

UDC 355.40:004.94:327.5

DOI: [https://doi.org/1034169/2414-0651.2026.2\(50\).125-130](https://doi.org/1034169/2414-0651.2026.2(50).125-130)**O. M. RAKHMANYI, PhD**<https://orcid.org/0000-0002-4010-0749>*(Central Scientific Research Institute of Armament and Military Equipment of Armed Forces of Ukraine, Kyiv)***S. V. BAZARNYI, PhD**<https://orcid.org/0000-0001-9545-1960>**O. V. TERNOVYI, Staff Adjunct Researcher**<https://orcid.org/0000-0003-2790-7262>*(National University of Defence of Ukraine, Kyiv)*

ANALYTICAL PARAMETERS OF THE DECISION-MAKING PROCESS CONCEPT IN A MULTIDOMAIN CONFLICT

The article investigates the concept of integrated management decision support in multi-domain operations based on a data-driven governance approach (using the Palantir platform as a model). Drawing on graph, vector-matrix and probabilistic models, a methodology for the multi-criteria evaluation of decision-making effectiveness is applied. It establishes that integral management effectiveness relies on data integration and relevance, decision timeliness and the system's resilience under conditions of degradation and information overload. The scientific novelty lies in the development of a system of analytical parameters for assessing management effectiveness. The research results can be utilized to improve defense planning and crisis response within the security and defense sector.

Keywords: *security and defense sector, national security, Ukrainian Armed Forces, governance resilience, multi-domain competition, armaments, analytical parameters.*

INTRODUCTION

Modern armed conflicts are characterized by a transition from platform-centric to data-centric models of warfare, where the key resource becomes not only firepower but also the ability to integrate, process, and interpret large arrays of heterogeneous data in real time [1].

The war in Ukraine reflects the formation of a new type of operational environment – a data-centric battlespace, in which the effectiveness of the decision-making process is determined by the speed of response, the quality of information integration, the resource cost of implementing a decision, and the system's ability to adapt it to changes in the operational environment [2, 3].

Despite the development of research in the fields of artificial intelligence (hereinafter AI), multi-domain operations (MDO), and digital military technologies (battlefield management systems), the issue of integrating the concept of data-driven governance with the practices of multi-domain

confrontation and operationalizing parameters of integrated decision support remains insufficiently studied [4, 5].

In the context of war, data-driven governance acquires the features of algorithmic management, where a decision is formed based on integrated analytical processes that combine human expertise and machine data processing [6]. At the same time, such a model creates new challenges associated with data dependency, risks of algorithmic bias, and a decrease in the role of individual experience in the decision-making process [7, 8].

A key characteristic of modern multi-domain confrontation is the interaction of domains and their synchronization through a unified information infrastructure, which ensures the formation of holistic situational awareness and contributes to the realization of the joint effects concept. Similar technological approaches are gaining relevance in Middle Eastern conflicts, where digital infrastructure and data processing are becoming critical elements of national security. One of the defining parameters of modern armed conflicts is the ability of state and military management systems to maintain functionality even in the event of the loss of a significant part of their leadership. In particular, the conflict in the Middle East demonstrates that targeting (namely, the physical destruction) of high-level state officials does not always lead to the collapse of the decision-making system [10].

Thus, a scientific contradiction arises between the growing role of digital platforms in modern warfare and the insufficient development of a parameter system with which their impact on management efficiency and resilience can be evaluated. Within the study, it is advisable to understand the effectiveness of the decision-making process as an integral indicator reflecting the management system's ability to transform information into timely, resource-justified, and effective actions. In the modern conditions of multi-domain confrontation, effectiveness cannot be interpreted merely as the «correctness» of a decision, but must be evaluated through the balance of three basic components: effectiveness, promptness, and efficiency. It is this interpretation that allows moving from a descriptive understanding of decision-making to its formalized analytical evaluation.

ANALYSIS OF PUBLICATIONS

The modern scientific discourse testifies to a change in the nature of armed conflicts, where traditional models are being replaced by the concept of the data-centric battlespace. As noted in the works of [11], digital platforms and cloud technologies are ceasing to be merely auxiliary tools, becoming the foundation of state sovereignty [12] and military effectiveness. The study [10] emphasized that the implementation of intelligent systems in public administration requires the development of new evaluation indices that would take into account the specifics of automated decision-making. This correlates with our proposal to use a platform approach to ensure the coherence of the operational picture in conditions of multi-domain interaction.

A critical aspect of multi-domain confrontation is maintaining the functional resilience of control loops when individual leadership links are lost. Study [13] focuses on

the need to preserve «human agency» in AI-based systems, which is especially important for preventing algorithmic bias under conditions of high-intensity combat operations. At the same time, the experience of conflict escalation in 2025–2026, analyzed in the context of Middle Eastern events and NATO Allied Command Transformation reports [14], proves that a system's viability is determined not by its personnel composition, but by its distributed management architecture and the algorithmic delegation of authority. Our model complements these views by introducing the parameters «Control Loop Resilience» and «Centralization Level», which makes it possible to mathematically evaluate the survivability of the management system [15].

The transition to the practical implementation of multi-domain operations (MDO) requires strict mathematical formalization of interaction processes. The foundation for this is the game-theoretic model of multi-domain interaction proposed by [16], which allows for modeling conflict scenarios considering the dynamics of different domains. Scientific work [17] points out existing gaps in Data Science methodology during military decision-making, particularly regarding data speed and relevance. Research [9] further highlights the significance of data and analytics for detecting failures in intelligence and control processes.

Accordingly, the conducted analysis of scientific sources reflects that the topic of integrated decision-making support in multi-domain confrontation lies at the intersection of digital governance, military data science, and platform war infrastructure research. However, the issue of formalizing the analytical parameters of such support remains insufficiently developed, which determines the scientific direction of this study. At the same time, the analysis of scientific approaches gives grounds to assert that the effectiveness of the decision-making process in modern digital management systems should be evaluated not as an isolated result, but as a function of several interrelated variables.

These include the quality of achieving the set goal, resource expenditure on the formation and implementation of the decision, temporal response characteristics, and the system's ability to adapt the decision to changes in the baseline conditions. In this context, data-driven governance parameters should be interpreted as tools for measuring the system's technical capability and its managerial effectiveness.

The purpose of the article: to substantiate the conceptual foundations of integrated decision-making support in conditions of multi-domain confrontation and to develop a system of analytical parameters for evaluating management effectiveness based on the data-driven governance approach, utilizing the functional capabilities of digital platforms.

RESEARCH RESULTS

Thus, the resilience of a management system under conditions where the management vertical is targeted can be provided by organizational mechanisms and technological solutions that form a unified information environment for distributed decision-making. In this context, platforms like Palantir function as a tool for implementing such a management model, where the system-forming factor is not the hierarchy, but the integrated information architecture.

Indicative of modern multi-domain confrontation is the analytical effect of preserving a state system's functionality even after large-scale targeting of the command vertical [13, 14]. The events surrounding the escalation of Iran's military confrontation in 2026 showed that the elimination of a number of key political figures did not lead to an automatic management collapse: the Iranian system continued its military-political activities and maintained the ability to conduct active retaliatory actions. This provides grounds to believe that the resilience of a management system in modern warfare is determined not only by the personnel composition of top-level leadership but by a distributed management architecture, redundancy of command functions, standardized response scenarios, and the ability to rapidly integrate data from various domains into a single decision support environment. The presence of standardized response scenarios, command function redundancy, and elements of algorithmic delegation contributes to maintaining the system's functionality autonomously if communication with the management center is lost.

Following this logic, integrated digital platforms like Palantir must be viewed not just as technical tools, but as elements of data-driven governance [18, 19], which potentially reduces the system's dependence on individual personal decision-making centers and increases its functional survivability in a decentralized conflict. In the context of modern war, the formal form of government does not fully explain the resilience of the management system. Equally important is the type of political regime, since it determines the degree of power centralization, the nature of information exchange, accountability, the flexibility of power delegation, and the system's capacity to sustain functionality upon the loss of specific leadership links. Democratic, authoritarian, theocratic-authoritarian, and totalitarian management models differ in their political organization and decision-making architecture, directly impacting the possibilities of data-driven governance in multi-domain confrontation.

In view of the above, a question arises concerning the theoretical description of integrated decision support and the formation of a parameter system facilitating its analytical evaluation. The system of analytical parameters developed by us (Table 1) directly addresses this challenge, proposing specific metrics – from time delay to integral effectiveness – enabling the conversion of theoretical advancements into applied tools for defense planning. To operationalize the assessment of management efficiency in a multi-domain environment, the system of analytical parameters detailed in Table 1 was developed.

The provided comparative parameters demonstrate that amid the war in Ukraine and the escalation of the armed conflict in Iran, the key factor for management resilience is not solely the availability of military force, but also the capacity to integrate diverse data, rapidly transform it into operational knowledge, and support decision-making in a multi-domain environment. This justifies the need to study the Palantir platform as a model of integrated decision-making process support.

Conditionally, the graph will be represented in a formula as a multidimensional function:

$$E = f(T_d, D_i, D_r, D_t, C_o, L_c, H_o, S_r, C_c, I_m), \quad (1)$$

Table 1

Parameter	Technical and Analytical Content	Metric
Decision-making time delay	Interval between the initial signal and the formation of the decision	seconds/minutes
Completeness of data integration	Degree of data source coverage in the analytical system	from 0 to 1
Data reliability	Probability of data (verification, non-contradictory nature)	from 0 to 1 (%)
Data relevance	Degree of data relevance (freshness)	seconds/minutes
Intensity of multi-domain interaction	Level of simultaneous domain impact	from 0 to n
Coherence of the operational picture	Degree of data consistency between subsystems	from 0 to 1
Load on the subject	Level of cognitive overload of the commander	index, from 0 to 1
Control level	Share of decisions remaining under human oversight	from 0 to 1
Resilience of the control loop	System's ability to maintain functionality upon the loss of individual centers or channels	from 0 to 1
Centralization level of management architecture	Degree of system dependence on a single center	from 0 to 1
Speed of interagency interaction	Pace of information exchange between different agencies	minutes/hours
Integral effectiveness	Total system performance (weighted sum of parameters)	from 0 to 1

where:

- T_d – time delay of decision-making;
- D_i – completeness of data integration;
- D_r – data reliability;
- D_t – data relevance;
- C_o – coherence of the operational picture;
- L_c – cognitive load of the subject;
- H_o – level of human oversight;
- S_r – resilience of the control loop;
- C_c – centralization level;
- I_m – intensity of multi-domain interaction.

The graphical interpretation of the analytical parameter system reflects the dependence of the decision-making process's integral effectiveness on the set of key data-driven governance variables within a multi-domain operational environment (Fig. 1).

The X-axis (infrastructure degradation level, %) reflects the percentage loss of management system elements (communication, decision-making centers, leadership personnel). The Y-axis (functional resilience) is an integral indicator combining the parameters «time delay» (having an inverse exponential relationship to efficiency), «data reliability», and «coherence of the operational picture».

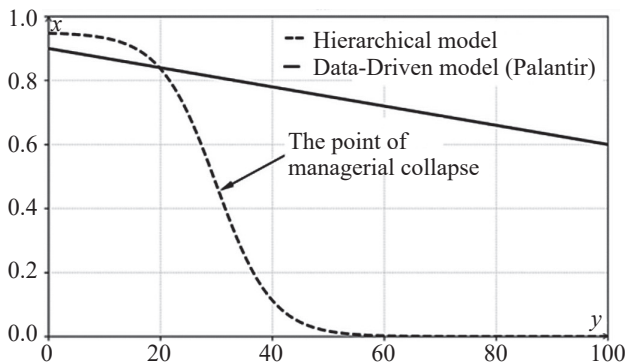


Fig. 1. Functional dependence of decision-making efficiency on key parameters of data-driven governance in multi-domain confrontation

The curve for the hierarchical model (dashed line) can be mathematically described as a tree-like structure with a high «Centralization Level». In such a system, removing the root node (top leadership) results in the severing of all connections, subsequently paralyzing the management system.

The curve for the data-driven model (solid line) is based on a graph model of distributed management. Owing to the «completeness of data integration» and «coherence of the operational picture», the system remains operational even if 50–70 % of the nodes are removed, as information and decision-making authority are duplicated across the network.

The graph illustrates an inverse U-shaped relationship for the human oversight parameter: an excessively low level → risk of algorithmic errors; an excessively high level → increased latency; an optimal level → maximum efficiency. Decreasing the time delay in decision-making leads to an exponential increase in efficiency, particularly during high-intensity combat phases. This substantiates the thesis concerning the compression of decision cycles in contemporary warfare. The completeness of data integration exhibits a threshold nature; up to a certain level, the effect is minimal, but upon reaching a critical value, there is a sharp increase in efficiency corresponding to the concept: data fusion → situational awareness → decision superiority.

An increase in the subject load parameter leads to efficiency degradation, even alongside high-quality data, demonstrating that data abundance ≠ decision advantage without appropriate analytical processing. The parameter for control loop resilience dictates the system's area of stability; at high values, the system preserves its efficiency even under conditions of: loss of management links, degradation of communication channels, information attacks. The centralization parameter possesses contextual dependency: under stable conditions → centralization enhances control, while under combat conditions → excessive centralization diminishes adaptability.

In this context, platforms like Palantir serve as tools for optimizing this multidimensional function, as they provide a simultaneous improvement in the completeness of data integration and coherence, a reduction in decision-making time delay, and the maintenance of an optimal balance between automated analysis and human control. Thus, Palantir acts as both a technological solution and a functional element of algorithmic management within a data-driven governance system.

To demonstrate the necessity of researching integrated decision-making support in multi-domain confrontation, it is beneficial to utilize a system of analytical parameters that capture both the technological and managerial dimensions of digital platforms' functioning. The outlined criteria determine the quality of data-driven governance via the parameters of decision-making delay, completeness of data integration, data reliability, coherence of the operational picture, level of human control, and the resilience of control loops. Collectively, these variables provide a foundation for conducting a comparative analysis of modern theaters of war, specifically the Ukrainian and Middle Eastern theaters, facilitating an evaluation of the Palantir platform as a model for an integrated decision support system.

CONCLUSIONS

Over the course of the study, it was substantiated that under conditions of multi-domain confrontation, the resilience of state management transitions from a hierarchical to a network model, where the defining parameter is the implementation of a data-driven governance approach based on integrated digital platforms. It has been established that employing systems such as Palantir helps overcome the systemic effect of management collapse upon the loss of the management vertical through the algorithmic delegation of authority, the redundancy of command functions, and data synchronization within a unified information environment.

The developed system of analytical parameters operationalizes the evaluation of decision-making effectiveness while factoring in the specific characteristics of the political regime and the risks of algorithmic bias. Ultimately, the functional survivability of a modern state system in a decentralized conflict relies heavily on its capacity to convert large arrays of data into holistic situational awareness and a coherent operational picture. It is proven that in multi-domain confrontation, a management system's resilience is increasingly dictated by its institutional hierarchy alongside its integrated information architecture.

A system of analytical parameters operationalizing the assessment of integrated decision support was proposed. Platforms such as Palantir operate as model solutions for decreasing decision latency, reinforcing data fusion, and heightening the coherence of the operational picture. Future research should focus on the empirical validation of the proposed parameter system, the construction of an integral efficiency index, and the testing of the model utilizing data from actual management systems within the security and defense sector.

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АНАЛІТИЧНІ ПАРАМЕТРИ КОНЦЕПЦІЇ ПРОЦЕСУ ПРИЙНЯТТЯ РІШЕНЬ В УМОВАХ БАГАТОДОМЕННОГО ПРОТИСТОЯННЯ

У статті досліджується концепція інтегрованої підтримки процесу прийняття управлінських рішень в умовах сучасного багатодоменого протистояння на основі платформеного підходу data-driven governance. Обґрунтовано трансформацію характеру збройного протистояння, розвиток multi-domain operations, зростання ролі цифрової інфраструктури, штучного інтелекту, аналітики великих даних та систем decision support. Платформу Palantir розглянуто як аналітичну модель інтегрованої системи підтримки прийняття рішень, здатної забезпечувати data ingestion, data

fusion, багаторівневу аналітичну обробку інформації та формування єдиної операційної картини для органів військового управління, сектору безпеки і оборони та інших суб'єктів державного управління.

Методологія дослідження ґрунтується на сукупності моделей, зокрема – графові, векторно-матричні, імовірнісні та застосовані багатокритеріальні підходи безпосередньо для оцінювання ефективності процесу прийняття рішень у багатодоменому операційному середовищі. Встановлено, що інтегральна ефективність управління визначається ступенем інтегрованості даних, їх достовірністю та релевантністю, часовою придатністю рішення, ресурсною вартістю його реалізації та здатності системи до адаптивного коригування управлінського циклу, а також здатністю системи зберігати функціональну стійкість за умов децентралізації, інформаційного переважання, деградації окремих ланок управління та втрати їх частини.

Результати дослідження можуть бути використані для подальшого розвитку доктринальних підходів до інформаційного забезпечення управління, а також формування перспективних рішень у сфері оборонного планування, кризового реагування та управління в секторі безпеки і оборони.

Наукова новизна дослідження полягає в розробленні та операціоналізації системи аналітичних параметрів інтегрованої підтримки прийняття рішень, які дозволяють оцінювати ефективність управління в умовах багатодоменого протистояння.

Ключові слова: сектор безпеки і оборони, безпека держави, Сили оборони України, стійкість управління, багатодоменне протистояння, озброєння, аналітичні параметри.

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The article was received by the editorial board on 08.04.2026.

The article accepted for publication after review 21.05.2026.

The article is published 30.06.2026.