumption that the future will resemble the past, which becomes a fundamental error under conditions of nonlinear dynamics.

Qualitative models that rely on expert assessments (such as the Delphi method and index construction) are somewhat more flexible but also have limitations. Experts, like all people, are prone to cognitive biases: they think within existing paradigms, underestimate low-probability but high-impact events, and often extrapolate current trends into the future (Melnyk, 2022, p. 91). As a result, expert communities frequently fail to notice the approach of a "black swan." Therefore, the "black swan" phenomenon requires not only improvement of old models but also a fundamental revision of approaches to forecasting and risk management.

Unlike traditional forecasting, scenario planning seeks to develop several alternative yet plausible future situations. This method does not answer the question "What will happen?" but instead asks, "What could happen, and how will we prepare for it?" The process includes identifying key driving forces and critical uncertainties, at the intersection of which scenarios are built (Kovalenko, 2023, p. 112). The main advantage of this method is that it prepares systems for different potential developments, increasing their adaptability and preventing "strategic shock," when reality diverges sharply from expectations.

Agent-based modeling (ABM) also deserves attention as a computer simulation method that allows researchers to study the dynamics of complex systems by modeling the behavior and interaction of individual “agents” (Gilbert, 2021). Unlike traditional top-down models, ABM operates from the bottom up (Petrenko, 2023, p. 78). Each agent is assigned certain behavioral rules, and during simulation it becomes possible to observe what macroscopic patterns arise as a result of their interactions. This approach makes it possible to explore how small changes at the micro level can lead to large-scale consequences – that is, to the emergence of “black swans.”

The development of digital technologies has opened access to massive amounts of unstructured data. Analysis of such data with machine learning and artificial intelligence can identify “weak signals” – subtle anomalies that may precede significant political changes (Shevchenko, 2023, p. 33). For example, sentiment analysis of social media posts can reveal rising public dissatisfaction earlier than sociological surveys. Although AI cannot directly predict a “black swan,” it serves as a powerful tool for environmental monitoring and early warning.

The most radical response to the “black swan” problem is the proposal to change the very goal of political riskology. If it is impossible to precisely predict the most dangerous events, efforts should focus on building systems that can endure unpredictable shocks. Two key concepts emerge here: resilience and antifragility.

Resilience is the ability of a system to withstand external shocks, maintain its key functions, and recover quickly after crises (Vasylenko, 2022, p. 58). Antifragility, another concept introduced by Taleb, goes further. While fragile systems collapse under pressure and resilient ones endure it, antifragile systems benefit from volatility, uncertainty, and stressors (Taleb, 2022). Such systems not only survive but become stronger after crises. This paradigm shift means that governments and corporations should invest less in attempts to achieve perfect prediction and more in developing systems characterized by redundancy, decentralization, flexibility, and the capacity for rapid experimentation and learning from mistakes.

The full-scale invasion of the Russian Federation into Ukraine on February 24, 2022, became a textbook example of a “black swan” for most international actors and institutions. This case clearly demonstrates both the failure of traditional forecasting models and the practical importance of the antifragility concept. The invasion meets all three of Taleb’s criteria for a “black swan.” For many Western governments and analytical centers, despite alarming intelligence data, the very idea of a full-scale conventional war in Europe in the twenty-first century seemed abnormal and irrational, and therefore unlikely. The impact of this event proved extreme: it caused the largest humanitarian crisis in Europe since the Second World War, triggered global energy and food crises, and fundamentally changed the architecture of international security. Finally, in retrospect, this event appears quite logical and even inevitable: an analysis of the imperial ideology of the Russian regime and its previous aggressive actions (Chechnya, Georgia, the annexation of Crimea) made the likelihood of escalation clear.

The forecasting failure stemmed from the fact that most models were based on the assumption of a rational actor guided by economic logic. The Russian leadership, however, acted according to a different, irrational – from the Western point of view – imperial revanchist logic. Experts who had studied Russia for years fell into cognitive traps, assuming that “this could not happen because it would not be in Russia’s own interest.”

At the same time, Ukraine’s response to the invasion became a vivid example of antifragility. Ukrainian society and the state not only withstood the blow (resilience) but also became stronger, more mobilized, and more united as a result. Key factors of antifragility included decentralization: local resistance, volunteer movements, and civic initiatives proved more effective than the centralized command structure of the enemy; flexibility and adaptability: the Armed Forces of Ukraine rapidly adopted new tactics and Western weapons, while society quickly reorganized around wartime needs; and learning from experience: the lessons of 2014, though painful, strengthened both the army and the public, eliminating illusions about the intentions of the Russian Federation.

This case shows that in the modern world, the ability to self-organize, adapt quickly, and learn during crises is far more valuable than attempting to construct an ideal but fragile plan based on flawed forecasts.

Conclusions

The conducted research allows us to conclude that the “black swan” phenomenon has become a fundamental challenge for classical political riskology. The modern political environment is characterized by high complexity and nonlinearity, which makes unprecedented events with extreme impact an inevitable part of reality. New approaches such as scenario planning, agent-based modeling, and

the analysis of Big Data through artificial intelligence represent important steps in adapting the methodological tools of political riskology.

However, even these methods cannot ensure accurate forecasting of “black swan” events. Therefore, a fundamental shift in paradigm is taking place – from attempts to predict the future toward building systems prepared for unexpected developments. The key concepts of this new paradigm are resilience and antifragility. The focus is moving toward the creation of flexible, decentralized, and adaptive institutions capable of functioning effectively in conditions that cannot be foreseen.

For Ukraine, which has experienced the destructive consequences of a “black swan” firsthand, the implementation of these approaches is a strategic imperative. Building an antifragile state and society should become a national priority, enabling the country not only to withstand current challenges but also to lay the groundwork for sustainable development in an unpredictable world.

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