Supply Chain Performance Measurement Using the SCOR Model in a Public University Logistics Division

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ABSTRACT

In public-sector organizations, effective supply chain management is crucial to ensure operational efficiency and service reliability. Vendor performance and trust are key determinants of procurement success, yet systematic evaluations in higher education institutions remain limited. This study aims to measure supply chain performance in a public organization using the Supply Chain Operations Reference (SCOR) model, with vendor reliability serving as a proxy for supplier trust. A quantitative descriptive approach was employed, using secondary procurement data of consumable goods collected from the Logistics Division of Universitas Padjadjaran over 2022–2024. Performance indicators included on-time delivery, number of purchase orders, contract value, and annual reliability trends, which were aggregated into key performance indicators to assess vendor consistency and operational reliability. The results show that most vendors achieved on-time completion rates above 95 percent, reflecting very high operational reliability and stable service performance. Longitudinal analysis indicates a consistent pattern of reliability, suggesting that procurement planning, contract management, and performance monitoring have been effectively implemented. These findings confirm the applicability of the SCOR framework in evaluating public-sector supply chain performance and provide evidence supporting data-driven procurement governance and continuous performance improvement in higher education institutions.

Keywords*: Logistics Management, Public Organization, SCOR Model, Supply Chain Performance, Vendor Reliability.*

INTRODUCTION

The development of distribution systems and supply chain management has undergone a significant transformation in response to the increasing complexity of modern organizational demands (Rauniyar et al., 2023; Wu et al., 2025). Distribution is no longer merely the physical movement of goods from one point to another but has become a strategic system that integrates material, information, and financial flows in a coordinated manner (Chowdhury & Sultana, 2023; Mozharovskyi & Hodz, 2024). In operations management, distribution plays a crucial role in determining service effectiveness, cost efficiency, and organizational sustainability. These challenges are further intensified by rapid digital advancements, growing public transparency requirements, and heightened expectations for timely and accurate service delivery. Consequently, digital transformation, the adoption of logistics information systems, and the application of process integration and efficiency principles are essential for organizations seeking to maintain service quality while enhancing competitiveness and accountability (Li et al., 2022; Nyangoma et al., 2024). In this context, supply chain performance measurement emerges as a strategic tool to ensure operational processes align with organizational objectives and stakeholder expectations.

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In the public sector, particularly in higher education institutions, logistics management presents unique challenges (Aithal & Maiya, 2023; Ngoc & Tien, 2023). Universities operate not only as academic institutions but also as public organizations responsible for managing large-scale resources, coordinating multiple operational units, and complying with regulatory and accountability requirements for public funds. The distribution of consumable goods such as construction materials, electrical components, cleaning supplies, and operational equipment must consistently support academic and administrative sustainability (Zhang et al., 2023; Farazi, 2024; Kandarkar & Ravi, 2024). However, empirical evidence indicates persistent fragmentation in procurement and distribution systems across units, limited data integration, and suboptimal use of information technology (Olayeye et al., 2024; Bühler et al., 2025). These issues often lead to duplicated procurement activities, budget inefficiencies, and service delays. Moreover, logistics performance measurement in public organizations remains largely ad hoc and insufficiently standardized, restricting management's ability to conduct objective evaluations and implement continuous improvement. This highlights the urgent need for a systematic, structured, and comprehensive performance measurement framework capable of capturing supply chain performance holistically (Nagariya et al., 2022; Al-Assaf et al., 2024).

Universitas Padjadjaran, through the Directorate of Asset and Infrastructure Management (*Direktorat Pengelolaan Aset dan Prasarana*/DPASP), is committed to delivering efficient, transparent, and user-oriented logistics services, aiming for zero complaints. This commitment is operationalized through strengthened standard operating procedures, integrated inventory information systems, enhanced human resource capacity, and continuous performance monitoring and evaluation. Internal data indicate that procurement and distribution of consumable goods occur frequently and involve hundreds of routine and program-based items. Nevertheless, challenges remain, including uneven distribution performance, fluctuating demand patterns, and coordination constraints among organizational units, necessitating more systematic control mechanisms. In this context, establishing measurable Key Performance Indicators (KPI) is critical to support evidence-based decision-making rather than intuition-driven managerial judgments. Applying a scientific approach to performance measurement is expected to strengthen logistics governance and optimize the use of public budgets.

The Supply Chain Operations Reference (SCOR) model is widely recognized as a relevant framework for addressing these challenges, providing standardized process structures, performance attributes, and measurement metrics. The five core SCOR dimensions' reliability, responsiveness, agility, cost, and asset management enable organizations to assess supply chain performance comprehensively, covering fulfillment consistency, service responsiveness, adaptability to demand variability, cost efficiency, and effective asset utilization. In this study, the SCOR framework is integrated with a quantitative approach to ensure objective and measurable performance assessment, allowing each indicator to be benchmarked against predefined targets and standards. By mapping the plan, source, make, deliver, and return processes, DPASP logistics performance can be systematically analyzed, identifying priority improvement areas that directly impact public service quality within the university (James et al., 2025).

This study aims to contribute both theoretically and practically. Academically, it enriches the literature on operations management and supply chain performance measurement in the public sector. Managerially, the findings are expected to assist logistics managers in formulating evidence-based policies, designing process improvement strategies, and fostering a performance- and data-driven organizational culture. Ultimately, this research seeks to support the development of a more efficient, adaptive, transparent, and accountable university logistics system, while also serving as a reference for other public institutions facing similar supply chain governance challenges.

LITERATURE REVIEW

SCOR-Based Supply Chain Performance Framework in Public Sector Logistics

Operations management focuses on the design, management, and control of transformation processes that convert inputs into outputs effectively and efficiently (Nazara et al., 2024; Jackson et al., 2024). Within logistics systems, distribution is no longer viewed merely as the physical movement of goods, but as a strategic process that determines service timeliness, cost efficiency, service quality, and organizational sustainability. In public organizations, operational efficiency must be aligned with transparency, accountability, and regulatory compliance. Empirical evidence from internal institutional documents indicates that logistics management in the Logistics Division of DPASP at Universitas Padjadjaran continues to face challenges related to fragmented data and processes, suboptimal coordination among organizational units, and limited use of standardized performance indicators. These conditions increase the risks of procurement duplication, delivery delays, and budget inefficiencies, highlighting the need for an objective, structured, and sustainable performance measurement system.

Supply Chain Management (SCM) represents an integrated approach to managing material, information, and financial flows from suppliers to end users to achieve superior operational performance (Salah et al., 2023; Kristanti et al., 2023; Anwar et al., 2025). In the DPASP context, SCM includes demand planning, procurement, inventory management, and the distribution of consumable goods, all of which require effective coordination. The Supply Chain Operations Reference (SCOR) model is adopted as the main performance measurement framework because it provides standardized process structures, plan, source, make, deliver, and return, and key performance attributes, namely reliability, responsiveness, agility, cost, and asset management. SCOR enables the systematic derivation of Key Performance Indicators (KPI) from strategic to operational levels, supporting quantitative and comparable performance evaluation in public-sector logistics (Hadiwantoro & Nugroho, 2025).

Conceptually, this study positions the five SCOR dimensions as independent variables influencing supply chain management performance as the dependent variable. Reliability reflects consistency and accuracy in order fulfillment, responsiveness captures the speed of organizational response to user needs, agility represents adaptability to demand variability and disruptions, cost measures efficiency in public resource utilization, and asset management evaluates the effectiveness of inventory and logistics infrastructure use. Together, these dimensions provide a comprehensive representation of SCM performance and form a robust basis for systematic evaluation and continuous improvement within public organizations.

Vendor Trust and Reliability in Public Procurement Performance

Vendor trust is a critical determinant of sustainable supply chain performance in public organizations, where accountability, service reliability, and regulatory compliance are central to procurement governance (Baah et al., 2022). Within the Logistics Division of DPASP at Universitas Padjadjaran, procurement activities begin with the submission of Purchase Orders (PO) based on operational needs from organizational units. This process is followed by vendor selection in accordance with public procurement regulations. Effective early-stage planning covering demand forecasting, technical specifications, and time and cost estimation plays a vital role in minimizing implementation deviations. The quality of this planning phase establishes contractual clarity and performance expectations, which in turn shape institutional trust between the organization and its vendors.

During the contract execution phase, vendors are required to comply with agreed technical specifications, delivery schedules, and quality standards. Within the SCOR framework, the reliability dimension emphasizes consistency in on-time and accurate order fulfillment as a primary indicator of supplier performance. Empirical procurement data for consumable goods indicate that most procurement packages are completed within contractual timeframes, as reflected by high on-time delivery rates. This level of

performance demonstrates strong operational reliability among vendors, contributing to stable material flows, reduced service disruptions, and reinforced institutional confidence in vendor capabilities (Rajabian et al., 2024).

The handover and completion phase represents the final point for evaluating vendor performance, encompassing delivery conformity, administrative completeness, and schedule adherence. Vendor trust is empirically captured through the Vendor Reliability KPI, which integrates indicators such as the number of purchase orders, contract value, and on-time completion percentage. The results show that most vendors achieve on-time performance exceeding 95 percent, categorized as very high reliability. The application of SCOR-based KPI provides an objective, transparent, and systematic framework for supplier evaluation, supporting data-driven decision-making and strengthening supply chain performance in public-sector logistics management (Asaduzzaman et al., 2025).

RESEARCH METHODS

This study employs a descriptive quantitative research design to measure and evaluate supply chain performance within the Logistics Division of DPASP at Universitas Padjadjaran. The analysis framework is the SCOR model, which functions as a performance measurement system by mapping core business processes: plan, source, make, deliver, and return, and linking them to five key performance attributes: reliability, responsiveness, agility, cost, and asset management. SCOR was selected for its ability to provide systematic and measurable performance indicators that support transparency, accountability, and continuous improvement in public-sector organizations.

The data collection method relies on secondary data, specifically procurement records of consumable goods from 2022 to 2024, maintained by the DPASP Logistics Division. The data include Purchase Order (PO) submissions, vendor identities, contract values, procurement methods, contract duration, start and completion dates, and handover dates. These records are operationalized into quantitative indicators to evaluate vendor and supplier performance, with primary emphasis on the reliability dimension, represented by a vendor's ability to fulfill contractual commitments on time. The research population consists of all vendors involved in consumable goods procurement during the observation period, encompassing hundreds of routine and program-based items. Each procurement package is individually analyzed to assess on-time delivery, which serves as the primary indicator of vendor reliability. A procurement package is classified as on time if the actual completion date is equal to or earlier than the contractual target date.

The data analysis procedure involves three main stages. The first stage is SCOR process mapping, aligning internal procurement flows with SCOR categories: PO submission as part of plan, vendor selection and contract issuance as Source, contract execution and goods/service delivery as Deliver (and partially make), and handover and administrative closure as Return. The second stage focuses on deriving the reliability KPI, using the percentage of on-time completion to operationalize vendor trust and reliability. The third stage includes data processing, aggregation, and interpretation. Reliability indicators are aggregated at both the vendor and annual levels (2022, 2023, 2024) and normalized on a 0–100 scale to ensure indicator comparability and to construct composite performance indices. This normalization procedure follows SCOR methodological standards, converting raw operational data into standardized performance scores for benchmarking and prioritization of improvement initiatives. Through this design, the study produces quantitative outputs on vendor reliability, which can be integrated into a broader SCOR-based evaluation of supply chain performance in public organizations. This approach enables objective, systematic, and evidence-based analysis, supporting managerial decision-making that is transparent, accountable, and focused on continuous performance improvement.

RESULTS

The dataset used in this study is derived from procurement records of consumable goods managed by the DPASP at Universitas Padjadjaran for the 2022–2024 period. The

dataset contains key attributes, including procurement package name, Purchase Order (PO) number, vendor name, contract value, procurement method, contract duration, contract start date, contract end date, and actual completion or handover date. The unit of observation in this study is the procurement package PO, whereas the unit of analysis is the vendor or supplier. Historical data indicate that procurement activities are routine and repetitive, with considerable variation in contract duration and contract value. This heterogeneity provides a representative empirical basis for evaluating vendor reliability quantitatively, particularly within the reliability dimension of the SCOR framework. The diversity of procurement characteristics enhances the robustness of performance assessment by capturing operational variability across vendors and contract types.

Table 1. Characteristics Matrix of Consumer Goods Procurement Data

Year	Number of PO	Number of Vendors	Total Contract Value (IDR)	Average Duration (Days)	On-Time (%)
2022	37	27	6,429,522,500.00	20.2	100.0
2023	44	30	5,761,132,025.76	28.5	100.0
2024	26	18	4,974,153,631.01	37.5	100.0

Based on Table 1, the characteristics matrix indicates variation in the number of procurement packages and participating vendors throughout the observation period. In 2022, 37 procurement packages were recorded involving 27 vendors, with a total contract value of IDR 6.43 billion and an average execution duration of 20.2 days. In 2023, the number of packages increased to 44 involving 30 vendors, although the total contract value declined to IDR 5.76 billion, and the average duration increased to 28.5 days. In 2024, procurement activity decreased to 26 packages involving 18 vendors, while the average execution duration further increased to 37.5 days, indicating higher task complexity and administrative intensity. Across all years, on-time completion rates reached 100 percent, reflecting a very high level of vendor reliability in fulfilling contractual commitments. These characteristics validate the suitability of the reliability dimension as a core indicator for supply chain performance assessment.

Vendor trust is measured using the On-Time Delivery indicator, defined as the comparison between actual completion dates and contractual deadlines. A procurement package is classified as on time when the actual completion date is equal to or earlier than the contractual target date. Vendor trust levels are calculated as the percentage of on-time packages relative to the total number of packages executed by each vendor during the observation period. The results demonstrate that most vendors exhibit high punctuality levels, with the majority achieving on-time performance equal to or exceeding 95 percent, which is classified as very high reliability. This finding indicates that vendors consistently fulfill contractual obligations, thereby minimizing the risk of delivery delays and operational service disruptions within the logistics system. In addition, analysis of the number of PO and total contract values suggests that vendors with higher transaction volumes are able to maintain stable punctuality levels. This result implies that vendor reliability is not solely determined by transaction scale but is also influenced by operational capability, process maturity, and internal control mechanisms.

Table 2. Measurement of Vendor Trust

Vendor Name	Number of PO	Total Contract Value (IDR)	On-Time (%)	Reliability Category
AZHAR RAKA NAZIFA CV	2	467,447,500	100	Very High
CV Bentang Haruman	1	382,000,000	100	Very High
CV Fajar Jaya Semesta	2	477,143,500	100	Very High
CV Izda Prima	1	226,150,000	100	Very High
CV Roza Alifa Abadi	1	47,800,000	100	Very High
Citresna Nu Asih, CV	3	91,593,000	100	Very High
Dipa Nangga Buana, CV	1	118,434,000	100	Very High
Diva Nusantara, CV	1	59,461,000	100	Very High
Eka Mulya, CV	1	214,430,000	100	Very High

Vendor Name	Number of PO	Total Contract Value (IDR)	On-Time (%)	Reliability Category
Erga Jaya, CV	1	86,000,000	100	Very High

Table 2 shows that all vendors studied demonstrated a very high level of reliability, with an on-time delivery percentage of 100%. This indicates that all vendors were able to complete contracts on time or ahead of the specified deadline, thus consistently fulfilling contractual commitments. The number of PO handled by each vendor varied, ranging from one to three PO, while the total contract value per vendor also varied, ranging from IDR 47,800,000 to IDR 477,143,500, indicating that both small and large-scale projects can be managed in a timely manner. Considering this consistent on-time completion, all vendors were classified in the "Very High" category for reliability. These findings confirm that the contract management and performance monitoring mechanisms in the Logistics Division of DPASP, Universitas Padjajaran, have been running effectively, resulting in high stability and consistency in vendor performance. These results also indicate that the level of trust in vendors, as a proxy for reliability, is at an optimal level, supporting the smooth operation of procurement and distribution of consumables within the university environment.

A longitudinal analysis was conducted to examine the stability of vendor performance over time. The results indicate that on-time delivery percentages remain consistently high across the three-year period, with only minor fluctuations and no statistically meaningful downward trend. This stability suggests that procurement planning, contract management, and vendor monitoring mechanisms have been effectively institutionalized within the organization. From a supply chain perspective, consistent reliability strengthens the performance of upstream and downstream processes, particularly in enhancing planning accuracy and distribution responsiveness. High reliability also reduces uncertainty in inventory control and scheduling activities, thereby contributing to operational stability.

High levels of vendor trust directly contribute to the overall performance of the Logistics Division's supply chain. Reliable supplier performance reduces the likelihood of stock-outs, minimizes the need for excessive buffer inventory, and enhances service satisfaction among internal users. Within the SCOR framework, strong reliability performance stabilizes the Plan and Deliver processes while improving resource utilization efficiency. From a managerial perspective, these findings provide a quantitative basis for implementing performance-based procurement policies, such as prioritizing high-performing vendors, strengthening Service Level Agreement (SLA) mechanisms, and integrating supplier reliability indicators into annual performance evaluations. A data-driven approach enhances transparency, objectivity, and continuous improvement in public procurement governance.

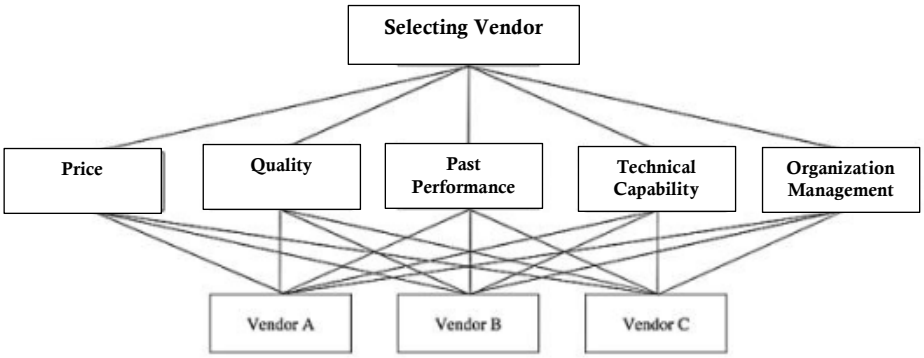

Figure 1. Vendor Selection Mechanism Flowchart

Figure 1 shows a multi-criteria vendor selection model. The process begins with the primary objective of selecting a vendor, which is then evaluated using five criteria: price,

quality, past performance, technical capability, and organizational management. Each criterion is used to evaluate all alternative vendors (vendor A, vendor B, and vendor C), ensuring a comprehensive and objective selection based on various performance aspects.

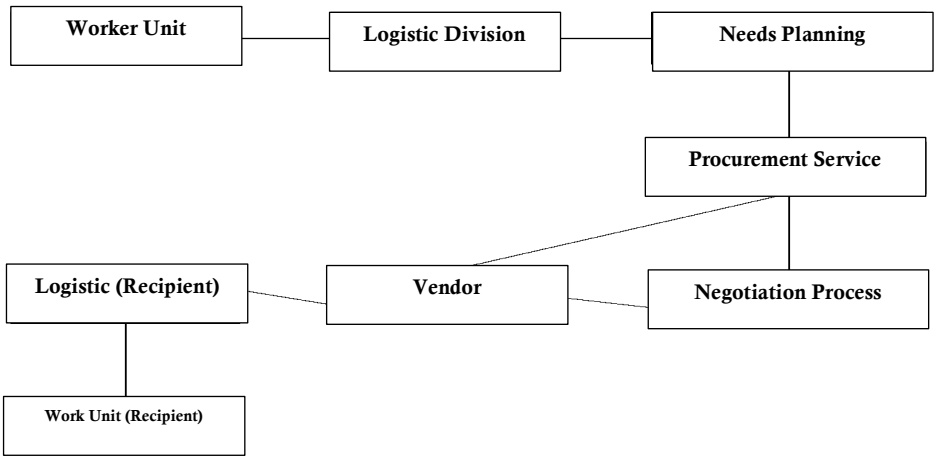

Figure 2. Logistics Requirements Submission Flow

Figure 2 illustrates the logistics and procurement process flow involving various work units and vendors. The process begins with the worker unit submitting a request, which is then forwarded to the logistics division for needs planning. The planned needs are then processed through the procurement service, including the negotiation process with the vendor. Once an agreement is reached, the goods or services are distributed to the logistics (recipient) and finally delivered to the work unit (requester) as the end user.

DISCUSSION

This discussion examines the extent to which the SCOR framework (plan–source–make–deliver–return) can be effectively applied within public institutions, particularly universities, to address persistent challenges such as fragmented logistics processes, limited data integration, and non-standardized performance measurement practices. Although SCOR was originally developed for industrial and manufacturing contexts, the findings of this study demonstrate its flexibility and applicability in public-sector environments characterized by bureaucratic procedures, regulatory constraints, and strong accountability requirements (Sienkiewicz-Małyjurek et al., 2024; Silva & Crispim, 2025). The adaptability of SCOR enables the alignment of operational activities with standardized process categories and measurable performance attributes, thereby improving transparency and comparability across organizational units (Rezaei et al., 2023; Tegbar et al., 2024). However, the application of SCOR in higher education institutions requires contextual adjustments, including the reinterpretation of process terminology, customization of performance indicators, and alignment with public procurement regulations (Sultana, 2022; Abbasi et al., 2025). These adaptations enhance the model's capacity to represent the complexity of public-sector logistics governance while preserving methodological rigor and analytical consistency.

The findings highlight reliability as a critical dimension for assessing vendor trust, operationalized through quantitative indicators such as on-time delivery, number of purchase orders, and contract value. Empirical results indicate that most vendors achieve on-time performance levels exceeding 95 percent, placing them within the very high reliability category. This level of consistency reflects vendors' strong capability to fulfill contractual commitments and maintain service continuity. High vendor reliability holds strategic significance in reducing delivery risks, enhancing internal service stability, and strengthening performance-based procurement governance. From a supply chain perspective, reliable supplier performance supports planning accuracy, reduces

operational uncertainty, and facilitates downstream process coordination (Khanuja & Jain, 2022; Akam et al., 2023; Seidu et al., 2024). The discussion further emphasizes that reliability-based evaluation provides an objective foundation for supplier selection, contract renewal, and partnership development in public-sector logistics management (Sandu et al., 2023; Karim & Talukder, 2024; Lin et al., 2025). Nevertheless, while reliability serves as a robust proxy for vendor trust, it may not fully capture qualitative dimensions such as flexibility, responsiveness to urgent demands, innovation capability, and communication effectiveness (Jiang et al., 2024). Therefore, future performance evaluation systems should integrate complementary indicators to provide a more holistic representation of supplier trust and partnership quality.

The analysis of procurement data from 2022 to 2024 reveals fluctuations in the number of purchase orders and participating vendors, variations in contract values, increasing execution duration, and consistently high on-time completion rates. The increase in average execution duration may reflect higher task complexity, more detailed technical specifications, and expanded administrative requirements in public procurement processes. Despite these complexities, the sustained punctuality of vendor performance indicates the effectiveness of contract control mechanisms and monitoring systems. From a managerial perspective, these trends suggest the importance of strengthening demand forecasting accuracy, optimizing procurement scheduling, and improving inter-unit coordination to mitigate administrative bottlenecks (Raj, 2025). Stable reliability performance also provides an opportunity to rationalize inventory policies, reduce excessive safety stock, and enhance resource allocation efficiency (Esan et al., 2024; Nathanael et al., 2025). These insights reinforce the strategic value of empirical performance data in supporting evidence-based logistics governance.

CONCLUSION

This study concludes that the implementation of the SCOR model provides a systematic, measurable, and contextually appropriate framework for evaluating logistics performance in public organizations, particularly higher education institutions. The mapping of plan–source–make–deliver–return processes and the use of data-driven performance indicators enhance evaluation transparency, strengthen operational accountability, and support evidence-based decision-making. The empirical findings further indicate that reliability, reflected through consistent on-time completion, serves as a proxy for vendor trust and contributes directly to service stability and the effectiveness of procurement governance.

The findings imply that the SCOR framework can function as an operational and practical performance evaluation tool within the public sector, especially in environments where data availability and measurability are key considerations. However, several limitations must be acknowledged. The reliance on secondary administrative data may introduce recording bias and provide limited insight into operational dynamics such as product quality, vendor flexibility, and internal user satisfaction. In addition, the performance measurement focuses primarily on a single SCOR dimension, reliability, thereby restricting a comprehensive assessment of supply chain performance across other dimensions, including responsiveness, agility, cost efficiency, and asset management. Furthermore, the descriptive research design limits the ability to draw strong causal inferences. Based on these limitations, future research is recommended to expand supply chain performance measurement by incorporating all SCOR dimensions and integrating quantitative indicators with qualitative approaches, such as user satisfaction surveys, process audits, and stakeholder interviews. The application of inferential statistical techniques or structural modeling is also suggested to examine causal relationships. Moreover, the development of digital performance dashboards and cross-unit data integration platforms is recommended to ensure that performance measurements become more operational, actionable, and sustainable in public sector logistics management.

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