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Logistics Efficiency and Operational Resilience: Sustainable Strategies for Local Supply Chains and the Public Sector

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ABSTRACT

The search for sustainability and operational efficiency in public supply chains has driven the adoption of resilient and innovative solutions, especially in the face of crises such as pandemics and logistical disruptions. This study aimed to identify, through a systematic literature review (RSL), the main strategies that integrate logistics efficiency, sustainability and resilience in the public sector and in local chains. The methodology was based on a qualitative analysis of 20 international articles selected between 2021 and 2025, with the support of Perplexity and thematic alignment criteria. The results were organized into four categories: (i) green digitalization and public logistics hubs; (ii) operational resilience strategies in the face of crises; (iii) sustainable innovation via AI, IoT, and circular economy; and (iv) public governance and collaborative partnerships. The literature shows that such strategies, when supported by public policies, adaptive infrastructure and efficient standardization, strengthen local chains and promote positive socio-environmental impacts. It is concluded that the integration between technological innovation, state capacity and intersectoral articulation is decisive to build resilient, sustainable and effective public chains.

INTRODUCTION

The intensification of the climate, health, and social crises has pressured contemporary States to rethink their administrative practices and logistical models, especially in the public sector. The search for sustainability and resilience began to demand coordinated, adaptive, and innovation-driven state action According to Sachs (2015), sustainable development only materializes when public policies are articulated with operational efficiency, social inclusion and environmental preservation. In this scenario, public and local logistics chains become strategic not only for the provision of essential services, but also as vectors of systemic transformation in the face of multiple emergencies.

This study, entitled aims to analyze Sustainable Logistics Efficiency and Operational Resilience in the Public Sector. To this end, a qualitative methodology of Systematic Literature Review (RSL) was adopted, based on articles indexed in the Web of Science database between 2021 and 2025, filtering the most adherent to the theme based on thematic, empirical, and sectoral criteria. The investigation was conducted based on the following guiding question: "What sustainable practices and strategies have contributed to logistics efficiency and resilience in the public sector and local supply chains?".

LITERATURE REVIEW

The notion of sustainability has established itself as a collective response to the unsustainability of the linear economic model, demanding inclusive growth, social justice and clear ecological thresholds for the next generations. The classic Brundtland Report (1987) and recent revisions highlight the need to transform productive and extractive systems, realigning institutions and governments to the climate and equity agenda, going beyond simple economic efficiency (Santos *et al.,* 2025).

The circular economy emerges as an alternative paradigm, offering a model of closed resource loops, recycling, remanufacturing, and life cycle extension, as opposed to "extract-make-dispose". This transformation requires both regulatory innovation and technological and cultural disruptions (Kirchherr *et al.,* 2018; Santos *et al.,* 2025).

The discussion on institutional sustainability is not detached from its environmental, economic and social dimensions; researchers point out that the success of circular models depends on the incorporation of clear metrics, multisectoral governance, and policies that promote inclusion and regional equity (Ghisellini *et al.,* 2016; Silva *et al.,* 2024).

Given the urgency of the multifaceted crises (climate, health, social), the contemporary State is increasingly required to play a leading role in both regulation and transversal coordination between sectors, boosting public budgets that promote integration between health, environment, infrastructure, and inclusion policies (Lavarda *et al.,* 2017; Silva *et al.,* 2024).

Cross-cutting agendas in public budgeting have become essential to develop flexible responses, especially in contexts of multiple crises. Studies show that only robust governance structures, with budgetary flexibility

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and intersectoral articulation, enhance the social and environmental impact of public policies (Silva *et al.,* 2024; Peters, 2015).

The public policy literature emphasizes that integrated approaches maximize positive impacts, avoiding overlapping efforts and achieving greater efficiency in the use of resources, a central argument for complex transformations in logistics, education, and health (Rezende, 2019; Araújo & Figueiredo, 2018).

The integration of budgetary instruments and long-term policies allows the State to act as an inducer of development, transforming fragmented sectoral issues into comprehensive and lasting solutions to public problems (Afonso, 2010).

In the field of institutional innovation, the role of normative arrangements and coercive isomorphisms stands out (DiMaggio & Powell, 1983). Institutional theory shows that sustainability practices and robust environmental governance only emerge effectively when legal and normative pressures are converted into real institutional capacities, and not just symbolic responses (Viana *et al.,* 2025).

Recent research on public supply chains shows that resilience depends on prioritizing attributes such as agility, speed, and operational visibility, which are essential for adapting to disruptions and for the efficiency of sensitive logistics processes. A national study showed that these factors are the most relevant for university pharmacies, while practices such as risk management culture and knowledge also stood out for their positive influence on organizational adaptation. The structured evaluation of these elements highlights challenges in the full implementation of certain control mechanisms, especially in regulated environments with high sanitary requirements. Thus, it contributes to the theoretical and practical understanding of logistics resilience in the public sector, supporting recommendations for managers in contexts of vulnerability and uncertainty (Freitas *et al.*, 2024).

The international literature connects these pressures and arrangements to the adoption of environmental standards, ESG registries, certification systems, and environmental audits, whose substantive effects depend on regulatory enforcement and local adaptive synergies (Chen *et al.,* 2025; de Gier *et al.,* 2025).

In turn, researchers argue that dense institutional governance structures and transnational networks optimize the transformative potential of environmental and logistical regulations, especially in countries or regions with a history of institutional fragility (Viana *et al.,* 2025; Kahupi *et al.,* 2024).

Green technological innovation, catalyzed by renewable energies, digitalization, the Internet of Things, blockchain, and cyber-physical systems, has revolutionized productive and service sectors, creating the conditions for more efficient and traceable logistics chains (Santos *et al.,* 2025; Song *et al.*, 2024).

IoT and blockchain, in particular, are pointed out as core technologies for traceability, automation, waste management, and circularity of supply chains, increasing transparency, mitigating losses, and reducing emissions, a precondition for sustainable logistics efficiency (Shoaib *et al.,* 2025).

The debate on public digitalization and its integration with local chains is reinforced by analyses that demonstrate the importance of regulatory support and investment in capacity building and infrastructure to ensure that frontier technologies translate into effective social and environmental outcomes (Wang & Yu, 2024; Chen *et al.,* 2024).

Technological circular economy is reiterated as promising, but faces challenges from greenwashing, difficulty in assessing real impact, and possible widening of inequalities in the absence of robust regulatory metrics and policies (Santos *et al.,* 2025; Blomsma & Brennan, 2017).

Interdisciplinary studies highlight that the transition process to more circular systems requires not only technological innovation, but also cultural change, organizational redesign, and inclusion of vulnerable local agents, combining environmental and social indicators (Hartley, Baldassarre, & Kirchherr, 2024).

Empirically, experiences of intersectoral budget integration and adaptive policies have promoted greater flexibility and resilience, optimizing resources and reconfiguring local chains for sustainability, especially in the face of uncertain scenarios, such as pandemics and economic crises (Silva *et al.,* 2024; Rausch, 2021).

The international literature reinforces that public logistics hubs, national platforms, and policies to encourage adaptive infrastructure are key to promoting efficiency, resilience, and positive externalities in urban and regional chains (Li & An, 2025; Wang & Yu, 2024).

Recent discussions point out that digitalization, combined with public policies to encourage and territorial integration, contributes to overcoming historical asymmetries, promoting transparency, and strengthening links between public authorities and civil society (Yang *et al.,* 2025).

Sustainability and logistical resilience, in public or community environments, are conditioned by the institutional capacity to promote multi-scale arrangements and collaborative networks, articulating stakeholders in processes of solution and joint innovation (Haque *et al.,* 2025; Shoaib *et al.,* 2025).

MATERIALS AND METHODS

The present research adopts a qualitative and descriptive approach through a Systematic Literature Review (RSL), with the objective of mapping and analyzing sustainable practices and strategies aimed at logistics efficiency and operational resilience in the public sector and local supply chains.

Data collection was carried out in the Web of Science database, using the Boolean terms: "logistics efficiency" OR "supply chain efficiency" OR "logistics performance" AND "resilience" AND "sustainability" AND "public sector", resulting in 1,335 articles initially. The following filters were applied: open access, period from 2021 to 2025, and document type "review article", reducing the

corpus to 79 articles.

Then, an analytical reading of titles, abstracts and keywords was carried out. The 20 articles most aligned with the theme were selected based on criteria of thematic adherence, approach applied to the public sector, and potential for practical contribution to resilient and sustainable logistics policies.

The selected articles were organized into four thematic categories, emerging from the content analysis: (1) Green Efficiency and Digitalization in Public and Urban Logistics, (2) Operational Resilience and Disruption/ Crisis Strategies, (3) Sustainable Innovation and Artificial Intelligence in the Public Sector, (4) Governance, Integrated Local Chains and Public-Private Partnerships. challenges and opportunities in local logistics chains.

RESULTS AND DISCUSSION

The analysis of the 20 empirical studies most aligned with the theme revealed four central categories for advancing logistics efficiency, resilience and sustainability in public administration and local chains: (1) Green Efficiency and Digitalization in Public and Urban Logistics, (2) Operational Resilience and Disruption/Crisis Strategies, (3) Sustainable Innovation and Artificial Intelligence in the Public Sector, and (4) Governance, Integrated Local Chains and Public-Private Partnerships. The results of these articles demonstrate distinct and complementary paths for the modernization of public supply chains, each providing methods, evidence, and practical lessons triangulated with state-of-the-art foundations.

Green Efficiency and Digitalization in Public and Urban Logistics

The adoption of green logistics strategies and digitalization processes has shown robust impact on optimizing flows, reducing costs, and elevating environmental and social control in public and urban operations (Chen *et al.,* 2024). These results dialogue with the framework that points to the circular economy and technology as essential paths for a new logistics paradigm, where innovative policies, interoperability between systems, and government incentives enable cleaner and more sustainable practices (Kirchherr *et al.,* 2018; Santos *et al.,* 2025). A study on national hubs reinforces that such public infrastructures must be accompanied by integrated planning to expand positive externalities and efficiency gains, in line with the theoretical recommendations that only institutional synergies, multisectoral governance, and environmental metrics guarantee perennial results (Li *et al.,* 2025; Ghisellini *et al.,* 2016; Silva *et al.,* 2024).

Operational Resilience and Disruption/Crisis Strategies

The operational robustness of public chains depends on adaptable systems, anticipation capabilities and integration of technical knowledge. The study of perishable fruit and vegetable frameworks showed that resilience depends directly on the structure of the network, the redundancy of suppliers, and the use of real-time information for flow replanning (Haque *et al.,* 2025).

Results on supply chains and regional e-commerce indicate that resilience in the face of disruptions requires digital mechanisms for anticipating demand, continuous monitoring, and channel diversification, an increasingly common strategy in modernizing policies (Yuan *et al.,* 2024). Quantitative frameworks applied to university pharmaceutical systems show that elements such as agility, operational speed, and visibility are critical to mitigate the impacts of disruptions, in addition to promoting rapid learning in public networks (Freitas *et al.*, 2024).

Studies focused on the agri-food sector and urban chains demonstrate that operational resilience is enhanced by risk management strategies and self-interested collaboration, highlighting the need for integration between contingency planning and robust public policies (Mu *et al.,* 2025).

Sustainable Innovation and Artificial Intelligence in the Public Sector

The advancement of AI, machine learning, and digital twins in the public sector has transformed operational routines and the management of sustainability policies. Practical results show that AI-based predictive models increase efficiency, automation of decision-making processes, and the responsible use of public resources, especially in risk- and volatility-sensitive sectors (Saen *et al.*., 2024).

The advanced digitalization of logistics processes has made it possible to integrate regional and federal operations, increasing the accuracy, analytical speed, and alignment of public actions with SDG demands, as pointed out in empirical reviews and case studies (Chen *et al.*, 2024).

Experiences with digital twin integration and circular economy have reinforced the role of innovative digital platforms in supporting public and regional logistics operations, contributing to smart cities and customized sustainability solutions (Shoaib *et al.,* 2025).

Inventory automation and monitoring, the use of sensors, and IoT control have demonstrated a direct impact on the sustainability and logistics efficiency of cities, reducing waste, increasing operational safety, and enhancing collaborative practices between different public agencies (Turskis & Sniokiene, 2024).

Governance, Integrated Local Chains and Public-Private Partnerships

Empirical results show that the strengthening of governance arrangements, adoption of PPPs and budget integration are critical factors for the success and sustainability of regional public chains. The use of hub benchmarking and multi-criteria decision models has made it possible to improve resource allocation, institutional transparency, and decision efficiency in logistics infrastructure (Mishra, 2025).

Frameworks for public policy evaluation and concession analysis show that collaborative environments, institutional transparency, and participatory governance structures make it possible to overcome regulatory

barriers, strengthen the culture of accountability, and attract managerial innovation to the local sector (Wang *et al.,* 2025).

The impact assessment of public logistics hubs using DEA methods revealed significant advances in performance, cost reduction, and effectiveness of institutionalized partnerships, reinforcing the need for data-driven public policies and multisectoral integration for resilient chains (Jinor & Bridgelall, 2024).

The study of the role of PPPs in infrastructure and public logistics highlights that synergies between public and private agents are fundamental for efficiency gains, consolidation of technical skills and generation of social value in long-term projects, especially in critical areas such as sanitation and health (Bhilat *et al.,* 2024).

CONCLUSIONS

This study aimed to map and analyze contemporary strategies that integrate sustainability, innovation, and logistical resilience in the public sector and local chains, with a focus on operational efficiency and institutional strengthening in the face of disruptions and crises. The research, anchored in a Systematic Literature Review (RSL) for the period from 2021 to 2025, aimed to answer the guiding question: "what are the main practices and strategies that integrate logistics efficiency, sustainability, and resilience in the public sector and local supply chains?"

The results of the RSL showed four recurrent and interdependent macrocategories: (i) the search for green efficiency and digitalization of urban and public logistics, with emphasis on national hubs and smart technologies; (ii) the emphasis on operational resilience and adaptability in the face of crises, especially pandemics and trade disruptions; (iii) the advancement of sustainable innovation, with the integration of artificial intelligence, blockchain, circular economy, and digital twins; and (iv) the role of regional governance, intersectoral integration and public-private partnerships (PPPs) as catalysts for efficiency and inclusion. Evidence shows that the integration between technology, public policies, and regional coordination mechanisms is the central link to build more robust and sustainable chains.

In view of this, it is concluded that recent literature offers solid subsidies to affirm that sustainable logistics efficiency in the public sector depends on a systemic approach, which combines green technological innovation, integrated governance, flexible budgets and adaptive institutional capacities. The answer to the guiding question is positive: there are viable and replicable practices and strategies that articulate efficiency, sustainability, and resilience in public and local chains but their success requires regulatory enforcement, inclusion of local stakeholders, and continuous government capacity for networking.

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