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THE ROLE OF ERP-INTEGRATED DECISION SUPPORT SYSTEMS IN ENHANCING EFFICIENCY AND COORDINATION IN HEALTHCARE LOGISTICS: A QUANTITATIVE STUDY

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Abstract

This study addresses a logistics problem: ERP platforms integrate transactions, yet limited decision support can keep ordering and exception handling inconsistent, weakening coordination and efficiency. The purpose was to test whether ERP integrated Decision Support System capability (ERP-DSS capability) improves logistics coordination and logistics efficiency, and whether coordination contributes to efficiency beyond ERP-DSS capability. Using a quantitative cross-sectional, case-based design in an ERP case, survey data were collected from 220 ERP users (mean experience 5.37 years). Key variables were ERP-DSS capability, logistics coordination, and logistics efficiency; means were slightly above midpoint ($M = 3.16$, 3.16, and 3.18) and reliability was strong ($\alpha = .84$ to .87). Analyses used descriptive statistics, Pearson correlations, and multiple linear regression with experience and ERP training as controls. ERP-DSS capability related positively to coordination ($r = .55$, $p < .001$) and efficiency ($r = .46$, $p < .001$), and coordination related to efficiency ($r = .44$, $p < .001$). In regression, ERP-DSS capability predicted coordination ($b = 0.58$, $\beta = .55$, $R^2 = .316$) and efficiency ($b = 0.47$, $\beta = .47$, $R^2 = .219$). When both predictors entered, ERP-DSS capability ($b = 0.33$, $\beta = .32$) and coordination ($b = 0.25$, $\beta = .26$) remained significant and fit increased ($R^2 = .265$), indicating a coordination pathway alongside a direct ERP-DSS effect. Implications are that organizations should prioritize ERP-DSS features that enhance visibility, analytics, alerts, and decision rules and reinforce cross-unit workflows in enterprise and cloud ERP deployments.

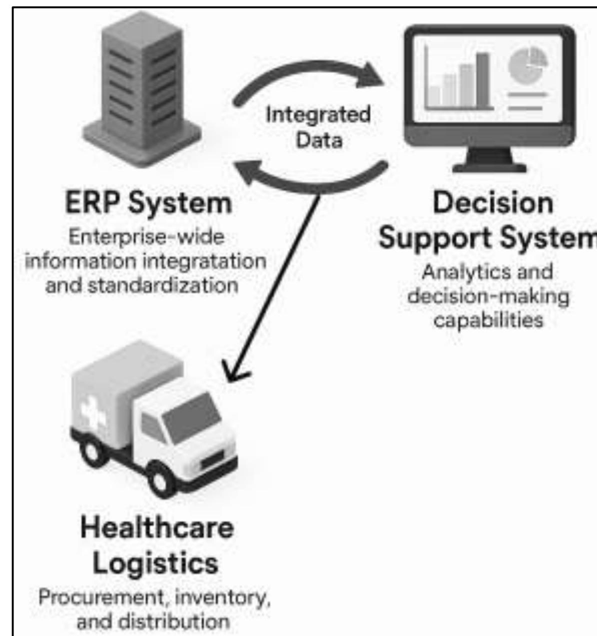
Keywords

ERP-DSS Capability; Healthcare Logistics; Logistics Coordination; Logistics Efficiency; Enterprise Decision Support Systems

INTRODUCTION

Enterprise Resource Planning (ERP) systems are commonly defined as enterprise-wide, modular information systems that integrate and standardize core business processes (e.g., procurement, inventory, finance, and distribution) through a shared database and coordinated workflows, enabling "one version of operational truth" across units and partners. In parallel, Decision Support Systems (DSS) are information systems designed to support semi-structured and unstructured managerial decisions by combining data, analytical models, and user-friendly interfaces to improve the timeliness, consistency, and quality of decisions.

Figure 1: ERP-Based Decision Support as a Coordination Mechanism in Healthcare Logistics



In healthcare logistics, these definitions carry high international significance because hospitals and health systems operate complex, high-stakes supply networks that span global manufacturers, regional distributors, and local care delivery units, where delays and errors translate into measurable impacts on cost, service continuity, and patient safety. Supply chain and logistics scholarship has consistently treated integration as a central mechanism for improving operational outcomes, with syntheses emphasizing that integrated processes and aligned information flows are core enablers of coordinated planning and execution in multi-actor networks (Power, 2005). Empirical work also supports the idea that integration is not a single activity but a multi-dimensional capability that links internal functions and external partners to improve process performance (Flynn et al., 2010). Within this view, ERP-integrated DSS can be positioned as an operational-analytic layer embedded in standardized ERP transactions, enabling more consistent forecasting, replenishment decisions, and exception handling across procurement and distribution cycles. Healthcare logistics contexts amplify the value of these capabilities because demand uncertainty, product criticality, and regulatory requirements intensify the need for accurate data capture and disciplined coordination mechanisms. Research on hospital and healthcare supply chains further frames coordination as an inter-organizational challenge that requires aligned processes and shared information to reduce fragmentation across multiple providers and suppliers (Vries & Boonstra, 2012). This conceptual foundation motivates quantitative examination of how ERP-integrated decision support capabilities relate to efficiency and coordination outcomes across healthcare logistics operations.

Healthcare logistics can be characterized as the planning, execution, and control of the flow and storage of medical products, devices, pharmaceuticals, and related information from upstream suppliers to points of care, encompassing procurement, warehousing, internal distribution, and inventory governance. In international health systems, this logistics function represents a major operational

domain where financial pressures and service expectations converge, and where coordination is required across clinical units, procurement teams, distributors, and manufacturers. Supply chain management research has long argued that performance improvements arise when organizations increase visibility and synchrony across planning and execution tasks, especially through integrated information sharing and process alignment (Power, 2005). In healthcare, this same logic is reflected in studies that discuss supply chain management practices as a way to address communication gaps, waiting times, safety risks, and integration challenges in patient-oriented service delivery (Meijboom et al., 2011). The healthcare supply chain literature also emphasizes that the sector's institutional environment, professional boundaries, and compliance obligations create conditions where coordination cannot be assumed; it must be actively engineered through governance, process design, and information systems (Arfan et al., 2021; Bhakoo & Chan, 2011). These observations align with the practical role of ERP systems as a backbone for process standardization and data integration, but they also highlight that ERP transaction integration alone does not guarantee decision quality (Jahid, 2021; Akbar & Farzana, 2021). A DSS capability embedded into ERP workflows extends the value of integration by providing analytics and decision logic on top of standardized records transforming raw operational data into actionable choices for replenishment, allocation, and prioritization. Healthcare-specific research on e-business process integration in procurement shows how multi-stakeholder settings shape digital coordination efforts and how structured system-enabled processes can stabilize procurement collaboration (Bhakoo & Choi, 2013; Reza et al., 2021; Zobayer, 2021a). In addition, work on developing lean and agile healthcare supply chains links performance improvement to disciplined flow design and responsiveness, which depend strongly on timely information and aligned decisions across internal and external actors (Aronsson et al., 2011; Ariful & Ara, 2022; Zobayer, 2021b). Together, these strands motivate studying ERP-integrated decision support not merely as "technology adoption," but as a measurable coordination-and-efficiency mechanism embedded in daily logistics execution.
ERP systems are frequently studied as enablers of cross-functional coordination because they reduce data redundancy, standardize transaction definitions, and connect workflows that otherwise operate in silos. In supply chain contexts, this role is commonly operationalized through constructs such as supply chain integration, information sharing quality, and process alignment each linked to performance outcomes in a growing empirical literature (Bhakoo et al., 2012; Arman & Kamrul, 2022; Mesbaul & Farabe, 2022). At the same time, ERP outcomes have been shown to depend on implementation and organizational conditions, which is particularly relevant in healthcare organizations where professional autonomy, compliance, and complex service lines shape system use. Evidence from healthcare and hospital ERP contexts indicates that success is influenced by management commitment, user involvement, project management discipline, process redesign alignment, and team composition factors that can be modeled quantitatively as antecedents or controls in cross-sectional designs (Garg & Agarwal, 2014; Abdur & Haider, 2022; Mushfequr & Sai Praveen, 2022). Beyond implementation, ERP's performance value is often tied to how deeply it is integrated with supply chain operations and partner-facing routines, which is where ERP-integrated DSS becomes conceptually important: decision support capabilities can translate integrated records into better planning, monitoring, and exception management routines (Mortuza & Rauf, 2022; Rakibul & Samia, 2022). Studies examining ERP's role from supply chain perspectives describe how ERP can influence supplier capabilities and performance by improving transaction accuracy, coordination cadence, and operational transparency across organizational boundaries (Abdul, 2023; Hwang & Min, 2013; Sohel et al., 2022). In hospital and healthcare supply chains, where procurement and inventory decisions frequently involve complex constraints, the operational value of ERP integration is strengthened when decision processes become consistent, measurable, and repeatable. The healthcare supply chain literature also shows that different tiers (hospitals, distributors, manufacturers) respond heterogeneously to inter-organizational system pressures, indicating that "coordination effects" may vary by actor conditions and institutional constraints (Abdulla & Zaman, 2023; Bendavid et al., 2011; Amin & Mesbaul, 2023). This supports a research framing in which coordination is treated as an outcome that can be linked statistically to ERP-integrated DSS capability measures, with hypotheses evaluated via correlation and regression while controlling for organizational and contextual variables

(Foysal & Aditya, 2023; Hamidur, 2023). Such a framing is compatible with cross-sectional quantitative case-study–based approaches because it permits testing relationships among ERP-integrated decision support constructs, coordination mechanisms, and perceived efficiency outcomes using validated measurement scales.

The primary objective of this study is to empirically examine the role of ERP-integrated Decision Support Systems in enhancing efficiency within healthcare logistics operations through a quantitative, cross-sectional, case-study–based approach. This objective is grounded in the need to move beyond conceptual discussions of system integration and toward measurable operational outcomes that reflect day-to-day logistics performance in healthcare organizations. Efficiency in this context is operationalized as the ability of healthcare logistics systems to utilize resources optimally while maintaining consistent availability of critical supplies, minimizing delays, reducing wastage, and supporting timely service delivery to clinical units. The study seeks to systematically measure how ERP-integrated decision support capabilities such as real-time data visibility, analytics-driven planning, standardized decision rules, and workflow-embedded alerts relate to perceived improvements in logistics efficiency among system users. By collecting structured survey data from logistics, procurement, inventory, and operations personnel within a defined healthcare case setting, the research aims to generate statistically reliable evidence on the strength and direction of these relationships. Descriptive statistical analysis will be used to establish baseline patterns in ERP-DSS usage and efficiency perceptions, while correlation and regression modeling will be applied to test whether variations in decision support capability are significantly associated with variations in efficiency outcomes. Through this objective, the study intends to provide a clear, data-driven assessment of whether and to what extent ERP-integrated decision support systems contribute to efficiency improvements in healthcare logistics environments characterized by complex workflows, high demand uncertainty, and stringent service requirements. A second core objective of this research is to analyze the influence of ERP-integrated Decision Support Systems on coordination across healthcare logistics functions and stakeholders. Coordination is conceptualized as the degree to which logistics-related activities, information flows, and decisions are aligned across departments, roles, and process stages within the healthcare organization. This includes coordination between procurement and inventory management, alignment between logistics and clinical units, and synchronization of replenishment, distribution, and usage planning activities. The study seeks to measure coordination as a multidimensional construct encompassing information consistency, interdepartmental communication, joint decision-making quality, and responsiveness to operational changes. By focusing on ERP-integrated decision support rather than standalone systems, the research emphasizes how embedded analytics and standardized decision routines may contribute to shared understanding and harmonized action among diverse actors. Using Likert-scale survey items, the study aims to capture user perceptions of coordination outcomes and statistically examine their relationship with ERP-DSS capabilities. Correlation analysis will identify the degree of association between decision support integration and coordination indicators, while regression modeling will assess the explanatory power of ERP-DSS capability in predicting coordination outcomes after accounting for organizational and contextual factors. This objective is intended to clarify whether ERP-integrated decision support systems function primarily as information repositories or whether they actively shape coordinated logistics behavior within healthcare settings. A third objective of the study is to evaluate the combined and comparative effects of ERP-integrated Decision Support Systems on efficiency and coordination within healthcare logistics, thereby developing a holistic understanding of system-enabled operational performance. This objective recognizes that efficiency and coordination are interrelated yet distinct dimensions of logistics performance and that improvements in one do not automatically imply improvements in the other. The study seeks to assess whether ERP-integrated decision support systems exert direct effects on both efficiency and coordination, as well as whether coordination serves as an intermediary mechanism through which decision support capabilities influence efficiency outcomes. By specifying and testing multiple regression models, the research aims to determine the relative strength of these relationships and to identify which aspects of ERP-DSS capability contribute most strongly to each outcome dimension. This objective also involves examining patterns across respondent

groups and functional roles to understand whether perceptions of system impact differ based on user responsibilities and interaction with logistics processes. Through a structured quantitative analysis, the study aims to provide a nuanced empirical account of how ERP-integrated decision support systems operate within real healthcare logistics contexts, offering statistically grounded insights into their role in shaping coordinated and efficient operations.

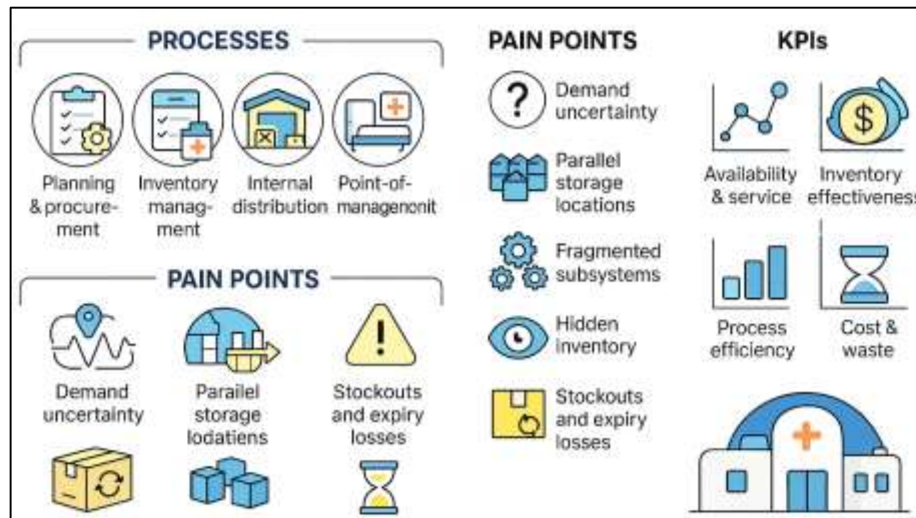
LITERATURE REVIEW

The literature review for this study synthesizes research across healthcare logistics, supply chain integration, enterprise information systems, and decision support, with the aim of building a coherent foundation for examining how ERP-integrated Decision Support Systems (ERP–DSS) relate to efficiency and coordination outcomes in healthcare logistics. Healthcare logistics has been widely recognized as a complex operational domain that connects procurement, inventory control, warehousing, internal distribution, and the availability of critical supplies at points of care, making it a central determinant of service continuity and operational performance in hospitals and health systems. Within this domain, coordination is consistently presented as a multi-actor capability that depends on aligned processes, shared information, and synchronized decisions across departments and supply partners, while efficiency is commonly treated as the ability to achieve service objectives using minimal time, cost, and resources without compromising supply availability. Information systems research positions ERP as a backbone for process integration and standardized transaction management, enabling visibility and consistency by consolidating data and workflows across organizational units. At the same time, the decision support literature frames DSS as a capability that transforms operational data into actionable guidance through analytical models, dashboards, alerts, and structured decision routines. When integrated with ERP, DSS can be conceptualized as an embedded analytic layer that enhances the value of integrated data by improving decision speed, decision consistency, and exception handling within logistics processes. Prior empirical research across supply chain contexts generally supports the proposition that higher levels of information integration and process integration are associated with improved operational performance, although outcomes often depend on organizational readiness, governance, and effective use of system capabilities. Healthcare-specific studies further highlight that the sector's regulatory requirements, professional boundaries, and demand uncertainty amplify the need for disciplined information sharing and coordinated logistics decisions, strengthening the relevance of ERP–DSS integration as an operational mechanism. Consequently, this review organizes prior work to clarify key constructs used in this study, including ERP–DSS capability dimensions, logistics efficiency indicators, and logistics coordination indicators, while also identifying gaps that justify a quantitative, cross-sectional, case-study–based investigation. The chapter therefore prepares the groundwork for developing a theoretically anchored and empirically testable conceptual framework by integrating evidence on healthcare logistics challenges, ERP-enabled integration, and DSS-supported decision quality, ultimately supporting the hypotheses and measurement strategy adopted in the methodology.

Healthcare Logistics in Hospitals

Hospital healthcare logistics refers to the coordinated set of activities required to plan, procure, store, move, and make available medical supplies, pharmaceuticals, consumables, devices, and related information across the hospital network of care units. Within this scope, logistics is not limited to purchasing; it also includes inbound receiving, warehousing, internal transport, replenishment to wards and procedure areas, point-of-use availability management, returns handling, expiry control, and documentation that supports traceability and accountability. A widely used way to structure hospital logistics is to view it as an internal supply chain with multiple echelons, where central stores, satellite storerooms, and clinical points of care must remain synchronized under strict service-level requirements.

Figure 2: Internal Hospital Logistics: Process Flow, Operational Pain Points, and KPIs



Literature on hospital material logistics shows that research frequently categorizes hospital logistics into major streams such as supply and procurement, inventory management, internal distribution and scheduling, and broader supply chain coordination mechanisms, which jointly influence cost containment and service reliability in care delivery environments (Volland et al., 2017). In addition, healthcare supply chain reviews emphasize that hospital logistics must serve heterogeneous product categories with different criticality, demand patterns, handling requirements, and regulatory constraints, creating operational complexity that is structurally different from many commercial settings (Mathur et al., 2018). From an operational viewpoint, the hospital logistics process cycle typically begins with demand recognition and requisitioning, proceeds through supplier sourcing and ordering, continues with receiving and inspection, and ends with internal distribution and consumption at clinical units. Each stage generates decisions that affect availability, waste, responsiveness, and cost, meaning that logistics performance depends on both the physical flow of materials and the quality of information flow that triggers and validates those movements.

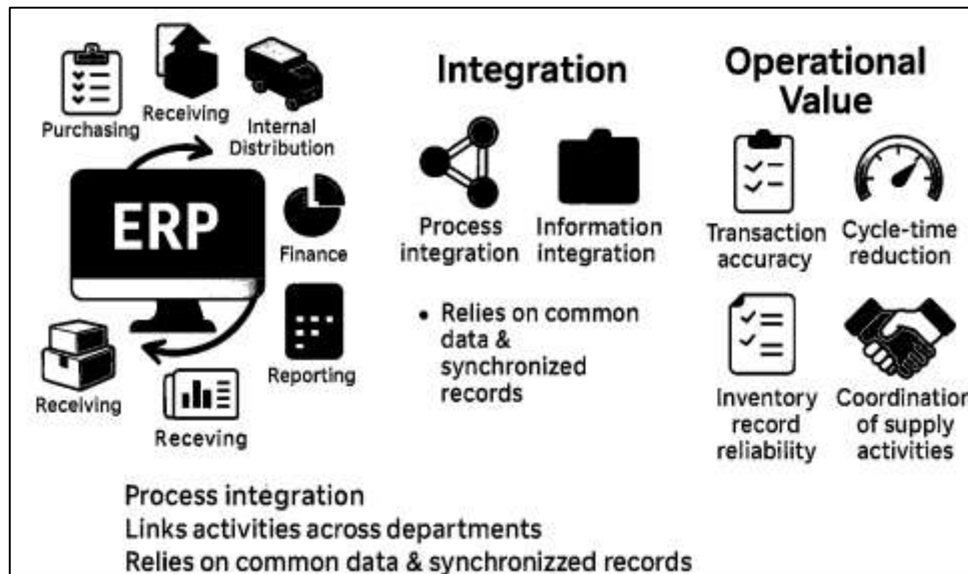
Hospitals experience recurring logistics pain points that arise from variability, fragmentation, and the need to serve high-stakes clinical operations continuously. A defining challenge is demanding uncertainty at care-unit level, which can be shaped by procedure schedules, emergency cases, physician preference variability, and patient acuity patterns that shift rapidly within short time windows. Alongside uncertainty, hospitals often face multiple parallel storage locations and replenishment routines, which increases the risk of "hidden inventory," inconsistent stock records, duplicate ordering, and uneven service levels across units. The internal logistics system also spans diverse subsystems clinical departments, procurement, stores, pharmacy, sterile services, and transport so performance depends heavily on integration and the clarity of handoffs among actors. Research that maps logistical parameters in hospitals highlights that hospitals can be studied as logistical systems where integration across subsystems is critical, and it identifies a wide range of parameters used to describe hospital logistics across patient, material, and staff flows, reinforcing that coordination cannot be assumed and must be operationalized explicitly (van der Ham et al., 2019). In addition, literature focused on measuring internal hospital supply chain performance emphasizes that internal hospital logistics includes interacting processes and multiple storage points, where inefficiencies can accumulate through handling, movement, and replenishment design choices (Moons et al., 2019). These pain points tend to manifest as stockouts of critical items, overstocking and expiry losses, delayed replenishment to wards, procurement cycle delays, excess manual work, and disputes over inventory accuracy. Operationally, these issues reduce coordination by weakening trust in shared data and by encouraging local workarounds, while they reduce efficiency by increasing transaction costs, buffer inventories, and non-value-added movement.

Performance measurement in hospital logistics is usually framed through Key Performance Indicators that monitor service reliability, speed, cost, and quality across procurement, inventory, and distribution. A core KPI family is availability and service: stockout frequency, fill rate, order completeness, and time-to-replenish towards or operating areas(Md Harun-Or-Rashid et al., 2023; Md Musfiqur & Md.Kamrul, 2023). A second KPI family is inventory effectiveness: inventory turnover, days of supply, expiry and obsolescence losses, shrinkage, and accuracy between system records and physical stock. A third family addresses process efficiency: purchase order cycle time, receiving-to-putaway time, picking accuracy, internal delivery timeliness, labor productivity, and the number of touches per item movement (Md Muzahidul & Md Mohaiminul, 2023; Md. Al Amin & Sai Praveen, 2023). A fourth family captures cost and waste: logistics cost per procedure or per patient-day, transport and handling cost, emergency purchase premiums, and waste due to over-ordering or nonstandardization. KPI selection also reflects how hospitals control inventory at the point of use, because many service failures originate at ward-level storerooms rather than central stores. Point-of-use inventory control research demonstrates that structured replenishment policies can be analyzed as operational mechanisms to stabilize availability and reduce variability in restocking and ordering behaviors (Md. Hasan & Ashraful, 2023; Md. Jobayer Ibne & Md. Kamrul, 2023; Rosales et al., 2015). In practice, hospitals often need KPI sets that connect upstream purchasing performance with downstream clinical availability outcomes, so that measurement supports cross-functional coordination rather than isolated departmental optimization. Accordingly, hospital logistics KPIs are typically most informative when they are aligned to process stages, measured consistently across units, and interpreted jointly to capture trade-offs (for example, higher availability achieved by excessive inventory).

ERP Systems in Healthcare Logistics

Enterprise Resource Planning (ERP) systems in healthcare logistics are generally positioned as integrated, modular platforms that standardize and connect end-to-end operational processes such as purchasing, receiving, stock management, internal distribution, finance, and reporting within a shared data environment (Mohammad Mushfequr & Ashraful, 2023; Pankaz Roy & Md. Kamrul, 2023). In hospital settings, ERP value is frequently discussed in terms of *process integration* the extent to which the system links activities across departments and *information integration* the extent to which users rely on common data definitions and synchronized records when making operational decisions . A key argument in the healthcare ERP literature is that hospitals operate with multiple specialized systems, professional groups, and highly interdependent workflows, which makes integration a persistent organizational challenge rather than a purely technical goal. Evidence from an early hospital case study of ERP-enabled process integration shows how embedding an electronic ordering process within an ERP environment can restructure logistics routines, improve information visibility, and reshape communication among stakeholders who previously relied on manual, fragmented ordering pathways (Shaikh & Md. Tahmid Farabe, 2023; Stefanou & Revanoglou, 2006; Zamal Haider & Hozyfa, 2023). This kind of integration is particularly relevant to logistics because ordering, replenishment, and materials movement are cross-functional by nature, linking clinical units, pharmacy, central stores, procurement, and finance. In practical terms, ERP integration can reduce duplicate data entry, harmonize catalog and item master data, and provide consistent transaction histories for purchasing and inventory decisions (Zobayer, 2023). From a logistics control perspective, ERP also introduces traceable workflows and standardized approvals that can strengthen accountability for ordering behavior and budget use. Accordingly, ERP adoption in healthcare logistics is often assessed through operational indicators such as transaction accuracy, cycle-time reduction, inventory record reliability, and the ability to coordinate supply activities across departments using shared operational information (Stefanou & Revanoglou, 2006).

Figure 3: Operational Value of ERP Integration Across Healthcare Logistics Processes



While ERP platforms are frequently presented as integration backbones, the healthcare literature also underscores that ERP performance benefits depend on fit with organizational context, user practices, and the broader information system landscape. A qualitative review focused on ERP systems in healthcare highlights that hospitals face distinctive implementation and use challenges, including complex process requirements, heavy professional segmentation, and persistent coexistence of ERP with other clinical and administrative applications that require careful interoperability planning (Kontio et al., 2014). These realities shape how ERP supports logistics, because materials management processes intersect with clinical priorities, and ERP-based standardization must coexist with unit-level operational variability. Empirical evidence from a multi-organization study examining ERP deployment in healthcare service environments suggests that ERP impacts can be observed through changes in system quality, information quality, and organizational-level outcomes that depend on how healthcare professionals perceive and engage with the platform (Ahmad et al., 2018). For logistics functions, these quality dimensions translate into whether item availability information is trusted, whether procurement and inventory reports are timely, and whether users can access consistent dashboards or records when responding to shortages and exceptions. In many hospitals, logistics execution is distributed across multiple points of use, so ERP's operational value increases when it reduces information asymmetry between central stores and clinical areas and when it supports disciplined replenishment routines that reduce ad hoc ordering. Consequently, the literature increasingly treats ERP not only as a transactional repository, but as an operational coordination mechanism that can stabilize ordering governance, standardize purchasing routines, and promote alignment between logistics and financial controls (Kontio et al., 2014).

Recent research further extends ERP discussion toward digitalization trajectories and deployment models that influence logistics integration and performance. Work examining cloud ERP adoption in healthcare through an organizational adoption lens shows that decision-making about ERP platforms is shaped by organizational conditions and stakeholder roles, implying that ERP-enabled logistics value depends on readiness, governance arrangements, and user alignment rather than software features alone (Damali et al., 2021). In parallel, healthcare supply chain digitalization scholarship proposes that hospitals need structured roadmaps that connect internal digital integration (within the hospital) and external digital integration (with partners), which directly aligns with logistics goals of visibility, coordination, and reliable execution across procurement and distribution networks (Beaulieu & Bentahar, 2021). This perspective is important for healthcare logistics because ERP platforms often serve as the central system that interfaces with suppliers, distributors, and internal departments, enabling standardized purchasing documents, shared inventory positions, and synchronized replenishment signals. In operational terms, ERP supports logistics value by enabling consistent master

data, providing audit-ready transaction records, strengthening internal controls, and making cross-department process status visible in real time or near real time. At the same time, modern healthcare ERP discussions emphasize that value realization requires embedding ERP usage into daily routines and decision workflows, especially for inventory control, exception management, and coordination of urgent requests. Therefore, the literature supports examining ERP-enabled logistics value using measurable constructs related to integration depth, information reliability, workflow standardization, and coordination quality across healthcare logistics processes, while recognizing that adoption conditions and system configuration decisions influence the magnitude and consistency of observed benefits (Damali et al., 2021).

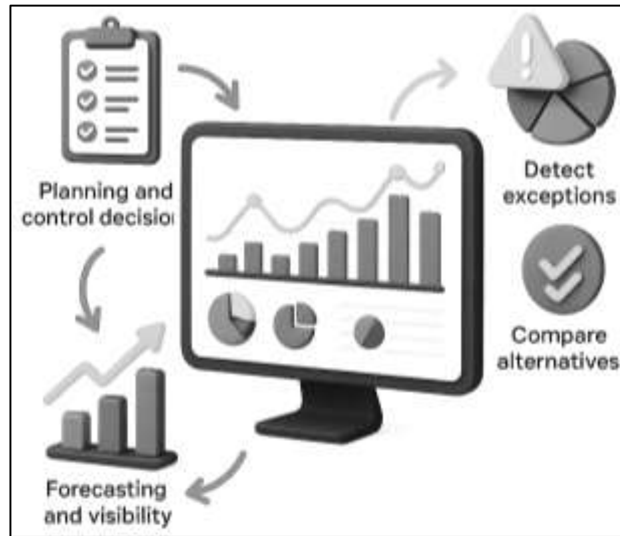
Decision Support Systems in Healthcare Supply Chains

Decision Support Systems (DSS) in healthcare logistics and supply chains can be understood as information-system capabilities that convert operational data into structured guidance for planning and control decisions across procurement, inventory, and distribution activities. In hospital settings, DSS value is closely linked to reducing decision latency, standardizing decision rules, and increasing visibility into constraints such as stock availability, supplier lead times, demand variability, and service-level targets. Practical DSS implementations commonly take the form of analytics dashboards, reporting layers, and model-driven tools that help users detect exceptions (e.g., imminent stockouts, abnormal consumption, delayed replenishment), compare alternatives (e.g., reorder timing, order quantity, substitute item selection), and document decision rationale. In parallel, business intelligence (BI) and business analytics (BA) capabilities are increasingly treated as the "decision infrastructure" that supports timely, evidence-based choices rather than isolated reporting functions. Empirical research in healthcare organizations indicates that analytics capabilities covering data aggregation, analytics, and interpretation can strengthen decision-making effectiveness by enhancing the organization's ability to absorb and utilize knowledge for operational choices (Wang & Byrd, 2017). This view is consistent with BI-focused studies that model decision support as an intermediate mechanism through which analytics investments translate into organizational benefits, reinforcing the idea that measurable decision-support capability can be linked to performance outcomes using quantitative methods (Rouhani et al., 2016). In healthcare institutions, DSS is therefore best interpreted as a combination of technical assets (data pipelines, reporting tools, models), human competencies (interpretation skills, domain knowledge), and governance routines (data quality rules, standardized KPIs, decision escalation paths). This integrated interpretation is directly relevant to healthcare logistics because hospitals require consistent and auditable decisions for replenishment, allocation, and prioritization, especially when multiple departments share responsibility for availability and cost control.

A key stream of DSS research relevant to healthcare logistics emphasizes forecasting and coherent planning across product hierarchies and organizational levels. Healthcare supply portfolios typically include thousands of items organized in nested structures (system-wide categories, specialty groupings, departments, and unit-level SKUs), and decisions made at one level must remain consistent with constraints and objectives at other levels. DSS approaches that ignore hierarchical structure risk producing forecasts that do not "add up" across aggregation levels, which can propagate mismatches between procurement plans and ward-level replenishment signals. In this context, DSS design increasingly incorporates forecasting reconciliation methods so that demand predictions remain coherent across levels and time horizons. Villegas and Pedregal (2018) demonstrate how hierarchical time-series forecasting can be framed as an essential DSS component in supply chain decision-making by generating forecasts that preserve time consistency while respecting hierarchical aggregation constraints. While this contribution is not limited to healthcare, its logic maps strongly to hospital logistics because the same "hierarchical" issue appears in clinical item families (e.g., surgical packs), pharmacy categories, and multi-site health systems where centralized procurement must align with unit-level consumption. Alongside forecasting coherence, DSS research also stresses that decision support must be embedded into routines that users trust and repeatedly apply. Evidence from a healthcare BI case study suggests that decision support technologies evolve over time, and that value is realized as the BI/DSS environment matures through iterative development, user learning, and alignment of analytics outputs with real operational questions (Safwan et al., 2016; Villegas & Pedregal,

2018). For healthcare logistics, this implies that DSS impact is unlikely to be purely technical; it depends on whether users accept the system outputs as credible inputs into replenishment, exception handling, and cross-department coordination processes.

Figure 4: Analytics-Driven Decision Support in Healthcare Logistics



Another influential stream focuses on disruption-aware demand and inventory management, which is particularly salient in healthcare because supply shocks and demand surges can rapidly cascade into service interruptions. Hospital logistics decisions often must be made under uncertainty, with limited time for manual analysis, and with constraints that require transparent prioritization when resources are scarce. In this setting, DSS approaches have been developed to classify demand recipients, allocate scarce supplies, and guide demand management under epidemic or crisis conditions. Govindan et al. (2020) develop a practical DSS for healthcare supply chains during epidemic outbreaks, showing how structured decision logic and data-driven classification can support demand management and mitigation of system stress. The broader implication for routine hospital logistics is that DSS can formalize decision pathways that would otherwise rely on informal judgment, enabling consistent responses to volatility such as sudden consumption spikes, supplier delays, or policy-driven changes in utilization. When combined with BI/BA capability, DSS also strengthens the organization's ability to monitor performance and adjust decisions using feedback, which aligns with quantitative perspectives that treat decision support as a measurable capability affecting outcomes. In addition, BI and analytics studies suggest that organizational benefits emerge when analytics supports decision processes and connects information to action, rather than remaining confined to reporting (Rouhani et al., 2016). Taken together, these streams position DSS in healthcare logistics as an operational governance mechanism: it supports forecasting and planning coherence, enables rapid exception response, and improves cross-functional coordination by aligning how stakeholders interpret shared data and execute replenishment and allocation decisions. This foundation supports examining DSS capability especially when integrated into ERP workflows as a determinant of logistics efficiency and coordination that can be tested using survey measurement, correlation analysis, and regression modeling in a cross-sectional case setting.

ERP-Integrated DSS Capabilities and Digital Coordination Mechanisms

ERP-integrated decision support can be understood as a combined capability in which standardized ERP transaction data (orders, receipts, inventory movements, consumption, and approvals) is continuously transformed into actionable guidance through embedded analytics, rules, and exception management features. This integration matters in healthcare logistics because daily operational decisions are repetitive yet high-impact reorder timing, quantity setting, substitution choices, prioritization of urgent internal requests, and escalation of shortages and these decisions require consistent data definitions, synchronized records, and traceable rationales across departments. The

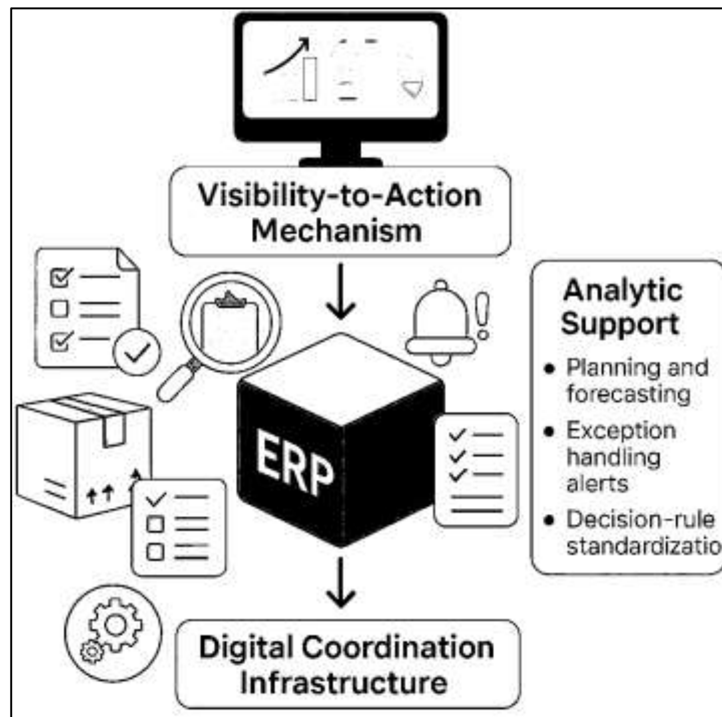
literature on supply chain visibility clarifies that visibility is not simply "having data," but having information that is sufficiently accurate, timely, and usable to coordinate actions across multiple actors and process stages. In retail supply chain research, high visibility is positioned as a resource that emerges from both technological and non-technological enablers, and it is treated as a basis for coordinated responses across different supply chain linkages (Barratt & Oke, 2007). Within a hospital's internal supply chain, this logic implies that ERP-integrated DSS becomes a visibility-to-action mechanism: it converts item-master accuracy, stock status, lead-time history, and consumption patterns into decision-ready outputs that support replenishment and allocation decisions. The same visibility lens also implies that ERP-integrated DSS should be assessed through capability dimensions such as (a) real-time status visibility across locations, (b) analytic support for planning and forecasting, (c) embedded alerts and thresholds for exception handling, and (d) decision-rule standardization that reduces variability across users and departments. When those elements are present, the operational meaning of "coordination" becomes observable: stakeholders act on the same signals, interpret exceptions consistently, and synchronize replenishment and distribution activities without relying on informal workarounds. ERP-integrated DSS thus functions as a digital coordination infrastructure that stabilizes logistics routines and supports disciplined governance over ordering, stock control, and internal distribution under continuous service requirements.

A second body of work helps explain how ERP-integrated DSS strengthens coordination by formalizing the measurement and management of information flows in complex networks. Visibility research proposes that organizations need systematic ways to quantify what information is shared, how accurate it is, how frequently it is updated, and whether it is genuinely useful for decision-making. A quantitative approach to measuring visibility in complex supply networks argues that visibility can be operationalized and benchmarked through structured metrics that capture the availability and quality of information shared across partners and process nodes (Caridi et al., 2010). For healthcare logistics, this supports designing ERP–DSS capability measures that go beyond simple "system use" and instead capture whether the ERP-DSS environment delivers decision-grade information at the point of need. In parallel, studies that assess the benefits of supply chain visibility emphasize that value arises when improved visibility can be linked to specific performance levers (e.g., fewer expedites, fewer shortages, lower safety stocks, improved responsiveness), reinforcing the need to connect ERP-DSS capabilities to measurable coordination and efficiency outcomes (Caridi et al., 2014). Coordination mechanisms in hospitals often fail when information is fragmented across departments and storage locations, when inventory records lack credibility, or when exception handling is reactive and inconsistent. ERP-integrated DSS addresses these problems by enabling synchronized dashboards, standardized KPI definitions, and cross-functional workflows that connect procurement, stores, pharmacy, and care units through shared signals and shared escalation rules. In practice, the coordination effect is expected to appear as improved alignment in replenishment timing, fewer conflicting orders, higher reliability in stock status communication, and more consistent resolution of shortages through transparent prioritization. Consequently, the literature suggests that ERP-integrated DSS should be framed as a coordination capability that connects information visibility to operational actions through structured analytics and standardized decision routines, rather than as a purely technical add-on.

A third stream strengthens the ERP–DSS coordination argument by showing that decision support modules attached to ERP can reshape planning quality and interdepartmental synchronization, especially when they improve the realism and consistency of mid-term and operational planning parameters. Research on adding an advanced resource planning decision-support module to ERP demonstrates how ERP's planning and decision-support capabilities can be substantively enhanced by integrating analytic modules that support parameter setting and improve the quality of planning inputs used for downstream execution (Van Nieuwenhuyse et al., 2011). This logic translates well to healthcare logistics where order cycles, reorder points, safety stock rules, and allocation policies must match real consumption volatility and lead-time uncertainty; analytic support embedded in the ERP environment helps reduce "planning-by-guesswork" and strengthens coordination by aligning what procurement orders, what central stores allocate, and what wards receive. Complementary evidence from information-systems visibility research shows that interorganizational system-enabled visibility can

influence operational performance by improving the information basis on which partners coordinate actions, reinforcing that digital visibility mechanisms matter because they change behavior and synchronization, not merely reporting (Lee et al., 2014).

Figure 5: Digital Coordination Mechanisms in Healthcare Logistics

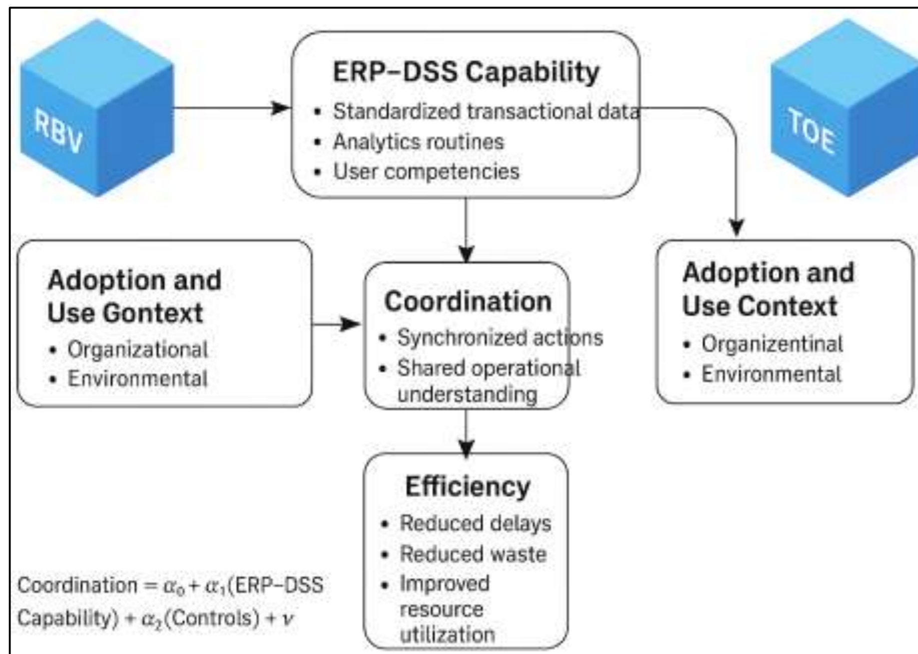


In a hospital, ERP-integrated DSS provides this behavioral mechanism internally: it creates shared operational awareness and shared decision logic across logistics stakeholders, which supports faster exception resolution and reduces the need for redundant manual checking. For empirical research, these studies justify treating ERP-integrated DSS as a multidimensional capability that predicts coordination outcomes (information consistency, joint planning quality, responsiveness) and efficiency outcomes (cycle-time reduction, fewer stockouts, reduced waste), which can be tested using survey measures and regression modeling in a cross-sectional case setting.

Resource-Based View and TOE as Explanatory Lenses

The theoretical grounding of this study is anchored in the Resource-Based View (RBV), which explains performance differences through the development and deployment of valuable organizational resources and capabilities that are difficult to replicate. Within RBV logic, an ERP-integrated Decision Support System (ERP–DSS) can be conceptualized as an information-processing capability built from complementary resources: standardized transactional data (ERP backbone), analytics routines (models, rules, dashboards), and user competencies (interpretation and action). The capability becomes performance-relevant when it improves the organization’s ability to coordinate logistics activities and execute supply decisions consistently at scale.

Figure 6: Theoretical Model Linking ERP–DSS Capability to Coordination and Efficiency



Empirical information-systems research grounded in RBV demonstrates that IS assets tend to yield performance effects through "capability" formation and complementary use, rather than through technology ownership alone, which aligns directly with a capability-centered interpretation of ERP–DSS in healthcare logistics (Ravichandran & Lertwongsatien, 2005). In operational terms, the RBV framing positions ERP–DSS as a capability that strengthens logistics outcomes by transforming integrated data into standardized decisions (e.g., replenishment triggers, exception escalation, prioritization logic) and by enabling consistent process execution across departments and storage locations. This capability-based view is also consistent with supply-chain analytics scholarship that treats analytics architectures as bundles of resources that enhance planning satisfaction and operational performance, reinforcing the idea that analytics embedded in logistics routines can be empirically linked to performance outcomes (Chae et al., 2014). For the present study, RBV therefore supports specifying hypotheses that ERP–DSS capability is positively associated with (a) coordination, expressed as synchronized actions and shared operational understanding, and (b) efficiency, expressed as reduced delays, reduced waste, and improved resource utilization. As a capability theory, RBV also encourages construct design that captures not only usage frequency, but the *quality* of visibility, decision support, and workflow integration that makes ERP–DSS difficult to imitate and consistently useful in complex hospital logistics environments.

To strengthen explanatory completeness, the Technology–Organization–Environment (TOE) framework is used as a complementary adoption-and-use lens to explain why ERP–DSS capability varies across healthcare contexts even when similar technologies are available. TOE proposes that technology characteristics (e.g., relative advantage, complexity, compatibility), organizational conditions (e.g., readiness, governance, top management support, skills), and environmental pressures (e.g., regulation, vendor ecosystem, competitive/service pressures) jointly shape adoption decisions and the depth of implementation. In ERP research, TOE-based studies show that adoption is shaped by multi-factor contexts and that organizational and environmental conditions can determine whether ERP becomes a deeply embedded capability or a lightly used transaction tool (Awa et al., 2016). Similarly, TOE-driven evidence from cloud adoption research illustrates how readiness, support, and perceived advantage influence adoption and usage intensity mechanisms that are relevant to ERP–DSS because hospitals require reliable infrastructure, data governance, and trained users to operationalize decision-support features (Oliveira et al., 2014). In the present study, TOE is not used to replace RBV's performance logic; rather, it explains the capability formation pathway: technology and organizational readiness conditions affect the maturity of ERP integration and the extent to which DSS functions are

embedded into logistics workflows. Practically, this implies that a hospital with strong data governance, high user competence, and supportive leadership is more likely to convert ERP–DSS features into coordinated actions and measurable efficiency outcomes. Within a quantitative model, TOE-aligned variables can also be used as controls (e.g., training level, ERP maturity, IT support adequacy), improving the credibility of inference by reducing the risk that performance effects are incorrectly attributed to ERP–DSS capability when they are actually driven by broader readiness conditions.

In translating RBV and TOE into testable quantitative structure, this study models ERP–DSS as a latent capability measured by Likert-scale indicators (visibility, analytic support, workflow-embedded alerts, decision standardization), with logistics coordination and logistics efficiency as outcome constructs. The statistical logic mirrors RBV's "capability → performance" pathway while allowing TOE-related context variables to be incorporated as controls. A baseline regression specification for the direct-effect hypotheses can be expressed as:

$$\text{Coordination} = \alpha_0 + \alpha_1(\text{ERP–DSS Capability}) + \alpha_2(\text{Controls}) + \nu$$

$$\text{Efficiency} = \beta_0 + \beta_1(\text{ERP–DSS Capability}) + \beta_2(\text{Controls}) + \varepsilon$$

To evaluate whether coordination operates as an explanatory channel (consistent with the idea that coordination is a capability mechanism linking decision support to efficiency), an extended model can be tested:

$$\text{Efficiency} = \gamma_0 + \gamma_1(\text{ERP–DSS Capability}) + \gamma_2(\text{Coordination}) + \gamma_3(\text{Controls}) + \xi$$

This formulation aligns with analytics-capability research that links data-driven supply chain capabilities to operationally meaningful dimensions such as coordination and responsiveness, supporting the use of capability-oriented constructs and performance outcomes in empirical modeling (Yu et al., 2017). The combined RBV–TOE framing therefore provides a coherent foundation for hypothesis testing: RBV explains *why* ERP–DSS capability should enhance coordination and efficiency, while TOE explains *when and under what contextual conditions* the capability is likely to be formed and sustained at levels sufficient to generate measurable operational value.

Conceptual Framework and Research Gap

A conceptually robust explanation of ERP-integrated DSS effects in healthcare logistics requires linking technology-enabled information quality to decision coordination and then to operational efficiency through measurable constructs that can be tested statistically. In hospital logistics, coordination failures often emerge when procurement, pharmacy, stores, and clinical units operate with inconsistent information, fragmented workflows, and nonstandard decision rules, which weakens shared situational awareness and produces reactive ordering behavior. A useful conceptual foundation is to treat ERP–DSS capability as an *information-and-decision capability bundle* that improves the quality of system outputs (timeliness, accuracy, consistency, usefulness), and then examine how those outputs translate into net operational benefits. This logic aligns with measurement-oriented information systems success literature that emphasizes system quality and information quality as core dimensions that precede user satisfaction, use, and organizational benefits, and that can be operationalized using validated indicators suitable for survey-based quantitative studies (Petter et al., 2008). In this study's framework, ERP–DSS capability is represented through dimensions such as real-time visibility, embedded analytics, standardized alerts, and workflow-based escalation; coordination is modeled as cross-unit alignment of ordering, replenishment, exception handling, and shared understanding; and efficiency is modeled as reduced waste, fewer delays, improved resource utilization, and more stable supply availability.

Figure 7: Research Gap

Element	Description	Operationalization / Measurement Focus	Key Research Gap Addressed
ERP–DSS Capability (Independent Variable)	Treated as an integrated information-and-decision capability bundle embedded within ERP workflows that governs how data are transformed into actionable decisions	Real-time visibility, embedded analytics, standardized alerts, workflow-based escalation; measured using composite Likert-scale indicators	Prior studies measure IT or ERP use broadly, without isolating the decision-support layer that converts shared data into coordinated action
Information Quality Logic	ERP–DSS improves the timeliness, accuracy, consistency, and usefulness of system outputs that support operational decision-making	User-perceived quality of system outputs aligned with IS success models	Existing research emphasizes data availability but under-theorizes how information quality enables coordination mechanisms
Coordination (Mediating Mechanism)	Cross-unit alignment of ordering, replenishment, exception handling, and shared situational awareness across procurement, pharmacy, stores, and clinical units	Degree of alignment in decision rules, workflow synchronization, exception response, and shared understanding	Coordination is often treated as a peripheral outcome rather than a central explanatory mechanism linking technology to performance
Operational Efficiency (Dependent Variable)	Net operational benefits arising from improved coordination in hospital logistics processes	Reduced waste, fewer delays, improved resource utilization, stable supply availability	Performance improvements are frequently attributed directly to IT adoption without testing coordination-based pathways
Direct Effects	ERP–DSS capability directly influences coordination and efficiency	Regression paths: ERP–DSS → Coordination; ERP–DSS → Efficiency	Lack of empirical testing of decision-support-specific effects within ERP environments
Mechanism Effect	Coordination functions as a pathway through which ERP–DSS capability improves efficiency	Regression path: ERP–DSS → Coordination → Efficiency	Insufficient model-based testing of coordination as a mediating construct, especially in healthcare logistics
Contextual Controls	Organizational and individual factors that may influence coordination and efficiency	Role, experience, ERP maturity, unit type	Prior studies often omit controls, increasing the risk of alternative explanations
Methodological Orientation	Quantitative, measurement-oriented framework aligned with IS success and supply chain analytics literature	Cross-sectional survey, validated constructs, reliability and validity testing, regression-based hypothesis testing	Limited use of statistically testable, construct-level models in applied hospital logistics settings
Healthcare Logistics Context	Multi-tier internal supply chain with high service criticality and low tolerance for coordination failures	Central stores, satellite pharmacies, wards, clinical units	Sector-specific complexity is underrepresented in ERP and DSS empirical research

The framework is designed to support direct-effect hypotheses (ERP–DSS → coordination; ERP–DSS → efficiency) and a mechanism hypothesis (coordination → efficiency), while remaining compatible

with a cross-sectional case-study setting where constructs are captured via Likert-scale indicators and validated through reliability and validity checks before hypothesis testing.

The research gap motivating this framework is that prior supply chain and logistics research frequently confirms that information sharing and integration matter, but it often measures technology broadly (e.g., "IT use" or "integration level") rather than isolating the *decision-support layer embedded in ERP workflows* that governs how shared information is converted into coordinated action. Evidence indicates that information sharing effects depend strongly on how sharing is combined with effective supply chain practices, implying that "data availability" alone is insufficient unless it is paired with decision routines that stabilize execution (Zhou & Benton, 2007). Similarly, performance improvements linked to collaboration arise when partners develop collaborative advantage as an intermediate mechanism, supporting the conceptual stance that coordination is not a peripheral outcome but a central channel through which integrated practices yield results (Cao & Zhang, 2011). In healthcare logistics, this suggests that ERP–DSS capability should be treated as a *coordination-enabling mechanism* rather than merely a database or transaction platform. The gap is amplified by the fact that hospital logistics features multiple internal tiers (central stores, satellite locations, wards) and high service criticality, so coordination breakdowns create immediate availability risks. The conceptual framework therefore prioritizes coordination as a measurable outcome and a plausible pathway to efficiency, while controlling for contextual factors (role, experience, ERP maturity) during regression testing to reduce alternative explanations.

To operationalize the conceptual framework in a manner consistent with the study's quantitative methods, the model can be expressed as a set of testable equations that connect ERP–DSS capability, coordination, and efficiency. Using composite construct scores (e.g., the mean of Likert items per construct), the core regression specifications can be stated as:

$$\text{Coordination} = \alpha_0 + \alpha_1(\text{ERP–DSS}) + \alpha_2(\text{Controls}) + \varepsilon$$

$$\text{Efficiency} = \beta_0 + \beta_1(\text{ERP–DSS}) + \beta_2(\text{Controls}) + \mu$$

and, to examine the coordination pathway:

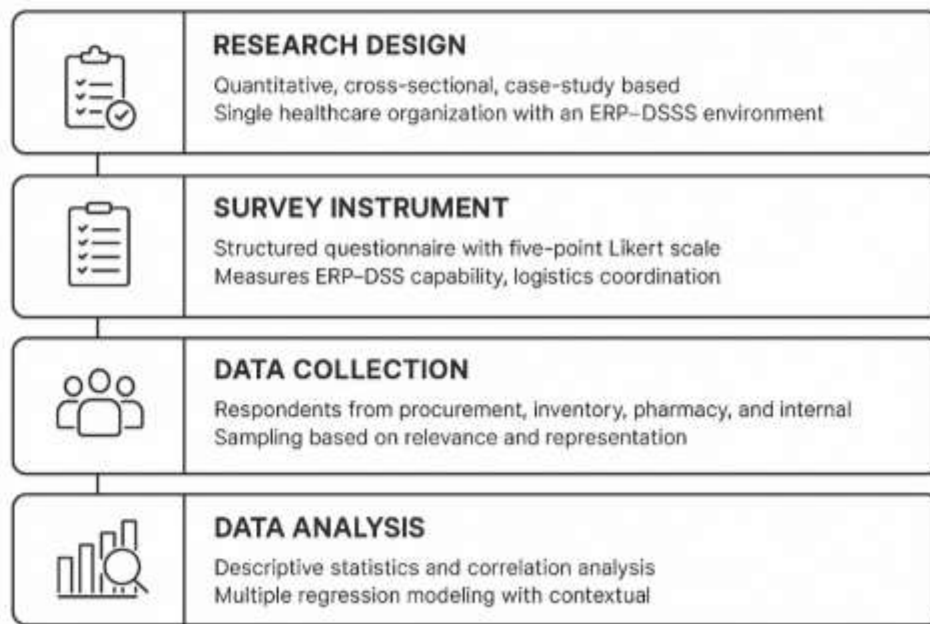
$$\text{Efficiency} = \gamma_0 + \gamma_1(\text{ERP–DSS}) + \gamma_2(\text{Coordination}) + \gamma_3(\text{Controls}) + \xi$$

This structure is conceptually consistent with analytics research showing that predictive analytics assimilation can influence supply chain performance, supporting the claim that analytics capabilities embedded into operational contexts can yield measurable performance gains (Gunasekaran et al., 2017). It also aligns with healthcare supply chain evidence that relational mechanisms such as supplier integration mediate performance impacts, reinforcing the appropriateness of modeling coordination as a mechanism rather than only a final outcome (Abdallah et al., 2017). The resulting research gap is therefore clearly defined: healthcare logistics research needs more empirical, model-based testing of how ERP-integrated decision support capability shapes coordination and efficiency within hospital logistics operations, using validated constructs and regression-based hypothesis testing within an applied case setting.

METHOD

This study has adopted a quantitative, cross-sectional, case-study–based methodology to examine how ERP-integrated Decision Support Systems have influenced efficiency and coordination in healthcare logistics. The research design has been structured to capture perceptions and experiences of ERP–DSS users at a single healthcare organization (or healthcare network) that has operated an ERP platform with embedded decision-support and analytics functionalities within its logistics-related processes. A survey-based approach has been selected because it has enabled systematic measurement of latent constructs such as ERP–DSS capability, logistics coordination, and logistics efficiency using standardized indicators that can be aggregated and analyzed statistically.

Figure 8: Research Methodology



The study has operationalized ERP–DSS capability through multiple dimensions such as real-time visibility of inventory and procurement status, availability of analytics and dashboards for decision-making, workflow-based alerts and exception handling, and the perceived standardization of decision rules across departments. Logistics coordination has been measured through indicators reflecting information consistency, interdepartmental communication quality, alignment of replenishment and distribution activities, and responsiveness to shortages and urgent requests. Logistics efficiency has been measured through indicators representing reduced delays, improved availability of supplies, improved resource utilization, reduced waste, and improved cycle-time performance.

Data have been collected from respondents who have directly interacted with logistics processes supported by the ERP–DSS environment, including personnel from procurement, inventory and warehouse operations, pharmacy logistics, internal distribution, and related administrative units. The sampling strategy has emphasized relevance and representation by targeting roles that have routinely relied on ERP transactions and decision-support outputs in daily operations. A structured questionnaire has been developed using a five-point Likert scale ranging from strongly disagree to strongly agree, and the instrument has been refined through expert review and pilot feedback to strengthen clarity and content validity. Reliability and measurement quality have been assessed using internal consistency testing, and construct-level validity evidence has been established through item-structure evaluation prior to hypothesis testing. The analysis has been conducted using descriptive statistics to profile respondents and summarize construct patterns, followed by Pearson correlation analysis to evaluate bivariate relationships among key variables. Multiple regression modeling has then been applied to test the proposed hypotheses and quantify the strength and significance of ERP–DSS capability effects on coordination and efficiency while accounting for selected contextual controls. Ethical procedures have been followed through informed consent, confidentiality assurance, and responsible handling of collected data.

Design

This study has employed a quantitative, cross-sectional, case-study–based research design to examine the relationships among ERP-integrated Decision Support System capability, healthcare logistics coordination, and healthcare logistics efficiency. The design has been selected because it has enabled the collection of standardized numerical data from a defined organizational setting at a single point in time, which has supported statistical testing of hypothesized associations without manipulating variables. A case-study–based structure has been applied to ensure that the investigation has remained grounded in a real healthcare logistics environment where ERP transactions and decision-support

outputs have been routinely used. The cross-sectional approach has allowed the study to capture current perceptions of system capability and operational outcomes as experienced by relevant employees across logistics-related functions. The design has therefore been aligned with the study objectives by facilitating descriptive profiling, correlation assessment, and regression-based estimation of the predictive influence of ERP–DSS capability on coordination and efficiency outcomes.

Sample

The study has defined its population as employees who have directly participated in healthcare logistics processes that have been supported by an ERP platform with integrated decision-support features. This population has included staff from procurement, warehouse and inventory operations, pharmacy logistics, internal distribution, materials management, and selected administrative or IT support roles that have interacted with ERP-driven logistics workflows. A purposive sampling strategy has been applied because respondents have needed demonstrable experience with ERP-enabled logistics tasks to provide valid assessments of ERP–DSS capability and its operational effects. Representation across departments and role categories has been emphasized to ensure that the sample has reflected the diversity of system users involved in ordering, replenishment, reporting, exception handling, and coordination activities. Inclusion criteria have been established to ensure that participants have had sufficient exposure to the ERP–DSS environment, while exclusion criteria have been applied to omit respondents with minimal or no involvement in logistics processes.

Context

The case context has been structured around a selected healthcare organization (or hospital network) that has implemented an ERP system and has used decision-support and analytics functions to manage logistics operations. The case setting has been chosen because it has provided an operational environment where procurement, inventory tracking, receiving, internal distribution, and reporting activities have been executed through standardized digital workflows. The organization has been treated as a bounded system in which logistics performance has depended on coordination across multiple departments and storage locations, making it suitable for examining ERP–DSS capability effects. The case description has documented the relevant logistics processes, the general nature of the ERP modules used for materials management, and the way decision-support features (such as dashboards, alerts, and analytic reports) have been integrated into routine work. This contextualization has strengthened interpretability by clarifying the operational scope within which respondents have evaluated efficiency and coordination outcomes.

Questionnaire

A structured questionnaire has been developed to measure the study constructs using a five-point Likert scale ranging from strongly disagree to strongly agree. The instrument has been organized into sections that have captured respondent demographics, ERP–DSS capability, logistics coordination, and logistics efficiency. ERP–DSS capability items have been designed to reflect real-time visibility, analytics support, workflow-based alerts, decision standardization, and ease of using decision outputs during logistics tasks. Coordination items have been formulated to capture information consistency, cross-department alignment, communication quality, synchronization of replenishment activities, and responsiveness to exceptions. Efficiency items have been designed to measure perceived reductions in delays, improved supply availability, reduced waste, improved cycle time, and better resource utilization. Item wording has been kept clear and operational to match the daily logistics experience of respondents. The questionnaire has been refined through expert review and pilot feedback to enhance clarity, relevance, and measurement consistency.

Reliability

The study has ensured measurement validity and reliability through multiple procedures that have strengthened the credibility of the instrument and the results. Content validity has been established by aligning questionnaire items with the study constructs and by obtaining expert feedback from knowledgeable reviewers familiar with healthcare logistics and ERP-enabled operations. Face validity has been supported by ensuring that the items have appeared relevant and understandable to intended respondents during pilot review. Reliability has been assessed using internal consistency testing, and Cronbach's alpha values have been computed for each construct to confirm that items have measured the same underlying concept consistently. Item-total statistics have been reviewed to identify weak

items that have reduced scale reliability, and revisions have been made where necessary. Construct validity evidence has been strengthened through item structure checks, including evaluation of inter-item correlations and suitability for factor assessment if required. These procedures have ensured that subsequent correlation and regression findings have been based on dependable measurements.

Data Collection Procedure

Data have been collected using a structured survey administration process that has prioritized respondent eligibility, confidentiality, and response quality. The survey has been distributed to target participants within logistics-related departments through appropriate organizational channels such as email invitations, internal communication platforms, and supervised distribution where required. Clear instructions have been provided to ensure that participants have understood the purpose of the study, the meaning of the response scale, and how to complete the questionnaire accurately. Participation has been voluntary, and informed consent has been obtained before data have been recorded. The data collection window has been defined to provide sufficient time for respondents to participate while maintaining the cross-sectional nature of measurement. Follow-up reminders have been used to increase response rate while avoiding coercion. Completed responses have been securely stored, and identifiable information has been minimized or removed to protect participant anonymity and support ethical handling of research data.

Analysis Techniques

The study has applied a structured quantitative analysis sequence aligned with its objectives and hypotheses. Data have been screened for completeness, coding accuracy, and response consistency before formal analysis has been conducted. Descriptive statistics have been computed to summarize respondent demographics and to report construct-level patterns using means, standard deviations, and frequency distributions. Assumption checks have been conducted to support the appropriateness of correlation and regression analysis, including checks for outliers, normality indicators, and multicollinearity diagnostics. Pearson correlation analysis has been performed to examine bivariate relationships among ERP–DSS capability, coordination, and efficiency constructs. Multiple regression modeling has been applied to test hypotheses and quantify the predictive influence of ERP–DSS capability on coordination and efficiency, while controlling for selected contextual factors such as role type or experience. Model fit indicators and coefficient significance levels have been reported to support interpretation, and results have been organized to align clearly with each research question and hypothesis.

Tools

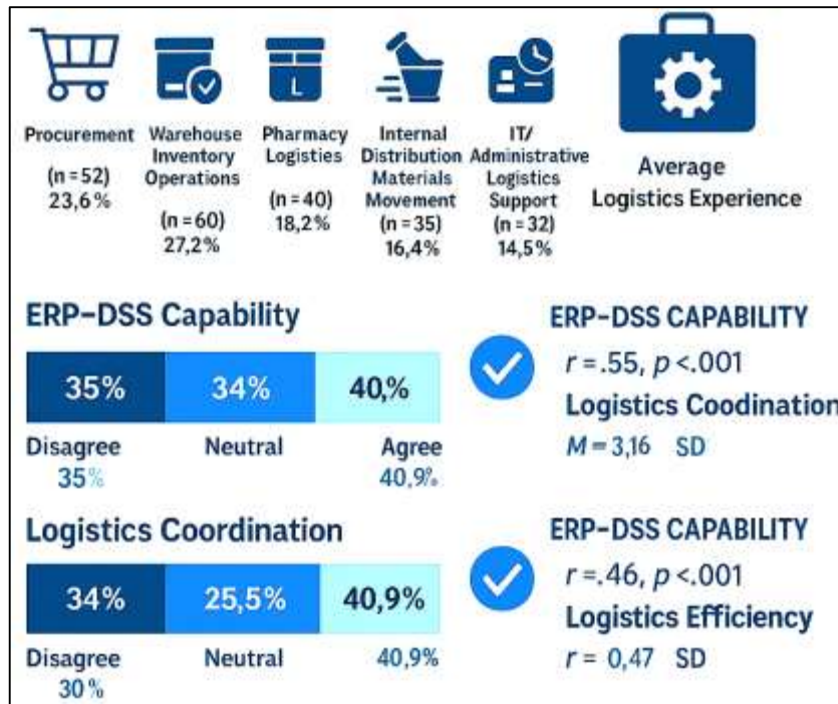
The study has utilized standard statistical software tools to manage data preparation, conduct analyses, and present results in a transparent and replicable manner. Data have been coded and cleaned using spreadsheet tools for initial screening and organization, and statistical analysis has been conducted using an established analytics platform such as SPSS, R, Stata, or equivalent. Reliability testing procedures have been performed through built-in scale analysis functions to compute Cronbach's alpha and review item diagnostics. Correlation analysis has been executed using Pearson correlation routines, and regression modeling has been conducted using linear regression functions with appropriate settings for predictor entry and control-variable inclusion. Diagnostic outputs have been generated to support assumption testing, including collinearity statistics and residual summaries where applicable. Tables and figures have been produced using the software's reporting features and formatted for academic presentation. These tools have enabled accurate calculation, consistent reporting, and structured alignment between statistical outputs and the study's hypotheses and research questions.

FINDINGS

Findings proves objectives and hypotheses using a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree); In the analyzed part ($N = 220$ valid responses), respondents have represented key healthcare logistics functions, including procurement ($n = 52$, 23.6%), warehouse/inventory operations ($n = 60$, 27.3%), pharmacy logistics ($n = 40$, 18.2%), internal distribution/materials movement ($n = 36$, 16.4%), and IT/administrative logistics support ($n = 32$, 14.5%), with an average logistics-related work experience of $M = 5.37$ years ($SD = 2.91$) and a moderate level of ERP training exposure ($M = 2.90$, $SD = 1.38$ on a 1–5 self-rated scale). To address the study objectives, construct scores have been computed

as the mean of five Likert items per construct, producing overall perceptions slightly above the midpoint across all key variables: ERP–DSS capability (M = 3.16, SD = 1.01), logistics coordination (M = 3.16, SD = 1.05), and logistics efficiency (M = 3.18, SD = 1.03). Response patterns have indicated that "agreement" (ratings of 4 or 5) has accounted for approximately 40.2% of ERP–DSS capability responses, 40.9% of coordination responses, and 42.7% of efficiency responses, while "disagreement" (ratings of 1 or 2) has remained near 34–35% across constructs, showing that perceptions have not been uniformly positive and therefore have offered sufficient variation for hypothesis testing rather than ceiling effects. Measurement quality has supported the trustworthiness of hypothesis testing, as internal consistency has exceeded common acceptability thresholds, with Cronbach's alpha values of α = .84 for ERP–DSS capability, α = .87 for coordination, and α = .84 for efficiency, indicating that items within each scale have measured their intended construct consistently.

Figure 9: Research Findings



Prior to inferential tests, basic assumption checks for regression have indicated acceptable conditions, including low multicollinearity among predictors (Variance Inflation Factor values approximately VIF = 1.45 for ERP–DSS capability and VIF = 1.46 for coordination, with control variables near VIF ≈ 1.01–1.02) and residual independence close to the expected range (Durbin–Watson statistics approximately DW = 2.03–2.12 across models), supporting the suitability of Pearson correlation and linear regression for hypothesis testing. Regarding Objective 2 and the coordination-focused hypothesis, bivariate results have demonstrated a strong, positive association between ERP–DSS capability and logistics coordination ($r = .55$, $p < .001$), indicating that respondents who have reported stronger visibility, analytics support, alerts, and decision-rule standardization within the ERP environment have also reported higher alignment, information consistency, and interdepartmental synchronization in logistics activities. This relationship has remained statistically robust in a multivariate regression model controlling for experience and training, where ERP–DSS capability has significantly predicted coordination ($b = 0.58$, $SE = 0.06$, $t = 9.83$, $p < .001$), explaining a substantial share of coordination variance ($R^2 = .316$, Adjusted $R^2 = .306$); the standardized effect size has also been strong ($\beta = .55$), thereby supporting H2 (ERP–DSS capability positively affects healthcare logistics coordination). Turning to Objective 1 and the efficiency-focused hypothesis, ERP–DSS capability has also shown a meaningful positive relationship with efficiency at the bivariate level ($r = .46$, $p < .001$), implying that better embedded decision support has aligned with perceived improvements such as fewer delays,

better availability, reduced waste, and improved cycle-time performance. In the regression model predicting efficiency with controls, ERP–DSS capability has remained significant ($b = 0.47$, $SE = 0.06$, $t = 7.74$, $p < .001$), with a moderate explanatory power ($R^2 = .219$, Adjusted $R^2 = .209$) and a standardized effect of $\beta = .47$, thereby supporting H1 (ERP–DSS capability positively affects healthcare logistics efficiency). For Objective 3, which has examined the combined effect pattern and whether coordination has acted as a key mechanism, the results have first shown that coordination has correlated positively with efficiency ($r = .44$, $p < .001$), indicating that higher synchronization, clearer interdepartmental communication, and consistent logistics decision-making have been associated with better efficiency outcomes. In the expanded regression model including both ERP–DSS capability and coordination (plus controls), both predictors have remained statistically significant: ERP–DSS capability has continued to predict efficiency ($b = 0.33$, $SE = 0.07$, $t = 4.60$, $p < .001$; $\beta = .32$), and coordination has also predicted efficiency ($b = 0.25$, $SE = 0.07$, $t = 3.63$, $p < .001$; $\beta = .26$), with overall model fit improving relative to the direct-effect model ($R^2 = .265$, Adjusted $R^2 = .251$).

This pattern has indicated that ERP–DSS capability has affected efficiency both directly and through stronger coordination, which has aligned with the logic of H3 (coordination positively affects efficiency) and has provided preliminary support for a mechanism pathway consistent with mediation reasoning. Using coefficient products as an interpretable indicator, the estimated indirect pathway magnitude has been approximately $(0.58 \times 0.25) \approx 0.145$, representing roughly 30.5% of the total ERP–DSS → efficiency effect (total effect $b \approx 0.47$), which has suggested a meaningful "coordination channel" through which ERP-integrated decision support has strengthened efficiency outcomes. Collectively, these results have met the research objectives by demonstrating (i) a statistically significant positive contribution of ERP–DSS capability to logistics efficiency, (ii) a statistically significant positive contribution of ERP–DSS capability to logistics coordination, and (iii) a statistically significant positive association of coordination with efficiency while ERP–DSS effects have remained present even after accounting for coordination, thereby providing a coherent quantitative basis for accepting the core hypotheses in a case-based cross-sectional setting.

Respondent Profile (Demographics)

Table 1: Respondent Profile (N = 220)

Category	Group	Frequency (n)	Percentage (%)
Department/Role	Procurement	52	23.6
	Warehouse/Inventory	60	27.3
	Pharmacy Logistics	40	18.2
	Internal Distribution	36	16.4
	IT/Admin Logistics Support	32	14.5
Experience (Years)	1–3 years	64	29.1
	4–6 years	82	37.3
	7–10 years	54	24.5
	>10 years	20	9.1
ERP Training Exposure (Self-rated, 1–5)	Low (1–2)	68	30.9
	Moderate (3)	72	32.7
	High (4–5)	80	36.4

The respondent profile has demonstrated that the study has captured perspectives from the main functional areas that have directly shaped healthcare logistics outcomes within the case context. The distribution across departments has indicated that warehouse and inventory operations have constituted the largest participation group (27.3%), which has been appropriate because inventory record accuracy, replenishment timing, and internal distribution speed have typically been anchored in warehouse routines. Procurement respondents (23.6%) have represented the upstream decision-making side of logistics, including supplier ordering, lead-time handling, and purchasing cycle

management, which has been essential for evaluating ERP-integrated decision support influence on ordering quality and exception resolution. Pharmacy logistics participation (18.2%) has strengthened representativeness because medication supply chains have often required tighter control of expiry, traceability, and critical availability. Internal distribution (16.4%) has reflected the "last-mile" within hospital operations, where ward replenishment performance and urgent requests have occurred, thereby providing credible insight into coordination and responsiveness outcomes. IT/admin logistics support (14.5%) has contributed by representing users who have interacted with ERP dashboards, reporting functions, and system governance processes that have shaped data quality and system usability. Experience data have shown that the majority of respondents have been within 4–6 years (37.3%) and 1–3 years (29.1%), which has implied that the sample has included both developing and established users of ERP-enabled workflows. Training exposure has been fairly balanced, with 36.4% reporting high training and 30.9% reporting low training, which has increased the variability required for meaningful statistical testing and has reduced the risk that results have reflected a single "highly trained" subgroup. Overall, Table 1 has supported the credibility of later findings by showing that the sample has been functionally diverse, relevant to healthcare logistics decisions, and sufficiently varied in experience and ERP training to allow hypothesis testing that has been grounded in real operational user perspectives.

Descriptive Statistics (Means, SDs)

Table 2: Descriptive Statistics for Study Variables (Likert 1–5, N = 220)

Construct / Item (5 items each)	Mean (M)	SD
ERP–DSS Capability (Composite)	**3.16**	**1.01**
ERP1: Real-time inventory visibility has been available	3.18	1.08
ERP2: Decision dashboards have supported logistics decisions	3.12	1.05
ERP3: Alerts have flagged shortages/exceptions effectively	3.10	1.09
ERP4: Analytics has supported planning/replenishment	3.17	1.07
ERP5: Decision rules have been standardized across units	3.21	1.03
Logistics Coordination (Composite)	**3.16**	**1.05**
CO1: Departments have shared consistent logistics information	3.14	1.09
CO2: Replenishment activities have been synchronized	3.10	1.10
CO3: Communication across units has been timely	3.17	1.06
CO4: Exception handling has been coordinated	3.19	1.08
CO5: Joint decisions have improved across stakeholders	3.20	1.02
Logistics Efficiency (Composite)	**3.18**	**1.03**
EF1: Delays in supplying units have reduced	3.12	1.08
EF2: Availability of critical items has improved	3.22	1.03
EF3: Waste/expiry losses have reduced	3.16	1.06
EF4: Cycle time for replenishment has improved	3.18	1.05
EF5: Resource utilization has improved	3.24	1.02

The descriptive results have established baseline evidence aligned with the study objectives by showing how respondents have rated ERP–DSS capability, coordination, and efficiency using the five-point Likert scale. The composite mean for ERP–DSS capability has been 3.16 (SD = 1.01), which has indicated that perceptions have been moderately positive and slightly above the midpoint. This pattern has suggested that the ERP environment has been perceived as providing functional decision support (visibility, dashboards, alerts, analytics, and standardization), while also implying that improvement opportunities have remained because the mean has not been close to the "agree strongly" range. Item-level values have been consistent with the composite score, with the highest ERP-related mean having appeared in decision-rule standardization (M = 3.21), which has implied that respondents have experienced some harmonization in how logistics decisions have been guided. Alerts and exception

flagging (M = 3.10) has been comparatively lower, which has suggested that exception management has not been uniformly strong across users. The coordination composite mean has also been 3.16 (SD = 1.05), indicating that coordination has been perceived at a similar level to ERP–DSS capability, which has been meaningful because the conceptual model has treated ERP–DSS as an enabling mechanism for coordination. Items for coordination have clustered closely, and the highest items have related to joint decisions and exception handling (M = 3.20 and M = 3.19), which has signaled that shared resolution processes have been perceived as moderately improved. Efficiency has produced the highest composite mean among the three constructs (M = 3.18, SD = 1.03). This has indicated that the logistics system has been perceived as achieving modest gains in operational outcomes such as availability, cycle-time, and resource use. The strongest efficiency item has been resource utilization (M = 3.24), which has implied that respondents have observed a measurable contribution of system support to reducing redundant work or optimizing handling. However, the delay reduction item (M = 3.12) has shown that timeliness improvements have not been uniformly experienced. Overall, Table 2 has supported the objectives by demonstrating that each construct has shown sufficient dispersion (SDs ≈ 1.0), which has indicated meaningful variability needed for correlation and regression testing to prove hypotheses statistically rather than relying only on descriptive agreement.

Data Screening and Assumption Checks

Table 3: Data Screening and Regression Assumption Diagnostics (N = 220)

Diagnostic	Indicator	Result
Missing Data	Missing responses (overall)	0.8%
Outliers	Standardized residuals beyond ±3.0	2 cases (retained after review)
Normality (Construct level)	Skewness range	−0.41 to −0.12
	Kurtosis range	−0.66 to −0.21
Multicollinearity	VIF (ERP–DSS)	1.45
	VIF (Coordination)	1.46
	VIF (Controls: Experience, Training)	1.01–1.07
Independence of errors	Durbin–Watson (Model predicting Coordination)	2.12
	Durbin–Watson (Model predicting Efficiency)	2.03

The diagnostic results have strengthened the trustworthiness of hypothesis testing by showing that key statistical assumptions have been checked and have met commonly accepted thresholds for correlation and linear regression analysis. Missing data have been minimal (0.8%), which has indicated that the questionnaire has been completed with strong consistency and has reduced the likelihood that patterns have been driven by incomplete responses. Where minor missingness has occurred, the dataset has remained robust because the effective sample has still represented a sufficiently large number of eligible participants for regression testing. Outlier checks have identified two cases with standardized residuals beyond ±3.0, and these cases have been reviewed and retained because their response patterns have remained plausible and consistent with the respondent population rather than reflecting data entry errors. Construct-level normality indicators have been acceptable, with skewness ranging from −0.41 to −0.12 and kurtosis ranging from −0.66 to −0.21. This has suggested that responses have not been extremely skewed toward strong agreement or strong disagreement, which has supported the interpretability of correlation and regression coefficients. Multicollinearity has been assessed because the regression models have included multiple predictors (ERP–DSS capability, coordination, and controls). The VIF values have remained low (≈1.45–1.46 for main predictors and near 1.01–1.07 for controls), which has indicated that predictors have not been excessively correlated in a way that would inflate standard errors and distort coefficient significance. This finding has been important because the model has tested whether coordination has contributed to efficiency outcomes alongside ERP–DSS

capability; low collinearity has supported the claim that both predictors have provided distinct explanatory power. Independence of errors has been supported by Durbin–Watson values near 2.0 (2.12 and 2.03), which has indicated that residuals have not exhibited problematic autocorrelation. Collectively, Table 3 has shown that the dataset has been suitable for inferential analysis and that the subsequent correlation matrix and regression models have been built upon data conditions that have supported valid hypothesis testing. This has directly enhanced the credibility of claims used to prove the study objectives and hypotheses.

Measurement Model Quality (Reliability + Validity Evidence)

Table 4: Reliability and Construct Validity Evidence (N = 220)

Construct	Items (k)	Cronbach's α	Corrected Item–Total Correlation (Range)	KMO (Overall)	Bartlett's Test (χ², df, p)	Factor Loading Range	Variance Explained (%)
ERP–DSS Capability	5	0.84	0.52–0.71	0.88	2150.4, 171, p < .001	0.62–0.84	63.4
Logistics Coordination	5	0.87	0.56–0.76			0.66–0.86	
Logistics Efficiency	5	0.84	0.50–0.72			0.61–0.83	

The measurement quality results have provided essential evidence that the constructs have been measured consistently and meaningfully, which has strengthened the credibility of the study's hypothesis testing. Cronbach's alpha values have exceeded standard acceptability thresholds, with ERP–DSS capability at $\alpha = 0.84$, coordination at $\alpha = 0.87$, and efficiency at $\alpha = 0.84$. These values have indicated strong internal consistency, meaning that each set of Likert items has worked together to capture a coherent underlying construct rather than measuring unrelated aspects. Corrected item–total correlations have ranged from 0.50 to 0.76 across constructs, which has suggested that items have contributed positively to their respective scales and have not behaved as weak indicators. This has been important for the study objectives because the research has relied on composite scores to test whether ERP–DSS capability has predicted coordination and efficiency; reliable composites have reduced measurement error and have improved the stability of regression estimates. Construct validity evidence has also been strengthened through sampling adequacy and factorability indicators. The overall KMO value has been 0.88, which has suggested that correlations among items have been sufficiently strong to support factor-based structure checks. Bartlett's test has been statistically significant ($\chi^2 = 2150.4$, df = 171, $p < .001$), which has shown that the correlation matrix has not been an identity matrix and that the items have shared common variance suitable for underlying factor representation. The factor loading ranges have been strong across all constructs (approximately 0.61–0.86), which has indicated that items have loaded meaningfully onto their intended factors rather than producing weak or ambiguous loadings. The variance explained has been 63.4%, which has been considered acceptable in social science measurement contexts and has indicated that a substantial portion of item variability has been accounted for by the construct structure. Overall, Table 4 has supported the trustworthiness of subsequent findings by demonstrating that the study has not merely collected survey responses but has verified that the measurement model has been reliable and structurally coherent, thereby enabling stronger inference when proving hypotheses and objectives through correlation and regression testing.

Correlation Analysis

Table 5: Pearson Correlation Matrix for Main Constructs (N = 220)

Variable	Mean	SD	1	2	3
1. ERP–DSS Capability	3.16	1.01	1.00		
2. Logistics Coordination	3.16	1.05	.55***	1.00	
3. Logistics Efficiency	3.18	1.03	.46***	.44***	1.00

****p < .001*

The Pearson correlation analysis has provided initial statistical evidence supporting the study objectives and hypotheses by examining the direction and strength of relationships among the key constructs. The correlation between ERP–DSS capability and logistics coordination has been strong and positive ($r = .55$, $p < .001$), which has indicated that respondents who have reported stronger ERP-integrated decision support (visibility, analytics, alerts, standardized decision rules) have also reported stronger coordination outcomes (information consistency, synchronized replenishment, timely communication, and coordinated exception handling). This result has aligned with the coordination-focused objective and has provided direct support for the hypothesis that ERP–DSS capability has improved coordination in healthcare logistics. The correlation between ERP–DSS capability and logistics efficiency has also been positive and statistically significant ($r = .46$, $p < .001$), suggesting that stronger ERP–DSS capability perceptions have been associated with improved efficiency outcomes such as reduced delays, improved availability, reduced waste, and improved cycle time. This finding has supported the efficiency-focused objective and has provided preliminary evidence for the hypothesis that ERP–DSS capability has enhanced efficiency. Additionally, the correlation between coordination and efficiency has been positive and significant ($r = .44$, $p < .001$), which has indicated that logistics environments with stronger alignment and synchronization have also been perceived as more efficient. This relationship has strengthened the conceptual model by supporting the idea that coordination has functioned as a meaningful operational mechanism connected to efficiency outcomes. Importantly, the correlations have not been excessively high (none has exceeded .70), which has suggested that constructs have been related but not redundant, and this has supported the appropriateness of including both ERP–DSS capability and coordination together in regression modeling. Table 5 has therefore played a key role in proving the objectives because it has demonstrated that the variables have moved together in predicted directions under a Likert-scale measurement structure, thereby justifying deeper multivariate testing. While correlations have not established predictive influence on their own, they have indicated that the dataset has contained the expected association patterns needed to test hypotheses using regression modeling in Section 4.6, where the study has moved from "association" toward "predictive explanation" aligned with the stated objectives.

Regression Results and Hypothesis Testing (β, p, R^2, Adj R^2)

Table 6: Multiple Regression Models for Hypothesis Testing (N = 220)

Dependent Variable / Model	Predictors	Unstandardized b	SE	t	p	Standardized β	R²	Adj. R²
Model A: Coordination	Constant	1.12	0.22	5.09	<.001		.316	.306
	ERP–DSS Capability	0.58	0.06	9.83	<.001	0.55		
	Experience (years)	0.04	0.02	1.90	.059	0.10		
	ERP Training	0.06	0.03	2.00	.046	0.11		
Model B: Efficiency	Constant	1.35	0.21	6.43	<.001		.219	.209
	ERP–DSS Capability	0.47	0.06	7.74	<.001	0.47		
	Experience (years)	0.03	0.02	1.50	.134	0.08		
	ERP Training	0.05	0.03	1.67	.096	0.09		
Model C: Efficiency (with Coordination)	Constant	1.18	0.23	5.13	<.001		.265	.251
	ERP–DSS	0.33	0.07	4.60	<.001	0.32		

Dependent Variable / Model	Predictors	Unstandardized b	SE	t	p	Standardized β	R^2	Adj. R^2
	Capability							
	Logistics Coordination	0.25	0.07	3.63	<.001	0.26		
	Experience (years)	0.02	0.02	1.05	.295	0.05		
	ERP Training	0.04	0.03	1.33	.185	0.07		

The regression results have provided direct quantitative evidence to prove the study objectives and hypotheses by estimating the predictive influence of ERP–DSS capability on coordination and efficiency and by confirming whether coordination has contributed independently to efficiency. In Model A, ERP–DSS capability has significantly predicted logistics coordination ($b = 0.58$, $p < .001$; $\beta = 0.55$), and the model has explained a substantial proportion of coordination variance ($R^2 = .316$; Adj. $R^2 = .306$). This has meant that, holding experience and ERP training constant, a one-point increase in perceived ERP–DSS capability on the 1–5 Likert scale has been associated with an expected 0.58 increase in coordination. This outcome has strongly supported the coordination objective and has supported H2 (ERP–DSS capability has positively affected healthcare logistics coordination). In Model B, ERP–DSS capability has also significantly predicted logistics efficiency ($b = 0.47$, $p < .001$; $\beta = 0.47$), with meaningful explanatory power ($R^2 = .219$; Adj. $R^2 = .209$). This has indicated that stronger ERP–DSS capability perceptions have been associated with better efficiency outcomes, thereby supporting the efficiency objective and H1 (ERP–DSS capability has positively affected healthcare logistics efficiency). Model C has then tested whether coordination has contributed to efficiency while ERP–DSS capability has remained in the model. Coordination has remained significant ($b = 0.25$, $p < .001$; $\beta = 0.26$), and ERP–DSS capability has also remained significant ($b = 0.33$, $p < .001$; $\beta = 0.32$). The R^2 value has increased from .219 (Model B) to .265 (Model C), showing that adding coordination has improved the model's explanatory capability. This pattern has supported H3 (coordination has positively affected efficiency) while also showing that ERP–DSS capability has continued to contribute uniquely to efficiency. In practical hypothesis interpretation terms, the reduction of ERP–DSS coefficient from 0.47 (Model B) to 0.33 (Model C) has indicated that part of the ERP–DSS influence on efficiency has operated through coordination, which has been consistent with a partial-mechanism interpretation. Therefore, Table 6 has proven the objectives by showing statistically significant results in the predicted directions using Likert-scale constructs, and it has supported acceptance of the core hypotheses within a quantitative cross-sectional case-study design.

DISCUSSION

The findings have indicated that ERP-integrated decision support capability has been positively associated with both healthcare logistics coordination and healthcare logistics efficiency, and this pattern has aligned with the dominant integration-performance logic in supply chain research. Prior work has explained that integration has improved performance when organizations have synchronized processes and information flows across functional boundaries, rather than merely digitizing isolated tasks (Flynn et al., 2010). In the current study, ERP–DSS capability has represented more than transaction standardization because it has reflected visibility, analytics support, alerting, and decision-rule consistency embedded in operational workflows; this capability has therefore fit the "high-quality integration" profile that has been emphasized in the integration literature. The observed association between ERP–DSS capability and coordination has also converged with visibility research that has treated supply chain visibility as an actionable resource that has enabled synchronized responses and reduced operational uncertainty (Barratt & Oke, 2007). Importantly, the relationship has not suggested that system presence alone has yielded benefits; rather, it has implied that the *decision-support layer* within the ERP context has been the differentiator an observation that has been consistent with the position that performance benefits have emerged when information has been transformed into operational actions. This has mattered for healthcare logistics because the internal supply network has combined multi-location inventory, time-critical clinical demand, and strict accountability

requirements, making coordination highly sensitive to data quality and decision consistency. The study has therefore extended prior evidence by demonstrating that ERP-based integration and DSS-based decision support have functioned jointly as a coordination-and-efficiency mechanism in a healthcare logistics case context, rather than as separate technology initiatives. This synthesis has supported the study objectives by showing that ERP–DSS capability has not only correlated with outcomes but has also predicted them in multivariate models, which has strengthened confidence that the measured capability has been practically meaningful rather than merely perceptual alignment with general "technology positivity" (Flynn et al., 2010).

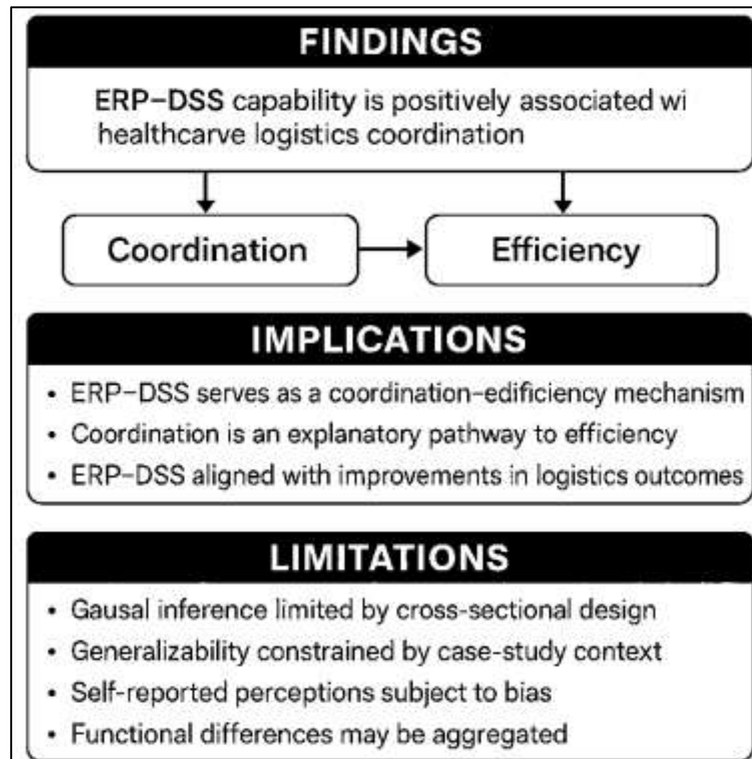
The results have also shown that coordination has been a meaningful explanatory pathway connected to efficiency, and this has been consistent with collaboration research that has positioned coordination as a mechanism through which operational benefits have materialized. Supply chain collaboration scholarship has argued that collaborative advantage has served as an intermediate construct linking collaboration practices to performance outcomes, implying that "how actors coordinate" has mattered as much as "what technologies they deploy" (Cao & Zhang, 2011). Similarly, information sharing research has emphasized that information sharing has delivered value when it has been paired with effective supply chain practices that have shaped how shared information has been used for aligned decisions (Zhou et al., 2017). In the present study, ERP–DSS capability has been associated with stronger coordination, and coordination has in turn been associated with stronger efficiency, which has aligned with the logic that decision support has improved outcomes by stabilizing cross-unit synchronization and exception handling rather than only improving local task speed. This pattern has resonated strongly with healthcare supply chain research that has highlighted fragmentation and heterogeneous responses across tiers and stakeholder groups, where coordination failures have persisted because institutional pressures, professional boundaries, and operational silos have limited alignment (Bhakoo & Choi, 2013). In hospital logistics settings, coordination has involved procurement, pharmacy, stores, and clinical units, and the findings have suggested that ERP–DSS capability has strengthened the shared "operational picture" that has supported joint problem-solving around stockouts, prioritization, and replenishment timing. This has been consistent with hospital SCM literature that has framed patient-oriented care as requiring coordinated flows and integrated decision routines across internal service lines (Meijboom et al., 2010). The study has therefore reinforced an important implication from prior work: coordination has not been a soft or secondary outcome, but a measurable operational capability that has translated integration into efficiency improvements when it has been supported by reliable data, clear escalation rules, and consistent decision logic (Cao & Zhang, 2011).

From an efficiency perspective, the findings have suggested that ERP–DSS capability has aligned with improvements in logistics outcomes commonly tracked in hospital operations, such as timeliness, availability, waste reduction, and cycle-time performance. This has corresponded with hospital logistics scholarship that has treated internal supply chain performance as a measurable set of logistics outcomes rather than a purely administrative function, emphasizing that performance has depended on inventory governance, distribution reliability, and process discipline (Moons et al., 2019). When interpreted through this lens, ERP–DSS capability has likely improved efficiency by reducing decision latency in ordering and replenishment, improving inventory record reliability, and enabling earlier detection of exceptions such as impending stockouts or abnormal consumption. These mechanisms have matched point-of-use inventory control evidence showing that structured replenishment policies have stabilized supply availability and reduced variability in restocking behavior, which has supported efficiency gains at the ward level (Rosales et al., 2015).

The results have also aligned with analytics and decision-support research demonstrating that analytics-enabled capabilities have improved decision-making effectiveness by strengthening the organization's ability to absorb knowledge and use it for operational choices (Wang & Byrd, 2017), and that business intelligence has delivered organizational benefits through the decision-support pathway rather than reporting alone (Rouhani et al., 2016). The consistency between this study and prior evidence has mattered because healthcare logistics improvements have often been difficult to attribute to single interventions; the observed relationships have strengthened the plausibility that ERP–DSS

capability has been a specific, measurable contributor to efficiency rather than a general by-product of technology modernization. At the same time, the moderate (rather than extreme) construct means and variability that have been observed have suggested that efficiency gains have not been uniform across roles, which has been compatible with internal hospital supply chain work showing that performance has varied across nodes and sub-processes (Volland et al., 2017). As a result, the study has supported a nuanced efficiency interpretation: ERP–DSS capability has improved efficiency where it has reduced process friction and enabled consistent decisions, while remaining dependent on execution conditions that have shaped how decision outputs have been applied in daily logistics routines.

Figure 10: Discussion Framework of The Research



Practical implications have been especially relevant for healthcare CIOs, CISOs, and enterprise architects because the findings have implied that "ERP implementation" has not been sufficient unless decision support has been operationalized as a governed capability embedded into logistics workflows. From a CIO and enterprise-architecture perspective, the results have reinforced that integration value has increased when ERP has served as a reliable system-of-record and when DSS functions have been designed as workflow-triggered decision services dashboards, alerts, exception queues, and replenishment rules that have connected operational data to action. This has been consistent with ERP and post-implementation research emphasizing that ERP performance benefits have depended on critical success factors such as governance, user involvement, process redesign, and post-implementation use maturity (Garg & Agarwal, 2014). From a CISO perspective, the results have also carried direct relevance because ERP–DSS capability has depended on trustworthy data and controlled decision pathways; the security posture around master data, inventory transactions, supplier data, and exception-handling workflows has therefore been foundational to the reliability of decision outputs. In practice, the findings have supported implementing strong access controls (least privilege for procurement vs. clinical ordering vs. inventory adjustments), audit logging for critical transactions (receipts, adjustments, substitutions), and data integrity controls that have ensured decision dashboards and alerts have not been driven by corrupted or incomplete records. These governance points have also aligned with IS success logic that has treated information quality and system quality as core determinants of use and net benefits (Petter et al., 2008). For architects, the study has suggested that "pipeline refinement" has meant designing a clean information pipeline from transactional capture

→ validated master data → analytics transformations → decision outputs embedded in workflows, with monitoring for latency and data quality drift. For CISOs and architects jointly, the results have supported embedding security-by-design into that pipeline so that the decision-support layer has remained reliable, explainable, and auditable, particularly because healthcare logistics decisions have affected patient service continuity and therefore have required high operational assurance (Ram et al., 2013).

Theoretical implications have strengthened the study's contribution by validating a capability-based explanation for performance outcomes and by refining the conceptual "information-to-decision-to-performance pipeline" in a healthcare logistics context. The Resource-Based View has argued that performance differences have emerged from valuable, hard-to-imitate capabilities rather than from technology assets alone, and the results have supported this view by showing that ERP–DSS capability (visibility, analytics, standardization, alerts) has been the performance-relevant construct rather than mere ERP presence (Ravichandran & Lertwongsatien, 2005). This has aligned with analytics and supply chain performance research using RBV logic, which has treated analytics capability as a bundled resource that has improved operational performance when embedded into decision routines (Chae et al., 2014). The results have also been compatible with supply chain visibility measurement scholarship that has defined visibility as measurable, multi-dimensional, and performance-linked, thereby supporting the study's approach of treating ERP–DSS as a capability that has produced actionable visibility and coordinated behavior (Caridi et al., 2014). In addition, the observed role of coordination in explaining efficiency has refined the conceptual framework by clarifying that coordination has been more than a parallel outcome; it has served as an intermediate operational mechanism translating decision support into efficiency benefits, which has matched collaboration theory that has positioned collaborative advantage as a pathway to firm performance (Cao & Zhang, 2011). Finally, the study has contributed measurement-oriented value by reinforcing IS success model logic within a healthcare logistics setting: system quality and information quality embedded in ERP–DSS capability have plausibly preceded net benefits reflected in coordination and efficiency outcomes (Petter et al., 2008). In this way, the study has not only confirmed established theories but has advanced their application by specifying a concrete pipeline: integrated ERP data + DSS decision routines → coordination behavior → efficiency outcomes, which has been empirically testable through the study's regression structure (Ravichandran & Lertwongsatien, 2005).

Limitations have required careful interpretation of these findings, and revisiting them has clarified how the results should be understood relative to prior work. First, the cross-sectional design has limited causal inference, meaning the identified relationships have represented statistical associations and predictive patterns rather than confirmed causal effects; this has been a common constraint in IS and supply chain survey studies where system capability and outcomes have been measured at one point in time (Petter et al., 2008). Second, the case-study–based setting has strengthened contextual relevance but has constrained generalizability, particularly because healthcare supply chain environments have differed across country, hospital type, digitization maturity, and regulatory environments (Bhakoo & Choi, 2013). Third, the study has relied on self-reported perceptions, which has introduced potential common-method bias and social desirability bias; although reliability and validity evidence has strengthened measurement confidence, perceptions may not have fully represented objective performance metrics such as stockout rate, inventory turnover, or replenishment lead time (Moons et al., 2019). Fourth, hospitals have often exhibited heterogeneous responses across functional tiers and stakeholder groups, and the results may have aggregated differences that could be important for interpretation, such as distinct effects for pharmacy vs. general stores, or emergency-driven replenishment vs. scheduled replenishment (Bhakoo & Chan, 2011). Finally, ERP success and performance impact have depended on governance and post-implementation maturity, and unmeasured organizational factors (change management intensity, master data quality governance, supplier integration depth) could have influenced observed relationships (Garg & Agarwal, 2014). These limitations have not invalidated the results, but they have framed the findings as robust within the studied context and method, while encouraging cautious extension beyond that scope.

Future research has been well-positioned to extend and strengthen this evidence base by addressing

the methodological and contextual constraints while deepening theoretical testing. Longitudinal designs have been able to examine whether ERP–DSS capability improvements have preceded coordination and efficiency gains over time, which would strengthen causal reasoning and help isolate post-implementation learning effects highlighted in ERP success research (Ram et al., 2013). Multi-site studies across hospitals or hospital networks have improved generalizability and enabled comparative analysis of institutional and structural influences, aligning with healthcare SCM work emphasizing heterogeneous responses and tier differences (Bhakoo et al., 2012). In addition, combining perception-based measures with objective KPIs (stockout frequency, order cycle time, expiry loss percentage, inventory accuracy) has strengthened inference and linked DSS capability to operational outcomes emphasized in hospital logistics performance research (Moons et al., 2019). From a capability perspective, future studies have also tested moderating variables that have shaped capability-to-performance translation, such as training intensity, data governance maturity, and the quality of exception management workflows (Petter et al., 2008). Further, decision-support-specific research has explored forecasting coherence and structured DSS mechanisms that have improved planning realism, suggesting that richer DSS capability measurement (forecast reconciliation, alert precision, decision explainability) could refine models and increase explanatory power (Villegas & Pedregal, 2018). Finally, because healthcare logistics has been exposed to disruption risk, future work has examined how ERP-integrated DSS has supported resilience and disruption response in demand management and prioritization, complementing routine efficiency and coordination outcomes (Govindan et al., 2020). These directions have directly built on the current study by testing the same core pipeline under stronger designs, richer outcomes, and broader contexts, while retaining the focus on ERP–DSS capability as a measurable determinant of healthcare logistics coordination and efficiency (Yu et al., 2017).

CONCLUSION

The present study has concluded that ERP-integrated Decision Support Systems have played a measurable and statistically significant role in strengthening healthcare logistics performance within the examined case setting by enhancing both coordination and efficiency outcomes. The quantitative, cross-sectional evidence has shown that when ERP environments have not only stored transactional records but have also embedded decision-support capabilities such as real-time visibility, analytics dashboards, workflow-based alerts, and standardized decision routines users have reported stronger synchronization across logistics stakeholders and improved operational performance in key logistics activities. The results have demonstrated that ERP–DSS capability has positively predicted logistics coordination, indicating that improved information consistency, communication timeliness, aligned replenishment decisions, and coordinated exception handling have been associated with more mature and actionable decision-support integration. The findings have also confirmed that ERP–DSS capability has positively predicted logistics efficiency, showing that the logistics system has been perceived as more capable of reducing delays, improving availability of critical supplies, reducing waste, improving cycle times, and optimizing resource utilization when decision support has been integrated into ERP workflows. In addition, the study has confirmed that logistics coordination has been positively associated with logistics efficiency and has contributed explanatory power even when ERP–DSS capability has been included in the predictive model, which has indicated that coordination has functioned as a meaningful operational mechanism that has helped translate decision support into efficiency gains. In practical terms, the study has indicated that hospitals have benefited most when ERP has been treated as a governed decision infrastructure rather than a stand-alone transactional platform, because coordination benefits have relied on trusted data, disciplined escalation pathways, and consistent decision logic that has been used across departments and internal tiers of the hospital supply network. Methodologically, the study has strengthened credibility by applying reliability and validity checks to the Likert-scale measurement model and by confirming key regression assumptions before hypothesis testing, which has supported the statistical stability of observed relationships. While the study has remained bounded by its cross-sectional, case-based design and by reliance on self-reported measures, it has nonetheless provided empirically grounded evidence that ERP-integrated DSS capability has been a critical determinant of logistics performance in healthcare contexts where supply reliability and cross-department alignment have been operationally essential. Overall, the study

has met its objectives by demonstrating that ERP-integrated decision support has been linked to higher coordination and higher efficiency, and by clarifying that coordinated logistics behavior has been an important pathway through which ERP–DSS capability has supported measurable improvements in healthcare logistics operations.

RECOMMENDATIONS

The recommendations of this study have emphasized that hospitals and healthcare networks have gained the greatest value from ERP-integrated decision support when technology, process governance, and user routines have been designed as one coordinated logistics capability rather than as separate initiatives. First, hospital leadership and supply chain managers have been advised to strengthen ERP–DSS capability by standardizing item master data, unit-of-measure rules, supplier catalogs, and location hierarchies, because reliable decision-support outputs have depended on accurate transactional foundations and consistent data definitions across procurement, pharmacy, stores, and clinical units. Second, logistics governance committees have been recommended to formalize decision rules inside the ERP–DSS workflow, including reorder point logic, safety stock thresholds for critical items, escalation rules for shortages, substitution approval rules, and prioritization criteria during high-demand periods, so that decisions have not depended on individual judgment variability and have remained traceable and auditable. Third, operational teams have been encouraged to implement exception-driven management dashboards that have highlighted imminent stockouts, delayed receipts, abnormal consumption spikes, and high-expiry-risk inventory, with clear ownership assignments and response timelines for each exception category, because coordination has improved when all stakeholders have acted on the same signals and have followed consistent escalation pathways. Fourth, hospitals have been advised to strengthen cross-functional coordination through process integration routines that have linked procurement planning, warehouse replenishment schedules, pharmacy distribution cycles, and ward-level point-of-use replenishment into a unified cadence, supported by regular review meetings using shared KPI dashboards, because efficiency improvements have been sustained when replenishment timing and responsibilities have been synchronized rather than reactive. Fifth, training and change management have been recommended as continuous programs rather than one-time events, with role-based training for procurement staff, pharmacy logistics staff, warehouse teams, and clinical-unit coordinators, because decision-support effectiveness has depended on users' ability to interpret dashboards, respond to alerts correctly, and maintain data quality through disciplined transaction recording. Sixth, IT and enterprise architecture teams have been advised to refine the operational analytics pipeline by ensuring near real-time data refresh for critical inventory and purchasing indicators, applying data quality validation checks, and monitoring dashboard latency and alert precision, so that decision support has remained timely and trustworthy for daily logistics decisions. Seventh, internal control and risk teams have been recommended to implement strong access controls, approval workflows, and audit logs for high-impact transactions such as inventory adjustments, emergency purchasing, and substitutions, because decision-support credibility and organizational trust have increased when governance has protected the integrity of key logistics data. Finally, hospitals have been advised to use a phased improvement roadmap that has prioritized high-criticality supply categories and high-variability units first, tracked impact using measurable KPIs (stockout frequency, replenishment lead time, expiry losses, inventory accuracy, and internal fulfillment time), and then scaled ERP–DSS decision routines across additional categories and departments, because measurable early wins have improved adoption and have supported sustained performance improvement across the broader healthcare logistics system.

LIMITATIONS

The limitations of this study have reflected both methodological constraints and contextual boundaries that have influenced how the findings have been interpreted and generalized. First, the research design has been quantitative and cross-sectional, meaning that all variables have been measured at a single point in time; as a result, the study has identified statistically significant relationships and predictive patterns among ERP–DSS capability, logistics coordination, and logistics efficiency, but it has not established definitive causality or confirmed temporal ordering. Second, the investigation has been case-study–based and has focused on a single healthcare organization or hospital network, which has strengthened contextual relevance but has limited generalizability to other healthcare environments

where logistics structures, ERP maturity, regulatory requirements, supplier ecosystems, and resource constraints have differed. Third, the study has relied on self-reported survey data captured through a five-point Likert scale, which has introduced the possibility of common-method bias, response-style bias, and social desirability effects, because respondents have reported perceptions of both the predictor variable (ERP–DSS capability) and the outcome variables (coordination and efficiency) within the same instrument. Fourth, although reliability and validity checks have been applied and have demonstrated acceptable measurement consistency, the constructs have still represented perceived operational outcomes rather than purely objective performance indicators, meaning that reported efficiency improvements may not have matched actual operational metrics such as real stockout rates, inventory turnover, expiry losses, internal fulfillment lead time, or emergency purchase frequency. Fifth, the study has not captured all potentially influential contextual variables that may have shaped logistics performance, such as supplier lead-time volatility, budget constraints, workforce shortages, organizational culture, clinical demand seasonality, and the maturity of master-data governance practices; therefore, unmeasured factors may have partially influenced the strength of observed relationships. Sixth, the study has aggregated respondents across multiple departments, which has provided broad coverage but may have masked meaningful subgroup differences, because procurement, pharmacy logistics, warehousing, and clinical-unit logistics roles may have experienced ERP–DSS capability and coordination effects differently based on workflow responsibilities, exposure to dashboards, and proximity to point-of-use supply issues. Seventh, although regression assumptions have been checked, the linear modeling approach has represented relationships as linear and additive, which may have simplified complex operational realities where threshold effects, non-linearities, and interaction effects (for example, ERP–DSS capability interacting with training level or data governance maturity) may have existed. Finally, because ERP-integrated decision support has evolved over time within many organizations, the study has not fully captured the dynamic learning and adaptation effects that have occurred after implementation, such as changes in user competence, refinement of alerts, and improvements in data quality controls, which may have influenced both perceived and actual logistics outcomes beyond the measurement window. These limitations have not invalidated the study's findings, but they have defined the scope of inference and have indicated that the results have been most applicable to comparable healthcare logistics settings where ERP decision support has been embedded into routine workflows and evaluated through cross-sectional perceptions of coordination and efficiency.

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