Issues in Information Systems
Volume 26, Issue 4, pp. 221-232, 2025

DOI: https://doi.org/10.48009/4_iis_2025_119

Military experience of using artificial intelligence as a benchmark to drive innovation and productivity in the logistics area of contemporary organizations

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Abstract

The development of organizations depends on many factors, with artificial intelligence (AI) emerging as a key driver in today's global environment. When properly implemented, AI enables both quantitative and qualitative growth, offering a competitive edge. However, not all AI solutions deliver expected benefits; some introduce risks or fail to enhance innovation and productivity. This article examines the potential of adopting best practices from military applications of AI into the logistics process management of contemporary organizations. Military environments have successfully integrated AI for tasks such as demand forecasting, real-time tracking of assets and personnel, and cyber protection. These applications offer valuable benchmarks for improving civilian logistics systems. The main objective of the study was to assess which military AI solutions can be effectively transferred to civilian logistics to drive innovation and productivity. The research was guided by a working hypothesis that selected military-developed AI practices could improve logistics performance when adapted to commercial contexts. Through literature analysis and empirical research, the study identified potential benchmarking models that may serve as practical tools for AI integration in logistics. These findings aim to support organizations in making informed decisions about AI adoption based on proven military applications.

Keywords: artificial intelligence, logistics, innovation, productivity, organization

Introduction

Artificial intelligence (AI) has become a defining element of technological advancement in the 21st century, playing a transformative role across various sectors - including the military. In recent years, military AI systems have demonstrated their capacity to process vast quantities of data, automate logistics, enhance situational awareness, and support complex decision-making processes. These developments are particularly visible in military logistics, where AI applications have significantly improved supply chain efficiency, operational readiness, and risk mitigation. Despite these achievements, the integration of AI in such critical systems also raises concerns, including issues of cybersecurity, workforce adaptation, and ethical considerations (Lacroix, 2023).

Given the advanced and often critical nature of AI applications in the military domain, it is reasonable to consider whether such innovations can serve as benchmarks for civilian sectors - particularly in logistics, where efficiency and precision are equally vital. The defense sector often operates under conditions that demand rapid innovation, resilience, and adaptability - qualities that are increasingly sought after in commercial supply chains as well.

Artificial intelligence solutions used in the military sector offer unique solutions that have advantages over existing civilian applications because they allow the use of machine learning algorithms to optimize logistics processes on a macro scale internationally. Their degree of sophistication is closely correlated with the scale of the tasks carried out, which in the area of military logistics are characterized by extraordinary dynamics and the need for great flexibility.

Artificial intelligence solutions used in the military sector analyze huge amounts of data to make predictions (demand forecasts, detection of potential disruptions, optimization of resource allocation). They enable forward maintenance (predictive maintenance) by predicting component failure before it occurs. This reduces unplanned downtime, saves costs and increases operational security. AI automates processes and supports decision-making, optimizing transportation routes and processing large amounts of battlefield data to improve localization of locations and speed up decisions.

One example of the implementation of artificial intelligence solutions from the military sector to the civilian sector is solutions to optimize routes. AI algorithms can process data from various sources, such as traffic sensors, GPS tracking and weather forecasts, to determine the best possible route. AI can be used to analyse real-time traffic data to determine the fastest route for delivery vehicles. This includes taking into account factors such as road closures, accidents and congestion. Artificial intelligence can also be used to optimize routes based on weather conditions, taking into account factors such as rain or snowfall.

The aim of this article is to identify and assess the feasibility of transferring best practices in AI-based logistics solutions from the military domain to contemporary civilian organizations. The study addresses two key research questions: (1) Which AI solutions developed and used in military logistics are suitable for implementation in civilian supply chains? and (2) What tangible benefits can be expected from such implementation in terms of innovation and productivity? To answer these questions, the article draws on a literature review, expert opinions, and quantitative research conducted among logistics managers from both military and civilian sectors.

The article is structured as follows: First, the background and literature review present the state of AI applications in military logistics, identifying core patterns and technological trends. Next, the methodology section outlines the research design, including sample characteristics and data collection methods. This is followed by a discussion of empirical findings, which highlights specific military AI solutions with potential civilian use. The article concludes with a synthesis of insights and directions for future research, emphasizing the value of military-civilian collaboration in AI-driven logistics innovation.

Background and literature review

Artificial intelligence has become a game-changer in military logistics, offering unprecedented opportunities for supply chain management. AI-driven systems can analyze vast amounts of data in real time, providing valuable insights into resource allocation, demand forecasting, and inventory management. This significantly improves logistical efficiency, reduces waste, and ensures that military units get the goods they need when and where they need them (Sander, 2024). There are many applications for AI, including chatbots, automated drones, facial recognition, virtual assistants, cognitive automation, fraud detection, autonomous vehicles, and applications for predictive analytics. However, regardless of how AI is applied, each of these applications has something in common. Despite the variety of applications, people who have created hundreds or even thousands of AI projects know that every AI use case falls into one or more of seven categories (Fig. 1)

Figure 1. Seven general patterns of artificial intelligence
Source: Rashid, et al., (2023)

The seven patterns of artificial intelligence are goal-driven systems, autonomous systems, conversational/human interactions, predictive analytics, hyper-personalization, and decision support. These seven patterns of AI have revolutionized military operations in recent years, offering new capabilities and applications for tasks such as object detection, decision support, and conversational interactions (Rashid et al., 2023, p. 2). Artificial Intelligence in the Military Market Size was estimated at 9.9 (USD Billion) in 2023. The Artificial Intelligence (AI) in Military Market is expected to grow from 11 (USD Billion) in 2024 to 35 (USD Billion) by 2035. The Artificial Intelligence (AI) in Military Market CAGR (growth rate) is expected to be around 11.1% during the forecast period 2025 – 2035 (Fig. 2).

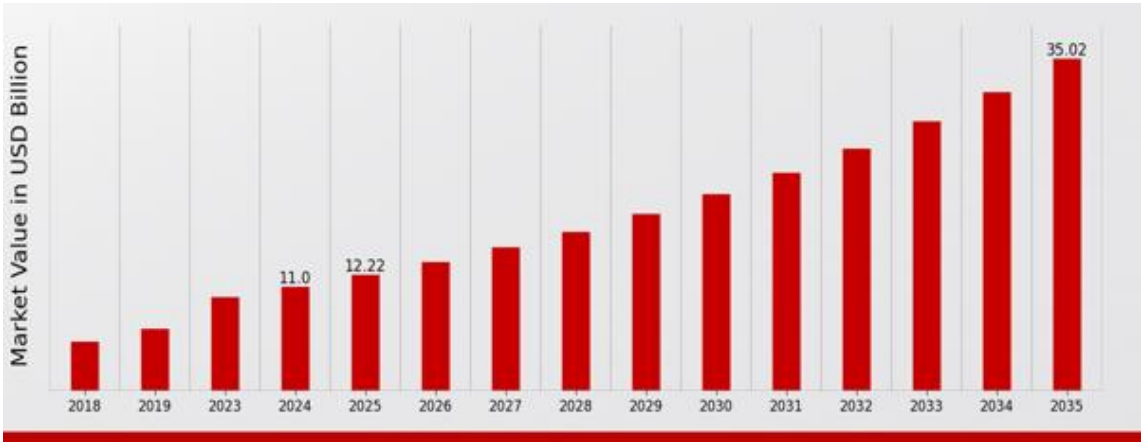

Figure 2. Forecast of using AI in the military market
Source: Akre (2025)

The most important is that AI integration with current military systems has been increasingly popular in recent years, improving their capabilities without requiring total redesigns. The goal is to develop hybrid systems that integrate state-of-the-art AI technologies with conventional military assets. AI is being implemented in the military sector in different areas, but the most important are: surveillance, robotics, data analysis, cyber security, and logistics (Fig. 3).

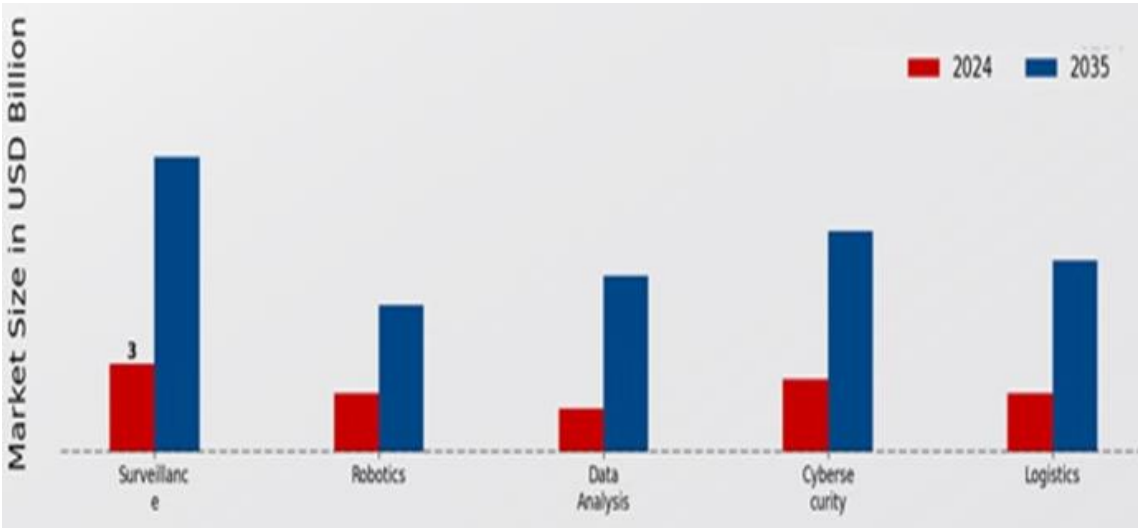

Figure 3. AI in military market, by application, 2024&2035
Source: Akre (2025)

For the issue of essence of this article, it is worth noting that using AI in military logistics provides the visibility of supply chain demands, inventory, distribution, and forecasting of critical combat power while allowing the human interaction of accurately managing production and data-based analysis. Recently, in line with the rapid development of the 4th Industrial Revolution Technology (such as Internet of Things, Cloud, Big Data, and Mobile), Artificial Intelligence (AI) is in the spotlight as a technology that can maximize the synergy effect with these technologies. In particular, in logistics, a large amount of data is produced on a daily basis, so that it is possible to maximize productivity and efficiency by analyzing the data using AI technologies.

Due to these characteristics, various types of AI-based platforms such as smart supply chain management, smart logistics warehouse, smart factory, and smart predictive maintenance have been developed and utilized in the civil logistics field. In addition, the US military is applying AI-based smart maintenance concepts to F-35 fighters and the Stryker fleet to save budget and improve the availability of the weapon systems (Shin, et al., 2019, p. 2433). But the most important thing is to concentrate on decision-making processes. AI algorithms can predict potential supply chain disruptions and recommend proactive risk mitigation measures. This predictive capability ensures a more resilient supply chain, which is critical to maintaining operational readiness in unpredictable environments.

Probably the best-known subcategory of AI is machine learning. Technical breakthroughs in computing power, especially in terms of processors and video cards, have facilitated rapid progress in this field. Examples of civilian applications based on these developments include automatic image recognition, and natural language processing, as well as artificial “players” of board or computer games. In principle, these programs require multiple components. Machine learning-enabled software must first be trained by experts using – preferably large – datasets. As a civilian example, in order to identify road users, camera images are used as training data. This enables algorithms to generate predictions independently in relation to as-yet unknown data and, ideally, to autonomously improve their own performance over time (Masuhr, 2019, p. 1).

In the scientific literature there are a lot of information connected with using AI in military logistics and the most interesting information from author’s presented especially: Artificial Intelligence Applications in Military Logistics Operations (Castro et al., 2023) the chapter of book: Developments and Advances in

Defense and Security (Rocha, et al., 2023), The Opportunities and Possibilities of Artificial Intelligence in Logistic Systems: Principles and Techniques (Veres, 2024) the chapter of book: Advances in Digital Logistics, Logistics and Sustainability (Tamás et al., 2024), Application of Artificial Intelligence Methods for Improvement of Strategic Decision-Making in Logistics (Kitzmann et al., 2024) the chapter of book: Transfer, Diffusion and Adoption of Next-Generation Digital Technologies (Sharma et al., 2024), article: AI's New Frontier in War Planning: How AI Agents Can Revolutionize Military Decision-Making (Farnell, Coffey, 2024), Optimizing Military Supply Chains with AI (Smith, 2024).

Although there is an abundance of literature on artificial intelligence in military logistics, there is a noticeable lack of studies on the implementation of applied solutions to the civilian sector. However, it is worth emphasizing that a careful analysis of applied solutions clearly shows that solutions developed in the military sector serve as a benchmark for driving innovation and productivity in the logistics area of contemporary organizations, especially in terms of making optimization decisions, which is so important in today's supply chains.

Particularly valuable solutions relate to supporting the coordination of supply chains, forecasting procurement needs and ensuring efficient use of resources. It is also worth noting solutions in which predictive algorithms assist in planning maintenance of military equipment, minimizing the risk of failure under conditions of heavy use. Given the advanced and often critical nature of AI applications in the military domain, it is reasonable to consider whether such innovations can serve as benchmarks for civilian sectors - particularly in logistics, where efficiency and precision are equally vital. The defense sector often operates under conditions that demand rapid innovation, resilience, and adaptability - qualities that are increasingly sought after in commercial supply chains as well.

Methodology and Research Questions

In the theoretical background, main aspects of using AI in military logistics were presented, primarily from the perspective of contemporary challenges. The main objective of this article is to identify and assess the feasibility of implementing best practices from the use of artificial intelligence in the military environment into the logistics process management practices of contemporary organizations. To achieve this objective, the study seeks to answer two key research questions: (1) Which of solutions of AI from military environment are worthy implementing to civilian supply chains? and (2) What potential benefits does implementing AI in logistics processes bring from the contemporary organizations' perspective?

To achieve the research objective and address the identified research gap—namely, the lack of analyses concerning the potential for implementing the experience of using AI from military logistics to civilian supply chains military and civilian managers were selected as the target group. This choice was justified by the wide cooperation between this group in the course of tasks of logistical security during peace and numerous crises.

Based on a comprehensive literature review concerning implementation AI in military and civilian logistics, a quantitative survey in the form of a structured questionnaire was developed. The questionnaire consisted of questions directly related to the research topic, along with a confidential section including demographic questions (gender, education, and place of work). A pilot study was conducted on a sample of 20 logistics managers (10 represented military sector and 10 represented civilian sector) users to identify and eliminate any ambiguities in the questionnaire, ensuring the clarity and comprehensibility of the questions for all respondents.n the last quarter of 2024 and first quarter of 2025, the main survey was conducted among logistics managers (military and civilian) using the CAWI method (Computer Assisted Web

Interview) – the questionnaire was made available online and distributed via a dedicated link. Participation in the study required respondents to declare that they actively use AI solutions in logistics processes. The study sample consisted of 298 randomly selected logistics managers. The detailed structure of the research sample is presented in table 1.

Table 1. Summary of Research Studies on Credit Card Fraudulent Transactions and Machine Learning

	logistics managers represented military sector	logistics managers represented civilian sector
Gender		
F	23	63
M	134	78
Age		
under 35	19	23
36-45	56	87
above 46	82	31
Size of the represented Organization		
Small (battalion and smaller level)	16	9
Medium (brigade level)	67	91
Big (division and above level)	74	41

Source: own.

The study was provided with a sampling error of 6% and the use of positional measures, which ensured an appropriate sample size for the analysis. The Cronbach's alpha coefficient for the questionnaire was 0.79, indicating satisfactory internal consistency.

Findings and Discussion of Findings

The results presented in the article are part of a wide-ranging study and, due to the limitations introduced, are presented only in relation to the essence of the phenomenon studied. The first part of the empirical study focused on collecting data and information to address the first research question: Which of the solutions of AI from military environments are worthy of implementation in civilian supply chains?

Based on the past experience of the Polish Armed Forces and those operating in the armies of NATO countries, a number of solutions proven to manage logistics processes in the military sector have been proposed for respondents. In addition, each respondent was given the opportunity to indicate another area that he or she thought was worth considering for implementation from the military sector into civilian supply chain management. Figure 4 presents an aggregated overview of the results obtained in percentage terms.

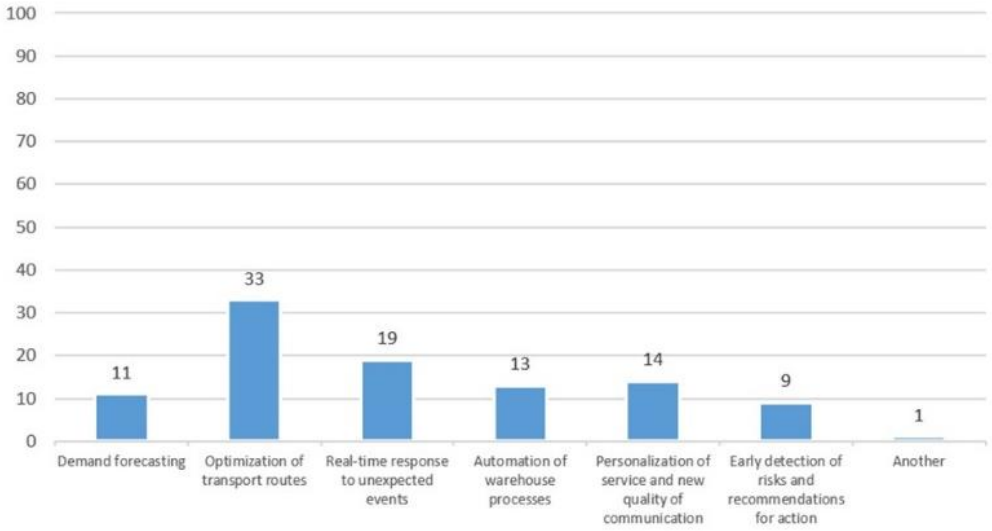

Figure 4. Results of proposal of implement AI solutions from military to civilian logistics sector
Source: own.

Among the responses indicated, the largest number of responses referred to the optimization of transport routes (33%). Respondents specifically stressed that the military's experience in this area is due to its considerable complexity and the specificity of the tasks it performs. In addition, there were arguments clearly indicating that the artificial intelligence algorithms used in the military environment analyze in real time the most favorable vehicle-route connections, taking into account all vehicles and routes simultaneously, which is macro-scale in the military environment. In addition, it was pointed out that military experiments carried out in different parts of the world, under extremely different terrain and weather conditions, made it possible to refine the use of AI to optimize transport routes based on big data sets.

It is worth noting at this point that the use of the emergence of big data technologies marks the commencement of a new stage in data-centric decision-making, offering unparalleled prospects for diverse stakeholders to extract valuable insights from vast and diverse datasets. Within the military domain, defined by the critical importance of information dominance, skillful deployment of big data analytics has the potential to confer a competitive edge amid complex and ever-evolving operational environments. The reviews highlighted that it has made decision-making faster and more efficient by using artificial intelligence to interpret larger and more complex data sets, and in some cases completely automated the decision-making process.

The second research question (What benefits can the implementation of artificial intelligence bring to the implementation of logistics processes in modern organizations?), concerning the potential benefits that implementing AI in logistics processes brings from the contemporary organizations' perspective, was analysed especially from the perspective of civilian managers who received a wide, present proposal based on the first part of the research. The particular value of the proposals presented was to indicate the differences in essence between solutions used in military logistics and those in the civilian sector. It turned out to be a certain limitation that a large group of solutions from the military sector are classified. For this reason, only unclassified information was considered in the research. Figure 5 presents an aggregated overview of the results obtained in percentage terms.

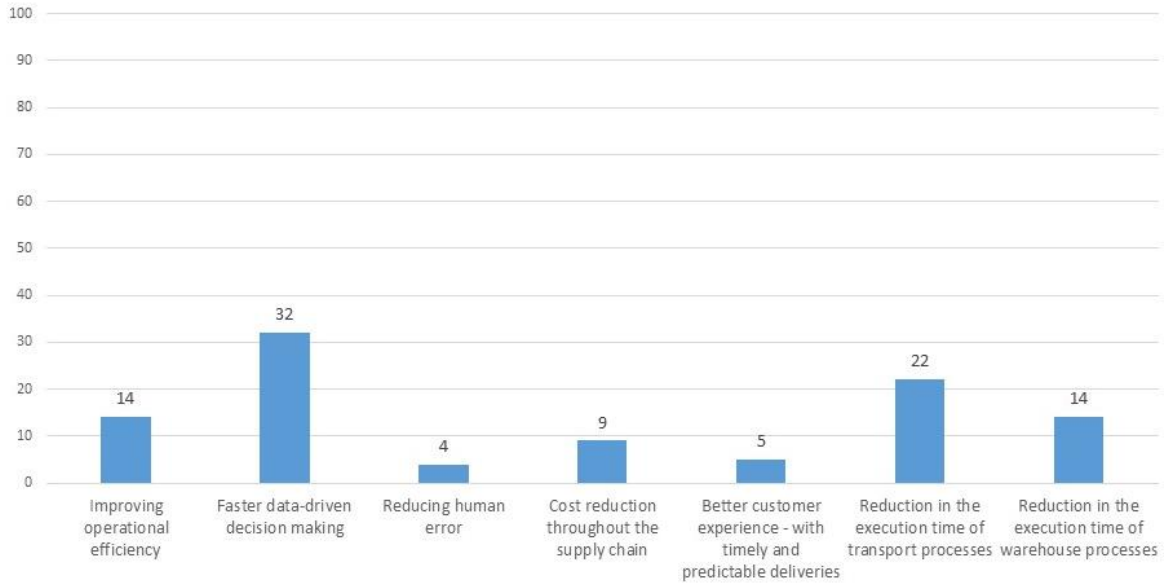

Figure 5. Results of the benefits does implementing AI in logistics processes
Source: own.

The results indicate that as many as 32% of respondents indicated faster decision-making in the area of logistics process management based on data generated by artificial intelligence, which is in line with the trend in the industry. According to Oracle's research in 2023, a whopping 85% of business leaders have felt the stress of decision-making, with three-quarters experiencing a tenfold increase in daily decision volumes over the past three years (Hampton, 2023). On the other hand, so far, only 7% of companies use AI in big strategic decisions, such as strategy development or financial planning. At the same time, the importance of technology for the future is enormous: 75% of business leaders believe that what will set companies apart from their competitors in the future will be determined by who has the most advanced generative AI (Meissner, Yusuke, 2023). Interpreting the information presented in Figure 5, it should be noted that reducing human error resulted in only 4%. This is probably due to the extensive system of control at the various levels of logistics process implementation in both military and civilian environments.

One of the key advantages of incorporating AI in decision-making is the potential for increased efficiency and speed. AI systems can automate decision-making processes, reducing the time and effort required for manual analysis (Brynjolfsson, McAfee, 2014). By leveraging computational power and advanced algorithms, AI can rapidly process vast amounts of data and generate insights at a pace that surpasses human capabilities (Balbaa, Abdurashidova, 2024, p. 29).

Figure 6 presents the potential benefits of military applications of AI identified in structured interviews provided by RAND Corporation. Their team interviewed 29 experts in the field of AI and other areas relevant to this study. Drawing from insights we gained in these discussions, RAND team developed a 26-question survey (plus nine demographic questions), which their administered online to approximately 2,500 people in the United States, polling their attitudes regarding the ethical acceptability of various military applications of AI across a range of strategic contexts (Morgan at all, 2020).

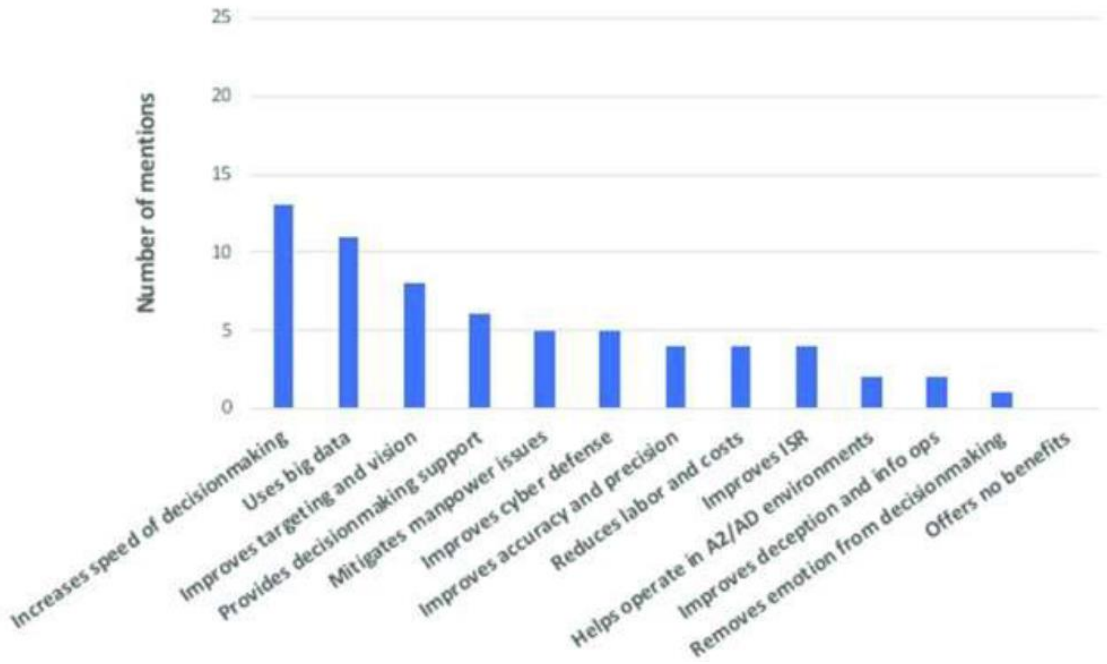

Figure 6. Potential Benefits of Military Applications of Artificial Intelligence Identified in Structured Interviews
Source: Morgan et al. (2020)

To sum up the empirical part of the article, it is worth noting the need for cooperation between the military and the civilian logistics community. The flow of information and exchange of experience between managers responsible for the implementation of the various stages of the supply chain is particularly important in view of the dynamic changes occurring in the modern logistics industry. In doing so, the research results obtained should be considered as a reference point for further, extended scientific research in this extremely important area.

Conclusions

The aim of this article was to identify and assess the feasibility of implementing best practices from the use of artificial intelligence in the military environment into the logistics process management practices of contemporary organizations. Based on the literature review and the research results obtained, several cross-cutting conclusions can be drawn:

1. Solutions resulting from the use of artificial intelligence in the military environment may serve as valuable benchmarks to drive innovation and productivity in the logistics domain of contemporary civilian organizations.
2. The logistics process most susceptible to optimization through artificial intelligence is transportation, particularly in route planning and fleet management.
3. The widespread adoption of artificial intelligence in logistics decision-making can offer significant benefits in enhancing process efficiency, responsiveness, and resilience.

4. Military-civilian cooperation in the area of logistics AI implementation appears to be a mutually beneficial strategy, especially in the context of accelerating technological change and global supply chain volatility.

From a theoretical perspective, the study contributes to bridging the gap between military innovation and civilian logistics theory by identifying translatable AI applications. It supports the growing discourse on cross-sectoral technology transfer and demonstrates the relevance of military-derived best practices in enhancing civilian organizational performance.

Practically, the research provides logistics managers with a data-driven rationale for investing in AI systems inspired by military use cases. Organizations may use these insights to prioritize AI initiatives in transport logistics, forecasting, and real-time tracking. Additionally, the results emphasize the importance of intersectoral collaboration, which can facilitate more robust AI implementation strategies by leveraging defense sector experience.

Despite its contributions, the study has certain limitations. Firstly, the analysis focused only on unclassified military applications of AI, which may exclude some of the most advanced or impactful technologies. Secondly, the research was conducted within a limited geographic and institutional scope, primarily involving Polish and NATO-aligned logistics managers. This may affect the generalizability of findings to other regions or organizational contexts.

Moreover, the survey data were self-reported and may be subject to respondent bias or variance in interpretation, particularly regarding perceived benefits and implementation readiness. Finally, while the quantitative approach provides breadth, it may lack the depth of understanding that qualitative methods could offer, especially regarding organizational resistance or adaptation challenges.

Future research should aim to:

- Expand the empirical scope to include a more diverse, global sample of logistics professionals across civilian sectors and regions.
- Conduct qualitative case studies of successful military-to-civilian AI implementation to identify enabling conditions and barriers.
- Explore classified military innovations under controlled access frameworks to assess their broader applicability.
- Investigate the organizational change processes, cultural factors, and workforce impacts associated with AI implementation in logistics.
- Examine long-term performance outcomes of AI adoption across different logistics functions, including warehousing, procurement, and last-mile delivery.
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Continuous and interdisciplinary research in this area is essential to fully harness the transformative potential of AI, ensuring that innovations developed for defense can be responsibly and effectively adapted to support civilian logistics and supply chain advancement.

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