

Comparative Analysis of Impact of E-procurement and Traditional Procurement on Building Construction Project Delivery in Rivers State Nigeria

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ABSTRACT

This study provides a comparative analysis of impact of e-procurement and traditional procurement on building construction project delivery in Rivers State Nigeria. A mixed-methods approach was employed, involving descriptive statistics, relative importance index, severity index analysis, factor analysis, Surveys, principal component analysis (PCA) and correlation analysis to analyze data from 180 respondents in the construction industry. Results of this study showed that e-procurement systems outperform traditional systems in efficiency, accuracy, transparency, and cost-effectiveness. A strong positive correlation was observed between the performances metrics of both systems, emphasizing that e-procurement amplifies the benefits seen in traditional systems. This strong positive correlation (0.807) shows that higher cost-effectiveness in traditional procurement is associated with higher cost-effectiveness in electronic procurement. The result is highly significant, implying that improvements in cost-effectiveness are similarly reflected in both systems. This strong positive correlation (0.714) suggests that time efficiency in traditional procurement is positively related to time efficiency in electronic procurement as the significant p-value indicates that the relationship is statistically reliable. Based on this finding, it is recommended that stakeholders prioritize the integration of e-procurement to leverage these advantages fully while ensuring compatibility with existing traditional methods during the transition phase.

Key words: Building Construction, Cost Saving, Efficiency, Electronic Procurement, Traditional Procurement.

1. INTRODUCTION

The construction industry is a fundamental pillar of economic growth and development, particularly in developing regions such as Rivers State, Nigeria. This sector not only contributes significantly to the economic growth and development of a country but also plays a crucial role in infrastructure development and job creation. Despite its importance, the construction industry in Nigeria still faces numerous challenges, including inefficiencies, corruption, project delays, and cost overruns. These persistent issues often result in low

quality project delivery, thereby distorting economic and social development goals [38].

Electronic procurement in building construction projects refers to the use of electronic systems and platforms to manage the entire procurement process in the building construction project. E-procurement system is web technology-based purchasing solutions aimed at simplifying commercial transactions within and between organizations and information technology solutions for ordering, logistics and handling systems as well as for payment systems [40]. [20], in similar view posits that e-procurement is the use of electronic communication technologies and transaction processes to buy services, goods, and works or conduct tendering for construction works. [17], made a different observation where he explained that various business concerns found it appropriate to embrace the use of internet facilities for enhancing performance of different project tasks. [42] also believe that E-procurement has become an avenue for integrating communities and countries into a global market economy over the past few decades.

Rivers State, located in the Niger Delta region of Nigeria, is a hub of construction activities due to its strategic importance in the nation's oil and gas industry. This has led to substantial infrastructure development, including the construction of roads, bridges, and buildings [36]. However, the construction sector in Rivers State is viewed as plagued by bureaucratic inefficiencies and corruption that often result in project delays and cost overruns. The adoption of e-procurement in this context holds significant potential to address these challenges and improve on successful project execution [24].

Despite the promising benefits, the adoption of e-procurement in Rivers State is still in its early stage. Encouragingly, several construction firms and government agencies are beginning to recognize the advantages of digital procurement and are investing in the necessary infrastructure and training in the area of e-procurement. However, this widespread adoption faces barriers such as resistance to change, limited technological infrastructure, and lack of skilled personnel [45]. These setbacks have necessitated procurement reforms in Nigeria through the implementation of the e-procurement systems [3], [4]. It is against this backdrop that this study aims at examining

the effects of e-procurement on building construction project in Rivers State.

Also, the building construction sector in Nigeria is faced with complex challenges that call for efficient use of available resources, it is worthy of note that different organizations involved in the procurement of building services, products and materials are constantly seeking for ways of improving project delivery in their procurement activities [4]. Therefore, the traditional procurement system widely practiced in the Nigerian construction sector and in Rivers State in particular, involves the normal advertisement process, bidding, selection to the award process but heavily challenged with so many setbacks, including selective tendering process, sole source contracting, advertisement challenges, limited and ineffective public bidding, among others. This study aims to compare the impact of e-procurement and traditional procurement on building construction project delivery in Rivers State Nigeria.

Statement of the Problem

The construction industry in Rivers State, Nigeria, is a critical driver of economic development, contributing significantly to the region's infrastructural development, and better employment opportunity. However, this sector faces numerous challenges that impede its efficiency and effectiveness. The key issues include project delays, cost overruns, substandard project quality, and pervasive corruption. These problems are often exacerbated by traditional, paper-based procurement methods that are slow, error-prone, and lack of transparency.

Procurement inefficiencies is a major bottleneck in the construction industry. The traditional procurement processes are characterized by lengthy approval cycles, cumbersome paperwork, and a high risk of human error. Moreover, these manual processes are highly susceptible to corrupt practices, such as bid rigging and favoritism, which further undermine project outcomes. Consequently, projects frequently suffer from delays, inflated costs, and compromised quality, all of which detract from the overall economic and social development goals in Rivers State [33], [17].

The inefficiencies and corrupt practices associated with traditional procurement methods pose significant challenges to the construction industry in Rivers State. The potential of e-procurement to address these issues presents a compelling case for its adoption. However, realizing this potential requires a comprehensive understanding of the current procurement landscape, the effects of e-procurement on building construction projects, and the barriers to its implementation. This study aims to explore these dimensions, providing comparative analysis of impact of e-procurement and traditional procurement on building construction project delivery in Rivers State Nigeria.

Objectives of the Study

This study aims to:

1. compare the impact of e-procurement and traditional procurement on building construction project delivery in Rivers State Nigeria.

2. Develop strategies of overcoming the barriers of electronic procurement systems on building construction projects in Rivers State.

Research Questions

1. How does the electronic procurement system compare with the traditional procurement system on building construction projects in Rivers State?

Research Hypotheses

The research hypotheses used for this study are stated in the following null form

H01: There is no significant difference between the electronic procurement system and the traditional procurement system on building construction projects in Rivers State.

2. LITERATURE REVIEW

Concept of Electronic Procurement

Electronic procurement, also known as e-procurement or supplier exchange, is the process of requisitioning, ordering and purchasing goods and services online. It is a business-to-business process, [22]. Unlike e-commerce, e-procurement utilizes a supplier's closed system and is only available to registered users. E-procurement facilitates interactions between preferred suppliers and customers through bids, purchase orders and invoices. Electronic procurement (e-procurement), which implies the automation of an organization's procurement of goods and services through web-based applications, has been noted for its potentials to rationalize organizational expenditure, reduce administrative costs, and stimulate efficiency in operations [19]. Typically, procurement is one of the most important areas in organizational cost structure, and public sector organizations applying e-procurement for contracts could generate several benefits depending on the context of its implementation [30].

Types of E-Procurement

[23] classifies e-procurement into the seven categories: the first is Web-based ERP (Enterprise Resource Planning). This deals with creating and approving purchasing requisitions, placing purchase orders and receiving goods and services by using a software system based on Internet technology. The second category is E- MRO (Maintenance, Repair and Operations) which deals with creating and approving purchasing requisitions, placing purchase orders and receiving non-product related MRO supplies. The third type is E-sourcing, which involves Identifying new suppliers for a specific category of purchasing requirements using Internet technology. The fourth type is E-tendering that involves sending requests for information and prices to suppliers and receiving the responses of suppliers using Internet technology. E-reverse auctioning is another type of e-procurement. This makes use of Internet technology to buy goods and services from several known or unknown suppliers. The sixth type is E-informing which involves gathering and distributing purchasing information from internal and external parties using Internet technology. The last type of e-procurement, according to [26] is E-market

sites that enables the buying communities to access preferred suppliers' products and services, add to shopping carts, create requisition, seek approval, receipt purchase orders and process electronic invoices with integration to suppliers' supply chains and buyers' financial systems.

E-Procurement Implementation in Construction Projects

The Rivers State Government is on track to introducing e-procurement for tendering and online registration of businesses and companies via the State Bureau of Public Procurement [17]. This e-procurement will be able to streamline government activities with the aim of improving the quality of services it renders. Suppliers and construction firms could easily participate in the government tendering procedures by subscribing to the e-procurement system, as the system not only eliminates the traditional procurement procedures, but also provides reliable outcomes in a complex environment like government establishments [9]. As such, the e-procurement helps the businesses to simplify regulatory processes and cuts red-tapism. It also assists the government in online business, especially in such areas like e-marketing strategies. Again, [9] noted that e-procurement system is a useful tool in government to business, by improving the quality of communication and transactions with business. Also, it improves accountability and transparency in government contracts and projects.

The e-procurement procedure allows government contracting authorities to procure goods and services from their suppliers electronically, by transforming the hitherto manual procurement procedure into an electronic, internet-based system [44]. Suppliers, in turn, benefit from being able to present their products on the World Wide Web. They (suppliers) are able to receive, manage and process government purchase orders, and receive payment from government agencies online by using the e-procurement system. With the automation of the entire procurement cycle in e-procurement system, suppliers benefit significantly from the opportunity to reach a broader base of buyers than ever before coupled with lower operating costs, shorter turnaround time, additional revenue and increased customer satisfaction. Evidence from the extant literature reveals important benefits of e-procurement implementation in the government sector (Ojha, and Palvia, 2012).

Overview of Construction Industry

Construction has been defined as a sector of an economy which through effective planning, construction design, constructions work, alterations, maintenance and operation will transform information, finance, human and material resources over time into constructed facilities through effective project management [27]. The construction industry and its project are the commonly recognized project-based industry both in developing and developed nations due to its unique output that transform social economic growth and development of the society.

Construction projects are time-consuming undertakings, which are considered successful if delivered on time, to an appropriate budget and to a quality desired by the owner [21]. However, in recent times, apart from the above-mentioned indicators of

project success, health and safety, and environmental performance have also become important aspects of project performance. Many literatures and studies on the construction industry have analyzed projects and tried to identify factors affecting project performance. Though the factors found are numerous, a lot of the studies indicated that procurement related factors have significant effects on construction project performance [33].

In a study, [8] noted that countries all over the world are always beset with various political and socio-economic problems at one time or the other. Constant efforts are often being made by the various governments to find solutions to such problems. This is usually through administrative reforms, whereby a policy option is made to halt a named political, educational or socio-economic problem. [39] further stressed that the due process policy is a package of policy measures, and like any other policy, it has set goals, which it aimed at achieving. Thus, the institution of the reform measures presupposes the existence of some administrative deficiencies. The rectification of the flows in the administrative machinery depends on the satisfactory implementation of the reform goals [7].

According to [34] despite the numerous social economic roles played by the construction industry in the growth and development of the society the construction industry is still plagued by numerous challenges such as:

Poor Cost management and performance

Poor Time management and performance

Inadequate Quality performance

Low level of professionalism

Poor implementation of existing statutes and codes

Obsolete governing legislations and codes of practice

Inadequate work opportunities

Administrative bottlenecks in planning approvals and administration

Resource insufficiency

Institutional weakness.

Construction Projects

Nigeria has shown a significant regression in procurement processes in comparison with the heavy investment channeled into the sector, different studies have confirmed the use of various types of procurement methods for project delivery in Nigeria [33]. The traditional procurement route, which has been widely criticized, as an ineffective procurement route is the most often used. [46] further stated that over-duplication of procurement manuals leads to diverse interpretations and implementation of existing rules across various public agencies and even within some of the agencies, lack of oversight responsibilities for the proper functioning of the procurement system creates serious gap in the enforcement of rules.

Traditional Procurement versus Electronic Procurement

Procurement is the process which a public body buys goods, works, and services. Traditional methods of procurement therefore manage all the stages of the procurement cycle manually.

Traditional methods of procurement typically heavily rely on physical means such as paper processes, making calls, and manually managing procurement functions. This is often tedious, repetitive, and time consuming. Through relying mainly on paper processes, traditional procurement methods also result in a lack of visibility throughout the process often leading to extra tasks and constant chasing to ensure care is being arranged properly and proactively.

E-procurement on the other hand is a more strategic and digitalized compared to traditional procurement processes. Through the use of technology, it involves more dynamic processes that offer higher transparency and visibility as well as minimum paperwork. This helps to create more value and significantly boosts the time it takes to organize the care and support needed across the health and social care sector.

What is clear is that traditional methods are a lot more time consuming and often are a lot less flexible when care needs change while e-procurement does have a range of benefits that go one step further than more traditional methods of procurement. It offers more flexibility and visibility of audit trails, as well as offering more competition to allow buyers to have more choice in finding the best supplier to meet individual care needs. However, there are some disadvantages when digitizing procurement processes. Like all digital transformations in local government services, there can be some teething issues including initial investment costs, issues with training and security, as well as resistance to change.

What is important to remember is that when any service undergoes a digital transformation journey, these initial barriers are to be expected. It is now a question of how a firm prepare for them so every staff member can use the system correctly and confidently to ensure suppliers deliver the task that is actually needed.

Barriers to Implementing E-Procurement in the Construction Industry

There are several tangible and not-so-tangible risks that have led to the relatively slow uptake of e-procurement in construction. These barriers can largely be divided into technical, human, and organizational impediments:

Technical barriers present a major concern for many within the construction industry. Simple issues such as lack of high-speed internet and incompatible software systems are cited as a reason for reluctance for many. Another major barrier seems to be the perceived difficulty of integrating e-procurement systems with existing internal processes. Still, more contractors are concerned with the security aspect and worry that integrating new IT systems could lead to an uptick in system vulnerabilities. Cyber security concerns are valid but the procurement industry takes its responsibilities seriously and

with adequate training, staff will be able to spot potential problems ahead of time. Technical challenges such as limited high-speed internet access, incompatible software systems, and integration difficulties with existing processes hinder e-procurement adoption. Cybersecurity concerns are another major issue, as contractors fear increased vulnerabilities. However, with proper training and awareness, these risks can be mitigated [38].

Human barriers: may be less obvious but are no less impactful. Management may feel they have limited resources to implement such a fundamental change and then provide the necessary training for staff. Coupled with this, a simple resistance to change and fear of the unknown, and we see low levels of implementation within construction. [10].

Organizational barriers can arise when the implementation of a new system could lead to the transformation of an organization's existing structure or when long-held business relationships may be affected.

According to [2], some of the perceived barriers to E-Procurement adoption and implementations are also:

Inadequate Information Technology Infrastructure

Top Management Support

Organizational Policies

Leadership Support

Legality of the system

Cost of Implementation

Inadequate knowledge and skills of E-Procurement

Lack of business relationship between suppliers and clients

Security of Transactions

System Compatibility

Similarly, [1] also pose that the challenges facing the low adoption of E-Procurement in developing nations like Ghana, Kenya, South African and Nigeria etc. are:

Insufficient Support from Project Stakeholders

Resistant to Adoption of New Technology

Security and Authentication issues

Unavailability of Supporting Infrastructure and Facilities.

Theoretical Literature

This paper adopts dynamic capabilities theory.

Dynamic Capabilities Theory

Coined by [11], dynamic capabilities theory goes beyond the traditional resource-based view of the firm by emphasizing an organization's ability to integrate, build, and reconfigure its internal and external competencies in response to changing circumstances. The theory assesses how organizations develop

and leverage dynamic capabilities (e.g. learning and adaptation) to gain competitive advantage through procurement.

At its core, dynamic capabilities theory posits that firms must possess the capacity to sense changes in their external environment, seize new opportunities, and continuously reconfigure their internal resources and capabilities to stay competitive. This involves a combination of sensing, seizing, and transforming capabilities. Dynamic capabilities theory is a strategic management as well as logistics management framework that has gained prominence in understanding how organizations can adapt and thrive in dynamic and uncertain environments.

Empirical Review

[24] investigated the factors that influenced the adoption of e-Procurement in building projects delivery using online questionnaire survey involving 603 stakeholders in the South African construction industry. The three most widely used e-Procurement technologies were e-mail, websites and portals, which were used for communication, exchange of bill of quantities, CAD drawings and project specifications. Findings revealed that the characteristics of e-Procurement technology, size of firms, and the influence of firms outside the building industry were among the key factors that influenced the use of e-Procurement in the delivery of building projects. The study did not identify the leading adopters of e Procurement and the organizational factors that have significant influence on its adoption.

[44] examined a questionnaire survey of 93 respondents in the South African construction industry. Findings revealed that the factors that constituted barriers to the adoption of e-Procurement in sourcing construction materials were the lack of awareness, resistance to change, (c) high cost of installation and operation and Internet fraud. The study focused only on the use of e-Procurement in the procurement of construction materials; and thus, neglecting other uses of e-Procurement in construction. In addition, the study did not identify the specific type of e-Procurement technologies and application used.

[6] investigated the use of e-Procurement in selected construction firms in Oyo state, Nigeria. The data were derived using a well-structured questionnaire survey involving 104 respondents. Descriptive statistical and correlation analyses were used to analyze the data. Findings show that the use of electronic procurement in the selected construction firms for carrying out procurement function is high with majority of the professionals affirming the use of the system, the four categories of e-Procurement used were e-mail, static websites, web.2.0 technologies and portals that have capabilities of supporting the execution of functions limited to intra and inter firm communication and exchange of project information and data. Consequently, between 84 percent and 76 percent of the respondents used these e-Procurement technologies for communication of information, exchange of bill of quantities, project reports, CAD drawings and project specifications.

Consequently, factors with the highest positive impacts on the use of these technologies in the firms were the speed of transactions, lower transaction cost and ease of use.

[2] evaluated the critical success factors (CSFs) for e-Procurement adoption in the Nigerian construction industry. The study was carried out in the six geo-political zones in Nigeria using a survey research design. Construction stakeholders were selected using purposive and random sampling techniques. The study also revealed that construction stakeholders perceived the availability of reliable, affordable, and fast Internet services as the most critical success factor for the adoption of e-Procurement technologies. The critical success factors (CSFs) were further classified into management support for physical infrastructure, and human factors and characteristics of the technology. The study showed that these critical success factors (CSFs) are crucial for the adoption of e-Procurement systems in the Nigerian construction industry. The study recommended that there is still a need for increased awareness of the e-Procurement tools and technologies and the benefits that are accrued from their use among public sector construction participants.

[34] examined the potential of e-procurement in reducing corrupt practices in public procurement using quantitative research approach. Questionnaires were self-administered to government officers in Ministries, Departments and Agencies (MDAs) where construction works are mostly being procured. Fifty-six (56) valid questionnaires were returned which was analyzed using descriptive statistics and factor analysis. The findings revealed that unjustified use of exceptions and illicit fragmentation of the procurement practice are major causes of corruption, while the best anti-corruption strategy is to reduce lithographic works and physical contacts. The study concludes that effective implementation of e-procurement will assist in reducing unethical practices in the procurement process.

[16] examined the Impact of Sustainable Procurement of Construction Materials on Projects Delivery in Nigeria using structured questionnaire, relative importance index and average mean score, the study revealed that the success factors of sustainable procurement have positive impact on construction materials procurement for project delivery in Nigeria as factors such as organizational strategy, contract management, user satisfaction, technological parameters and government policies are the most important factors influencing sustainable procurement of construction materials on project delivery which is guided by the rules and regulations of the public procurement Act 2007. The study recommended that efforts should be made to control the relevant constraints/challenges by all stakeholders involved in the procurement process of a project.

[29] examined the implementation of e-procurement in public building construction projects in the Federal Capital Territory. The study adopted quantitative approach. A total of 145 questionnaires were administered using stratified sampling

method. A total of 143 questionnaires was returned and found valid for analysis. The collected data were analyzed using Percentages, frequency, Mean Item Score (MIS), Relative Importance Index (RII) and Skruskal Wallis test. The study found that lack of technical expertise, unreliable power supply, inadequate government support, poor ICT and internet facilities, and high costs of implementation are the main barriers to e-procurement uptake in FCTA. Good governance in reduction of collusion among the bidders, and transparency and openness in public procurement, are the leading prospects to e-procurement implementation in the FCTA. Inadequate financial resources and backing, and inadequate technological infrastructure of tenderers are the challenges of implementing e-procurement by the public. It was found that the prominent strategies for effective implementation of e-procurement in public sectors are; assessing and documenting the current procurement process, review and select the optimal e-procurement solution provider for your needs. It is recommended that appropriate legislations should be put in place by the government to encourage the uptake and adoption of e-procurement in the Federal Capital Territory Administration secretariat.

[15] analyzed a questionnaire survey of 483 participants of the UK construction industry. A majority of the procurement activities was done electronically on write-once CD. E-Procurement adoption rate across the UK construction industry was found to be around 27%; while the private sector was found to be lagging behind the public sector in the e-Procurement use in construction. The study identified the type of organization as the only organizational factor that influenced the adoption of e-Procurement in construction.

3. METHODOLOGY

Research Design

Research design is a master plan or structure that provide a road map for the research to collect, arrange, measure and analyze data with the aim of providing answers or solutions to the problems or questions under investigation [26]. This research made use of both quantitative and qualitative methods. This quantitative method involved the use of primary data via questionnaire distribution while the qualitative method will was with the use of focus group discussion.

Population

Population refers to the entire group of persons or elements under investigation. [29] defined the target population as a complete set of individuals, case or objects with the same common observable characteristics. The population for this study was the registered stakeholders from the selected companies which comprised of project manager, project clients, civil engineers, procurement officers, quantity surveyors, architects, contractors and sub-contractors.

Sample Size and Sampling Techniques

The sample size is a selected proportion of the population intended as to represent the population [29]. The sample size should be adequate enough to answer the research questions and for the findings to be used to judge the whole [46]. This study employed purposive sampling and snow balling sampling in reaching respondents for the study. Structured questionnaires were administered to these research respondents, namely project manager, project clients, civil engineers, procurement officers, quantity surveyors, architects, contractors and sub-contractors working in the different selected construction companies in Rivers State. 60 copies of the questionnaires were returned for analysis from each of the senatorial district in Rivers State making up a total number of 180 copies of the questionnaires used as the sample size for the analysis.

Also, the researcher used probability (stratify random sampling) and non-probability (purposive/judgmental) sampling techniques. The stratified random sampling was utilized in this study. This was done by segmenting the internal stakeholders of the firm based on their job status ranging from skilled and unskilled manpower, top managers, strategic managers, operational managers in various functional departments. This technique is appropriate in order to ensure that every element in the sampling frame has an equal opportunity of being selected to express their view on the effect of electronic procurement on building construction project in Rivers State.

4. RESULTS AND ANALYSIS

Results

This section presents the field data obtained from the 180 study participants comprising the demographic information of the participant. Collecting this demographic information provides valuable context for analyzing the responses and understanding the influence of different background factors on the adoption and effectiveness of electronic procurement systems in building construction projects in Rivers State, Nigeria. The participants were asked to provide information based on their gender; this is presented below (figure 1).

General Demographic Data of Respondents

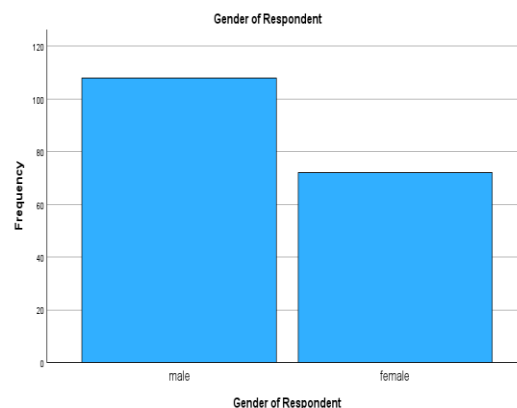


Figure 1: Gender of Respondent

The figure shows that 60% of the respondents are male representing a higher percentage of the respondents while 40% are female. This is also shown in the table 1 below.

Table 1: Gender of Respondent

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	108	59.7	60	60
Female	72	39.8	40	100
Total	180	99.4	100	

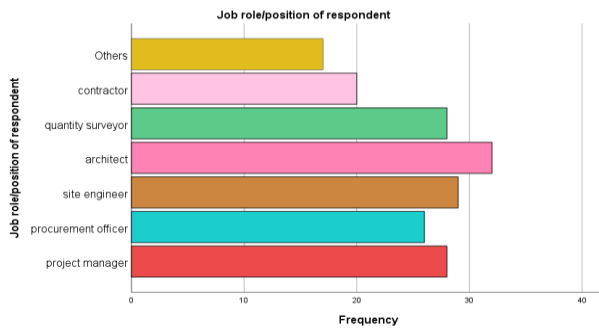


Figure 2: Job role/position

Figure 2 above represents the job role/position of each respondent, 15.6% represents project manager, 14.4% represents procurement officers, 16.1% represents site engineer, 17.7% were architect, 15.5% were quantity surveyor, contractors represent 11.0% of the population, while 9.4% of the respondent are captured as security personnel among others, as shown also in table 4.2 below.

Table 2: Job role/position of respondent

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Project manager	28	15.5	15.6	15.6
Procurement officer	26	14.4	14.4	30.0
Site engineer	29	16.0	16.1	46.1
Architect	32	17.7	17.8	63.9
Quantity surveyor	28	15.5	15.6	79.4
Contractor	20	11.0	11.1	90.6
Others	17	9.4	9.4	100.0
Total	180	99.4	100.0	

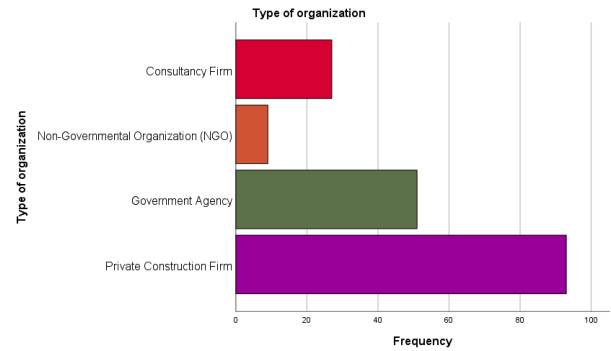


Figure 3: Type of organization

Figure 3 above shows the type of organization captured in our analysis, private construction firm was 51.4% follow by government agency with 28.3%, non-governmental organization with 5.0% and finally consultancy firms with 14.9%. This is also reflected in table 3 below.

Table 3: Type of organization

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Private Construction Firm	93	51.4	51.7	51.7
Government Agency	51	28.2	28.3	80.0
Non-Governmental Organization (NGO)	9	5.0	5.0	85.0
Consultancy Firm	27	14.9	15.0	100.0
Total	180	99.4	100.0	

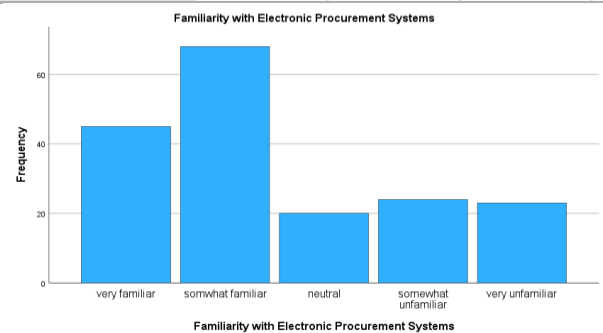


Figure 4: Level of familiarity with electronic procurement systems

We examined each participant in terms of their level of familiarity with electronic procurement systems, from figure 4 above, 24.9% and 37.6% are familiar with electronic procurement systems, and 11.0% were neutral while 13.3% and 12.7% were unfamiliar with electronic procurement system supported in table 4 below.

Table 4: Familiarity with Electronic Procurement Systems

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very familiar	45	24.9		25.0
Somewhat familiar	68	37.6		62.8
Neutral	20	11.0		73.9
Somewhat unfamiliar	24	13.3		87.2
very unfamiliar	23	12.7		100
Total	180	99.4		

Efficiency_ traditional	Pearson Correlation	.829**	1	.601*	.807*	.459**	.714*
	Sig. (2-tailed)	.000	180	.003	.001	.000	.002
			180				180
Cost_ traditional	Pearson Correlation	.753**	.601*	1	.576*	.309**	.262*
	Sig. (2-tailed)	.000	.003		.002*	.000	.001
		180	180		180	180	180
Cost_ electronic	Pearson Correlation	.676**	.807*	.576	1	.251	.654*
	Sig. (2-tailed)	.000	.001	.002		.000	.003
		80	180	180		180	180
Time_ traditional	Pearson Correlation	.439**	.459**	.309**	.251	1	.500*
	Sig. (2-tailed)	.000	.000	.000	.000		.001
		180	180	180	180		180
Time_ electronic	Pearson Correlation	.545**	.714*	.262*	.654*	.500*	1
	Sig. (2-tailed)	.000	.002	.001	.003	.001	
		180	180	180	180	180	

Results for the Objective

Table 5: Correlation Analysis

** : p<0.01(significant at 1%)

* : p<0.05(significabt at 5%)

	Efficiency_ traditional	Efficiency_ electronic	Cost_ traditional	Cost_ electronic	Time_ traditional	Time_ electronic
Efficiency_ traditional	1	.829**	.753**	.676**	.439**	.545**
		.000	.000	.000	.000	.000
		180	180	180	180	180

Table 5 shows that there exists a strong positive correlation (0.829) between efficiency traditional and efficiency electronic procurement. This indicates that as efficiency in traditional procurement increases, efficiency in electronic procurement also tends to increase. The correlation is highly significant, suggesting a robust relationship between the efficiencies of the two systems. This strong positive correlation (0.807) shows that higher cost-effectiveness in traditional procurement is associated with higher cost-effectiveness in electronic procurement. The result is highly significant, implying that improvements in cost-effectiveness are similarly reflected in both systems. This strong positive correlation (0.714) suggests that time efficiency in traditional procurement is positively related to time efficiency in electronic procurement. The significant p-value indicates that the relationship is statistically reliable.

In summary there is a strong positive correlation between efficiency_traditional and efficiency_electronics ($r = 0.829$, $p < 0.01$), indicating that as efficiency in traditional procurement increases, the efficiency in electronic procurement also increases. There is a moderate relationship between time_traditional and time_electronic ($r = 0.50$, $p < 0.05$), suggesting that time performance in both procurement systems is somewhat related. Cost metrics also show a significant positive correlation between traditional and electronic procurement methods.

5. HYPOTHESES TESTING

H01: There is no significant difference between electronic procurement system and the traditional procurement system on building construction projects in Rivers State.

Reporting Pearson correlation

Pearson product correlation of electronic procurement system and the traditional procurement system was carried out on its efficiency, cost and time.

Table 6: Correlation Analysis

		Efficiency traditional	Efficiency electronic	Cost traditional	Cost_electronic	Time traditional	Time_electronic
Efficiency traditional	Pearson Correlation	1	.829**	.753**	0.676**	0.439**	.545**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N		180	180	180	180	180
Efficiency electronic	Pearson Correlation	.829**	1	.601*	.807*	.459**	.714*
	Sig. (2-tailed)	.000		.003	.001	.000	.002
	N	180		180	180	180	180
Cost_traditional	Pearson Correlation	.753**	.601*	1	.576*	.309**	.262*
	Sig. (2-tailed)	.000	.003		.002*	.000	.001
	N	180	180		180	180	180
Cost_electronic	Pearson Correlation	.676**	.807*	.576	1	.251	.654*
	Sig. (2-tailed)	.000	.001	.002		.000	.003
	N	180	180	180		180	180
Time_traditional	Pearson Correlation	.439**	.459**	.309**	.251	1	.500*
	Sig. (2-tailed)	.000	.000	.000	.000		.001
	N	180	180	180	180		180
Time_electronic	Pearson Correlation	.545**	.714*	.262*	.654*	.500*	1
	Sig. (2-tailed)	.000	.002	.001	.003	.001	
	N	180	180	180	180	180	

Table 6 indicates that is a strong positive correlation between efficiency traditional and efficiency electronics ($r = 0.829$, $p < 0.01$), indicating that as efficiency in traditional procurement increases, the efficiency in electronic procurement also increases. There is a moderate relationship between time traditional and time electronic ($r = 0.50$, $p < 0.05$), suggesting that time performance in both procurement systems is somewhat related. Cost metrics also show a significant positive correlation between traditional and electronic procurement methods.

6. DISCUSSIONS

Discussion on the Results of the Objective

The Comparison of Electronic Procurement with Traditional Procurement using the Pearson correlation analysis shows strong positive correlations between traditional and electronic procurement systems across efficiency, cost-effectiveness, and time management. The high correlation (0.829) between the efficiencies of both systems indicates that improvements in one system are generally reflected in the other. The strong correlations suggest that while both procurement methods are related in terms of their performance metrics, electronic procurement does not drastically outperform traditional methods in all areas. This suggests that electronic systems can achieve efficiencies similar to traditional methods but may require further optimization to surpass them. This finding is consistent with research by [34], who found that while electronic procurement offers improvements, it is not a panacea and requires careful implementation

Also, [37] in their evaluation of the critical success factors (CSFs) for e-Procurement adoption in the Nigerian construction industry. The study was carried out in the six geo-political zones in Nigeria using a survey research design. Construction stakeholders were selected using purposive and random sampling techniques. The study also revealed that construction stakeholders perceived the availability of reliable, affordable, and fast Internet services as the most critical success factor for the adoption of e-Procurement technologies.

The critical success factors (CSFs) were further classified into management support for physical infrastructure, and human factors and characteristics of the technology. The study showed that these critical success factors (CSFs) are crucial for the adoption of e-Procurement systems in the Nigerian construction industry.

7. CONCLUSION

This study sought to compare electronic procurement systems with traditional procurement systems. This objective was also achieved using correlation analysis and descriptive statistical methods, which showed that e-procurement systems outperform traditional systems in efficiency, accuracy, transparency, and cost-effectiveness. A strong positive correlation was observed between the performance metrics of both systems, emphasizing that e-procurement amplifies the benefits seen in traditional systems. Based on this finding, it is recommended that stakeholders prioritize the integration of e-procurement to leverage these advantages fully while ensuring compatibility with existing traditional methods during the transition phase.

8. RECOMMENDATION

Based on the findings from this study on the effects of electronic procurement (e-procurement) on building construction projects in Rivers State, Nigeria, the following recommendations are proposed:

1. Capacity Building and Training

Implement comprehensive training programs for procurement professionals, contractors, and suppliers to enhance their technical expertise and understanding of e-procurement systems.

Provide user-friendly guides and tools to simplify the adoption process and increase confidence in using e-procurement platforms.

2. Address Cost Barriers

Introduce financial support mechanisms such as subsidies, grants, or tax incentives to reduce the high initial implementation costs of e-procurement systems.

Encourage partnerships with software vendors to develop affordable solutions tailored to the construction industry in Rivers State.

Invest in advanced security technologies and provide ongoing support to ensure system integrity and user trust.

3. Promote Awareness and Stakeholder Engagement

Conduct targeted awareness campaigns and workshops to educate stakeholders on the benefits of e-procurement, including improved efficiency, transparency, and cost-effectiveness.

Facilitate collaboration among government agencies, construction firms, and technology providers to promote adoption.

4. Adopt and Support Change Management Strategies

Develop structured change management programs to address resistance among stakeholders and encourage a culture of innovation.

Highlight the long-term benefits of e-procurement through pilot projects and success stories to build trust and enthusiasm for adoption.

By implementing these recommendations, construction companies in Rivers State can overcome the barriers to e-procurement adoption and fully leverage the benefits of these systems, ultimately improving efficiency, transparency, and cost-effectiveness in their procurement processes.

Contribution to Knowledge

1. This study contributes to knowledge by providing empirical evidence on comparative benefits and barriers of e-procurement in the construction industry in Rivers State.
2. Additionally, it offers a methodological approach that combines Relative Importance Index, Severity Index, and Principal Component Analysis to assess adoption and identify critical factors influencing e-procurement.

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