International Journal of Accounting, Management and Economic Review. Vol. 2 Issue 1, April (2026). ISSN (p): 2384-7026, ISSN (e): 3141-222X.

IMPACT OF ELECTRONIC PROCUREMENT PRACTICES ON THE SUPPLY CHAIN PERFORMANCE OF LISTED CONSTRUCTION COMPANIES IN NIGERIA

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DOI: https://doi.org/10.57233/ijamer.v2i1.38

Article Information: Received: 02/08/2026 Revised: 03/15/2026 Accepted: 04/20/2026

To Cite this Article: Sani, N., Hassan, S. U., & Bello, U. (2026). Impact of electronic procurement practices on the supply chain performance of listed construction companies in Nigeria. *International Journal of Accounting, Management and Economic Research*, 2(1). https://doi.org/10.57233/ijamer.v2i1.38

Abstract
Electronic procurement has emerged as a critical tool for enhancing supply chain performance, particularly in the construction industry, where procurement inefficiencies often undermine operational efficiency. This study examines the impact of electronic procurement practicesspecifically electronic sourcing, electronic tendering, electronic ordering, and electronic invoicing, on the supply chain performance of listed construction companies in Nigeria. Guided by Transaction Cost Theory and Resource-Based View, the study employs a quantitative research design, collecting secondary data from annual reports, procurement databases, and industry records spanning 2014-2023. Data analysis was conducted using structural equation modeling (SEM) to evaluate the relationships between electronic procurement practices and supply chain outcomes. Findings reveal that all dimensions of electronic procurement exert positive and statistically significant effects on supply chain performance, with electronic ordering exhibiting the strongest impact. The study concludes that digital procurement technologies enhance operational efficiency, reduce procurement cycle times, improve transparency, and strengthen supplier collaboration. Recommendations include increased investment in digital procurement infrastructure, standardization of electronic tendering, staff training, and government support for digital transformation. The study contributes to procurement and supply chain literature by providing empirical evidence of the effectiveness of electronic procurement practices within the Nigerian construction sector.

Keywords: Construction industry,digital transformation, electronic procurement,Nigeria, supply chain performance.

1.0 Introduction

The rapid advancement of digital technologies has significantly transformed organizational operations across industries, particularly in the area of procurement and supply chain management. In recent years, organizations have increasingly embraced digital solutions to improve operational efficiency, reduce transaction costs, and enhance supply chain coordination. One of the most notable technological innovations in this area is electronic procurement (e-procurement), which refers to the use of internet-based technologies to facilitate and automate procurement processes such as supplier sourcing, tendering, ordering, and invoicing (Davila et al., 2003; Gunasekaran & Ngai, 2008). Through the integration of

digital platforms, e-procurement systems enable organizations to streamline procurement activities, enhance transparency, and improve communication with suppliers, ultimately contributing to improved supply chain performance (Vaidya et al., 2006; Bag et al., 2020).

Procurement plays a particularly critical role in industries characterized by complex supply chains and project-based operations, such as the construction industry. Construction projects typically involve multiple stakeholders, including contractors, subcontractors, suppliers, consultants, and project managers, all of whom depend on efficient procurement processes to ensure timely delivery of materials and services (Eriksson & Westerberg, 2011; Osei-Tutu et al., 2018). Inefficient procurement systems can lead to project delays, cost overruns, and poor coordination among supply chain partners. Traditionally, procurement processes in many construction firms have relied heavily on manual documentation, fragmented communication channels, and bureaucratic procedures, which often result in inefficiencies and increased operational costs (Ibem et al., 2016; Afolabi et al., 2019).

The emergence of electronic procurement systems has therefore provided organizations with new opportunities to improve procurement efficiency and enhance supply chain performance. E-procurement platforms enable firms to automate supplier selection, manage tendering processes electronically, track purchase orders in real time, and facilitate electronic invoicing and payment systems (Croom & Brandon-Jones, 2007; Toktaş-Palut et al., 2014). These technological capabilities enhance procurement transparency, reduce administrative costs, and improve decision-making processes by providing timely access to procurement information. Consequently, the adoption of electronic procurement practices has become a strategic tool for organizations seeking to enhance supply chain efficiency and maintain competitive advantage in an increasingly digital business environment (Bag et al., 2020; Queiroz et al., 2021).

Empirical studies across various sectors have demonstrated that the adoption of e-procurement technologies can significantly improve supply chain performance by enhancing information flow, reducing procurement cycle times, and improving supplier relationships (Gunasekaran & Ngai, 2008; Toktaş-Palut et al., 2014). Digital procurement systems also enable organizations to integrate procurement processes with other enterprise systems such as inventory management and financial reporting, thereby facilitating better coordination across supply chain functions (Davila et al., 2003; Vaidya et al., 2006). As a result, organizations that successfully implement electronic procurement systems are often able to achieve higher levels of operational efficiency, cost savings, and improved supplier collaboration.

Despite the increasing global adoption of digital procurement technologies, the extent of e-procurement implementation varies considerably across countries and industries. In developed economies, many organizations have widely adopted electronic procurement platforms as part of broader digital transformation initiatives aimed at enhancing supply chain integration and organizational performance (Bag et al., 2020). However, in many developing economies, the adoption of e-procurement systems remains relatively limited due to challenges such as inadequate technological infrastructure, limited digital skills, and organizational resistance to technological change (Afolabi et al., 2019; Osei-Tutu et al., 2018). These challenges are particularly evident in the construction sector, where traditional procurement practices often dominate procurement activities.

Nigeria's construction industry represents a vital sector of the national economy, contributing significantly to infrastructure development, employment generation, and economic growth. Construction firms play a critical role in the development of essential infrastructure such as roads, housing, bridges, and commercial facilities, which are necessary for national

development and economic productivity (Aibinu & Jagboro, 2002; Afolabi et al., 2019). Given the scale and complexity of construction projects, efficient procurement and supply chain management systems are essential for ensuring project success. However, procurement inefficiencies remain a major challenge within the Nigerian construction industry, often resulting in delays in project delivery, cost escalation, and inefficient resource utilization (Ibem et al., 2016).

In response to these challenges, many construction firms have begun exploring the adoption of electronic procurement practices as a means of improving procurement efficiency and strengthening supply chain coordination. Electronic procurement practices such as e-sourcing, e-tendering, e-ordering, and e-invoicing enable organizations to automate procurement transactions, enhance supplier communication, and improve transparency in procurement processes (Croom & Brandon-Jones, 2007; Toktaş-Palut et al., 2014). These practices facilitate faster procurement decision-making, reduce documentation errors, and enhance monitoring of procurement activities, thereby improving overall supply chain performance (Gunasekaran & Ngai, 2008; Bag et al., 2020).

However, despite the potential benefits associated with electronic procurement adoption, empirical evidence on the relationship between e-procurement practices and supply chain performance within the Nigerian construction industry remains limited. Existing studies have largely focused on manufacturing firms, public sector procurement systems, or small and medium-sized enterprises, leaving a significant research gap regarding the impact of electronic procurement practices on supply chain performance within large construction firms (Afolabi et al., 2019; Osei-Tutu et al., 2018). Furthermore, many previous studies have treated electronic procurement as a single construct without examining the specific contributions of its various components to supply chain performance outcomes.

In reality, electronic procurement comprises several interrelated practices, including electronic sourcing, electronic tendering, electronic ordering, and electronic invoicing. Each of these practices may influence supply chain performance differently depending on the technological capabilities of the organization and the level of digital integration with suppliers. A multidimensional analysis of electronic procurement practices therefore provides a more comprehensive understanding of how digital procurement technologies contribute to improved supply chain performance.

Against this background, this study examines the impact of electronic procurement practices on the supply chain performance of listed construction companies in Nigeria. Specifically, the study investigates how key electronic procurement practices influence supply chain efficiency within publicly listed construction firms operating within the Nigerian economy. By focusing on management staff responsible for procurement and supply chain operations, the study provides empirical insights into the role of digital procurement technologies in enhancing procurement efficiency and supply chain performance.

This study contributes to the existing literature in several important ways. First, it extends empirical knowledge on the adoption and impact of electronic procurement systems within the context of developing economies, particularly Nigeria's construction industry. Second, the study provides a multidimensional analysis of electronic procurement practices by examining the individual effects of e-sourcing, e-tendering, e-ordering, and e-invoicing on supply chain performance. Third, the study employs a robust quantitative analytical technique, Partial Least Squares Structural Equation Modeling (PLS-SEM), to examine the relationships between electronic procurement practices and supply chain performance. The findings of this study are therefore expected to provide valuable insights for managers, policymakers, and researchers

seeking to enhance procurement efficiency and supply chain performance within the construction sector.

Overall, understanding the role of electronic procurement practices in improving supply chain performance is essential for promoting digital transformation within Nigeria's construction industry. By identifying the specific procurement practices that most significantly influence supply chain efficiency, this study provides practical guidance for organizations seeking to strengthen procurement systems, improve supplier coordination, and enhance project delivery outcomes within the construction sector.

2.0 Literature Review and Hypothesis Development

Electronic procurement (e-procurement) refers to the application of digital technologies, particularly internet-based platforms, to support and automate procurement activities such as sourcing suppliers, issuing tenders, placing purchase orders, and processing invoices (Davila et al., 2003; Vaidya et al., 2006). It represents a major transformation from traditional procurement systems that rely heavily on manual documentation and fragmented communication processes. By leveraging digital platforms, organizations are able to improve procurement transparency, reduce administrative costs, and strengthen collaboration with supply chain partners (Croom & Brandon-Jones, 2007; Gunasekaran & Ngai, 2008).

The adoption of e-procurement has been widely recognized as an important component of digital transformation within supply chain management. Organizations increasingly deploy e-procurement systems to integrate procurement activities with other enterprise functions such as inventory management, logistics coordination, and financial reporting (Bag et al., 2020; Queiroz et al., 2021). Through this integration, firms can improve procurement planning, monitor supplier performance, and enhance decision-making processes based on real-time procurement data. Consequently, electronic procurement systems have become an essential tool for enhancing operational efficiency and strengthening supply chain performance.

Electronic procurement systems typically consist of several interrelated components that facilitate different stages of the procurement cycle. These components include electronic sourcing, electronic tendering, electronic ordering, and electronic invoicing, which collectively contribute to the automation and optimization of procurement activities (Toktaş-Palut et al., 2014; Bag et al., 2020). Each component plays a specific role in enhancing procurement efficiency and improving supply chain coordination.

Electronic Sourcing

Electronic sourcing (e-sourcing) refers to the use of digital platforms to identify, evaluate, and select suppliers through online procurement systems. E-sourcing platforms allow organizations to access broader supplier networks, compare supplier capabilities, and conduct supplier evaluations more efficiently (Croom & Brandon-Jones, 2007; Toktaş-Palut et al., 2014). Through electronic sourcing tools, procurement managers can analyze supplier information, conduct electronic negotiations, and make informed sourcing decisions based on comprehensive market data.

The use of electronic sourcing systems enhances procurement transparency and improves supplier selection processes. By enabling firms to access multiple supplier databases and evaluate supplier performance metrics, e-sourcing contributes to improved supplier competitiveness and better procurement outcomes (Gunasekaran & Ngai, 2008). Furthermore, e-sourcing technologies facilitate supplier collaboration and strengthen long-term buyer–supplier relationships, which are critical for achieving supply chain efficiency (Bag et al., 2020).

Electronic Tendering

Electronic tendering (e-tendering) refers to the use of online platforms to issue tender invitations, receive bids from suppliers, and evaluate supplier proposals electronically. E-tendering systems automate the tendering process by allowing procurement officers to distribute bid invitations digitally and receive supplier responses through electronic platforms (Davila et al., 2003; Toktaş-Palut et al., 2014). This digital process eliminates the need for physical documentation and reduces the time required to complete procurement transactions.

The adoption of electronic tendering systems improves procurement transparency and reduces opportunities for procurement irregularities. By maintaining digital records of tendering processes and supplier bids, organizations can enhance accountability and ensure compliance with procurement regulations (Vaidya et al., 2006). In addition, e-tendering systems facilitate competitive bidding among suppliers, which can lead to cost savings and improved procurement efficiency. Consequently, organizations that implement electronic tendering systems are better positioned to achieve improved procurement performance and enhanced supply chain outcomes (Bag et al., 2020).

Electronic Ordering

Electronic ordering (e-ordering) involves the use of digital platforms to generate and transmit purchase orders to suppliers electronically. Through e-ordering systems, procurement managers can automate purchase order creation, track order status, and manage supplier deliveries in real time (Croom &Brandon-Jones, 2007). These systems reduce the need for manual documentation and minimize the likelihood of procurement errors associated with traditional ordering processes.

E-ordering systems also enhance coordination between procurement departments and suppliers by facilitating faster communication and improved order tracking. By integrating ordering systems with inventory management platforms, organizations can monitor stock levels and trigger automated replenishment orders when necessary (Gunasekaran & Ngai, 2008). This capability improves inventory management efficiency and reduces the risk of supply chain disruptions.

Electronic Invoicing

Electronic invoicing (e-invoicing) refers to the digital processing and management of supplier invoices through electronic procurement platforms. E-invoicing systems enable organizations to receive, verify, and process invoices electronically, thereby eliminating the need for manual invoice processing (Toktaş-Palut et al., 2014). By automating invoice verification and payment procedures, e-invoicing systems significantly reduce administrative workload and processing time.

The adoption of e-invoicing systems improves financial transparency and strengthens financial control within procurement processes. Digital invoice records enable organizations to track procurement expenditures, monitor supplier payments, and detect discrepancies more effectively (Bag et al., 2020). As a result, electronic invoicing contributes to improved financial management and enhanced supply chain performance.

Supply Chain Performance

Supply chain performance refers to the ability of an organization's supply chain system to effectively coordinate procurement, production, and distribution activities in order to achieve operational efficiency and customer satisfaction (Gunasekaran et al., 2004; Christopher, 2016). It reflects the extent to which supply chain operations contribute to improved organizational outcomes such as cost reduction, service quality improvement, and delivery reliability.

In the context of procurement management, supply chain performance is often measured through indicators such as procurement cycle time, supplier responsiveness, inventory efficiency, and cost efficiency (Gunasekaran et al., 2004). Effective procurement systems play a crucial role in enhancing supply chain performance by ensuring timely procurement of materials, improving supplier coordination, and reducing operational costs.

Recent studies suggest that digital technologies such as e-procurement systems can significantly enhance supply chain performance by improving information sharing, reducing transaction costs, and strengthening supplier collaboration (Bag et al., 2020; Queiroz et al., 2021). Through digital procurement platforms, organizations can integrate procurement activities with broader supply chain operations, thereby improving supply chain visibility and operational efficiency.

Theoretical Review

This study is anchored on the Technology Acceptance Model (TAM) developed by Fred Davis. The Technology Acceptance Model explains how users adopt and utilize new technologies based on their perceptions of usefulness and ease of use. According to Davis (1989), perceived usefulness refers to the extent to which individuals believe that using a particular system will enhance their job performance, while perceived ease of use reflects the degree to which individuals believe that using the system will be free from effort. These two factors influence users' attitudes toward technology adoption and subsequently determine their intention to use technological systems (Davis, 1989; Venkatesh & Davis, 2000).

The Technology Acceptance Model has been widely applied in studies examining the adoption of digital technologies across various sectors, including supply chain management, electronic commerce, and procurement systems (Venkatesh et al., 2012; Bag et al., 2020). Within the context of procurement management, the model provides a useful framework for understanding how organizations adopt electronic procurement technologies and how such adoption influences operational outcomes such as procurement efficiency and supply chain performance.

In the context of electronic procurement, the perceived usefulness of digital procurement platforms lies in their ability to enhance procurement efficiency, improve supplier communication, and reduce transaction costs. When procurement professionals perceive e-procurement systems as beneficial to their work processes, they are more likely to adopt these technologies and integrate them into their procurement operations (Croom & Brandon-Jones, 2007; Gunasekaran & Ngai, 2008). Similarly, when electronic procurement platforms are user-friendly and easy to operate, organizations are more likely to implement them successfully across procurement functions.

The Technology Acceptance Model therefore provides a theoretical explanation for how the adoption of electronic procurement practices such as e-sourcing, e-tendering, e-ordering, and e-invoicing can influence supply chain performance outcomes. By facilitating greater technological acceptance within organizations, these digital procurement practices enable firms to improve procurement efficiency, enhance supplier collaboration, and strengthen supply chain coordination (Bag et al., 2020; Queiroz et al., 2021). Consequently, the Technology Acceptance Model serves as an appropriate theoretical lens for examining the relationship between electronic procurement practices and supply chain performance within the construction industry.

Empirical Review

A growing body of empirical literature has examined the relationship between electronic procurement practices and organizational performance across various industries. Several studies have reported that the adoption of electronic procurement technologies significantly enhances procurement efficiency, reduces operational costs, and improves supply chain coordination (Davila et al., 2003; Vaidya et al., 2006; Gunasekaran & Ngai, 2008).

For instance, Davila et al. (2003) found that organizations that adopted electronic procurement systems experienced substantial improvements in procurement transparency and transaction efficiency. Similarly, Vaidya et al. (2006) reported that e-procurement implementation significantly reduced procurement cycle time and enhanced supplier collaboration within organizations. These findings suggest that digital procurement systems contribute to improved supply chain performance by facilitating faster procurement transactions and strengthening buyer–supplier relationships.

Further empirical evidence suggests that electronic procurement systems improve procurement decision-making by providing organizations with real-time access to supplier information and procurement data. Croom and Brandon-Jones (2007) observed that organizations utilizing electronic procurement platforms were better able to monitor supplier performance and coordinate procurement activities across supply chain networks. This improved information visibility enhances supply chain coordination and contributes to improved operational performance.More recent studies have also highlighted the strategic role of electronic procurement in supporting supply chain digitalization. Toktaş-Palut et al. (2014) found that organizations adopting electronic procurement systems experienced improved inventory management efficiency and reduced procurement processing costs. Similarly, Bag et al. (2020) reported that digital procurement technologies significantly enhanced supply chain responsiveness and operational flexibility within manufacturing firms.

Within developing economies, studies have also examined the adoption of electronic procurement systems and their impact on organizational performance. For example, Afolabi et al. (2019) found that electronic procurement practices significantly improved procurement transparency and accountability within the Nigerian construction sector. Similarly, Osei-Tutu et al. (2018) observed that the adoption of electronic procurement platforms improved supplier coordination and reduced procurement delays within construction firms in emerging economies.Despite these findings, existing studies have largely examined electronic procurement as a single construct rather than investigating the individual effects of specific procurement practices. In reality, electronic procurement systems consist of multiple components such as e-sourcing, e-tendering, e-ordering, and e-invoicing, each of which may influence supply chain performance differently. Understanding the individual contributions of these procurement practices therefore provides a more comprehensive understanding of how digital procurement systems improve supply chain performance.Furthermore, empirical studies focusing specifically on the construction industry remain relatively limited. Given the complex procurement structures and supply chain dependencies that characterize construction projects, investigating the impact of electronic procurement practices within this sector is particularly important. This study therefore addresses this research gap by examining the influence of different electronic procurement practices on the supply chain performance of listed construction companies in Nigeria.

Hypothesis Development

Electronic procurement practices have the potential to significantly enhance procurement efficiency and improve supply chain coordination. By automating procurement processes and

improving information sharing among supply chain partners, e-procurement systems reduce transaction costs and enhance operational efficiency (Gunasekaran & Ngai, 2008; Toktaş-Palut et al., 2014). Consequently, organizations that effectively adopt electronic procurement technologies are more likely to achieve improved supply chain performance.

Electronic Sourcing and Supply Chain Performance

Electronic sourcing platforms enable organizations to access broader supplier networks and evaluate supplier capabilities more effectively. By facilitating supplier identification and evaluation processes, e-sourcing improves procurement decision-making and strengthens supplier relationships (Croom & Brandon-Jones, 2007; Bag et al., 2020). Improved supplier selection processes contribute to better procurement outcomes and enhanced supply chain performance.

H1a: Electronic sourcing has a significant positive effect on supply chain performance.

Electronic Tendering and Supply Chain Performance

Electronic tendering systems enhance procurement transparency and improve competitive bidding among suppliers. By automating the tendering process and maintaining digital records of supplier bids, organizations can reduce procurement irregularities and ensure fair supplier selection processes (Davila et al., 2003; Vaidya et al., 2006). These improvements contribute to enhanced procurement efficiency and supply chain performance.

H1b: Electronic tendering has a significant positive effect on supply chain performance.

Electronic Ordering and Supply Chain Performance

Electronic ordering systems enable organizations to automate purchase order generation and track supplier deliveries in real time. These systems improve procurement coordination and reduce procurement errors associated with manual ordering processes (Gunasekaran & Ngai, 2008). Consequently, e-ordering systems contribute to improved supply chain efficiency and operational performance.

H1c: Electronic ordering has a significant positive effect on supply chain performance.

Electronic Invoicing and Supply Chain Performance

Electronic invoicing systems automate invoice processing and payment procedures, thereby reducing administrative workload and improving financial transparency within procurement processes (Toktaş-Palut et al., 2014). By facilitating faster invoice verification and payment processing, e-invoicing systems enhance supplier satisfaction and strengthen supply chain relationships.

H1d: Electronic invoicing has a significant positive effect on supply chain performance.

3.0 Methodology

This study adopts a quantitative research approach to examine the impact of electronic procurement practices on supply chain performance of listed construction companies in Nigeria. Quantitative research designs are widely used in management and supply chain studies because they allow researchers to collect numerical data that can be statistically analyzed to test theoretical relationships among variables (Creswell, 2014; Sekaran & Bougie, 2020). The quantitative approach is particularly appropriate for this study because it facilitates the empirical testing of hypothesized relationships between electronic procurement practices and supply chain performance.A cross-sectional survey design was employed to collect primary data from management staff of listed construction firms. Survey research is commonly used in supply chain and procurement studies because it allows researchers to gather perceptions and experiences from respondents who are directly involved in procurement and supply chain decision-making processes (Hair et al., 2019). Through the use of a structured questionnaire,

the study captured respondents' views regarding the adoption of electronic procurement practices and their influence on supply chain performance within their respective organizations.

The population for this study consists of management staff working in nine construction companies listed on the Nigerian Exchange Group (NGX). These organizations represent major participants in Nigeria's construction sector and are involved in large-scale infrastructure and real estate development projects. Management staff were selected as the target respondents because they play strategic roles in procurement planning, supplier management, and supply chain coordination within their organizations.According to information obtained from the Nigerian Exchange Group corporate database, the nine listed construction firms collectively employed 1,880 management staff, which constituted the total population of the study. These employees were considered appropriate respondents because of their direct involvement in procurement and supply chain management activities within their respective firms. Focusing on management personnel is consistent with previous procurement and supply chain studies that emphasize the importance of managerial insights in assessing procurement systems and organizational performance (Croom & Brandon-Jones, 2007; Bag et al., 2020).

Given the relatively large population of 1,880 management staff, it was necessary to determine an appropriate sample size that would ensure reliable statistical analysis while maintaining representativeness of the population. The sample size for the study was determined using the sample size determination table developed by Krejcie and Morgan (1970), which provides recommended sample sizes for different population levels.For a population of 1,880 respondents, the Krejcie and Morgan table recommends a minimum sample size of 320 respondents. However, to account for potential non-response or incomplete questionnaires, the study incorporated a 20 percent contingency allowance, which is commonly recommended in survey research to compensate for possible response losses (Sekaran & Bougie, 2020). The adjusted sample size was therefore calculated as:
$320 + (320 \times 0.20) = 384$ respondents
Consequently, 384 questionnaires were distributed to management staff across the nine listed construction companies.

To ensure adequate representation of each organization, the study employed a proportionate random sampling technique. This sampling approach allows the sample to reflect the relative proportion of respondents from each company within the population. Proportionate sampling is widely recommended in organizational research because it improves sample representativeness and enhances the generalizability of research findings (Hair et al., 2019).

Primary data for the study were collected using a structured questionnaire designed to measure electronic procurement practices and supply chain performance. The questionnaire consisted of two main sections. The first section captured respondents' demographic characteristics, including age, educational qualification, job role, and years of work experience. The second section measured the key constructs of the study, namely electronic procurement practices and supply chain performance.

Electronic procurement practices were operationalized using four dimensions: electronic sourcing, electronic tendering, electronic ordering, and electronic invoicing. These dimensions were adapted from previous studies on digital procurement systems (Davila et al., 2003; Toktaş-Palut et al., 2014; Bag et al., 2020). Supply chain performance was measured using indicators such as procurement efficiency, supplier responsiveness, delivery reliability, and operational efficiency, which have been widely used in supply chain performance research (Gunasekaran et al., 2004; Christopher, 2016).All questionnaire items were measured using a

five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Likert scales are commonly used in management and social science research because they allow respondents to express varying levels of agreement with statements related to organizational practices and performance (Sekaran & Bougie, 2020).

Data Analysis Technique

The data collected from the survey were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM is a multivariate statistical technique used to analyze complex relationships between latent variables in management and social science research (Hair et al., 2017). This method is particularly suitable for exploratory and predictive research models involving multiple constructs and indicators.PLS-SEM was chosen for this study because it is capable of handling relatively complex research models and does not require strict assumptions regarding data distribution. Additionally, PLS-SEM is widely used in supply chain management and information systems research to evaluate relationships between technological adoption and organizational performance (Hair et al., 2019; Sarstedt et al., 2020).

The analysis followed a two-stage procedure recommended in PLS-SEM literature. First, the measurement model was evaluated to assess the reliability and validity of the constructs using indicators such as factor loadings, composite reliability, and average variance extracted. Second, the structural model was assessed to examine the hypothesized relationships between electronic procurement practices and supply chain performance through path coefficients, coefficient of determination (R^2), and effect size measures.

4.0 Results and Discussion

Descriptive Analysis of Respondents and Study Variables

This section presents the descriptive results of the study, focusing on the demographic characteristics of respondents as well as the statistical properties of the study variables. Descriptive analysis is important in empirical research because it provides an overview of the data and helps researchers understand the distribution and characteristics of the respondents involved in the study (Hair et al., 2019; Sekaran & Bougie, 2020). In the context of this research, descriptive statistics help explain the composition of respondents from the listed construction companies and provide preliminary insights into the level of adoption of electronic procurement practices and the state of supply chain performance within the firms.The descriptive results are presented in two stages. The first stage focuses on the demographic profile of respondents, while the second stage examines the descriptive statistics and correlation among the major study variables. These analyses provide the foundation for the subsequent inferential analysis.

Table 1:

Demographic Characteristics of Respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	238	61.9
	Female	146	38.1
Age	20-30 years	72	18.8
	31-40 years	146	38.0
	41-50 years	112	29.2
	Above 50 years	54	14.0
Educational Qualification	HND/BSc	198	51.6
	MSc/MBA	142	37.0

	PhD	44	11.4
Work Experience	1-5 years	86	22.4
	6-10 years	148	38.5
	11-15 years	94	24.5
	Above 15 years	56	14.6

Source: Field Survey, 2026.

The demographic profile presented in Table 1 shows that male respondents constitute 61.9 percent of the sample, while female respondents account for 38.1 percent. This distribution suggests that the construction industry in Nigeria remains male-dominated, which is consistent with previous studies that identify construction as a sector characterized by a higher proportion of male professionals due to the technical and field-oriented nature of its operations (Oladinrin et al., 2021; Oke et al., 2022).

In terms of age distribution, the majority of respondents (38 percent) fall within the 31-40 years age bracket, followed by 41-50 years (29.2 percent). This indicates that most respondents are in their mid-career stage, suggesting that they possess adequate professional experience and organizational knowledge to provide informed responses regarding procurement practices and supply chain management within their firms. The presence of experienced respondents enhances the credibility and reliability of the data collected in this study.Regarding educational qualification, 51.6 percent of respondents possess HND or BSc degrees, while 37 percent hold postgraduate qualifications such as MSc or MBA, and 11.4 percent have doctoral degrees. The relatively high proportion of respondents with postgraduate education reflects the professionalization of procurement and supply chain management roles in modern organizations. This finding aligns with the growing emphasis on professional expertise and managerial competence in procurement activities within technologically driven supply chains (Christopher, 2016; Bag et al., 2020).

Work experience distribution further strengthens the reliability of the dataset. The results show that 38.5 percent of respondents have between 6 and 10 years of work experience, while 24.5 percent have between 11 and 15 years of experience. This implies that a substantial proportion of respondents possess significant practical exposure to procurement operations and supply chain activities, which enhances their ability to evaluate the effectiveness of electronic procurement systems in their organizations.Overall, the demographic distribution indicates that the respondents are sufficiently experienced and professionally qualified, making them appropriate participants for assessing the impact of electronic procurement practices on supply chain performance in listed construction companies in Nigeria.

Table 2:
Descriptive Statistics and Correlation Matrix

Variables	Mean	Std. Dev	ESP	ETP	EOP	EIP	SCP
Electronic Sourcing Practices (ESP)	3.84	0.71	1				
Electronic Tendering Practices (ETP)	3.76	0.69	0.54	1			
Electronic Ordering Practices (EOP)	3.81	0.73	0.49	0.57	1		
Electronic Invoicing Practices (EIP)	3.68	0.66	0.46	0.52	0.55	1	

Variables	Mean	Std. Dev	ESP	ETP	EOP	EIP	SCP
Supply Chain Performance (SCP)	3.92	0.74	0.61	0.58	0.63	0.56	1

Source: Field Survey, 2026.

Table 2 presents the descriptive statistics and correlation matrix for the key variables examined in the study. The mean values provide an indication of the general perception of respondents regarding the extent of adoption of electronic procurement practices and the level of supply chain performance within their organizations.

The results show that electronic sourcing practices recorded a mean value of 3.84, suggesting that respondents generally agree that their organizations utilize digital platforms for supplier identification, evaluation, and communication. Similarly, electronic tendering practices have a mean score of 3.76, indicating that many construction firms are gradually adopting electronic tendering systems for bid submission and evaluation processes. This finding is consistent with earlier research indicating that electronic tendering enhances procurement transparency and reduces administrative costs (Davila et al., 2003; Toktaş-Palut et al., 2014).
Electronic ordering practices recorded a mean value of 3.81, suggesting that digital procurement systems are widely used for placing and tracking purchase orders within the organizations.Likewise, electronic invoicing practices recorded a mean score of 3.68, indicating moderate adoption of automated invoicing and payment processing systems. The relatively lower mean value for electronic invoicing may reflect infrastructural and technological challenges that still affect full digital integration within procurement systems in developing economies (Bag et al., 2020; Adebayo et al., 2023).

Supply chain performance recorded the highest mean value of 3.92, implying that respondents perceive their firms as achieving relatively high levels of operational efficiency, supplier responsiveness, and procurement effectiveness. The positive perceptions of supply chain performance may be associated with the increasing integration of digital procurement tools within organizational supply chains.The correlation results further show positive relationships between all electronic procurement practices and supply chain performance. Electronic sourcing exhibits a correlation coefficient of 0.61 with supply chain performance, while electronic ordering shows the strongest correlation at 0.63. These results suggest that greater adoption of electronic procurement practices is associated with improved supply chain performance outcomes in construction firms.

Overall, the descriptive statistics and correlation analysis provide preliminary evidence that electronic procurement practices are positively related to supply chain performance. However, correlation analysis alone does not establish causality; therefore, further inferential analysis using structural modeling techniques is required to examine the magnitude and significance of these relationships.

Structural Model Evaluation and Hypothesis Testing

Following the descriptive analysis, this section presents the measurement model assessment and structural model results using Partial Least Squares Structural Equation Modeling (PLS-SEM). Structural equation modeling is widely used in procurement and supply chain studies because it allows researchers to evaluate complex relationships between latent constructs while simultaneously assessing measurement reliability and structural relationships (Hair et al., 2017; Sarstedt et al., 2020).The analysis was conducted in two stages as recommended in the SEM literature. First, the measurement model was evaluated to confirm the reliability and validity

of the constructs used in the study. Second, the structural model was assessed to determine the strength and significance of the relationships between electronic procurement practices and supply chain performance.

Table 3:
Measurement Model Assessment

Construct	Items	Factor Loadings	Composite Reliability	AVE
Electronic Sourcing Practices (ESP)	4	0.74-0.86	0.88	0.64
Electronic Tendering Practices (ETP)	4	0.72-0.85	0.87	0.62
Electronic Ordering Practices (EOP)	4	0.76-0.88	0.90	0.67
Electronic Invoicing Practices (EIP)	4	0.71-0.84	0.86	0.60
Supply Chain Performance (SCP)	5	0.75-0.89	0.91	0.69

Source: Field Survey, 2026.

Table 3 presents the measurement model results, which evaluate the reliability and convergent validity of the constructs used in the study. In structural equation modeling, the reliability and validity of constructs must be confirmed before examining the structural relationships among variables (Hair et al., 2017; Hair et al., 2019).

The factor loadings for all measurement items range between 0.71 and 0.89, which exceed the recommended threshold of 0.70 for indicator reliability. This indicates that the observed variables adequately represent their respective latent constructs. High factor loadings demonstrate that the measurement items used in the questionnaire effectively capture the underlying dimensions of electronic procurement practices and supply chain performance.Composite reliability values range from 0.86 to 0.91, which are well above the minimum acceptable threshold of 0.70 recommended in SEM literature. This suggests that the measurement items used for each construct demonstrate strong internal consistency. High composite reliability indicates that the indicators measuring each construct produce consistent results across respondents.

The Average Variance Extracted (AVE) values range between 0.60 and 0.69, exceeding the recommended minimum threshold of 0.50. AVE measures the extent to which a construct explains the variance of its indicators relative to measurement error. The results therefore confirm that the constructs possess adequate convergent validity.Overall, the measurement model results demonstrate that the constructs used in this study meet the required standards of reliability and validity, indicating that the dataset is suitable for further structural model analysis.

Table 4:
Structural Model and Hypothesis Testing

Hypothesis	Relationship	Path Coefficient (β)	t-value	p-value	Decision
H1	ESP → SCP	0.28	3.91	0.000	Supported
H2	ETP → SCP	0.22	3.14	0.002	Supported
H3	EOP → SCP	0.31	4.27	0.000	Supported
H4	EIP → SCP	0.19	2.86	0.004	Supported

Source: Field Survey, 2026.

Table 4 presents the structural model results and hypothesis testing outcomes. The results reveal that all four dimensions of electronic procurement practices have positive and

statistically significant effects on supply chain performance among listed construction companies in Nigeria.

The first hypothesis examined the relationship between electronic sourcing practices and supply chain performance. The results show a path coefficient of 0.28, with a t-value of 3.91 and a p-value less than 0.05, indicating a statistically significant relationship. This suggests that the use of digital platforms for supplier identification, evaluation, and communication enhances procurement efficiency and improves supply chain coordination within construction firms. Electronic sourcing enables organizations to access a wider pool of suppliers and improve supplier selection processes, thereby strengthening supply chain effectiveness.

The second hypothesis assessed the effect of electronic tendering practices on supply chain performance. The results show a path coefficient of 0.22, which is statistically significant. This finding indicates that the use of electronic tendering systems improves procurement transparency and reduces administrative delays associated with traditional tendering procedures. Digital tendering platforms facilitate faster bid evaluation and enhance fairness in procurement processes.The third hypothesis examined the impact of electronic ordering practices on supply chain performance. The results show a path coefficient of 0.31, representing the strongest effect among the four electronic procurement practices. This suggests that automated purchase ordering systems significantly enhance operational efficiency by reducing procurement cycle time and improving order tracking and Scoordination with suppliers.

Finally, the fourth hypothesis evaluated the effect of electronic invoicing practices on supply chain performance. The results reveal a positive and statistically significant relationship, with a path coefficient of 0.19. Although the effect size is relatively smaller compared to other practices, the finding indicates that digital invoicing systems improve financial transparency and accelerate payment processing within procurement transactions.Overall, the structural model results confirm that electronic procurement practices play a significant role in improving supply chain performance within the Nigerian construction sector.

Table 5:
Model Predictive Power

Variable	R^2	Effect Size (f^2)
Supply Chain Performance	0.58	Moderate

Source: Field Survey, 2026.

Table 5 presents the predictive power of the structural model, measured using the coefficient of determination (R^2). The results show that the four dimensions of electronic procurement practices jointly explain 58 percent of the variance in supply chain performance among listed construction companies in Nigeria.According to structural equation modeling guidelines, an R^2 value of 0.50 or higher is considered substantial in management research, indicating that the model has strong explanatory power (Hair et al., 2017; Sarstedt et al., 2020). The result therefore suggests that electronic procurement practices represent a significant determinant of supply chain performance within the construction industry.

The moderate effect size observed in the model further indicates that electronic procurement adoption contributes meaningfully to operational improvements in procurement and supply chain management. These findings support previous studies which emphasize that digital procurement technologies enhance organizational efficiency by reducing transaction costs, improving supplier coordination, and accelerating procurement processes (Davila et al., 2003;

Toktaş-Palut et al., 2014; Bag et al., 2020).Overall, the results demonstrate that the integration of electronic procurement systems can significantly improve supply chain efficiency, transparency, and responsiveness within construction firms operating in emerging economies.

5.0 Conclusion and Recommendations

This study examined the impact of electronic procurement practices on supply chain performance of listed construction companies in Nigeria. The growing complexity of procurement activities and increasing competition within the construction sector have compelled organizations to adopt digital procurement systems that improve operational efficiency and strengthen supplier coordination. Electronic procurement has emerged as a strategic tool that enables organizations to streamline procurement processes, enhance transparency, and improve supply chain responsiveness. The findings of the study reveal that electronic procurement practices significantly influence supply chain performance among listed construction companies in Nigeria. Specifically, the results demonstrate that electronic sourcing, electronic tendering, electronic ordering, and electronic invoicing all exert positive and statistically significant effects on supply chain performance. These findings confirm that the integration of digital procurement technologies enhances procurement efficiency, reduces transaction costs, and improves coordination between firms and their suppliers.

The results further indicate that electronic ordering practices exert the strongest influence on supply chain performance, suggesting that automated purchasing systems play a critical role in reducing procurement cycle time and improving operational efficiency. By enabling real-time order processing and monitoring, electronic ordering systems allow organizations to maintain better control over procurement activities and ensure timely delivery of materials required for construction projects.Similarly, the study finds that electronic sourcing practices significantly improve supply chain performance by enabling firms to identify and evaluate potential suppliers through digital platforms. The adoption of electronic sourcing systems enhances supplier selection processes, promotes competition among suppliers, and enables firms to secure better procurement terms. This finding aligns with previous studies which emphasize that digital sourcing platforms enhance procurement transparency and strengthen supplier relationships.

Electronic tendering practices also demonstrate a positive effect on supply chain performance. The use of electronic tendering platforms simplifies bid submission processes, reduces administrative delays, and enhances fairness in procurement decision-making. These systems help eliminate inefficiencies associated with traditional tendering procedures and ensure greater transparency in supplier selection.In addition, the results show that electronic invoicing practices positively influence supply chain performance, although the effect size is relatively smaller compared to other procurement practices. Electronic invoicing systems facilitate automated invoice processing and improve financial transparency in procurement transactions. By accelerating payment cycles and reducing manual errors in invoice processing, electronic invoicing systems contribute to stronger supplier relationships and improved supply chain coordination.

Overall, the study concludes that electronic procurement practices constitute a critical driver of supply chain performance within the Nigerian construction industry. The adoption of digital procurement technologies enables construction firms to improve procurement efficiency, enhance transparency, and strengthen collaboration with suppliers. These improvements ultimately contribute to better project execution and improved organizational performance.Furthermore, the findings underscore the importance of technological innovation in procurement management, particularly in developing economies where inefficiencies in

procurement processes often undermine supply chain effectiveness. The integration of electronic procurement systems therefore represents an important strategic initiative for organizations seeking to improve their operational performance and remain competitive in increasingly dynamic business environments.

Recommendations

Based on the findings of this study, the following recommendations are proposed:
i. Organizations within the construction sector should allocate adequate financial and technological resources toward the development and implementation of electronic procurement systems. Investment in digital procurement platforms will enable firms to streamline procurement processes, reduce operational inefficiencies, and improve coordination with suppliers.

ii. Since electronic ordering practices were found to exert the strongest impact on supply chain performance, construction companies should prioritize the implementation of automated ordering systems that facilitate real-time order tracking, inventory management, and supplier coordination.

iii. Construction firms should adopt advanced electronic sourcing platforms that allow them to identify and evaluate a wider range of suppliers. Expanding the supplier base through digital sourcing systems can enhance competition, improve procurement outcomes, and reduce supply chain risks.

iv. Industry regulators and professional bodies should encourage the adoption of standardized electronic tendering platforms to enhance transparency and fairness in procurement processes. Standardization will also promote accountability and reduce opportunities for procurement irregularities.

v. Policy makers should introduce regulatory frameworks and incentives that encourage construction companies to adopt electronic procurement systems. Government support for digital procurement initiatives can significantly enhance efficiency within the construction sector and contribute to broader economic development.

Contribution of the Study

This study contributes to the growing body of literature on digital procurement and supply chain management by providing empirical evidence on the role of electronic procurement practices in improving supply chain performance within the Nigerian construction sector. While previous studies have primarily focused on manufacturing and service industries, this research extends the discussion to the construction industry, which plays a critical role in national economic development.The study also contributes methodologically by applying structural equation modeling to examine the multidimensional nature of electronic procurement practices, thereby providing deeper insights into the relative importance of different digital procurement tools in shaping supply chain performance outcomes.

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