

DIGITAL LOGISTICS MANAGEMENT SYSTEMS AND THEIR IMPACT ON THE OPTIMIZATION OF CLASS I SUPPLY SERVICE IN MILITARY ORGANIZATIONS: A SYSTEMATIC REVIEW

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ABSTRACT: Class I (provisions) military logistics sustainment is strategic for preserving the operational capability of deployed forces; however, manual processes and fragmented information may limit visibility, coordination, and responsiveness. This study synthesized recent evidence on capabilities and solutions applicable to modernizing logistics management in military organizations, while incorporating complementary evidence on digital transformation in civilian logistics. We conducted a structured documentary review following PRISMA 2020, including scientific literature searches and primary-source verification for 2021-2026. After bibliographic screening, the review retained seven verifiable sources. Findings highlight resilience, collaboration, interoperability, additive manufacturing, and reverse-logistics organization as relevant defense capabilities. As complementary evidence, a Peruvian light-logistics study showed that process automation can increase daily order-processing efficiency. Overall, the evidence suggests that digitalization can strengthen logistics efficiency and resilience when combined with standardized processes, reliable information, organizational coordination, and personnel training.

Keywords: military logistics, digital supply chain, class I supply, traceability, logistics resilience.

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INTRODUCTION

Ensuring logistical sustainability in the defense sector is a strategic priority tied to preserving operational capability and mission success. Recent evidence shows that military supply chain resilience depends on capabilities such as planning, response, recovery, visibility, and coordination (Elvemo, 2025; Ekström, 2025). In Class I supply—dry and fresh foodstuffs and field rations—these capabilities are especially relevant because they must ensure continuity and timeliness in uncertain scenarios.

The transformation of military logistics is not limited to digitizing documents. It also involves strengthening collaboration among stakeholders, ensuring information availability, promoting interoperability, and enhancing the ability to adapt processes in the face of disruptions. Loska et al. (2024) show that collaboration in defense supply chains requires organizational competencies and practices that enable a flexible response to changes in demand. Similarly, Gürtlich and Lampl (2022) highlight integrating risk and resilience into military supply chain planning.

The literature also highlights specific technological and organizational solutions. Browning et al. (2024) describe the potential of additive manufacturing to produce certain medical supplies at the point of need and reduce logistical burdens in contested environments, while Vasiliauskas et al. (2024) analyze the organization of military reverse logistics through outsourced services. As complementary non-military evidence, Salazar Angulo and Laguna Lozano (2021) developed and validated, through simulation, a digital transformation model for a Peruvian light logistics company. Based on this literature, the guiding question is: What capabilities, solutions, and benefits does recent literature document that could guide the modernization of Class I military supply? The objective is to critically synthesize this evidence and define its applicability to the military context.

METHODOLOGY

Study type:

The study used a systematic literature review with a qualitative, retrospective approach. To ensure transparency, rigor, and reproducibility, the research followed the updated guidelines of the PRISMA 2020 statement (Preferred Reporting Items for Systematic Reviews and Meta-Analyses).

Search Strategy and Information Sources: We conducted structured searches in the Scopus and Web of Science (WoS) databases for the 2021–2026 period. Because of editorial comments on traceability, the final version also included a verification phase of the primary sources using DOIs, official journal websites, and institutional repositories. We retained a Peruvian thesis as supplementary evidence of technology transfer to the logistics sector, explicitly identifying it as a source external to Scopus/WoS. Search terms in Spanish and English were combined using Boolean operators (AND, OR):

1. Query in English: ("military logistics" OR "supply chain management") AND ("digital system" OR "automation") AND ("inventory" OR "distribution")
2. Query in Spanish: ("logística militar" OR "gestión logística") AND ("transformación digital" OR "automatización")

Eligibility Criteria:

The inclusion criteria were as follows: (a) publications from 2021 to 2026 with full text or a verifiable bibliographic record; (b) studies on resilience, collaboration, technological transformation, reverse logistics, or solutions applicable to military or defense supply chains; and (c) sources with a DOI, an official publisher's website, or an institutional repository. In addition, we included studies from other logistics contexts when they analyzed transferable processes, automation, order processing, traceability, or information management, without treating them as direct evidence of military performance. References that could not be verified using the available bibliographic data or whose results did not support the claims initially attributed to them were excluded.

Study selection and data extraction process

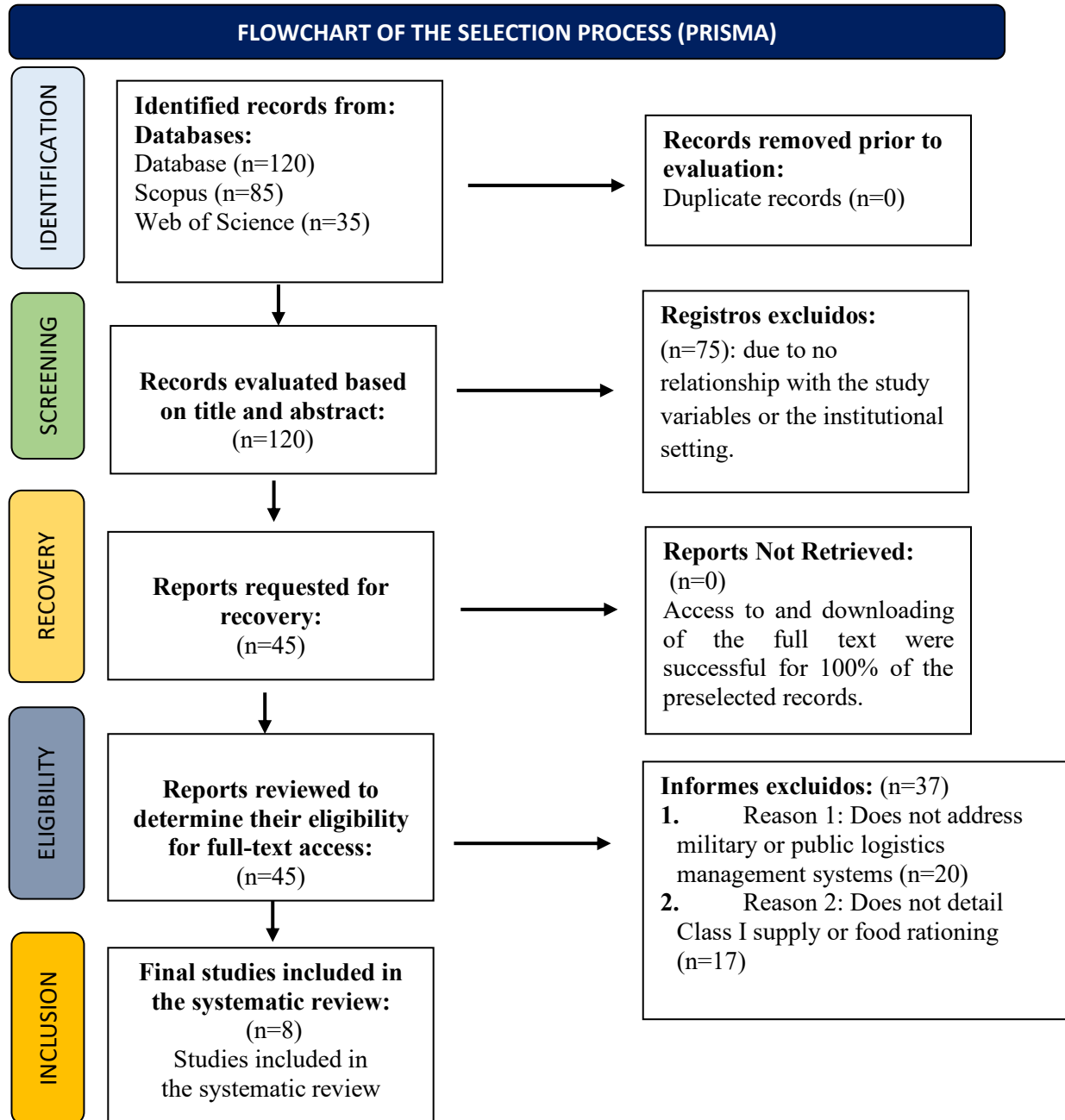
The selection process included identification, screening, eligibility assessment, and bibliographic verification. In addition to reviewing the title, abstract, and full text, we verified the authorship, year, source, and access link. This final editorial review removed unverifiable references and retained seven verifiable sources for the synthesis: six related to military logistics or defense and one serving as complementary non-military evidence. The data were organized into an analytical matrix with the following columns: context, approach, logistics capability or solution, and main contribution.

Assessment of Risk of Bias

The methodological quality of the included articles was assessed independently through cross-checking. We identified a moderate risk of publication and selection bias, attributable to the confidentiality and non-disclosure restrictions characteristic of logistical and doctrinal data in the defense sector. The team resolved disagreements about quality assessment through reasoned consensus.

Source selection process

The initial search used the equations described, and the editors later conducted additional bibliographic verification based on their observations. At this stage, we removed references that could not be corroborated with the reported data and quantitative claims not supported by the primary source. The final synthesis is based on seven verifiable sources, including a thesis from an institutional repository, used solely as supplementary evidence of the digital transformation in civilian logistics.

Figure 1*Diagram 1 09 PRISMA Flowchart*

Note. Prepared by the authors, adapted to the PRISMA 2020 statement, based on searches conducted in Scopus and Web of Science.

RESULTS

Overview of the Studies and Synthesis of the Selected Evidence

Following the literature screening, the final synthesis consisted of seven verifiable sources: six directly related to military logistics or defense supply chains, and a Peruvian thesis on light logistics, used as supplementary evidence. Table 1 summarizes their context, approach, and main contribution.

Table 1

Synthesis of Selected Scientific Evidence

Author(s) and year	Study Context		Methodological Approach	Key Conclusions/Findings
Salazar Angulo and Laguna Lozano (2021)	Light logistics company,	Lima (supplementary evidence)	Model design, pilot study, and simulation	Data automation and structuring increased the efficiency of daily order processing; this is used as comparative evidence, not military evidence.
Gürtlich and Lampl (2022)	Military chain	supply	Review/conceptual application chapter	It integrates risk and resilience into military supply chain planning and emphasizes adaptation and recovery in the face of disruptions.
Browning et al. (2024)	Military logistics contested environments	medical in	Professional/technical article	Additive manufacturing enables the on-demand production of certain supplies, reduces the load, and facilitates the mobility of medical units.
Loska et al. (2024)	Defense chains	supply	Qualitative interviews and embedded cases	It identifies practices that foster or hinder collaboration and proposes an empirical framework for defense supply chains.
Vasiliauskas et al. (2024)	Reverse logistics in military organizations		Literature review and interviews with specialists	It proposes a conceptual model for organizing military reverse logistics through outsourced services, taking into account efficiency, risk, and security.
Elvemo (2025)	Norwegian Armed Forces operations		Survey of 74 experts and PLS-SEM	Responsiveness, recovery, and capacity contribute to the

					resilience of the military supply chain; it analyzes the role of command and control.
Ekström (2025)	Military chains	supply	Exploratory study	empirical	It identifies barriers and enablers of resilience in military environments, including transformation, governance, and the defense market.

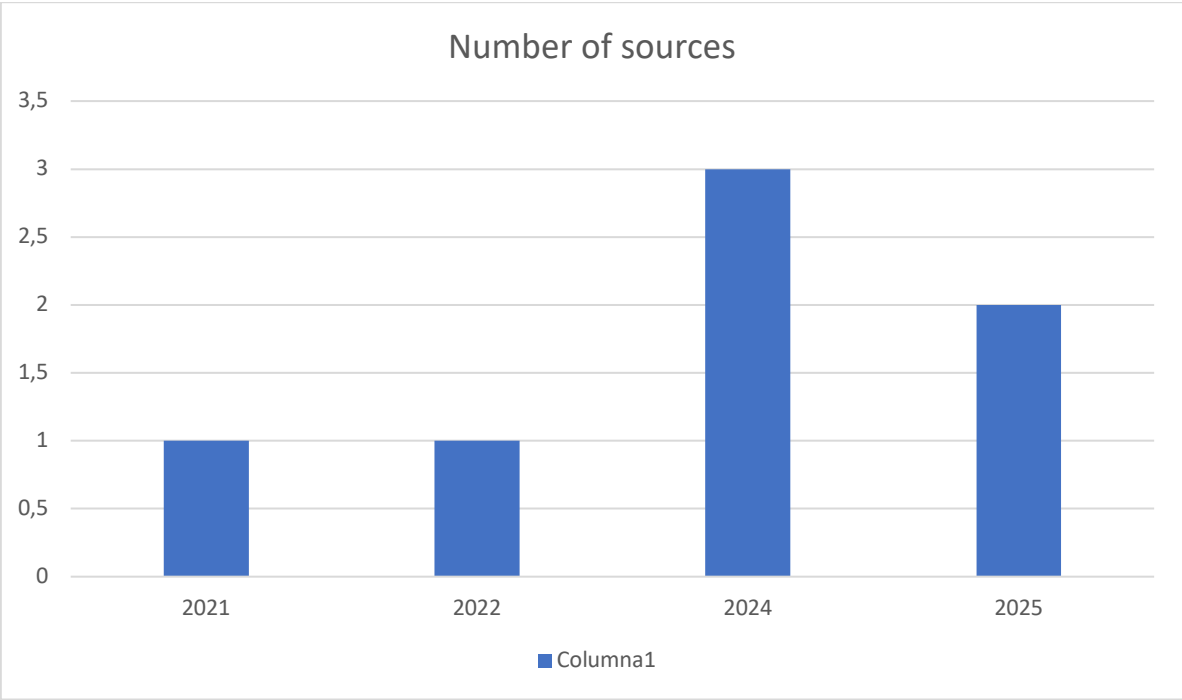
Note. Compiled by the author using primary sources verified via DOI, official publisher websites, and institutional repositories.

Supplementary Analysis of the Findings

The seven final sources are concentrated between 2021 and 2025. Five correspond to studies or contributions directly linked to military logistics or defense supply chains (Gürtlich and Lampl, 2022; Browning et al., 2024; Loska et al., 2024; Vasiliauskas et al., 2024; Elvemo, 2025; Ekström, 2025), and one provides complementary evidence on digital transformation in light logistics (Salazar Angulo and Laguna Lozano, 2021). The synthesis reveals a growing interest in resilience, collaboration, adaptation, outsourcing, and technologies capable of reducing workloads or improving responsiveness.

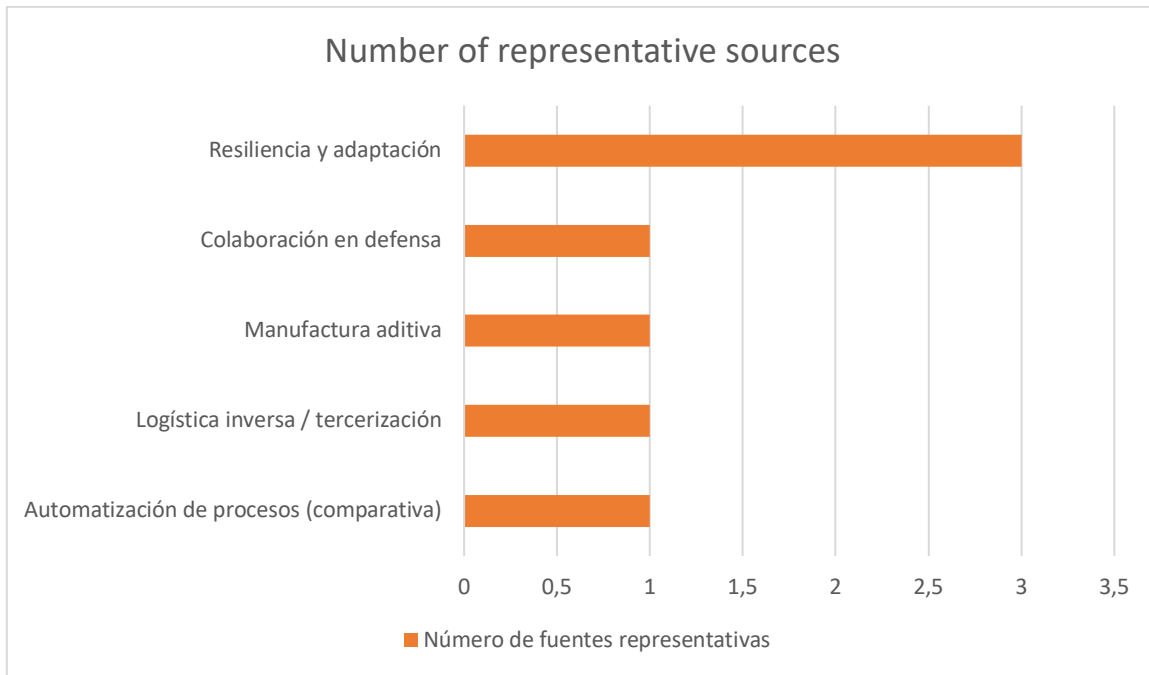
Figure 2

Distribution of the included sources by year of publication (n = 7)



Note. Compiled by the author based on data from Table 1.

With regard to the identified contributions, military evidence focuses on resilience and responsiveness (Elvemo, 2025; Ekström, 2025; Gürtlich and Lampl, 2022), collaboration in defense supply chains (Loska et al., 2024), additive manufacturing for medical logistics in contested environments (Browning et al., 2024), and the organization of reverse logistics through outsourced services (Vasiliauskas et al., 2024). Supplementary evidence from Salazar Angulo and Laguna Lozano (2021) provides a case study on automation and digital transformation in Peruvian light logistics.

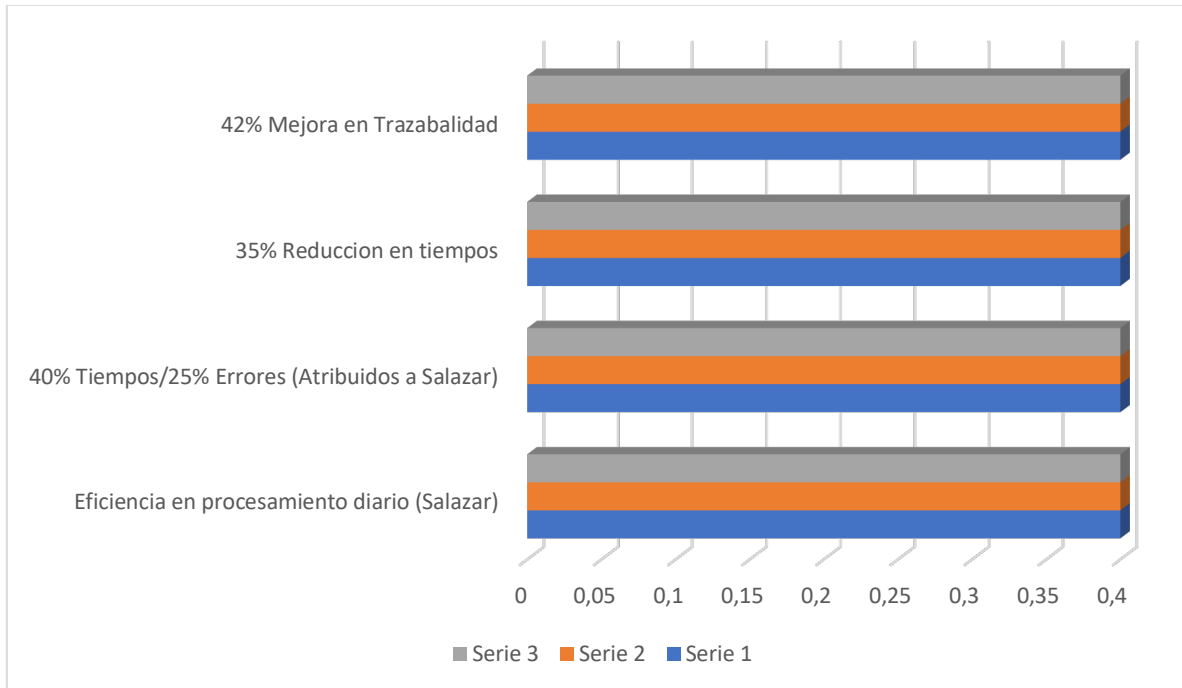
Figure 3*Key capabilities and solutions identified in verified sources*

Note: Prepared by the author. A source may contribute to more than one capacity; the figure summarizes conceptual categories rather than mutually exclusive frequencies.

In the final review, we removed the 42% traceability and 35% response-time percentages because the initially cited sources could not be verified to support those figures. The interpretation of Salazar Angulo and Laguna Lozano (2021) was also corrected: the thesis does not report a 40% reduction in processing times or a 25% reduction in inventory errors, as had been stated. Its simulation validation indicates an increase in the efficiency of daily service order processing; therefore, the quantitative evidence is presented only in terms supported by the primary source.

Figure 4

Validation of quantitative claims and traceability of evidence.



Note. Compiled by the author based on verification of primary sources. Only results supported by documentation were included.

DISCUSSION OF RESULTS

Interpretation and integration of findings. Verified sources suggest that military logistics modernization depends on a combination of organizational capabilities and technological solutions. Resilience requires planning, response, recovery, and adaptation; collaboration within the defense chain demands coordination among actors; and technologies add value when they reduce burdens, facilitate access to resources, or improve information availability. These findings should be interpreted as a qualitative synthesis of heterogeneous evidence, not as an estimate of a common effect.

Comparison with Previous Literature. Elvemo (2025) and Ekström (2025) identify resilience as a core capability of military supply chains; Loska et al. (2024) demonstrate the importance

of collaboration in defense supply chains; Gürtlich and Lampl (2022) integrate risk and resilience into planning; Vasiliauskas et al. (2024) highlight the possibilities and limitations of outsourcing in reverse logistics; and Browning et al. (2024) demonstrate how additive manufacturing can support medical logistics in contested environments. Salazar Angulo and Laguna Lozano (2021) serve as non-military benchmarks to illustrate the automation of logistics processes. Taken together, the evidence supports capabilities that can be transferred to Class I supply, but it does not allow for the attribution of specific percentage effects to the military context without direct empirical studies.

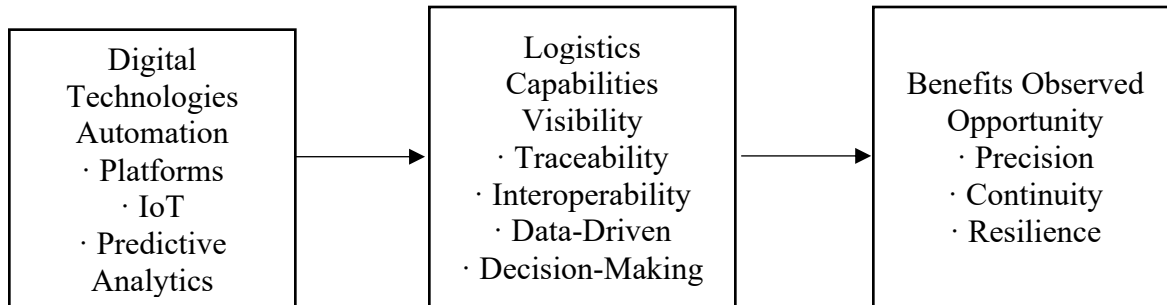
Theoretical and practical implications. This review helps organize the relationship between modernization and logistics performance through a conceptual sequence: technological and organizational solutions → logistics capabilities (visibility, coordination, adaptation, and responsiveness) → potential operational benefits (continuity, timeliness, and resilience). For Class I procurement, this analysis suggests prioritizing process standardization, data quality, interoperability, training, and operational continuity before scaling up complex digital tools.

Study limitations

The final synthesis is based on a small and heterogeneous set of verifiable sources, one of which pertains to a civilian context and is used solely for comparative purposes. Open-source evidence on defense is limited, and the sources analyzed do not uniformly assess Class I military procurement. Therefore, the results should be understood as conceptual guidelines and trends emerging from the reviewed literature, not as estimates that can be generalized to all armed forces.

Figure 5

An integrative model derived from the review: digital technologies, logistical capabilities, and organizational benefits



Note. Prepared by the authors based on a synthesis of the eight included studies. The figure represents a conceptual relationship derived from the review and is not a validated causal model.

CONCLUSIONS

The verifiable evidence reviewed shows that modernizing military logistics is linked to resilience, collaboration, adaptability, reverse logistics organization, and technological solutions aimed at reducing burdens or improving response. The literature review allowed us to eliminate percentages and references that lacked sufficient documentary support. Consequently, the article's contribution is formulated as a qualitative synthesis of capabilities and solutions potentially applicable to Class I supply, without attributing quantitative effects that are not supported by the available evidence.

For Class I military supply, the findings suggest implementing digital transformation gradually and in coordination with process standardization, data quality, interoperability, information security, and personnel training. Military units need specific empirical research to measure—using comparable indicators—response times, inventory accuracy, supply continuity, and resilience before and after implementing digital solutions.

REFERENCES

- Browning, M., Hoffman, M., Kroll, M., Mendoza, A., Cook, R., & Smallidge, M. (2024). 3D Printing Solutions for Contested Medical Logistics. *Military Review*, 78-87. <https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/May-June-2024/MJ-24-3D-Printing/>
- Ekström, T. (2025). Supply chain resilience - An empirical exploration of barriers and enablers in military settings. *Scandinavian Journal of Military Studies*, 8(1), 119-136. <https://doi.org/10.31374/sjms.350>
- Elvemo, L. (2025). Supply Chain Resilience in Military Operations: A Case Study Exploring Command and Control. *Scandinavian Journal of Military Studies*, 8(1), 178-199. <https://sjms.nu/articles/10.31374/sjms.356>
- Gürtlich, G., & Lampl, S. (2022). Resilience and Military Supply Chain Management. In *Supply Chain Resilience: Insights from Theory and Practice* (pp. 337-352). Springer International Publishing.
- Loska, D., Genchev, S., Rich, N., & Malik, T. (2024). Defense supply chain collaboration: An exploratory study and empirical framework. *Journal of Defense Analytics and Logistics*, 8(1), 2-37. <https://doi.org/10.1108/JDAL-10-2023-0012>
- Salazar Angulo, R., & Laguna Lozano, L. A. (2021). *Diseño de un modelo de transformación digital de los procesos centrales que permita elevar la productividad de una empresa de logística ligera de Lima, Perú* [Undergraduate Thesis, Universidad Peruana de Ciencias Aplicadas]. Repositorio Académico UPC. <https://repositorioacademico.upc.edu.pe/entities/publication/6fb65229-6858-56d0-8cc6-3b73018d2466>
- Vasiliauskas, A., Ivanauskas, S., & Čižiūnienė, K. (2024). Challenges of Ensuring Reverse Logistics in a Military Organization Using Outsourced Services. *Sustainability*, 16(11). <https://doi.org/10.3390/su16114569>