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THE ESSENCE AND ROLE OF INFORMATION LOGISTICS IN COUNTERTERRORISM MANAGEMENT SYSTEMS

This study examines the essence and role of information logistics within counterterrorism management systems, as well as the theoretical and legal foundations for their application in shaping the information space of Ukraine's national counterterrorism system. It explores the prospects for optimizing operational processes in counterterrorism operation command centres by converging the information systems of counterterrorism entities. The study also outlines the impact of implementing modern information-logistics tools to enhance the capabilities of management structures within counterterrorism entities, enabling them to counter effectively terrorist threats.

Keywords: *counterterrorism security, terrorism, counterterrorism management, information technology, logistics, information logistics, counterterrorism operation.*

Statement of the problem. The national counterterrorism system in Ukraine has a complex hierarchical structure composed of disparate systems under different departmental jurisdictions. These systems exhibit varying levels of management efficiency, material, technical, and informational support, as well as differences in the preparedness of human resources, etc. Consequently, these discrepancies significantly impact the overall quality of their core function – countering terrorist activities.

A specific feature of counterterrorism management is the different departmental subordination of its participants, who can function effectively only if there is alignment and absence of contradictions in the activities of individual counterterrorism entities, which share a common goal but have different functions.

Given the specific nature of counterterrorism operations characterized by rapid dynamics and the difficulty of forecasting their development, their outcomes are determined not so much by the capabilities of specialized units but by the efficiency of interaction, coordination, and resource management under conditions of limited decision-making time. A crucial factor in this regard is the ability to utilize optimally communication channels for information exchange. In essence, conducting a counterterrorism operation involves creating a localized information space where information is not merely a resource but a driving force for action and a decision-making tool that facilitates well-founded conclusions and effective responses [1].

In practice, integrating the information resources of various state institutions involved in counterterrorism security remains a significant challenge as they were historically developed based on their specific operational needs and using the data-processing technologies available to them. As of today, it is not always possible to integrate databases that have been created using different software tools, database management systems, or that follow different structural logics, among other factors. Considering that the effectiveness of counterterrorism efforts is partially defined by the level of convergence between the information systems of involved entities, developing an information-logistics model for a unified national system of terrorism prevention, response, and mitigation is one of the key tasks facing national security professionals today.

Analysis of recent recearch and publications. Prominent scholars such as I. Blank, A. Voichak, O. Hlohus, A. Kalchenko, A. Kyryhenko, M. Christopher, J. Cooper, S. Moller, M. Porter, N. Hutchinson, F. Khmil, R. Shapiro, J. Johansson and others have studied the theoretical foundations of information logistics. Analysing the scientific literature in this field reveals a lack of consensus on the definition and principles of information logistics.

A significant number of studies have addressed the role of information-logistics support in security and defence management. However, it is worth noting that the specific features of information logistics systems in counterterrorism operations remain insufficiently examined and require further in-depth research. The relevance of these issues has led to increased interest among security and defence researchers in developing applied aspects of logistics technologies for managing departmental information resources.

The purpose of the article is to explore the paradigm of information logistics within counterterrorism management concepts.

Summary of the main material. Counterterrorism units perform their duties under unique conditions that demand high responsibility measured in human lives, limited time for decision-making, uncertainty of conditions, etc. These factors drive the necessity for integrating existing information systems and create a trend toward unifying these systems into a single information space.

The issue of creating a unified information space has recently been actively discussed by specialists in the field of information technology, since existing information systems across various sectors are primarily designed to address internal tasks, however, their use in counterterrorism efforts requires their situational integration into a specialized information space with a unique structural framework.

The multifaceted and evidently multifunctional nature of information flows within the counterterrorism security domain necessitates the introduction of appropriate tools and methodological support, namely, information logistics. This is a separate scientific field with significant integration potential, enabling the consolidation and strengthening of institutional interactions between key functional elements of a virtual space or an information cluster, such as monitoring terrorism-prone environments, threat detection and risk forecasting, developing neutralization models, and designing mechanisms for countering terrorist activities.

Logistics is derived from the Greek word "logistics", meaning the art of calculation and reasoning. In the Roman Empire, special officials responsible for food distribution were called logisticians. In French, the word "logistics" is a military term referring to the art of transportation, supply, and deployment of military units. Traditionally, the term described the physical movement of material flows and the processes they generate (financial, service-related, etc.) [2].

In the modern information society, the concept of information logistics differs from its original meaning, as the primary focus of research, management, and optimization in logistics has shifted to managing chains of information flows that aims to coordinate all functions and processes of the material world [3, p. 20].

The fundamental principles of logistics as a comprehensive management tool were originally shaped within the security and defence sector. The requirements for organizing material and informational flows to manage combat units both on the battlefield and during counterterrorism operations are significantly more demanding than those in civilian life [3, p. 45].

The increasing role of information component in managing complex systems with diverse departmental affiliations has led to the development of information logistics. Within the national counterterrorism system, the object of information logistics research is the informational potential of counterterrorism management – a combination of regulatory, technical, technological, and operational information, as well as information resources and systems. The effectiveness of counterterrorism security management is determined by the interaction of these components through data accumulation, transmission, processing technologies, and the involvement of qualified personnel.

Information logistics [4] serves as a system-forming component of counterterrorism management, offering high convergence potential that enhances cooperation among key counterterrorism institutions and functional areas of the counterterrorism security systems, strengthens counterterrorism potential at the micro level through the activation of synergetic properties. With thorough scientific and methodological development of the theoretical and legal framework, information logistics for counterterrorism security can serve as a concept for counterterrorism activities, based on the integration of specialized technological approaches into the overall process of information support for counterterrorism activities. The goal of this process is to improve proactive counterterrorism technologies, enhance the accuracy of counterterrorism response models, prevent inefficient resource expenditure, optimize information processes, and reduce decision-making time, among other objectives.

Based on the above, we propose to specify the definition of the concept of "information logistics" within the context of counterterrorism management.

It is the process of acquiring, formalizing, administering, managing, and controlling the flow of messages, data, knowledge, and operational information used within the domain of counterterrorism security to eliminate ignorance (uncertainty) and fulfil the needs of intelligence components, to enable integrative, analytical-synthetic, systematic, and creative cognitive processes in counterterrorism efforts.

An important challenge in the evolution of new forms of counterterrorism management and the practice of information logistics is the inter-system compatibility of its constituent elements. This interoperability is assessed through the lens of technological and organizational indicators, necessitating the application of new mechanisms and methods of information management based on a more knowledge-intensive and advanced model of interaction, as well as the accumulation of structured and formalized sources of information – patterns and principles that enable real-world problem-solving in the process of interpreting results.

The information logistics process begins with monitoring, which involves collecting data from various sources, storing, processing, organizing, and analysing it in order to provide counterterrorism participants with the necessary informational products (knowledge about the problem in real-time or near real-time).

Information logistics enables timely responses to changing terrorist threats and risks, ensuring an effective influence on the dynamics of changes in the level of counterterrorism security. Another key application of its principles is the processing of vast data streams, such as cross-border movement records and real-time surveillance feeds.

In information-logistics systems, stream processing technologies play a pivotal role. Streaming technologies enable real-time data processing as it is received, which is particularly beneficial when handling large-scale data volumes that traditional methods cannot process quickly enough [5].

Information logistics is the ability to analyse data almost continuously and in real-time, which is literally its vital advantage during counterterrorism operations. Hence arises the necessity for the evolution of counterterrorism management and the implementation of information logistics practices, which require inter-system compatibility of constituent elements, evaluated through the lens of technological and organizational indicators. This, in turn, necessitates the adoption of new mechanisms and methods of information management, demanding the development of a more knowledge-intensive and advanced interaction model, as well as the accumulation of structured and formalized information sources – patterns and principles that enable effective problem solving and a deeper comprehension of counterterrorism outcomes [6].

It is important to note that information logistics and information management focus on the same object – the information flow, which consists of information resources, technologies, and systems. The subject of information logistics is a part of the subject of information management. Information logistics follows the principles of both logistics and information management. Accordingly, information management follows the principles of general management. At the same time, logistics principles do not exclude but rather complement and refine the principles of information management.

The goal of information logistics in counterterrorism structures is to develop and operate information systems that unify data from various sources into a standardized format, ensuring the availability of necessary information at the right place, at the right time, with minimal delays.

Information logistics optimizes the performance of the following information management functions:

– collecting incoming information within the system;

– analysing the acquired information;

– transferring information between system elements;

– accumulating and storing data;

– filtering information flows (selecting data and documents relevant to a specific management level);

– consolidating and distributing information flows;

– performing elementary information transformations;

– managing information flows.

Information logistics enables agencies with different departmental affiliations to take advantage of existing data flows, process them rapidly, and extract critical information or perform data operations in real time or close to it. The proposed technology is based on stream event processing, offering an exceptionally high data throughput capacity, which a priori inherently allows for instant and automated responses to changes in terrorist risks and threats, ensuring real-time adjustments to the dynamics of changes in the counterterrorism security levels.

The advantages of information logistics lie in its ability to analyse data almost continuously and in real time, including the following.

1. Rapid decision-making: information logistics enables the operational headquarters to receive

information as it becomes available. For example, during a counterterrorism operation, it allows tracking the activities of terrorists and their accomplices to respond promptly to changes in the operational situation.

2. Identifying new opportunities: quick access to up-to-date data allows analysts in the operational headquarters to detect new trends, opportunities to influence the response of social systems to a terrorist attack, to affect rapidly social resonance through monitoring social media, and to respond immediately to issues that cause concern.

3. Enhanced risk management: facilitates the rapid identification and response to potential terrorist risks and threats, detection of terrorist activities, and in the field of cybersecurity, it enables detecting and immediately countering cyber-attacks.

4. Optimization of operations: allows optimizing operational processes. For instance, the Anti-Terrorist Centre Headquarters under the Security Service of Ukraine (ATC HQ) can use it to monitor and manage operational command lines of counterterrorism units, detect problems, and take immediate action.

5. Improved interaction with terrorists during negotiations: enhances understanding of terrorist motives and needs. Operational staff analysts can track the terrorist behaviour, identify their preferences, and offer personalized proposals. This enables the optimization of the negotiation process and the quick development of potential responses to their demands.

6. Predictive analytics: real-time data analytics allows moving beyond historical statistics and delving into predictive analytics. Using machine learning algorithms and artificial intelligence, analysts can identify patterns and trends in data streams concerning the level of terrorism-related activity in social systems in real-time, enabling accurate predictions about future events, the development of operational situation, and the outcome of the impact on social system. For example, analytical units of the Anti-Terrorist Center Headquarters can use information logistics systems to monitor and predict the terrorist potential of a social system, preventing possible terrorist acts.

7. Operational Efficiency: real-time analytics enables the optimization of management activities by identifying bottlenecks and inefficiencies in the management of counterterrorism operations in real time. By tracking key performance indicators of counterterrorism security systems in real time, special services and security units of potential terrorist targets can quickly identify areas requiring attention and take immediate action. These measures may include a wide range of interventions, from adjusting counterterrorism security protocols to optimizing information space protection systems.

8. Integration: the development of collective technological potential through the integration of information systems of counterterrorism entities, which use different data formats and protocols for processing information, opens new opportunities for information logistics. For example, analysts can utilize real-time monitoring to track information about passengers listed as individuals associated with terrorist activities.

9. Artificial intelligence algorithms in information-logistics systems simplify content analysis in the media space, optimize image and video processing algorithms in visual surveillance, profiling, and criminal-linguistic search systems. Artificial intelligence tools can automatically enhance visual content, including images and videos. For example, object recognition algorithms can automatically assign relevant tags and descriptions to images, making them more visible in search engine results. AI-based content analytics of social systems' information space can accurately determine social sentiments and trends in public reactions to terrorist incidents by analysing reviews, reports, and social media comments. AI algorithms can classify sentiments as positive, negative, or neutral and even predict potential social crises. Additionally, AI-driven security measures can detect and block malicious terrorist activities, protect confidential information, and prevent unauthorized access.

Information logistics, as a component of counterterrorism management, operates within information flows and information resources under a unified legal framework in the field of counterterrorism [7–10]. The legal foundations for integrating information logistics technologies into the work of the Anti-Terrorist Center and its coordination groups within the regional offices of the Security Service of Ukraine are outlined in the relevant legal regulations [8]. However, the development of a comprehensive information logistics system in practice still depends on various factors, including the material support for its establishment, as well as the legal support for regulating access control to specific information systems, standardization of data processing algorithms, and so on.

Conclusions

Thus, the aspiration to leverage all potential advantages of information logistics tools to enhance the efficiency of existing counterterrorism practices is driven by an objective necessity. Since the system of counterterrorism entities in Ukraine remains in a phase of fragmented information logistics, the primary task of its reform should be the integration of modern information-logistics tools into management processes. The adaptation of scientific and technological advancements in information logistics to the domain of counterterrorism management provides new opportunities for in-depth information analysis with minimal physical and time expenditures. This, in turn, will contribute to reducing operational costs and increasing the productivity of personnel within the counterterrorism system. The establishment of a unified information space for the entities of Ukraine's national counterterrorism system should serve as the foundation for building a robust capacity to counter terrorist threats.

In summary, it should be stated that the promising directions for further scientific and technological advancements in this field involve the search for rational approaches and innovative models of information exchange systems in the interests of counterterrorism security management.

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СУТНІСТЬ ТА РОЛЬ ІНФОРМАЦІЙНОЇ ЛОГІСТИКИ В СИСТЕМАХ АНТИТЕРОРИСТИЧНОГО МЕНЕДЖМЕНТУ

Досліджено сутність і роль інформаційної логістики у системах антитерористичного менеджменту та теоретико-правових засад їх використання у практиці формування інформаційного простору загальнодержавної системи боротьби з тероризмом в Україні. Зокрема, важливою проблемою на сучасному етапі еволюції нових форм антитерористичного менеджменту є міжсистемна сумісність складових елементів, яка оцінюється через призму технологічних і організаційних показників.

Специфічною особливістю управління антитерористичною діяльністю є різне відомче підпорядкування її учасників, які можуть злагоджено функціонувати лише за умови узгодженості та браку суперечностей у діяльності окремих суб'єктів боротьби з тероризмом, що мають спільну мету, але різні функції. Це вимагає застосування нових механізмів і методів управління антитерористичною операцією, заснованих на більш наукоємній і прогресивній моделі взаємодії, а також накопичення структурованих, формалізованих джерел інформації.

Високе значення інформаційного складника у процесах управління складними системами різної відомчої підпорядкованості зумовило виділення особливого розділу логістики – інформаційної логістики. Об'єктом дослідження тут є інформаційні системи, що забезпечують управління інформаційними потоками всередині суб'єктів боротьби з тероризмом, а також обмін інформацією між ними.

У статті конкретизовано поняття «інформаційна логістика» у контексті антитерористичного менеджменту та висвітлено проблемні питання реалізації інноваційних технологій оброблення інформаційних потоків. Визначено мету інформаційної логістики антитерористичних систем – оптимізація операційних процесів центрів управління антитерористичною операцією шляхом конвергенції інформаційних систем суб'єктів боротьби з тероризмом. Окреслено вплив упровадження сучасного інформаційно-логістичного інструментарію у практику забезпечення управлінської ланки окремих суб'єктів боротьби з тероризмом на спроможність ефективно протидіяти терористичній діяльності.

Ключові слова: *антитерористична безпека, тероризм, антитерористичний менеджмент, інформаційні технології, логістика, інформаційна логістика, антитерористична операція.*

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