



DIGITAL TRANSFORMATION AND PROCUREMENT EFFECTIVENESS IN HOSPITALS: THE MEDIATING ROLE OF MATERIALS AND PROCUREMENT MANAGEMENT

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ABSTRACT

This review paper examines the relationship between digital transformation and procurement effectiveness in hospitals, with a particular focus on the mediating role of materials and procurement management practices, and, through a systematic literature review synthesizing peer-reviewed articles, industry reports, and case studies published between 2020 and 2026 using a thematic analysis approach, it identifies key patterns, challenges, and opportunities in digital procurement transformation within hospital settings; the findings reveal that digital transformation significantly enhances procurement effectiveness through multiple mechanisms including improved transparency and compliance, enhanced supplier relationship management, data-driven decision-making, and operational cost reduction, with materials and procurement management practices serving as a critical mediating variable in this relationship as digital technologies enable more sophisticated inventory management, demand forecasting, and supply chain integration, although adoption remains uneven and is hindered by significant barriers such as legacy system integration, workforce skill gaps, data quality issues, and regulatory compliance challenges; consequently, hospital administrators and procurement leaders are advised to adopt a strategic, phased approach to digital transformation that prioritizes data governance, staff training, and supplier collaboration, as investment in cloud-based platforms, artificial intelligence, and predictive analytics offers substantial returns in terms of cost savings, supply chain resilience, and improved patient outcomes, and ultimately, this paper contributes to the limited body of research examining the mediating mechanisms through which digital transformation influences procurement effectiveness in healthcare settings, thereby offering both theoretical insights and practical guidance for hospital leaders.

Keywords: Digital Transformation, Procurement Effectiveness, Hospitals, Materials Management, Supply Chain, Healthcare, Mediating Role.

1. INTRODUCTION

1.1 Background

The healthcare sector globally is undergoing a profound digital transformation, driven by technological advancements, changing patient expectations, and persistent pressures to reduce costs while improving quality of care. Hospitals, as complex organizations that consume substantial resources, are increasingly recognizing the strategic importance of procurement and supply chain functions in achieving operational excellence. Healthcare procurement encompasses the acquisition of medical supplies, equipment, pharmaceuticals, and services essential for patient care delivery—activities that typically account for 30-40% of a hospital's operating budget.

The COVID-19 pandemic exposed critical vulnerabilities in hospital supply chains across the globe, emphasizing the urgent need for more resilient, agile, and transparent procurement systems. Supply shortages, price volatility, and logistical disruptions highlighted the limitations of traditional, paper-based procurement approaches that remain prevalent in many healthcare organizations. In response, hospitals are increasingly turning to digital technologies to transform their procurement functions, with 81% of hospitals revising their 2025-2026 capital budgets to include new supply chain technologies.

1.2 Problem Statement

Despite growing recognition of digital transformation's potential to enhance procurement effectiveness, the relationship between digital technologies and procurement outcomes in hospitals remains inadequately understood. While numerous studies have examined digital transformation in healthcare broadly, relatively few have focused specifically on procurement functions or investigated the mediating mechanisms through which digital transformation influences procurement effectiveness. Furthermore, the role of materials and procurement management practices as an intermediary in this relationship has received limited attention in the literature.



1.3 Research Questions

This review paper addresses the following research questions:

1. What is the current state of digital transformation in hospital procurement?
2. How does digital transformation affect procurement effectiveness in hospitals?
3. What is the mediating role of materials and procurement management practices in the relationship between digital transformation and procurement effectiveness?
4. What are the key barriers and enablers of digital procurement transformation in hospitals?

1.4 Significance of the Study

Understanding the relationship between digital transformation and procurement effectiveness is essential for several reasons. First, hospitals face mounting financial pressures, with shrinking margins exacerbated by price volatility and labor inefficiencies. Second, supply chain disruptions continue to threaten patient care continuity. Third, regulatory requirements for transparency, traceability, and compliance are becoming increasingly stringent. Fourth, the potential for cost savings and efficiency gains through digital procurement is substantial, with some estimates suggesting that integrated digital platforms can deliver significant financial benefits.

1.5 Scope and Structure

This review paper is organized as follows: Section 2 presents a comprehensive literature review examining digital transformation in healthcare, procurement effectiveness, and the mediating role of materials management. Section 3 describes the review methodology. Section 4 presents the findings organized thematically. Section 5 discusses the implications of the findings. Section 6 provides conclusions and recommendations for future research and practice.

2. LITERATURE REVIEW

2.1 Digital Transformation in Healthcare

Digital transformation in healthcare refers to the integration of digital technologies into all areas of healthcare delivery, fundamentally changing how healthcare organizations operate and deliver value to patients. This transformation encompasses electronic health records (EHRs), telemedicine, artificial intelligence, cloud computing, Internet of Things (IoT) devices, and advanced analytics.

In the hospital context, digital transformation extends beyond clinical applications to include administrative and operational functions such as procurement, materials management, and supply chain operations. Health information technology investments have been rising steadily, yet research on the impact of technology sourcing strategies on hospital performance remains limited.

A study by Lee, Ratcliffe, and Spaulding (2026) found that greater application concentration among fewer vendors is associated with lower readmission rates and lower operating costs, suggesting that strategic IT sourcing can improve both efficiency and quality outcomes. However, the study also found that adding vendors is associated with higher operating expenses, indicating that consolidation may offer performance benefits.

2.2 Procurement in Healthcare Organizations

Procurement in healthcare is a multifaceted function encompassing the acquisition of medical supplies, equipment, pharmaceuticals, and services. The average hospital procures approximately 200,000 items, spanning maintenance supplies, medical devices, pharmaceuticals, and paper products. The complexity of healthcare procurement is exacerbated by the diversity of product types, varying procurement channels, and the critical nature of many medical supplies.

Traditional procurement approaches in hospitals have been characterized by paper-based processes, manual data entry, fragmented systems, and limited visibility into spending and supplier performance. A study examining hospital procurement in China identified several persistent problems: complex and inefficient processes, inadequate supplier management, information asymmetry, crude budget management, manual documentation challenges, and lack of data-driven decision support.

These traditional approaches create significant vulnerabilities. Manual processes are prone to errors, delays, and inefficiencies. As one healthcare supply chain executive noted, "We are facing challenges due to disruptions in the global supply chain, leading to delays in the delivery of essential medical supplies and equipment". The lack of real-time visibility into inventory levels, supplier performance, and spending patterns impedes effective decision-making and increases operational risks.

2.3 Procurement Effectiveness: Concepts and Measurement

Procurement effectiveness refers to the extent to which procurement functions achieve their intended objectives efficiently and effectively. Key dimensions of procurement effectiveness in hospitals include:



Cost Efficiency: The ability to acquire necessary goods and services at optimal prices while minimizing total cost of ownership. Digital procurement platforms have been shown to reduce procurement costs significantly, with some hospitals achieving substantial savings through automation and consolidation.

Operational Efficiency: The speed, accuracy, and reliability of procurement processes. Digital transformation streamlines procurement workflows, reduces cycle times, and minimizes errors.

Quality Assurance: The ability to procure products and services that meet clinical quality standards and patient safety requirements. Digital tools enable better supplier evaluation and product quality monitoring.

Transparency and Compliance: The extent to which procurement processes are visible, auditable, and compliant with regulatory requirements. Digital platforms enhance transparency by creating comprehensive audit trails and enabling real-time monitoring.

Supplier Relationship Management: The effectiveness of managing relationships with suppliers to ensure reliable supply, innovation, and value creation. Digital platforms facilitate better communication, collaboration, and performance tracking.

Supply Chain Resilience: The ability to maintain procurement continuity during disruptions. Digital technologies enhance resilience through better visibility, forecasting, and risk management.

2.4 Digital Transformation and Procurement: Theoretical Foundations

Several theoretical frameworks help explain the relationship between digital transformation and procurement effectiveness:

Information Systems Theory: This theory suggests that information technology enables organizations to process information more efficiently, reduce uncertainty, and improve decision-making. In the procurement context, digital systems provide real-time data on inventory levels, supplier performance, and market conditions, enabling more informed purchasing decisions.

Institutional Theory: This perspective emphasizes how organizational practices are shaped by regulatory requirements, professional norms, and competitive pressures. Hospitals are increasingly adopting digital procurement technologies in response to regulatory mandates for transparency, traceability, and accountability.

Resource-Based View: This theory suggests that organizations gain competitive advantage through unique resources and capabilities. Digital procurement capabilities—such as advanced analytics, supplier integration, and automated workflows—can serve as sources of sustainable competitive advantage.

Technology Acceptance Model (TAM): This framework explains how users come to accept and use new technologies, emphasizing the roles of perceived usefulness and perceived ease of use. Understanding TAM is crucial for successful digital procurement implementation, as staff adoption is a critical success factor.

2.5 Materials and Procurement Management as a Mediating Variable

Materials and procurement management encompasses the planning, organizing, and controlling of activities related to the acquisition, storage, and distribution of materials and supplies. In hospitals, this includes inventory management, warehousing, distribution, and logistics, in addition to procurement.

The argument for materials and procurement management as a mediating variable rests on the premise that digital transformation does not directly enhance procurement effectiveness; rather, it enables improvements in materials and procurement management practices, which in turn drive procurement effectiveness. This mediating role operates through several mechanisms:

Enhanced Data Integration: Digital technologies enable the integration of procurement data with clinical, financial, and operational data, providing a comprehensive view of materials utilization and costs. This integration enables better demand forecasting, inventory optimization, and spend analysis.

Improved Process Automation: Digital platforms automate routine procurement and materials management tasks—such as requisition processing, purchase order generation, and inventory replenishment—freeing staff to focus on higher-value activities.

Real-Time Visibility: Digital technologies provide real-time visibility into inventory levels, order status, and supplier performance, enabling proactive management of materials and supplies.



Data-Driven Decision Making: Advanced analytics enable evidence-based decisions about sourcing, inventory levels, and supplier selection, improving the effectiveness of materials and procurement management.

Supplier Collaboration: Digital platforms facilitate closer collaboration with suppliers, enabling better demand planning, joint problem-solving, and continuous improvement.

The mediating role of materials and procurement management is supported by empirical evidence. A study of private hospitals in Ghana found that procurement management practices have a significant and positive impact on service delivery, and that hospitals offer better service delivery when procurement management practices are executed digitally. The study concluded that the positive relationship between service delivery and procurement management practices improves with the introduction of digitalization.

Similarly, a study examining the relationship between digital transformation and supply chain procurement found that supply chain procurement plays a significant mediating role in the relationship between digital transformation and competitive advantage. This finding suggests that procurement functions serve as critical conduits through which digital transformation creates organizational value.

2.6 Current Trends in Digital Procurement in Healthcare

Several key trends are shaping the evolution of digital procurement in hospitals:

Artificial Intelligence and Machine Learning: AI is being leveraged to optimize hospital procurement processes, with applications including predictive analytics, demand forecasting, and supplier risk assessment. In Singapore, AI integration has improved procurement responsiveness, minimized supply chain disruptions, and enhanced crisis preparedness. However, broader adoption of emerging technologies such as AI, machine learning, big data analytics, and blockchain remains limited in the healthcare sector.

Cloud-Based Platforms: Healthcare organizations are increasingly migrating to cloud-based procurement platforms that centralize data and provide real-time visibility. The Bristol & Weston NHS Purchasing Consortium implemented SAP Ariba to modernize its procurement function, replacing five standalone systems with one end-to-end solution. The platform is expected to deliver £16 million in cost savings over five years.

Predictive Analytics: Hospitals are using predictive analytics to improve demand forecasting, reducing both overstocking and stockouts. This capability is particularly valuable for managing expensive medical supplies and pharmaceuticals with limited shelf lives.

Sustainability and ESG Integration: Digital procurement strategies are increasingly being leveraged to support environmental sustainability goals. Cloud-based platforms are used to gather supplier data on carbon and resource management, and sustainability criteria are embedded in electronic tender documents. Some hospital trusts have integrated carbon footprint analysis into their procurement systems to monitor emissions in real-time.

Supplier Collaboration Platforms: Digital platforms are enabling closer collaboration with suppliers, improving transparency and trust. These platforms facilitate better communication, performance tracking, and joint problem-solving.

3. METHODOLOGY

3.1 Review Approach

This paper employs a systematic literature review methodology following established guidelines for review papers. The review aimed to synthesize existing research on digital transformation, procurement effectiveness, and materials management in hospital settings.

3.2 Search Strategy

A comprehensive search was conducted across multiple databases including PubMed, Scopus, Web of Science, and Google Scholar. The search utilized combinations of the following keywords: "digital transformation," "procurement," "hospitals," "healthcare," "supply chain," "materials management," "procurement effectiveness," and "mediating role." The search was limited to publications from 2020 to 2026 to ensure currency.

3.3 Inclusion and Exclusion Criteria

Studies were included if they: (a) examined digital transformation in healthcare procurement or supply chain contexts; (b) addressed procurement effectiveness or performance; (c) focused on hospital or healthcare settings; (d) were published in peer-reviewed journals or reputable industry sources; and (e) were published in English or Arabic.



Studies were excluded if they: (a) focused primarily on clinical applications of digital technologies; (b) addressed procurement in non-healthcare sectors; (c) were not available in full text; or (d) were opinion pieces without empirical or analytical content.

3.4 Data Extraction and Synthesis

Data were extracted from included studies using a standardized template covering: author(s), year, research objectives, methodology, key findings, and implications. Thematic analysis was employed to identify patterns, themes, and relationships across studies.

4. FINDINGS

4.1 The Current State of Digital Procurement in Hospitals

The review reveals that digital procurement adoption in hospitals is accelerating but remains uneven. While many hospitals have implemented basic digital tools such as electronic procurement systems and supplier portals, more advanced capabilities—including AI, predictive analytics, and blockchain—are less widely adopted.

Survey data indicates significant momentum: 81% of hospitals revised their 2025-2026 capital budgets to include new supply chain technologies. Among healthcare leaders surveyed, 80% expect supply chain digitalization to accelerate in 2025. Nearly three-quarters of senior healthcare executives have adopted AI in procurement functions, with 92% reporting positive outcomes.

However, adoption challenges persist. The healthcare sector currently lies between the planning and early adoption stages for emerging technologies, due to issues such as limited investment, integration challenges, supplier readiness, and concerns around data security and privacy. Additionally, 45% of hospitals reported deferring planned IT upgrades due to technical staffing constraints.

4.2 Impact of Digital Transformation on Procurement Effectiveness

The review identifies multiple pathways through which digital transformation enhances procurement effectiveness:

Cost Reduction: Digital procurement platforms generate substantial cost savings through automation, consolidation, and improved spend visibility. The Bristol & Weston NHS Purchasing Consortium expects £16 million in cost savings over five years from its SAP Ariba implementation. Cloud-based services have helped hospitals realize savings into the double digits on medicines and other supplies.

Operational Efficiency: Digital transformation streamlines procurement processes, reducing cycle times and administrative burden. Automation of routine tasks has been a key focus, with standardized processes now close to 100% automated in some organizations. However, more complex transactions—such as managing bill-only orders for medical devices—remain areas for further improvement.

Enhanced Transparency and Compliance: Digital platforms provide comprehensive audit trails and real-time visibility into procurement activities, enhancing transparency and supporting regulatory compliance. New CMS mandates and FDA traceability laws are driving demand for platforms with audit-readiness and unit-level tracking.

Improved Supplier Management: Digital platforms enable better supplier evaluation, performance tracking, and collaboration. Hospitals can now assess supplier performance systematically rather than relying on manual, ad-hoc approaches.

Data-Driven Decision Making: Digital technologies provide access to real-time data and advanced analytics, enabling evidence-based procurement decisions. Predictive analytics helps hospitals improve demand forecasting, reducing both overstocking and stockouts.

Supply Chain Resilience: Digital transformation enhances supply chain resilience through better visibility, risk monitoring, and crisis response capabilities. This has become particularly important following the disruptions experienced during the COVID-19 pandemic.

4.3 The Mediating Role of Materials and Procurement Management

The review provides strong evidence that materials and procurement management practices serve as a critical mediating variable in the relationship between digital transformation and procurement effectiveness. This mediation operates through several mechanisms:

Inventory Optimization: Digital technologies enable more sophisticated inventory management, reducing stock holdings while ensuring availability of critical supplies. Bart's Health achieved a £1.5 million reduction in stock holdings in six months through improved inventory management systems.

Process Integration: Digital platforms integrate procurement with other hospital functions—including finance, clinical operations, and patient care—creating a unified view of materials utilization and costs. This integration enables better coordination and decision-making.



Demand Forecasting: Advanced analytics and AI improve demand forecasting accuracy, enabling more efficient procurement and inventory management. This reduces both waste from overstocking and risks from stockouts.

Supplier Collaboration: Digital platforms facilitate closer collaboration with suppliers, enabling better demand planning and joint problem-solving. This collaboration enhances supply chain reliability and innovation.

Data Quality and Governance: Digital transformation enables better data quality and governance, which are essential for effective materials and procurement management. Clean data prevents billing errors and missing supplies.

The mediating role is supported by empirical evidence from multiple studies. A study of private hospitals in Ghana found that digitization significantly moderates the relationship between procurement management practices and service delivery, with hospitals offering better service when procurement is executed digitally. Similarly, research on the impact of digital transformation on supply chain procurement found that procurement functions play a significant mediating role in creating competitive advantage.

4.4 Barriers to Digital Procurement Transformation

The review identifies several significant barriers to digital procurement transformation in hospitals:

Legacy Systems and Integration Challenges: Many hospitals operate with fragmented, legacy systems that are difficult to integrate with modern digital platforms. This creates data silos and impedes the realization of digital transformation benefits.

Workforce Skills Gaps: The shortage of technical staff with relevant skills is a major barrier. 45% of hospitals reported deferring planned IT upgrades due to technical staffing constraints, and 26% indicated difficulty in operationalizing AI-powered procurement systems.

Data Quality Issues: Inaccurate or incomplete data undermines the effectiveness of digital procurement systems. When item masters are inaccurate, supplies go missing, billing breaks, and clinicians are forced into workarounds.

Supplier Readiness: Not all suppliers have the capability to participate in digital procurement platforms, creating integration challenges.

Data Security and Privacy Concerns: Healthcare organizations face significant concerns about data security and patient privacy when implementing digital procurement systems.

Regulatory Complexity: Navigating complex regulatory requirements adds to the challenge of digital procurement implementation.

Change Management: Resistance to change and lack of organizational readiness can impede digital transformation initiatives.

4.5 Enablers of Successful Digital Procurement Transformation

The review also identifies key enablers that facilitate successful digital procurement transformation:

Strategic Leadership: Strong leadership commitment and clear strategic vision are essential for driving digital transformation. Healthcare CFOs increasingly view procurement as a strategic lever for improving working capital and organizational resilience.

Phased Implementation: A phased approach to implementation, starting with foundational capabilities and gradually adding more advanced features, reduces risk and enables learning.

Staff Training and Development: Investing in staff training and development is critical for building the skills needed to leverage digital procurement tools effectively.

Supplier Engagement: Engaging suppliers early in the transformation process and providing support for their digital adoption facilitates integration and collaboration.

Data Governance: Establishing robust data governance processes ensures data quality and supports effective decision-making.

Interoperability Standards: Adopting interoperability standards facilitates integration across systems and with external partners.



5. DISCUSSION

5.1 Synthesis of Findings

This review has examined the relationship between digital transformation and procurement effectiveness in hospitals, with a particular focus on the mediating role of materials and procurement management. The findings reveal a complex but coherent picture: digital transformation enhances procurement effectiveness through multiple pathways, with materials and procurement management practices serving as a critical mediating mechanism.

The mediating role of materials and procurement management is particularly important because it helps explain why digital transformation does not automatically translate into procurement effectiveness. Simply investing in digital technologies is insufficient; hospitals must also transform their materials and procurement management practices to realize the full benefits of digital transformation. This involves rethinking processes, building new capabilities, and fostering a culture of data-driven decision-making.

5.2 Theoretical Implications

The findings have several implications for theory. First, they support the resource-based view by suggesting that digital procurement capabilities can serve as sources of competitive advantage. However, these capabilities are not simply technological; they encompass the organizational processes, skills, and relationships that enable effective use of technology.

Second, the findings extend institutional theory by showing how regulatory pressures for transparency and accountability are driving digital procurement adoption. However, the findings also suggest that regulatory compliance alone is insufficient; hospitals must go beyond compliance to realize the full benefits of digital transformation.

Third, the findings contribute to information systems theory by identifying the specific mechanisms through which digital technologies enhance procurement effectiveness. Rather than a direct effect, digital transformation works through improvements in materials and procurement management practices.

5.3 Practical Implications

The findings have several practical implications for hospital administrators and procurement leaders:

Adopt a Strategic Approach: Digital procurement transformation should be viewed as a strategic initiative, not merely a technological upgrade. It requires clear objectives, executive sponsorship, and alignment with organizational strategy.

Focus on Fundamentals: Before investing in advanced technologies, hospitals should ensure that basic digital capabilities—such as electronic procurement systems, supplier portals, and basic analytics—are in place.

Invest in Data Governance: Data quality is foundational to digital procurement effectiveness. Hospitals should invest in data governance processes to ensure accurate, complete, and timely data.

Build Workforce Capabilities: Staff training and development are critical. Hospitals should invest in building digital skills across the procurement function.

Engage Suppliers: Supplier collaboration is essential for successful digital procurement. Hospitals should engage suppliers early and provide support for their digital adoption.

Measure and Monitor: Hospitals should establish metrics to track procurement effectiveness and the impact of digital transformation initiatives.

5.4 Limitations and Future Research

This review has several limitations. First, the review is based on existing literature and does not include primary empirical research. Second, the review focuses primarily on studies published in English, which may introduce language bias. Third, the healthcare systems in different countries vary significantly, and findings from one context may not be generalizable to others.

Future research should address several gaps identified in this review. First, more empirical research is needed to quantify the mediating effect of materials and procurement management on the relationship between digital transformation and procurement effectiveness. Second, longitudinal studies are needed to track the evolution of digital procurement capabilities and their impact over time. Third, comparative studies across different healthcare systems would help identify context-specific factors that influence digital procurement



transformation. Fourth, research is needed on the organizational change management processes that support successful digital procurement transformation.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

This review paper has examined the relationship between digital transformation and procurement effectiveness in hospitals, with a focus on the mediating role of materials and procurement management. The key conclusions are:

Digital transformation enhances procurement effectiveness through multiple pathways including cost reduction, operational efficiency, enhanced transparency, improved supplier management, and data-driven decision-making.

Materials and procurement management practices serve as a critical mediating variable in this relationship. Digital technologies enable improvements in inventory management, process integration, demand forecasting, and supplier collaboration, which in turn drive procurement effectiveness.

Adoption of digital procurement technologies is accelerating but remains uneven, with significant barriers including legacy systems, workforce skills gaps, data quality issues, and regulatory complexity.

Successful digital procurement transformation requires strategic leadership, phased implementation, staff training, supplier engagement, robust data governance, and attention to change management.

6.2 Recommendations for Practice

Based on the findings of this review, the following recommendations are offered for hospital administrators and procurement leaders:

Recommendation 1: Develop a Strategic Digital Procurement Roadmap. Hospitals should develop a comprehensive digital procurement strategy aligned with organizational objectives. This roadmap should include clear goals, milestones, and resource requirements.

Recommendation 2: Prioritize Data Governance and Quality. Before implementing advanced digital procurement technologies, hospitals should establish robust data governance processes to ensure data accuracy, completeness, and timeliness.

Recommendation 3: Invest in Workforce Development. Building digital skills across the procurement function is essential. Hospitals should invest in training and development programs and consider recruiting talent with relevant digital skills.

Recommendation 4: Engage Suppliers as Partners. Successful digital procurement requires collaboration with suppliers. Hospitals should engage suppliers early in the transformation process and provide support for their digital adoption.

Recommendation 5: Adopt a Phased Implementation Approach. Rather than attempting a "big bang" implementation, hospitals should adopt a phased approach, starting with foundational capabilities and progressively adding more advanced features.

Recommendation 6: Establish Performance Metrics. Hospitals should establish clear metrics to track procurement effectiveness and monitor the impact of digital transformation initiatives.

Recommendation 7: Foster a Culture of Innovation. Digital transformation requires a culture that embraces change, experimentation, and continuous improvement. Leaders should foster such a culture through communication, recognition, and reward systems.

6.3 Recommendations for Policy

For policymakers and regulators, the following recommendations are offered:

Recommendation 1: Support Digital Infrastructure Investment. Governments should consider providing funding or incentives for hospitals to invest in digital procurement infrastructure, particularly in underserved areas.

Recommendation 2: Develop Interoperability Standards. Clear interoperability standards would facilitate integration across systems and reduce the complexity of digital procurement implementation.

Recommendation 3: Address Workforce Gaps. Policies to address healthcare workforce shortages—particularly in technology roles—would support digital transformation efforts.

Recommendation 4: Balance Regulation and Innovation. While regulation is necessary for patient safety and accountability, overly burdensome requirements may impede innovation. Regulators should seek to balance these competing objectives.

6.4 Recommendations for Future Research

For researchers, the following recommendations are offered:

Recommendation 1: Conduct empirical studies to quantify the mediating effect of materials and procurement management on the relationship between digital transformation and procurement effectiveness.

Recommendation 2: Undertake longitudinal studies to track the evolution of digital procurement capabilities and their impact over time.



Recommendation 3: Conduct comparative studies across different healthcare systems to identify context-specific factors that influence digital procurement transformation.

Recommendation 4: Investigate the organizational change management processes that support successful digital procurement transformation.

Recommendation 5: Examine the role of emerging technologies—including AI, blockchain, and IoT—in shaping the future of hospital procurement.

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