Journal of Economics, Management Sciences and Procurement *Volume 4, Issue I, 2025*

pp. 273-284

Supply Chain Digitalization and Service Delivery Among County Referral Hospitals in Nyanza Region, Kenya.

Article history: *Revised format: 16th December 2024, Available online: 19th May 2025*

Magicho Hulder Adhiambo[1]; Dr. Dennis Juma, PhD[2]

Abstract

Purpose: *The primary objective of the study was to determine the influence of supply chain digitalization on service delivery in county referral hospitals within the Nyanza region of Kenya.*

Material/methods: *The study was guided by the Technology Acceptance Model and Systems Theory. A descriptive survey research design was adopted. The target population included 94 supply chain officers, data clerks, and accountants across five county referral hospitals, with procurement and stores personnel serving as the units of observation. A census approach was employed, and data were collected using structured questionnaires. Reliability was assessed using Cronbach's alpha, while construct validity was verified through component factor analysis. Data were analyzed quantitatively using descriptive statistics (frequencies, means, standard deviations) and inferential statistics (Pearson correlation and multiple regression analysis).*

Findings: *The study found that digital tendering and digital tracking significantly enhance service delivery in county referral hospitals. These tools improve operational transparency, inventory visibility, and coordination between supply chain and clinical functions.*

Conclusion*: The study concludes that the adoption of digital tools such as electronic tendering systems and enterprise-level tracking technologies (e.g., barcoding and RFID) improve procurement efficiency, enables real-time inventory management, and supports timely and reliable patient care.*

Value: *This research provides empirical evidence on the benefits of supply chain digitalization in the healthcare sector. It offers actionable recommendations for county governments and hospital administrators to adopt and scale digital solutions to enhance healthcare service delivery and operational performance in public health facilities.*

Keywords*: Supply Chain Digitalization, Service Delivery, Technology Acceptance Model, Systems Theory, Digital Tendering, Digital Tracking*

Paper Type: *Research Article*

Recommended citation: Adhiambo, M. H., & Juma, D. (2025). Supply chain digitalization and service delivery among county referral hospitals in Nyanza Region, Kenya. *Journal of Economics, Management Sciences and Procurement, 4*(1), 273–284.

1.1. Introduction

The Fourth Industrial Revolution is reshaping organizational ecosystems, driving the adoption of more connected and transparent systems, including supply chain management (SCM). Organizations are increasingly re-aligning their strategies to

[1] Msc Student, Jomo Kenyatta University of Agriculture and Technology

[2] Jomo Kenyatta University of Agriculture and Technology

integrate digitalization into supply chain processes, making supply chain digitalization a critical area of growing interest (Seyedghorban et al., 2020). The digital era has shifted the focus to digital services and the analytical algorithms that underpin supply chains, positioning them as key competitive drivers (Ivanov, 2021). The outbreak of COVID-19 significantly disrupted global supply chains, introducing challenges such as city lockdowns, logistics interruptions, and the necessity for remote operations. These disruptions accelerated the adoption of digital supply chain solutions, enabling organizations to reconstruct supply chain structures and mitigate risks efficiently (Ardolino et al., 2022).

Digitalization in supply chains involves leveraging advanced digital technologies to optimize transactions, communication, and operational processes (Sanders & Swink, 2019). These technologies include big data analytics, advanced manufacturing technologies with sensors, decentralized control systems, advanced robotics, augmented reality, enhanced tracking and tracing mechanisms, and 3D printing (Ivanov et al., 2019). The integration of these technologies enhances supply chain visibility, allowing for flexible structural adjustments and improvements in product quality and operational efficiency. Moreover, digital supply chains are inherently adaptive, providing resilience in response to internal and external uncertainties (Belhadi et al., 2022; Ivanov et al., 2022).

The healthcare sector has emerged as a leader in adopting digital platform technologies, employing them to develop innovative digital operational solutions that enhance healthcare service processes (Chakraborty et al., 2021). The push for digital transformation in healthcare has the potential to significantly reduce waste, improve resource utilization, and minimize the sector's carbon footprint (Man et al., 2024). Despite these advancements, the impact of digitalized supply chains on resilience and efficiency within healthcare remains underexplored and requires empirical validation to provide actionable insights for resilience management practices (Li et al., 2022; Belhadi et al., 2022).

In Migori County Referral Hospital, as in many other healthcare institutions, the adoption of supply chain digitalization offers a unique opportunity to enhance service delivery. Understanding the integration of digital technologies into the hospital's supply chain operations is essential for improving resource allocation, streamlining logistics, and achieving higher efficiency and resilience. This study seeks to explore the role of supply chain digitalization in enhancing service delivery within Migori County Referral Hospital, addressing a critical gap in the empirical evidence surrounding digital transformation in healthcare supply chains.

Delivering high-quality public healthcare services demands bureaucratic efficiency and strategic support, yet Kenya's Level 5 hospitals—responsible for 22 percent of sector output and equipped with advanced technology and skilled staff—are hampered by severe supply chain inefficiencies, including limited supplier options, frequent medicine stockouts, supplier defaults, price volatility, and quality concerns, which have coincided with declining growth rates and forced patients to purchase costly drugs privately (Agboola, 2015; Kenya Association of Private Hospitals, 2023; Kenya Medical Supplies Authority, 2021; Bwire, 2018; Atkins et al., 2022; Wandera et al., 2022a). Although digital supply chain integration has been shown to boost operational agility and service outcomes in other industries, empirical research has yet to establish

its effectiveness in enhancing service delivery within public hospitals, particularly at facilities like Migori County Referral Hospital, revealing a critical gap in understanding how digital technologies can address these persistent supply chain challenges and improve healthcare performance (Lee et al., 2022; Chatterjee et al., 2023).

1.2. Theoretical and Conceptual Framework

The study draws on the Technology Acceptance Model (TAM) to explain how procurement officers and healthcare administrators in county referral hospitals decide whether to adopt digital tendering systems. According to TAM, individuals' intentions to use a new technology hinge on their perceptions of its usefulness—how it improves job performance—and its ease of use—how little effort it requires (Davis, 1989). Research in procurement contexts shows that when officers find e-tendering platforms straightforward and clearly beneficial to transparency and efficiency, they are more likely to embrace them, thereby reducing paperwork, human error, and opportunities for corruption (Agbesi & Sun, 2022; Mose et al., 2020). Yet barriers such as inadequate IT infrastructure, user resistance, and cybersecurity concerns can impede adoption (Ouma & Wamalwa, 2021). Applying TAM in Nyanza's hospitals helps identify these facilitators and inhibitors, guiding policymakers to develop user-friendly, secure digital procurement tools and training programs that streamline the supply of medical essentials and support better patient care (Venkatesh & Bala, 2008).

Systems Theory, introduced by von Bertalanffy (1968), frames hospitals as integrated networks of interdependent components—procurement, inventory, logistics, finance, and clinical units—that must function cohesively to deliver quality care. In this view, digital tracking technologies (e.g., RFID, barcodes, GPS) are not standalone innovations but critical links in the healthcare supply chain (Checkland, 1999). Empirical studies demonstrate that well-implemented RFID systems enhance inventory visibility and reduce expired or misplaced supplies, while in sub-Saharan African hospital settings, digital monitoring has cut stockouts and waste (Pettit & Beresford, 2020; Mwangi & Musau, 2022). However, realizing these gains requires holistic integration—ensuring that tracking data feed seamlessly into procurement workflows, budgeting systems, and clinical operations—and robust training and infrastructure to avoid creating new inefficiencies (Abubakar et al., 2021). Systems Theory thus underscores the need for a coordinated, end-to-end approach to digital supply-chain management in county referral hospitals.

The conceptual framework (fig. 1) constitutes of the independent variables (digital tendering, digital tracking, artificial intelligence and Digital record keeping), dependent variable; service delivery among county referral hospitals in Nyanza region, Kenya.

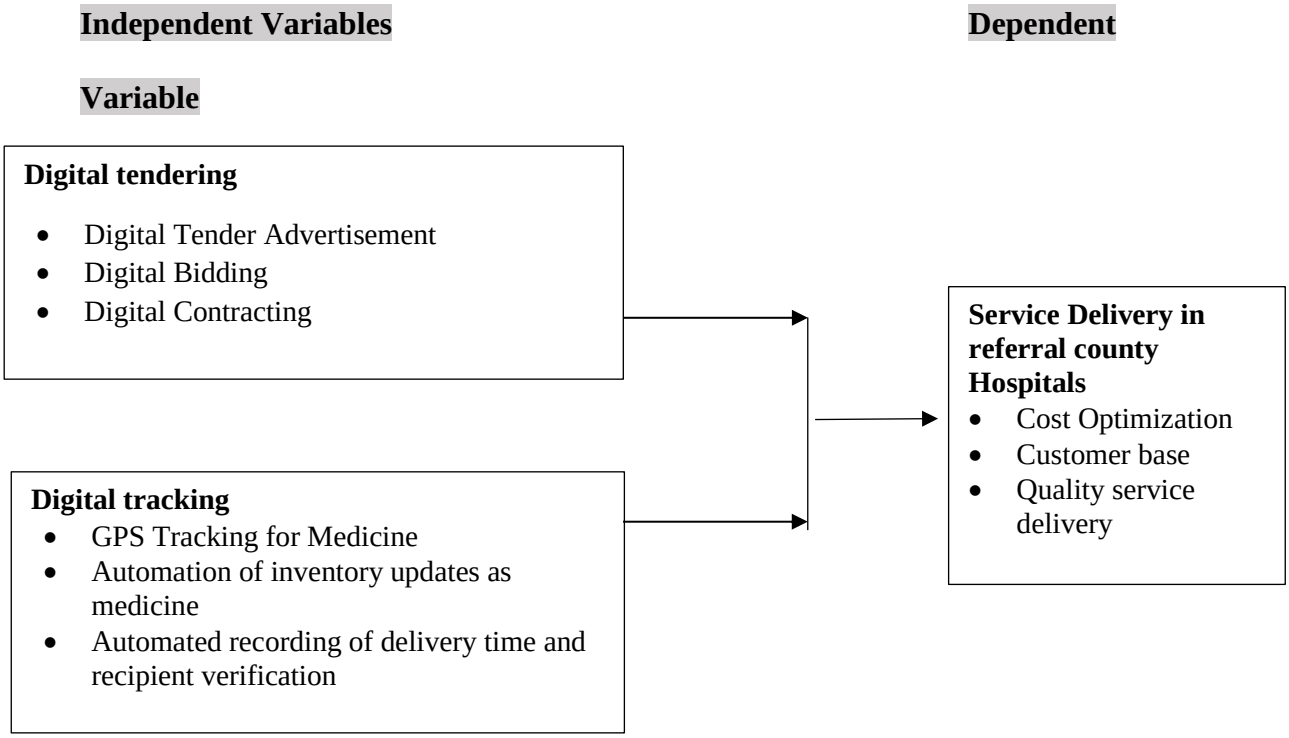

Figure 1: Conceptual Framework

2.1. Empirical Review

2.1.1. Digital Tendering on Service Delivery

Agbesi and Sun (2022) conducted a study in public healthcare institutions to assess the impact of e-tendering on procurement service delivery . Utilizing a case study approach, they collected data from procurement officers through structured questionnaires and analyzed the data using statistical methods. The findings indicated that automation through e-tendering reduced procurement cycle times and enhanced transparency, leading to improved service delivery. The study concluded that e-tendering systems are instrumental in minimizing human errors and increasing efficiency in procurement operations within hospitals.

Kang, Park, and Lee (2021) examined the adoption of digital tendering systems in public hospitals and their effect on procurement fraud and inefficiencies. Employing a survey research design, they gathered data from procurement staff across multiple hospitals and performed regression analysis. The results demonstrated that digital tendering significantly reduced instances of procurement fraud and inefficiencies, thereby contributing to better healthcare outcomes. The researchers emphasized the role of digital tendering in fostering accountability and streamlining procurement processes.

Mose, Kiptoo, and Karanja (2020) analyzed digital procurement practices within Kenyan government institutions, focusing on public hospitals. They conducted a descriptive survey involving procurement officers and utilized both qualitative and quantitative analysis methods. The study found that digital tendering enhanced accountability, reduced corruption, and expedited service delivery in public hospitals. The authors recommended broader adoption of digital procurement systems to further improve healthcare service provision.

Ouma and Wamalwa (2021) investigated the adoption of e-tendering in Kenyan hospitals and its impact on supplier competition and procurement costs. Through a cross-sectional survey of procurement managers, they analyzed data using statistical techniques. The findings revealed that e-tendering increased supplier competition, reduced costs, and improved the quality of procured medical supplies. The study concluded that digital tendering positively influences service delivery by fostering efficiency and accountability in procurement processes.

2.1.2. Digital Tracking on Service Delivery

Pettit and Beresford (2020) reviewed the implementation of RFID-enabled tracking systems in hospital supply chains within public hospitals in the United Kingdom. Using a case study methodology, they collected qualitative and quantitative data from hospital administrators and supply chain managers. The study concluded that real-time inventory monitoring through RFID minimized shortages and ensured timely delivery of essential medical supplies, thereby enhancing service provision.

Mwangi and Musau (2022) examined the role of digital tracking systems in service delivery within Kenyan hospitals. Conducting a cross-sectional survey of procurement officers, they analyzed data using regression techniques. The study found that automated tracking systems improved logistics management, reduced patient wait times, and enhanced service efficiency. The authors recommended increased investment in digital tracking technologies to further optimize healthcare operations.

Abubakar et al. (2021) investigated the adoption of digital tracking technologies in healthcare facilities across Africa. Utilizing a mixed-methods approach that combined surveys and in-depth interviews, they analyzed the impact of these technologies on supply chain disruptions. The study found that hospitals with advanced tracking systems reported fewer supply disruptions, leading to improved patient care. The researchers emphasized the importance of digital tracking in ensuring smooth healthcare operations and enhancing service delivery.

Gichuki and Wanjiru (2021) explored the implementation of digital tracking systems in Kenyan public hospitals. Using a descriptive survey design, they collected data from supply chain managers and analyzed it using statistical methods. The findings indicated that digital tracking streamlined procurement and delivery processes, reducing inefficiencies that often hamper service provision. The study concluded that digital tracking plays a critical role in ensuring smooth healthcare operations and enhancing service delivery.

3.1. Research Methodology

The study employed a descriptive survey design to examine how supply chain digitalization influences service delivery, targeting all 94 procurement, IT, and accounting officers across five referral hospitals in Kenya's Nyanza region—Siaya, Homa Bay, Kisii, Migori, and Nyamira—using a census approach to ensure full representation (Mugenda & Mugenda, 2003). Data were gathered via a structured, five-point Likert-scale questionnaire, piloted with 5% of the population (nine respondents) to refine item clarity and enhance reliability, which was confirmed by a Cronbach's alpha exceeding 0.7 (Tavakoli & Dennick, 2011). Face and content validity were

established through expert review and pilot feedback, while construct validity was assessed via factor analysis, discarding items below a 0.4 loading (Field, 2021). A drop-and-pick procedure—preceded by institutional introduction letters and cover notes assuring confidentiality—facilitated flexible, respondent-friendly data collection (Mugenda & Mugenda, 2013). The cleaned, coded data were then analyzed in SPSS 24 to produce descriptive statistics (means, frequencies, standard deviations) and inferential insights, applying multiple linear regression at a 0.05 significance level to test the hypothesized relationships between digitalization practices and service delivery outcomes (Kothari, 2003).The regression model is represented below:

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$

Where,

$Y =$ service delivery among county referral hospitals in Nyanza region, Kenya

$\beta_0 =$Constant

$X_1 =$ Digital tendering

$X_2 =$ Digital tracking

4.1. Findings And Discussion

This section reports on the analysis of data aligned with the study's objectives—namely, to assess how supply chain digitalization influences service delivery in private primary schools in Narok—by first evaluating questionnaire return rates. Of the 94 surveys distributed to procurement officers across five county referral hospitals, 71 were returned and deemed usable, representing an 81.9 percent response rate. This exceeds established benchmarks for reliability and generalizability (70 percent for "very good" and 60 percent for reliable analysis), ensuring that the study's inferences rest on a strong, representative sample.

4.1.1. Descriptive Statistics

This section presents descriptive statistics for the five key aspects of service delivery—service quality, timeliness of care, resource management, patient satisfaction, and continuous improvement—using a five-point Likert scale (SD = Strongly Disagree through SA = Strongly Agree). Table 1 below summarizes the percentage distributions, means, and standard deviations for each indicator. Respondents rated service delivery most favorably on patient satisfaction (mean = 3.75, SD = 1.03), indicating that most agree they are generally happy with their overall experience, and on resource management (mean = 3.66, SD = 1.55), suggesting a consensus that hospital resources are being used effectively. Timeliness of care (mean = 3.55, SD = 1.37) and commitment to continuous improvement (mean = 3.56, SD = 1.43) also scored above the neutral point, reflecting moderate agreement that care is both prompt and evolving. In contrast, perceptions of overall service quality lagged (mean = 2.65, SD = 1.31), with many respondents expressing some dissatisfaction. The combined service-delivery index (mean = 3.29, SD = 0.96) therefore points to moderate performance overall, with the greatest variation seen in resource-management responses and the tightest consensus around patient satisfaction.

Table 1: *Descriptive Statistics for Service delivery*

	Mean	Std. Dev
The hospital provides high-quality healthcare services to patients.	2.65	1.31
Patients receive timely and efficient medical attention at the hospital.	3.55	1.37
The hospital effectively manages its resources to optimize service delivery.	3.66	1.55
Patients are satisfied with the overall service experience at the hospital.	3.75	1.03
The hospital ensures continuous improvement in healthcare service standard	3.56	1.43
Service delivery	**3.29**	**0.96**

4.1.1. Descriptive Statistics for Digital Tendering

Staff perceptions of the hospital's digital tendering processes are cautiously positive but reveal areas for improvement. Respondents most strongly agreed that digital bidding has reduced paperwork and improved procurement efficiency, and that tenders are consistently advertised through online platforms, both scoring just above three on the five-point scale. Slightly lower—but still above neutral—ratings were given to the timeliness and accuracy of digitally disseminated tender information and the convenience of online bid submission. However, the hospital's capacity to manage contracts via digital systems received the weakest endorsement, with a mean below neutral, indicating that end-to-end digital contract management remains underdeveloped. Overall, the composite score of just under three suggests that while digital tendering is recognized for its efficiency benefits, full adoption and reliable performance across all stages of the process have yet to be achieved.

Table 2: *Descriptive Statistics for Digital tendering*

	Mean	Std. Dev
Our hospital consistently advertises tenders through digital platforms.	3.23	1.33
Digital tender platforms ensure timely and accurate dissemination of tender information.	3.20	1.35
Suppliers can conveniently submit bids through the hospital's digital bidding system.	3.04	1.44
Digital bidding has minimized paperwork and enhanced the efficiency of the procurement process.	3.42	1.38
The hospital effectively manages procurement contracts through digital platforms.	2.67	1.23
Digital Tendering	**2.98**	**1.08**

4.1.2. Descriptive Statistics for Digital Tracking

Table 3 (below) summarizes the percentage distributions, means, and standard deviations for each item. Overall digital tracking performs moderately well, with a composite mean of 3.53 (SD = 0.72). Automated inventory updates lead the way (M = 4.22, SD = 1.24), followed by GPS tracking (M = 3.55, SD = 1.43) and delivery-time recording (M = 3.55). Recipient verification shows solid but not uniform confidence (M = 3.38, SD = 1.51), while discrepancy reduction remains the weakest link (M = 3.09, SD = 1.07).

Table 3: Descriptive Statistics for Digital Tracking

	Mean	**Std. Dev**
Our hospital utilizes GPS tracking to monitor the movement of medical supplies.	3.55	1.43
The hospital's inventory system automatically updates stock levels upon receipt of medicine.	4.22	1.24
Digital tracking ensures accurate recording of delivery times for medical supplies.	3.55	1.14
Automated tracking systems enhance the verification of recipients during medicine delivery.	3.38	1.51
The use of digital tracking has minimized stock discrepancies and improved inventory management	3.09	1.07
Digital tracking	**3.53**	**0.72**

4.1.3. Correlation Analysis

Table 4 presents Pearson correlation coefficients and corresponding significance levels for each pair of variables, offering insight into how each factor influences service delivery among county referral hospitals in Nyanza region, Kenya. The findings in Table 4 reveal that all four dimensions of supply chain digitalization exhibit a statistically significant and positive correlation with service delivery at the 0.01 level. Among these, digital tendering recorded the strongest correlation with service delivery ($r = 0.686$, $p < 0.01$). Digital tracking was also strongly correlated with service delivery ($r = 0.640$, $p < 0.01$), implying that real-time visibility and monitoring of inventory and shipments help ensure essential medical supplies are available when needed, thereby reducing stock-outs and minimizing delays in patient care.

Table 4: *Correlation Analysis*

		Service delivery	**Digital tendering**	**Digital tracking**
Service delivery	Pearson Correlation	1		
	Sig. (2-tailed)	0.000		
Digital tendering	Pearson Correlation	.686**	1	
	Sig. (2-tailed)	0.000		
Digital tracking	Pearson Correlation	.640**	.626**	1
	Sig. (2-tailed)	0.000	0.000	

** Correlation is significant at the 0.01 level (2-tailed).

4.1.4. Regression Analysis

In this study, multiple regression analysis was applied to test the hypothesized effects of key supply chain digitalization dimensions—digital tendering and digital tracking, on the service delivery. This method was chosen due to its suitability for analyzing the simultaneous impact of multiple predictors on a single outcome variable. As shown in Table 5 the model yielded an R value of 0.782, indicating a strong positive correlation between the combined independent variables and the service delivery of private primary schools. The R Square (R^2) value of 0.611 implies that 61.1% of the variance in service delivery can be explained by the four supply chain digitalization variables included in the model. The Adjusted R Square of 0.598—which adjusts for the number of predictors—demonstrates that even after accounting for the number of variables, the model retains a strong explanatory power. These findings underscore the collective importance of supply chain digitalization elements—particularly digital tendering and digital tracking in shaping service delivery outcomes. Nonetheless, the remaining 38.9% of variance is attributed to other unexamined factor.

Table 5: *Model Summary Statistics*

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.782a	0.611	0.598	0.56395

a Predictors: (Constant), Artificial intelligence, Digital record keeping, Digital tracking, Digital tendering

The results in Table 6 show that the regression model is statistically significant, with an F-statistic of 48.327 and a p-value of .000. This indicates that the combined effect of the four supply chain digitalization predictors explains a significant portion of the variance in service delivery. Since the p-value is well below the conventional alpha level of 0.05, the null hypothesis—that the model provides no better fit than a model with no predictors—can be rejected. These results confirm that supply chain digitalization dimensions, when considered collectively, make a statistically meaningful contribution to the prediction of service delivery among county referral hospitals in Nyanza region, Kenya. This strengthens the case for integrating such capabilities into school management frameworks to enhance institutional outcomes.

Table 6:ANOVA for Goodness of Fit

ANOVA a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	61.48	4	15.37	48.327	.000b
	Residual	39.119	123	0.318		
	Total	100.599	127			

a Dependent Variable: service delivery of Service delivery

b Predictors: (Constant), Artificial intelligence , Digital record keeping, Digital tracking, Digital tendering

Table 7 presents the regression coefficients assessing the influence of supply chain digitalization dimensions—digital tendering and digital tracking,—on the service delivery among county referral hospitals in Nyanza region, Kenya. The first objective of the study was to determine the effect of digital tendering on service delivery. Regression analysis revealed that digital tendering had a positive and statistically significant effect ($B = 0.317$, $\beta = 0.312$, $t = 3.914$, $p < 0.001$). This indicates that a one-unit increase in the use of online procurement platforms corresponds to a 0.317-unit improvement in service delivery ratings, underscoring how streamlined, transparent tendering processes enhance the timely availability of critical supplies.

The second objective sought to establish the effect of digital tracking on service delivery. The regression results indicated a positive and statistically significant impact ($B = 0.199$, $\beta = 0.205$, $t = 2.605$, $p = 0.010$). This implies that the adoption of real-time tracking systems boosts service delivery by approximately 0.199 units, reflecting the role of inventory visibility in preventing stock-outs and ensuring continuity of patient care.

Table 7: *Coefficient of Estimates*

	Unstandardized Coefficients		**Standardized Coefficients**		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	0.402	0.206		1.950	0.053
Digital tendering	0.317	0.081	0.312	3.914	0.000
Digital tracking	0.199	0.076	0.205	2.605	0.010

a Dependent Variable: Service delivery

5.1. Conclusion

Based on the empirical findings, the study concludes that digital tendering is a critical enabler of county referral hospitals' service delivery by streamlining procurement processes, enhancing transparency, and ensuring timely access to essential medical supplies. By replacing manual purchase orders and competitive bidding on paper with online platforms, hospitals reduce administrative delays and foster fair, auditable supplier selection. This increased efficiency not only cuts procurement lead times but also builds trust among suppliers, ultimately contributing to more reliable stock availability and uninterrupted patient care.

The study also concludes that digital tracking plays a pivotal role in enhancing service delivery by providing real-time visibility of inventory movements and shipment statuses, which allows hospitals to anticipate and mitigate stock-out risks before they disrupt patient care. By leveraging barcodes, RFID tags, or GPS-enabled dashboards, managers can pinpoint exactly where critical items are at any given moment, reducing emergency orders and last-minute procurements. This proactive oversight supports smoother clinical workflows, as staff can plan around predictable supply cycles rather than reacting to sudden shortages.

6.1. Recommendations

County referral hospitals should invest in the development and integration of robust e-procurement systems that standardize tendering workflows across all facilities. This will involve selecting interoperable software that links directly with existing financial

management and supplier databases, ensuring end-to-end visibility of the tendering process. Hospitals must also establish clear e-procurement policies and conduct targeted training sessions for procurement officers and suppliers to build expertise in digital tendering tools. Regular audits of e-tendering activities should be institutionalized to monitor compliance, identify bottlenecks, and continuously refine platform configurations, thereby reducing procurement lead times and bolstering supplier accountability.

To preempt stock-out risks and support uninterrupted patient care, hospitals should roll out enterprise-wide digital tracking solutions—such as barcode or RFID tagging coupled with GPS-enabled inventory dashboards—that provide granular, real-time insights into the movement of critical supplies. Implementation should be phased, beginning with high-impact departments (e.g., pharmacy and emergency units) and gradually extending to all storerooms and clinical areas. Training logistics and store staff on scanning protocols, exception reporting, and dashboard interpretation will ensure swift detection of discrepancies. Additionally, IT teams must collaborate with network administrators to guarantee reliable connectivity and data security across all tracking endpoints.

6.2. Recommendations Further Research

Although digital tendering and tracking clearly enhance service delivery in county referral hospitals, future research should broaden the scope of supply-chain digitalization by investigating the performance impacts of supplier-relationship platforms, blockchain-based traceability, mobile ordering, and data-analytics dashboards, while also using qualitative interviews with procurement staff and clinicians to uncover contextual enablers and obstacles. Longitudinal studies will be crucial for mapping how phased digital investments drive continuous improvements, and expanding the research to hospitals in other Kenyan regions, national and sub-county facilities, as well as comparing public versus private and urban versus rural settings, will test the generalizability of these findings and reveal how organizational culture, funding models, and regulation shape digital-technology outcomes..

References

Agboola, T. O. (2015). Service compact and service delivery in Southwestern Nigeria (Doctoral dissertation, Obafemi Awolowo University).

Ardolino, M., Bacchetti, A., & Ivanov, D. (2022). Analysis of the COVID-19 pandemic's impacts on manufacturing: a systematic literature review and future research agenda. *Operations Management Research*, *15*(1), 551-566.

Atkins K, Musau A, Mugambi M, Odhyambo G, Tengah SA, Kamau M, et al. (2022). Health system opportunities and challenges for PrEP implementation in Kenya: A qualitative framework analysis. PLoS ONE, vol. 17, no.10, e0259738. https://doi.org/10.1371/journal.pone.0259738

Belhadi, A., Kamble, S. S., Venkatesh, M., Jabbour, C. J. C., & Benkhati, I. (2022). Building supply chain resilience and efficiency through additive manufacturing: An ambidextrous perspective on the dynamic capability view. *International Journal of Production Economics*, *249*, 108516.

Bwire, J. & Awino, Z (2018). Synergy of Top Management Team Demographics, Strategy and Structure: Empirical Evidence on Performance of Public Enterprises. International Journal of Business and Management. 13. 108-108. 10.5539/ijbm.v13n2p108.

Chakraborty, S., Bhatt, V., Chakravorty, T., & Chakraborty, K. (2021). Analysis of digital technologies as antecedent to care service transparency and orchestration. *Technology in Society*, *65*, 101568.

Chatterjee, S., Mariani, M., & Ferraris, A. (2023). Digitalization of supply chain and its impact on cost, firm service delivery , and resilience: technology turbulence and top management commitment as moderator. *IEEE Transactions on Engineering Management*.

Checkland P, Holwell S. 1999. Information management and organizational processes: An approach through soft systems methodology.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982–1003.

Ivanov, D. (2021). Digital supply chain management and technology to enhance resilience by building and using end-to-end visibility during the COVID-19 pandemic. *IEEE Transactions on Engineering Management*.

Ivanov, D., Dolgui, A., & Sokolov, B. (2019). The impact of digital technology and Industry 4.0 on the ripple effect and supply chain risk analytics. *International journal of production research*, *57*(3), 829-846.

Ivanov, D., Dolgui, A., & Sokolov, B. (2022). Cloud supply chain: Integrating Industry 4.0 and digital platforms in the "Supply Chain-as-a-Service". *Transportation Research Part E: Logistics and Transportation Review*, *160*, 102676.

Lee, K., Azmi, N., Hanaysha, J., Alzoubi, H., & Alshurideh, M. (2022). The effect of digital supply chain on organizational service delivery : An empirical study in Malaysia manufacturing industry. *Uncertain Supply Chain Management*, *10*(2), 495-510.

Li, G., Xue, J., Li, N., & Ivanov, D. (2022). Blockchain-supported business model design, supply chain resilience, and firm service delivery . *Transportation Research Part E: Logistics and Transportation Review*, *163*, 102773.

Man, L. C., Lin, Y., Pang, G., Sanderson, J., & Duan, K. (2024). Digitalization to achieve greener healthcare supply chain. *Journal of Cleaner Production*, 142802.

Mugenda, O. M., & Mugenda, A. G. (2013). Research Methods: Quantitative and Qualitative Approaches. Acts Press.

Mugenda, O., & Mugenda, A. (2003). Research methods quantitative and qualitative approaches. Nairobi Act Press.

Sanders, N. R., & Swink, M. (2019). Digital supply chain transformation: Visualizing the possibilities. *Supply Chain Management Review*.

Seyedghorban, Z., Tahernejad, H., Meriton, R., & Graham, G. (2020). Supply chain digitalization: past, present and future. *Production Planning & Control*, *31*(2-3), 96-114.

Tavakol, M., & Dennick, R. (2011). Making Sense of Cronbach's Alpha. International Journal of Medical Education, 2, 53-55. http://dx.doi.org/10.5116/ijme.4dfb.8dfd

Von Bertalanffy, L. (1968). General System Theory: Foundations, Development. New York: George Braziller.