Філософія, методологія, теорія та
історія основ національної безпеки держави

УДК 355.4:355.02(477+569.4)

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УПРАВЛІННЯ ВІЙСЬКОВОЮ ЛОГІСТИКОЮ В СИСТЕМІ НАЦІОНАЛЬНОЇ БЕЗПЕКИ: ДОСВІД УКРАЇНИ ТА ІЗРАЇЛЮ

MANAGEMENT OF MILITARY LOGISTICS IN THE NATIONAL SECURITY SYSTEM: THE EXPERIENCE OF UKRAINE AND ISRAEL

Summary. *Introduction. In the context of modern warfare, particularly hybrid and high-intensity conflicts, military logistics plays a pivotal role not only in supporting frontline operations but also in shaping the overall defense capabilities of a state. The effectiveness of logistical systems directly influences strategic sustainability, combat readiness, and operational continuity. Ukraine's ongoing war with Russia and Israel's long-standing experience in conflict management offer valuable empirical grounds for comparative analysis of military logistics in diverse geopolitical and operational environments.*

Purpose. This paper aims to analyze the structural features, strategic priorities, and innovation-based mechanisms of military logistics in Ukraine and Israel to identify applicable models for strengthening national logistical resilience.

Materials and Methods. The study uses comparative and content analysis of legislative frameworks, defense ministry reports, academic articles, and open data.. A SWOT analysis was conducted to identify the risks and opportunities within the logistics systems of Ukraine and Israel. Additionally, the method of logical generalization was used to formulate conclusions and recommendations.

Results. The study reveals the operational features of the military logistics systems of Israel and Ukraine under conditions of armed conflict. The financial dimensions of logistics, including sources of funding in both countries, have been analyzed. Key advantages of the Israeli model have been identified, such as decentralization, the use of digital technologies, the autonomy of logistical units, and the active integration of the dual-use startup ecosystem. These factors contribute to enhanced flexibility, rapid mobilization, and reliability of supply within the Israel Defense Forces.

At the same time, both the strengths and existing weaknesses of Ukraine's logistics system have been identified. Despite significant achievements in digitalization and the effective mobilization of volunteer resources, the study reveals issues related to insufficient autonomy of combat units, limited material and technical resources, and the inefficiency of outdated public procurement mechanisms.

The study proposes the adaptation of effective elements of the Israeli model to the context of Ukraine's protracted conflict by implementing innovative managerial and digital solutions. Simultaneously, it is recommended that Israel consider Ukraine's experience in decentralized mobilization and the involvement of the civil sector in ensuring national defense capabilities.

Discussion. Israel's experience underscores the importance of civil-military cooperation and technology transfer in logistics modernization. Key lessons for Ukraine include building decentralized logistics hubs, introducing AI and blockchain tools, and expanding public-private innovation ecosystems tailored to battlefield needs.

Conclusion. Applying select Israeli practices to Ukraine can significantly enhance logistical autonomy, responsiveness, and adaptability. Strengthening logistics is essential for national security and effective military operation sustainability.

Key words: *military logistics, national security, hybrid warfare, defense innovations, IDF, Armed Forces of Ukraine, dual-use technologies, decentralized management, civil-military partnership.*

Анотація. *Вступ. У сучасних умовах гібридних і повномасштабних війн військова логістика виступає ключовим компонентом забезпечення боєздатності, стійкості та мобільності збройних сил. Від ефективності логістичного управління значною мірою залежить результативність бойових дій, оперативне реагування на загрози та загальна обороноздатність держави. Війна в Україні, як і багаторічний досвід*

Ізраїлю у протидії зовнішнім загрозам, формують унікальне підґрунтя для порівняльного аналізу логістичних систем в умовах воєнного стану.

Мета. Метою дослідження є проведення порівняльного аналізу логістичних систем України та Ізраїлю з акцентом на структурні особливості, інноваційні рішення та адаптивні механізми, що забезпечують оперативність, ефективність і стійкість тилового забезпечення в умовах війни. Дослідження також має на меті окреслити можливості імплементації ізраїльського досвіду в український контекст.

Матеріали й методи. У роботі використано методи якісного контент-аналізу нормативно-правових актів, звітів, наукових джерел і відкритої аналітики. Для виявлення ризиків та можливостей розвитку логістичних систем України та Ізраїлю застосовано SWOT -аналіз, а також метод логічного узагальнення для формулювання висновків і рекомендацій.

Результати. У дослідженні розкрито особливості функціонування систем військової логістики Ізраїлю та України в умовах збройного конфлікту. Проаналізовано фінансовий аспект щодо джерел фінансування логістики в обох країнах. Визначено ключові переваги ізраїльської моделі, зокрема децентралізацію, використання цифрових технологій, автономність логістичних підрозділів та активну інтеграцію стартап-екосистеми подвійного призначення. Зазначені чинники сприяють підвищенню гнучкості, швидкості мобілізації та надійності постачання у Збройних силах Ізраїлю. Водночас з'ясовано як ключові переваги, так і наявні недоліки української логістичної системи: попри суттєві досягнення у сфері цифровізації та ефективної мобілізації волонтерського ресурсу, виявлено проблеми, пов'язані з недостатнім рівнем автономності бойових підрозділів, обмеженістю матеріально-технічних ресурсів і неефективністю механізмів державних закупівель. Запропоновано адаптацію ефективних елементів ізраїльської моделі до умов тривалого

конфлікту в Україні шляхом впровадження інноваційних управлінських та цифрових рішень. Водночас Ізраїлю рекомендовавно врахувати український досвід у сфері децентралізованої мобілізації та залучення громадянського сектору до процесів забезпечення обороноздатності держави.

Перспективи. В подальших наукових дослідженнях пропонується зосередити увагу на створенні в Україні єдиної IT-орієнтованої системи логістичного управління, запровадженні блокчейн-технологій для прозорого обліку ресурсів, використанні штучного інтелекту для прогнозування потреб та оптимізації маршрутів, а також формуванні пілотних центрів інновацій на базі цивільно-військового партнерства. Адаптація ізраїльських рішень до українських умов може сприяти підвищенню автономності, стійкості та ефективності логістичної системи у тривалому конфлікті.

Висновки. Зіставлення ізраїльського та українського досвіду дозволяє сформувати концептуальні орієнтири для розвитку військової логістики в Україні. Впровадження сучасних управлінських та технологічних рішень може значно посилити спроможності тилового забезпечення, підвищити ефективність управління ресурсами й забезпечити стійкість оборонної системи у тривалому конфлікті.

Ключові слова: *військова логістика, національна безпека, гібридна війна, оборонні інновації, ЦАХАЛ, Збройні Сили України, технології подвійного призначення, децентралізоване управління, цивільно-військове партнерство.*

Formulation of the problem. Modern armed conflicts demonstrate that effective military logistics plays a decisive role in achieving both operational and strategic success. Under conditions of dynamic combat environments and technological evolution, it is precisely logistical support that enables armed forces to maintain combat readiness, mobility, and resilience. In the context of the war

in Ukraine, which began in 2022, the issue of logistical and rear support has gained particular significance. Simultaneously, the experience of Israel – a country with longstanding expertise in defense and logistical operations – offers valuable insights into effective logistical models under wartime conditions. This highlights the relevance of the present study.

Analysis of Recent Research and Publications. Contemporary academic research confirms the increasing importance of military logistics as a core component of defense capability in the context of hybrid warfare. Ukrainian and international scholars have focused on the experiences of countries involved in protracted conflicts – particularly Israel – and the feasibility of adapting their practices to the Ukrainian context. The works of Z. V. Hbur [14] and V. M. Bilichenko [15] explore the principles of operation of the Israel Defense Forces (IDF), including centralized command, technological autonomy, and human resource management, all of which have significant potential for implementation within the Armed Forces of Ukraine. I. Mitronov [16] emphasizes the necessity of modernizing material and technical support in response to the challenges of hybrid warfare, highlighting the role of logistical innovation and digital transformation of the rear. International studies (e.g., D. Brodet [4]; J. A. Gross [18]) focus on the innovative character of Israel's military economy, support for dual-use startups, and rapid technological deployment in the defense sector. Publications by E. Jaffe et al. [20] and Col T. Rasmussen [21] detail the efficiency of medical evacuation logistics and the involvement of civil actors in logistical support. Nevertheless, there remains a lack of integrated analysis that combines Ukrainian and Israeli experiences to construct a flexible and resilient logistics model.

The purpose of the study is to conduct a comparative analysis and identify the key features of military logistics in Ukraine and Israel, with the aim of determining effective strategies, innovative approaches, and prospects for enhancing national rear support systems in wartime conditions.

Presentation of the main material of the study. Military logistics refers to the comprehensive system responsible for supplying the armed forces with material resources, equipment, food, fuel, ammunition, medical assistance, transportation, and maintenance and repair operations. Its primary functions include supply, distribution, transportation, storage, and evacuation. Key criteria for effective logistics are timeliness, flexibility, reliability, and adaptability. A well-functioning logistics system ensures the continuity of combat operations and the operational autonomy of units in field conditions.

Structure of Military Logistics in Ukraine and Israel. Following the onset of Russia's full-scale aggression in 2022, Ukraine began a substantial transformation of its military logistics system. As of January 1, 2022, the Logistics Forces acquired the status of a separate branch within the Armed Forces of Ukraine. They were established on the basis of the Logistics Forces Command, which had been created in 2018 through the merger of the Rear and Armament structures. This command is responsible for supplying the troops with weapons, equipment, fuel, food, medical supplies, and infrastructure [1; 2].

The main subdivisions include: Armament of the Armed Forces of Ukraine**,** which is tasked with the supply and maintenance of weaponry; Rear Services of the Armed Forces of Ukraine**,** which ensure the provision of material and technical means, including fuel, food, and other resources [1].

The **Israel Defense Forces (IDF)** employ a centralized logistics structure through the *Technology and Logistics Directorate of the General Staff (ATAL).* This body is responsible for material and technical supply, transportation, medical logistics, and combat support. Its core departments include: the Logistics and Operations Department; the Ground Forces Logistics Command Department; the Ground Forces Human Resources Department; the Ground Forces Technology and Maintenance Department; the Armed Forces and Infrastructure Department [3].

In addition, Israel has integrated advanced technological solutions into its military logistics framework. Notably, elite units such as *Lakat* and *MAMRAM*

have been established within the IDF to develop and implement IT solutions directly within the military infrastructure.

Financial Component of Military Logistics. The effective functioning of rear support systems requires substantial financial investment. In 2023, Ukraine allocated over 50% of its national budget to the defense sector, including more than USD 30.8 billion specifically earmarked for arms procurement. This level of funding was made possible through the mobilization of internal financial resources and significant support from international partners. Among these, the United States played a leading role by providing over USD 9.3 billion in direct military aid to Ukraine's defense sector [4].

Israel's defense budget has consistently exceeded USD 23 billion annually, with USD 3.8 billion covered by U.S. military aid. During the active phase of operations against Hamas in 2023–2024, Israel temporarily increased defense spending to approximately USD 48 billion, a significant share of which was directed toward logistics, personnel medical care, and infrastructure modernization [5–6].

Table 1

Financial Characteristics of Military Logistics in Ukraine and Israel in 2023

Indicator	Ukraine	Israel
Total defense budget (2023)	Over USD 30.8 billion	USD 23.6 billion
Share of defense budget in total state budget	Over 50%	Up to 20% (temporarily increased to USD 48 billion)
Main sources of logistics funding	State budget, assistance from the USA, EU, and Japan	State budget, U.S. military aid (USD 3.8 billion annually)
Key areas of logistics expenditure	Equipment, drones, fuel, medical support, repair and maintenance	Bases, transportation, medical support, infrastructure, ammunition
Institutions responsible for logistics	Command of the Logistics Forces of the Armed Forces of Ukraine	Technology and Logistics Directorate (ATAL), IDF General Staff

Source: Systematized by the authors based on [4–6]

Specific Features of the Logistics System under Wartime Conditions in Ukraine. With the onset of Russia's full-scale invasion of Ukraine in February

2022, logistics emerged as a critical component of military strategy. The Armed Forces of Ukraine faced numerous logistical challenges, including the destruction of infrastructure, the need for rapid scaling of supply lines along an extended front, and shortages of equipment and medical evacuation resources. Russian shelling caused significant damage to transport infrastructure, particularly in Kharkiv Oblast, affecting roads, railways, and bridges [7].

A distinctive feature of Ukraine's wartime logistics has been the extensive involvement of volunteer organizations in supporting the armed forces. This led to the emergence of a parallel logistics system that encompasses fundraising, procurement, delivery, and distribution of equipment. Furthermore, digital tools have played a crucial role in ensuring efficient and transparent military logistics under current wartime conditions. Applications such as *Diia*, the public procurement system *Prozorro*, and the *UNITED24* platform have demonstrated significant potential in mobilizing financial resources, enhancing transparency, and improving the speed of procurement (Table 2).

Table 2

Comparative Analysis of the Military Logistics Systems of Ukraine and Israel

Criterion	Ukraine	Israel
Technological Base	Partially modernized	Highly technological
Centralization of Management	Limited, with numerous bottom-up initiatives	Highly centralized
Role of Volunteers	Crucial	Primarily state-driven logistics
Unit Autonomy	Limited	72-hour autonomous provisioning
Flexibility	High due to civil society initiatives	High due to automation
Logistics Personnel Training	Insufficient (prior to 2022)	Systematic professional training
Electronic Logistics System	In the process of development and implementation	Fully automated TAV system
Cargo Identification System	Limited use	RFID implemented at all logistics stages
Military IT Units	Concentrated within Ukroboronprom (mainly civilian sector)	MAMRAM, Lakat, MAFAT — integrated into the military structure

Arms Exports	Limited	Among the global top 10 arms exporters
Conversion of Military Technologies	Initial stage	Active (startups, exports)

Source: systematized by the authors based on [5; 14–16; 18; 20; 21]

For instance, the *Diia* application facilitated the collection of over USD 5.6 million for the needs of the Armed Forces of Ukraine, including the purchase of bulletproof vests, drones, and technical equipment, which were subsequently transferred to the *Come Back Alive* foundation [8]. The *Prozorro* system has enabled a considerable increase in military transport procurement, with over UAH 8.1 billion spent in 2024 alone—double the amount allocated the previous year [7]. In addition, *Prozorro* has been instrumental in reforming military food supply systems and in facilitating large-scale drone procurements at competitive prices, thereby reducing corruption and improving quality assurance [8–10].

The *UNITED24* platform has become a centralized mechanism for funding defense initiatives. Notably, the *Army of Drones* project led to a hundredfold increase in the production and delivery of unmanned aerial vehicles. Moreover, *UNITED24* has been used for direct procurement of weapons, ammunition, and medical supplies, enabling a rapid response to evolving frontline needs [11–13].

Thus, digital platforms have become an integral part of Ukraine's military logistics system, enhancing its transparency, flexibility, and efficiency amidst armed conflict.

Additionally, despite a shortage of professional logisticians, Ukraine has successfully adapted its military infrastructure. This includes the establishment of humanitarian aid storage hubs, mobile repair units, and the deployment of drones to deliver ammunition and medical supplies to hard-to-reach areas.

Israel's Military Logistics System. The Israel Defense Forces (IDF) possess one of the most advanced military logistics systems in the world. A defining characteristic of this system is its ability to mobilize significant resources within extremely short timeframes (Table 3). Combat units are equipped with

autonomous reserves sufficient for 72 hours of operations, allowing them to function independently even in the event of disrupted communications with the rear [14].

The foundation of Israeli military logistics lies in centralized planning, a high degree of automation, and deep integration of IT solutions. All logistical processes – supply, transportation, maintenance, and medical evacuation – are coordinated by the Logistics Corps of the IDF. Particular attention is paid to the protection of rear bases and transportation routes, which is critically important given the constant threat from terrorist groups [14–16].

Israel is actively incorporating innovative technologies into its logistics operations, such as delivery drones, logistical UAVs, and autonomous parachute delivery systems capable of navigating to their destination independently, as well as robotic warehouses and AI-based demand forecasting systems. These innovations significantly enhance response speed and minimize operational losses [17].

A key element of Israel's model is the principle of self-reliance through high-tech solutions. For instance, the MAMRAM unit develops proprietary software, satellite systems, and communications technologies. The Lakat unit focuses on IT solutions tailored to the operational needs of the military. Consequently, knowledge and technological advancements originating in the defense sector are frequently converted into civilian startups – such as Check Point and Mirabilis – demonstrating the dual-use effect of military innovation on the national economy. IDF logistics also rely on the TAV electronic logistics management system, which ensures comprehensive control over material flows, and on the use of RFID tags for real-time cargo tracking. This enhances transparency, accuracy, loss reduction, and overall supply chain efficiency [18; 19].

The practical effectiveness of this system was demonstrated during Operation "Protective Edge" (2014), when, despite massive rocket attacks, the

IDF maintained uninterrupted supply of ammunition and fuel [20]. The medical evacuation system also functioned effectively, particularly through the implementation of the "golden hour" principle, which facilitated rapid treatment and improved survival rates. The Israeli emergency medical service Magen David Adom (MDA) provided aid to 842 wounded civilians under continuous rocket fire and challenging security conditions, reflecting the high level of preparedness and responsiveness of the evacuation system. Moreover, studies showed that during this operation, the rate of irreversible losses among wounded Israeli soldiers did not exceed 6%, marking a significant improvement compared to previous conflicts. This underscores the operational efficiency of Israel's military logistics and medical systems and serves as a potential model for the Armed Forces of Ukraine [21].

A comparative *SWOT analysis* of the logistics systems of Ukraine and Israel (Table 3) highlights substantial differences in terms of centralization, technological infrastructure, and the organization of rear operations. Israel, owing to its advanced digital infrastructure and the direct integration of innovative units within the army structure, has a clear advantage in automated resource management, transparency of logistics processes, and the conversion of military technologies into economic assets. Ukraine, on the other hand, demonstrates high adaptability, efficiency of civil society initiatives, and a strong potential for adopting best practices. The primary task for the Ukrainian logistics system remains overcoming structural fragmentation, minimizing the impact of the human factor, and implementing modern digital solutions at all levels of rear operations management.

Table 3

SWOT Analysis of Military Logistics Systems: Ukraine vs. Israel

Criterion	Ukraine	Israel
Strengths	High flexibility and adaptability due to volunteer movement and horizontal initiatives; active modernization since 2022 (establishment	Automated TAV system and RFID-based tracking; presence of

	of Logistics Forces, digitalization); adoption of Western (NATO-compatible) standards.	MAMRAM, Lakat, and MAFAT units integrated within the army; high level of centralization and digital logistics.
Weaknesses	Issues with centralized management and logistical planning; insufficient training of logistics officers prior to 2022; low automation and lack of a unified digital logistics platform; limited integration of inventory and communication systems; dependence on external aid and imports.	High cost of maintaining technological superiority; limited human resources in the high-tech sector.
Opportunities	Implementation of Israeli solutions in rear support (e.g., digital inventory and control systems similar to Israel's TAV); development of domestic digital platforms; integration of civilian IT solutions into logistics; conversion of military technologies into civilian sectors (startups, production); cooperation with NATO partners, experience exchange, and standards integration.	Further conversion of military innovations into startups; development of defense industry export potential; integration of AI into logistics.
Threats	Persistent cyberattacks targeting logistics infrastructure; high wear and tear of infrastructure; destabilization of rear areas due to missile strikes; insufficient funding under economic strain; corruption risks in logistics chains; lack of transparency in rear operations; excessive fragmentation among state, volunteer, and private suppliers.	Geopolitical instability; asymmetric threats (terrorist attacks, rear-area missile strikes); potential resource depletion during protracted conflicts.

Source: systematized by the authors on [1-22]

To enhance the efficiency of military logistics, Ukraine should implement a comprehensive set of measures aimed at increasing the adaptability, transparency, and resilience of its logistics system under wartime conditions. Specifically, it is recommended to:

– establish a unified digital logistics management system that incorporates modern IT solutions, including cloud platforms, blockchain technologies, and artificial intelligence (AI) components;

– develop the institution of military logisticians and introduce interdisciplinary training programs that reflect technological advancements and emerging cyber threats;

– integrate volunteer and civil society initiatives into the state rear support system by ensuring their accountability and coordination with official structures;

– increase the autonomy of combat units through the deployment of mobile warehouses, field logistics centers, and autonomous supply systems;

– strengthen the resilience of logistics routes and infrastructure against enemy attacks, disruptions, and communication loss by utilizing backup digital channels, satellite monitoring, and cybersecurity measures.

Particular attention should be paid to the implementation of advanced digital technologies in rear support systems. Notably, blockchain technologies enable the creation of transparent, secure, and traceable logistics chains, thereby minimizing risks of corruption, losses, and duplication. These tools are already being deployed in several NATO countries and have demonstrated their effectiveness in managing defense supplies. In addition, the application of artificial intelligence–particularly in forecasting unit needs, dynamically optimizing supply routes, and assessing risks–significantly enhances the responsiveness and flexibility of logistics operations in constantly changing combat environments.

In conclusion, modern military logistics must evolve from a supporting function into a strategic instrument of advantage, ensuring not only uninterrupted supply but also enabling rapid response, mobility, and information superiority in armed conflict.

Conclusions and Future Research Directions. The comparative analysis of the military logistics systems of Ukraine and Israel demonstrates that the efficiency of logistical support in modern warfare is largely determined by the degree of digitalization, the adaptability of organizational structures, and the integration of civilian resources into the defense infrastructure. The deployment of decentralized and technologically autonomous logistics frameworks – grounded in digital platforms and public-private partnerships – enhances the

mobility, flexibility, and resilience of supply chains under conditions of high uncertainty.

The research has revealed key advantages of the Israeli model, including centralized logistical control, automated inventory management, and the effective operation of specialized digital units. These components may serve as a reference point for Ukraine in developing a unified, transparent, and innovation-driven logistics management system. Conversely, Ukraine's experience in mobilizing volunteer initiatives, utilizing digital tools (such as Prozorro, Diia, and UNITED24), and establishing alternative logistics routes offers valuable insights for states operating in multi-front or resource-constrained scenarios.

Further research should concentrate on the conceptualization and implementation of an integrated digital logistics management platform designed to ensure transparency, real-time control, and predictive functionality. Particular emphasis should be placed on the application of artificial intelligence for demand forecasting and route optimization, blockchain technologies for secure and transparent resource accounting, and the development of adaptive models of civil-military cooperation in logistics. Such advancements would significantly improve the sustainability and effectiveness of rear support systems in protracted conflicts and hybrid warfare environments.

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