



Effect of E-Procurement Systems on Performance Levels of Selected Agencies in Akure, Ondo State, Nigeria

Adebisi T. A.^{1*}, Omonori, A.O.²

^{1,2}Department of Project Management Technology, School of Management Technology, Federal University of Technology, Akure (FUTA), Ondo State, Nigeria

*Corresponding author, biyibabs1988@yahoo.com

DOI: <https://doi.org/10.63680/ijstate062657.74>

Abstract

Digital procurement systems have increasingly been positioned as strategic mechanisms for improving transparency, efficiency, and service delivery within public sector agencies. However, empirical evidence on the specific pathways through which e-procurement system dimensions affect organizational performance levels in Nigerian subnational contexts remains limited. This study examined the effect of e-procurement systems on performance levels of selected public agencies in Akure, Ondo State, Nigeria. Five independent dimensions of e-procurement system effectiveness were examined: adoption level, system quality, feature utilisation, staff training, and integration level. Performance levels were operationalized through a composite of four dimensions: transparency, user satisfaction, service delivery, and operational efficiency. Using a quantitative descriptive-correlational research design, structured questionnaires were administered to 234 respondents drawn from seven purposively selected public agencies in Akure Metropolis, of which 211 valid responses were retained (90.2% response rate). Data were analysed using descriptive statistics, Pearson Product-Moment Correlation, multiple linear regression with heteroskedasticity consistent (HC) robust standard errors, and comprehensive diagnostic tests in SPSS version 27. The Pearson correlation between the composite e-procurement index and performance levels was $r = 0.782$ ($p < 0.001$), confirming a strong positive relationship. Multiple regression results revealed that the full model explained 74.1% of variance in performance levels (Adjusted $R^2 = 0.735$; $F(5,205) = 117.84$; $p < 0.001$). All five e-procurement dimensions were significant independent predictors: Adoption Level ($\beta = 0.284$, $p < 0.001$), System Quality ($\beta = 0.198$, $p = 0.002$), Feature Utilisation ($\beta = 0.173$, $p = 0.005$), Staff Training ($\beta = 0.149$, $p = 0.021$), and Integration Level ($\beta = 0.212$, $p < 0.001$). All five null hypotheses were rejected. Results were robust to bootstrapping, VIF multicollinearity diagnostics, Ramsey RESET functional form tests, and sub-sample validation. The study concludes that integrated, well-trained, and comprehensively utilized e-procurement systems significantly enhance organizational performance in Nigerian public agencies, with adoption level and integration serving as the strongest performance drivers. Practical recommendations are provided for procurement policy, digital infrastructure investment, and capacity building in Ondo State.

Keywords: E-Procurement Systems, Performance Levels, Adoption Level, System Quality

1. INTRODUCTION

Public procurement constitutes a critical pillar of public financial management, accounting for between 15% and 30% of Gross Domestic Product (GDP) in most economies, with developing countries often recording higher proportions (World Bank, 2016). The efficiency, accountability, and transparency with which public procurement is managed directly determines the quality of infrastructure delivery, public service provision, and the overall effectiveness of government operations. In Nigeria, the enactment of the Public Procurement Act (PPA) of 2007 and the establishment of the Bureau of Public Procurement (BPP) marked a significant institutional milestone in formalizing procurement governance at the federal level, with analogous frameworks established at the subnational level (BPP, 2020). These institutional reforms created the regulatory architecture for procurement standardization and laid the policy groundwork for the subsequent transition to digital procurement systems.

Electronic procurement (e-procurement) refers to the use of information and communication technologies (ICT) to automate, integrate, and manage public procurement processes across the full procurement lifecycle from needs identification and tender advertisement through bid submission, evaluation, contract award, and contract monitoring (Croom & Brandon-Jones, 2007). The global evidence on e-procurement effectiveness demonstrates that well-implemented digital procurement systems reduce procurement cycle times, lower transaction and administrative costs, enhance auditability, improve supplier competitiveness through wider market access, and contribute to measurable improvements in organizational performance outcomes (Vaidya, Sajeev, & Callender, 2006; OECD, 2016). Landmark implementations such as South Korea's KONEPS and the United Kingdom's public sector e-procurement programme have established benchmarks for performance improvement that developing-country procurement reformers seek to emulate.

In Nigeria, while federal-level e-procurement initiatives have attracted increasing policy attention, the actual deployment and performance impact of digital procurement systems at the subnational level specifically within state-level ministries, departments, and agencies (MDAs) remain empirically understudied. Ondo State represents a relevant subnational case: the Ondo State Bureau of Public Procurement (OSBPP) was established to regulate procurement activities in compliance with national standards, and various agencies in Akure the state capital have begun implementing electronic procurement platforms as part of broader public financial management modernization initiatives (Ondo State Bureau of Public Procurement, 2022). Despite these developments, the actual performance impact of e-procurement system adoption across these agencies has not been rigorously measured.

Contemporary scholarship increasingly recognizes that e-procurement's performance benefits are neither automatic nor uniform; they depend critically on the depth of system adoption, quality of the platform, breadth of feature utilisation, adequacy of staff training, and degree of integration with complementary organizational systems (Mohungoo, Brown, & Kabanda, 2020; Myovela, Ng'elenge, & Kisawike, 2023). Simply implementing an e-procurement platform does not guarantee performance improvement; the institutional capacity to use the system strategically is the decisive factor. This study is therefore motivated by the need to disaggregate e-procurement effectiveness into its constituent operational dimensions and empirically test their independent contributions to performance outcomes in a subnational Nigerian context.

This study examined the effect of e-procurement systems on performance levels of selected public agencies in Akure, Ondo State. Using a multi-dimensional framework that operationalizes e-procurement effectiveness through five independent dimensions adoption level, system quality, feature utilisation, staff training, and integration level and performance levels through four outcome dimensions transparency, user satisfaction, service delivery, and operational efficiency the study provides the first agency-level, multi-predictor empirical

investigation of e-procurement performance effects in Ondo State. The findings contribute to the growing body of subnational Nigerian e-procurement evidence and provide actionable insights for procurement policy, digital infrastructure investment, and capacity building in the state.

2. LITERATURE REVIEW

2.1 Conceptual Framework

2.1.1 E-Procurement Systems: Concept, Dimensions, and Evolution

E-procurement refers to the systematic use of information and communication technologies to automate, integrate, and manage the full spectrum of public procurement processes, from needs identification and supplier registration through tender advertisement, bid evaluation, contract award, and contract monitoring (Croom & Brandon-Jones, 2007; Chan & Owusu, 2022). The evolution of e-procurement systems has progressed through multiple phases: from early Electronic Data Interchange (EDI) systems that automated individual document exchanges between trading partners, through web-based tendering portals that enabled competitive online bidding, to fully integrated digital platforms that combine procurement planning, supplier management, financial management, contract administration, and performance monitoring in single-system architectures (Toyin et al., 2024; Govindan, Jain, Singh, & Mishra, 2023). The emergence of Procurement 4.0 characterized by the integration of blockchain, artificial intelligence, machine learning, and Internet of Things capabilities represents the current frontier of e-procurement evolution, enabling predictive analytics for risk identification, automated compliance monitoring, and immutable audit trail generation (Mircea, Stoica, & Ghilic-Micu, 2022; Adjorlolo et al., 2025).

The operational dimensions of e-procurement systems can be classified into five functionally distinct constructs that collectively determine the system's capacity to generate performance improvements. Adoption level the extent to which procurement officials actively use the platform in daily operations determines whether technological investment translates into operational change (Myovela et al., 2023). System quality encompassing reliability, ease of use, responsiveness, and data accuracy determines the functional usability of the platform (Aminah, Ditari, Kumaralalita, Hidayanto, Phusavat, & Anussornnitisarn, 2018). Feature utilization the breadth and frequency with which e-tendering, e-bidding, e-invoicing, contract management, and supplier registration functionalities are deployed determines whether the platform's technological capabilities translate into procurement process improvements (Sultan, Al-Hammad, Alothman, & AlSehli, 2025). Staff training the provision of digital competence development and technical skills building is essential for enabling procurement officers to derive full strategic value from the platform (Vaidya et al., 2006). Integration level the degree to which the e-procurement system connects with finance, budgeting, auditing, and inventory management systems determines the extent to which procurement data becomes a cross-organizational resource for strategic decision-making and performance monitoring (Masudin, Aprilia, Nugraha, & Restuputri, 2021).

2.1.2 Organizational Performance Levels in Public Agencies

Performance levels in public sector agencies constitute a multidimensional construct encompassing efficiency, effectiveness, compliance, transparency, accountability, and public value creation (Boyne, 2002; Van Dooren, Bouckaert, & Halligan, 2015). The New Public Management (NPM) framework, as articulated by Hood (1991), repositioned public sector performance assessment from procedural compliance toward outcome-oriented metrics that include service delivery quality, cost efficiency, and responsiveness to citizen needs. Moore's (1995) public value theory further extended this framework by identifying public institutions as strategic

value generators whose performance must be assessed across operational efficiency, citizen accessibility, and sustained social impact dimensions.

For procurement-specific performance assessment, the relevant dimensions encompass transparency—the extent to which procurement processes are visible, traceable, and resistant to manipulation (Hochstetter, Vásquez, Diéguez, Bustamante, & Arango-López, 2023); user satisfaction the degree to which procurement officers and stakeholders find the system efficient, accessible, and responsive to operational needs (Aminah et al., 2018); service delivery the reliability, speed, and quality of procurement service outputs including timely contract award and contract administration (Arjanto & Telussa, 2024); and operational efficiency reductions in processing time, administrative costs, paperwork burden, and workflow complexity (Maagi & Mwakalobo, 2023). These four dimensions collectively provide a comprehensive, balanced assessment of organizational performance that captures both process quality and outcome delivery.

2.1.3 The E-Procurement System–Performance Relationship

The academic literature provides substantial theoretical and empirical grounding for a positive relationship between e-procurement system effectiveness and organizational performance. Transaction Cost Economics (Williamson, 1985), as applied to e-procurement, predicts that digital procurement platforms reduce search costs, coordination costs, and contract monitoring costs generating direct efficiency improvements (Croom & Brandon-Jones, 2007). The Resource-Based View (Barney, 1991) conceptualizes effective e-procurement systems as strategic organizational capabilities: when digital procurement platforms are deeply adopted, technically robust, comprehensively utilized, supported by trained staff, and integrated with complementary systems, they become difficult-to-imitate organizational assets that generate sustained performance advantages. Systems Theory (Von-Bertalanffy, 1968; Katz & Kahn, 1978) provides a complementary framework by explaining that e-procurement performance benefits materialize only when all system components technology, human capacity, regulatory alignment, and organizational culture operate in coordinated interdependence.

Institutional Theory (Scott, 2014) adds a governance perspective: coercive pressures from regulatory mandates (such as PPA 2007 and state procurement laws), normative pressures from professional procurement standards, and mimetic pressures from successful implementation cases collectively drive e-procurement adoption, with performance outcomes depending on whether adoption is substantive or merely symbolic (Salifu, Nangpiire, Dawdi, & Yussif, 2022). This framework helps explain the variance in performance outcomes observed across Nigerian subnational agencies that have formally adopted e-procurement but exhibit different levels of operational integration and staff capability.

2.2 Theoretical Framework

2.2.1 Resource-Based View (RBV)

Barney's (1991) Resource-Based View provides the primary theoretical framework for this study. The RBV posits that sustained organizational performance advantages derive from resources that are valuable, rare, inimitable, and non-substitutable (VRIN). Applied to e-procurement, the theory predicts that agencies which develop deep e-procurement capabilities manifested through high adoption, robust system quality, comprehensive feature utilisation, skilled staff, and seamless system integration will achieve performance advantages over agencies that implement e-procurement superficially. The RBV framework explains why the performance effect of e-procurement is not a binary function of system adoption alone, but a continuous function of the depth and quality of capability development across all five operational dimensions studied here. The VRIN characterization also explains why e-procurement's performance benefits are not automatic:

only when the system is genuinely embedded within institutional processes and supported by complementary human and organizational resources does it generate sustained performance advantages.

2.2.2 Principal-Agent Theory

Jensen and Meckling's (1976) principal-agent theory provides a complementary framework for understanding how e-procurement systems reduce information asymmetry between procurement principals (agency leadership, oversight bodies, the public) and procurement agents (procurement officers, contractors). By digitizing all procurement transactions and creating comprehensive audit trails, e-procurement systems constrain opportunities for agent opportunism including bid rigging, preferential treatment, and process manipulation while enabling principals to monitor agent behaviour with greater efficiency and lower cost (Silalahi et al., 2023; Graycar, 2022). This reduction in agency costs directly improves organizational performance by decreasing transaction costs associated with monitoring and enforcement, and by improving the quality of information available for strategic procurement planning.

2.2.3 Institutional Theory

Scott's (2014) institutional theory frames e-procurement adoption as a response to regulative, normative, and cultural-cognitive pressures that shape organizational behaviour beyond rational efficiency optimization. In the Nigerian subnational context, coercive isomorphic pressures from the PPA 2007 and state procurement regulations create mandatory adoption drivers; normative pressures from professional procurement bodies and international development organizations promote best-practice adoption standards; and mimetic pressures from successful peer agency implementations encourage adoption even where local institutional conditions may not yet fully support system effectiveness (Salifu et al., 2022; Waci, Kariuki, & Mwirigi, 2024). Institutional theory explains the adoption-performance gap: agencies that adopt e-procurement primarily for legitimacy rather than operational improvement may achieve lower performance returns than agencies that adopt e-procurement as part of a comprehensive governance modernization strategy.

2.3 Empirical Review

2.3.1 Global Evidence on E-Procurement and Organizational Performance

The global empirical literature provides substantial evidence of the positive performance effects of e-procurement systems in both developed and developing institutional contexts. Croom and Brandon-Jones' (2007) landmark multi-case study of nine UK public sector organizations found that e-procurement adoption reduced transaction costs, improved process efficiency, enhanced specification quality, and strengthened governance controls establishing that performance benefits are both measurable and multi-dimensional. The OECD (2016) cross-country evaluation documented that digital procurement platforms improve transparency, value for money, and competitive market access when implemented comprehensively. Maagi and Mwakalobo (2023) demonstrated in Tanzania that e-procurement significantly reduces time savings in procurement cycle completion through process automation and enhanced documentation management.

Masudin et al. (2021) conducted a quantitative study of Indonesian manufacturing companies and found that e-procurement adoption significantly improved company performance across supply chain, cost, and quality dimensions, with integration level emerging as the strongest predictor. Hochstetter et al. (2023) documented that electronic public procurement platforms in Chile and Latin American contexts significantly improved transparency maturity scores and reduced corruption risk indicators. Sultan et al. (2025) examined e-procurement in Saudi Arabia's sustainable development transition and found that system quality and feature utilisation were the strongest predictors of procurement performance, suggesting that technical robustness and comprehensive feature deployment are more critical than adoption breadth alone. Belisari, Binci, and

Appolloni (2020) found in Italian advisory service organizations that e-procurement adoption improved operational effectiveness and reduced administrative overhead, with management support as a key enabling condition consistent with the institutional theory prediction.

2.3.2 E-Procurement Performance Effects in Nigerian and Sub-Saharan African Contexts

The empirical evidence on e-procurement performance in Nigeria and sub-Saharan Africa is growing but remains methodologically heterogeneous. Afolabi et al. (2019) identified the critical success factors for e-procurement adoption in the Nigerian construction industry, finding that top management support, digital infrastructure, staff training, and stakeholder awareness were the primary determinants of successful implementation and by extension, of performance outcomes. Toyin et al. (2024) documented through systematic bibliometric analysis that ICT application in Nigerian construction procurement has positive effects on project information coordination, cost management, and scheduling outcomes. Wuraola, Adekunbi, and Madu (2021) reported that e-procurement systems in Nigerian public institutions improved organizational transparency and reduced administrative bottlenecks, though effectiveness varied substantially by organizational capacity and ICT infrastructure quality.

At the subnational level, recent studies provide important contextual evidence. Myovela et al. (2023), studying e-procurement adoption in Tanzania's Songwe District Council, found that ICT infrastructure, managerial support, and staff digital competence were the primary factors determining whether e-procurement translated into operational performance improvements confirming that adoption alone is insufficient without complementary institutional capacity. Salifu et al. (2022) assessed e-procurement adoption challenges in Ghana's public sector and found that institutional barriers, including inadequate training, system interoperability gaps, and leadership capacity deficits, constrained performance realization despite formal adoption. For Nigeria specifically, Aduwo et al. (2020) demonstrated that e-procurement in construction project delivery improved anti-corruption performance but that construction-specific performance benefits depended on comprehensive stakeholder adoption rather than selective implementation.

2.3.3 Identified Gaps in the Literature

The review of existing literature reveals three specific gaps that this study fills. First, Nigerian subnational e-procurement research has predominantly focused on governance outcomes particularly anti-corruption rather than comprehensive organizational performance dimensions encompassing efficiency, service delivery, user satisfaction, and operational effectiveness. Second, the existing studies examine e-procurement as a unitary adoption variable rather than disaggregating its effects across the distinct operational dimensions adoption level, system quality, feature utilisation, staff training, and integration level that theory suggests should produce differential performance contributions. Third, agency-level empirical evidence from Ondo State MDAs using multiple regression with comprehensive diagnostic controls is absent from the literature, creating a localized knowledge gap that this study directly fills.

3. METHODOLOGY

3.1 Research Design

The study adopted a quantitative descriptive-correlational research design. This design is appropriate because the study's primary objective is both to describe existing procurement system effectiveness and to determine whether e-procurement dimensions have statistically significant effects on performance levels (Creswell & Creswell, 2018). A positivist epistemological orientation guided the research, emphasizing quantifiable, objective, and replicable evidence generation through hypothesis-testing procedures.

3.2 Study Area and Population

The population comprised all procurement officers, finance staff, auditors, procurement-associated administrative officers, and ICT staff in seven selected public agencies in Akure that have adopted or are implementing e-procurement systems. The agencies were purposively selected to represent the main procurement-active MDAs in Akure, collectively responsible for the largest volumes of state-level procurement activity. The total estimated population across these agencies was 600 respondents. The Ondo State Bureau of Public Procurement (2022) coordinates procurement regulation across all state agencies, providing a unified regulatory framework within which the sampled agencies operate.

3.3 Sample Size and Sampling Procedure

The Krejcie and Morgan (1970) sample size determination Table yielded a required sample of 234 respondents from a population of 600 at a 95% confidence level and 5% margin of error. A two-stage sampling strategy was employed: purposive sampling was used at the agency level to select agencies with active e-procurement systems and significant procurement volumes; simple random sampling (lottery method) was used at the respondent level within each agency to ensure equal selection probability and minimize selection bias. Table 3.1 presents the sampled agencies and their respondent allocations.

Table 3.1: Selected Agencies, Population, and Sample Allocation (n = 234)

Agency	Staff Cadre	Population	Sample Drawn	Sampling Method
Ministry of Finance	Procurement & Finance Officers	120	47	Simple Random
Ministry of Works & Infrastructure	Procurement & Technical Officers	110	43	Simple Random
Ondo State Bureau of Public Procurement	Procurement Regulators & Officers	80	31	Purposive + Random
State Revenue Service	Procurement & Audit Officers	90	35	Simple Random
Ministry of Health (Procurement Unit)	Procurement & Admin Officers	70	27	Purposive + Random
Ministry of Education	Procurement Officers & Admin Staff	60	23	Simple Random
State Auditor-General's Office	Auditors & Procurement Staff	70	28	Simple Random
Total	—	600	234	Stratified Multi-stage

Source: Authors' construction from Ondo State MDAs' staff registers (2025). Krejcie and Morgan (1970) formula applied proportionally.

3.4 Data Collection

Primary data were collected using a structured questionnaire comprising five sections. Section A captured demographic characteristics. Section B assessed performance levels through 16 items covering transparency, user satisfaction, service delivery, and operational efficiency. Section C measured e-procurement system effectiveness through 20 items across five sub-scales (adoption level, system quality, feature utilisation, staff training, and integration level). All performance and e-procurement items were rated on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Items were adapted from validated instruments in established e-procurement and public sector performance literature, including Croom and Brandon-Jones (2007), Vaidya et al. (2006), Aminah et al. (2018), and Masudin et al. (2021). Content validity was assessed by a panel of five subject matter experts. Pilot testing on 25 non-sampled procurement officers confirmed Cronbach's alpha values above 0.70 for all sub-scales.

3.5 Model Specification

The study specifies three analytical models to address the research questions and hypotheses:

Model 1: Simple Bivariate Correlation (Hypothesis 0):

$$r(EP, PL) \text{ tested at } \alpha = 0.05 \text{ (two-tailed)} \quad (1)$$

Model 2: Multiple Linear Regression: E-Procurement Dimensions → Performance Levels

$$PL_i = \beta_0 + \beta_1 AL_i + \beta_2 SQ_i + \beta_3 FU_i + \beta_4 ST_i + \beta_5 IL_i + \beta_6 RR_i + \beta_7 YOE_i + \varepsilon_i \quad (2)$$

Model 3: Dimension-Specific Sub-models:

$$TR_i = f(EP \text{ dimensions}); US_i = f(EP \text{ dimensions}); SD_i = f(EP \text{ dimensions}); OE_i = f(EP \text{ dimensions}) \quad (3)$$

Where: PL_i = Performance Level composite for respondent i ; AL_i = Adoption Level; SQ_i = System Quality; FU_i = Feature Utilisation; ST_i = Staff Training; IL_i = Integration Level; RR_i = Respondent Role (control); YOE_i = Years of Experience (control); β_0 = intercept; β_1 – β_7 = estimated coefficients; ε_i = error term. A priori expectations: β_1 – $\beta_5 > 0$ for all e-procurement dimensions based on the theoretical frameworks. HC-robust standard errors are applied following diagnostic detection of heteroskedasticity.

3.7 Data Analysis

Data were analysed using SPSS version 27 through four stages. Stage one: descriptive statistics (frequencies, percentages, means, standard deviations) for all variables. Stage two: Pearson Product-Moment Correlation to test bivariate EP–PL relationship. Stage three: multiple linear regression with HC-robust standard errors to test H_{01} – H_{05} . Stage four: diagnostic tests including Breusch-Pagan heteroskedasticity test, VIF analysis, Shapiro-Wilk normality test for residuals, Ramsey RESET functional form test, Durbin-Watson autocorrelation test, and bootstrapped standard error validation (500 replications). Decision rule: reject the null hypothesis if p -value < 0.05 (two-tailed).

4. RESULTS AND DISCUSSION

4.1 Response Rate and Demographic Profile

Of the 234 structured questionnaires distributed, 211 were validly returned a response rate of 90.2%. Table 4.1 presents the demographic profile of respondents. Male respondents constituted 58.8% and females 41.2%, reflecting the male-dominant composition of procurement departments in Nigerian public agencies. The

majority of respondents (35.1%) fell within the 26–35 age bracket, followed by 36–45 years (32.2%), indicating a predominantly mid-career workforce with direct procurement experience. Educational qualifications were high, with 56.4% holding HND/B.Sc degrees and 24.2% holding Master's or MBA qualifications, confirming the respondents' capacity to provide credible assessments of e-procurement system effectiveness.

Working experience was substantial: 39.3% of respondents had 6–10 years of experience and 27.5% had 11–15 years, confirming that the sample possesses sufficient institutional knowledge to evaluate procurement system performance meaningfully. Departmental distribution shows that 32.7% of respondents were from procurement departments the primary users of e-procurement systems followed by finance (22.7%) and administration (19.4%). This distribution confirms the sample's operational proximity to the procurement processes under study.

Table 4.1: Demographic Characteristics of Respondents

Variable	Category	n (%)	Notes
Gender	Male	124 (58.8%)	Majority male; consistent with Nigerian public sector profile
	Female	87 (41.2%)	—
Age	18–25 years	29 (13.7%)	—
	26–35 years	74 (35.1%)	Largest age cohort
	36–45 years	68 (32.2%)	—
	46–55 years	31 (14.7%)	—
	56 years and above	9 (4.3%)	—
Educational Qualification	OND/NCE	28 (13.3%)	—
	HND/B.Sc	119 (56.4%)	Majority qualification
	M.Sc/MBA	51 (24.2%)	—
	PhD	13 (6.2%)	—
Years of Work Experience	1–5 years	46 (21.8%)	—
	6–10 years	83 (39.3%)	Core experience cohort
	11–15 years	58 (27.5%)	—
	16 years and above	24 (11.4%)	—
Department	Procurement	69 (32.7%)	Largest departmental group
	Finance	48 (22.7%)	—

Variable	Category	n (%)	Notes
	Administration	41 (19.4%)	—
	ICT	32 (15.2%)	—
	Others	21 (10.0%)	—
Total	—	211 (100%)	Response rate: 90.2% (211/234)

Source: Field Survey (2025). Response rate: 211/234 = 90.2%.

4.2 Descriptive Analysis of E-Procurement System Effectiveness by Dimension

Table 4.2 presents the descriptive analysis of e-procurement system effectiveness across five operational dimensions. The cluster mean of 3.98 falls within the 'Agree' range, indicating that respondents generally affirm the effective deployment and functional utility of e-procurement systems in the sampled agencies. The adoption level sub-dimension recorded the highest means, particularly for management's strong support (Mean = 4.15) and electronic procurement activities (Mean = 4.12). This pattern confirms that institutional leadership commitment is a primary driver of adoption depth consistent with Vaidya et al.'s (2006) identification of top management support as the most critical e-procurement implementation success factor and Marei, Daoud, Ibrahim, and Al-Jabaly's (2020) demonstration of the moderating role of executive support in Jordanian procurement digitalization. The relatively lower mean for regular employee use in daily operations (Mean = 3.98) compared to the management support rating (Mean = 4.15) suggests a leadership-implementation gap: while management strongly endorses the system, full operational integration into all daily procurement workflows is not yet universal.

System quality sub-dimension means were consistently above 4.00 for all indicators except platform responsiveness (Mean = 3.95), indicating that the technical performance of the deployed systems is generally satisfactory but that response time optimization remains an improvement area particularly important in contexts where broadband connectivity is variable, as documented by Mohungoo et al. (2020) for African public procurement contexts. Feature utilisation recorded the lowest sub-dimension means in the study, with contract management features (Mean = 3.82), electronic invoicing (Mean = 3.86), and e-tendering (Mean = 3.88) all below 3.90. This pattern is particularly significant because these features e-tendering, e-bidding, and contract management represent the highest-value procurement functions and their underutilisation suggests that the agencies are not yet realizing the full potential performance benefits available from their installed platforms.

Staff training indicators recorded the two lowest individual means in the entire effectiveness construct: regular workshops and training programs (Mean = 3.74) and adequate training availability (Mean = 3.79). This finding is theoretically important: as Vaidya et al. (2006) and Scovia and Jonath (2024) argue, staff training is the critical bottleneck that determines whether adopted systems generate actual performance improvements. The documented training deficit provides a direct explanation for the feature utilisation gap observed above staff who have not received comprehensive training are less likely to utilize advanced platform features such as contract management and e-invoicing. This relationship between training and utilisation is addressed in the regression analysis below. Integration level recorded strong and consistent means (range: 4.02–4.14), suggesting that the sampled agencies have invested effectively in connecting their e-procurement systems

with financial management and information sharing infrastructure a finding that partially explains the strong transparency and audit performance outcomes documented in Table 4.2.

Table 4.2: Descriptive Analysis of E-Procurement System Effectiveness by Dimension

E-Procurement Effectiveness Indicator	Mean	Min	Max	Std. Dev.	Decision
ADOPTION LEVEL					
E-procurement systems are widely adopted in my organization	4.06	1	5	0.84	Agree
Most procurement activities are carried out electronically	4.12	1	5	0.81	Agree
Employees regularly use the e-procurement system in daily operations	3.98	1	5	0.89	Agree
Management strongly supports the adoption of e-procurement systems	4.15	1	5	0.80	Agree
SYSTEM QUALITY					
The e-procurement system is easy to use	4.09	1	5	0.83	Agree
The system is reliable and functions effectively	4.03	1	5	0.87	Agree
The system provides accurate procurement information	4.11	1	5	0.82	Agree
The e-procurement platform responds quickly during usage	3.95	1	5	0.91	Agree
FEATURE UTILISATION					
E-tendering features are effectively utilized in my organization	3.88	1	5	0.93	Agree
E-bidding functions are frequently used for procurement processes	3.91	1	5	0.90	Agree
Electronic invoicing and payment systems are adequately utilized	3.86	1	5	0.95	Agree
Contract management features are effectively used	3.82	1	5	0.96	Agree
STAFF TRAINING					
Employees receive adequate training on the use of e-procurement systems	3.79	1	5	0.98	Agree
Staff possess the technical skills required to use the system effectively	3.93	1	5	0.88	Agree

E-Procurement Effectiveness Indicator	Mean	Min	Max	Std. Dev.	Decision
Regular workshops and training programs are organized for users	3.74	1	5	1.01	Agree
Training has improved employees' ability to use the system efficiently	3.89	1	5	0.92	Agree
INTEGRATION LEVEL					
The e-procurement system is integrated with the finance department	4.02	1	5	0.86	Agree
The system supports inter-departmental information sharing	4.05	1	5	0.84	Agree
Procurement data can easily be accessed across departments	4.08	1	5	0.83	Agree
Integration of the system has improved coordination within the organization	4.14	1	5	0.79	Agree
CLUSTER MEAN	3.98	—	—	—	Agree

Source: Field Survey (2025). Scale: 1=Strongly Disagree to 5=Strongly Agree.

4.4 Correlation Analysis

Table 4.3 presents the Pearson correlation matrix for all study variables. The composite e-procurement index exhibits strong positive correlations with performance levels ($r = 0.782, p < 0.001$) and all four performance sub-dimensions. All five e-procurement dimensions are significantly and positively correlated with performance levels at the 1% significance level. The strongest bivariate correlations with performance levels are recorded for the composite e-procurement index ($r = 0.782, p < 0.001$), followed by integration level ($r = 0.671, p < 0.001$), system quality ($r = 0.673, p < 0.001$), and adoption level ($r = 0.641, p < 0.001$). Staff training records the lowest bivariate correlation with performance levels ($r = 0.548, p < 0.001$), though still strongly significant. Inter-dimension correlations range from $r = 0.388$ to $r = 0.572$, confirming that the five dimensions are meaningfully related but sufficiently distinct to justify their simultaneous inclusion in the multiple regression model. No inter-predictor correlation exceeds $r = 0.60$, ruling out severe multicollinearity concerns formally confirmed by the VIF diagnostics.

Table 4.3: Pearson Correlation Matrix of E-Procurement Dimensions and Performance Levels

Variable	AL	SQ	FU	ST	IL	EP (comp.)	PL	OE
Adoption Level (AL)	1.00							
System Quality (SQ)	0.524***	1.00						
Feature Utilisation (FU)	0.498***	0.541***	1.00					
Staff Training (ST)	0.412***	0.388***	0.461***	1.00				
Integration Level (IL)	0.534***	0.572***	0.491***	0.427***	1.00			
E-Procurement (comp.)	0.731***	0.748***	0.681***	0.614***	0.729***	1.00		
Performance Levels (PL)	0.641***	0.673***	0.612***	0.548***	0.671***	0.782***	1.00	
Operational Efficiency (OE)	0.587***	0.624***	0.571***	0.501***	0.618***	0.714***	0.891***	1.00

Notes: *** $p < 0.001$ (two-tailed). AL=Adoption Level; SQ=System Quality; FU=Feature Utilisation; ST=Staff Training; IL=Integration Level; EP=E-Procurement composite; PL=Performance Levels; OE=Operational Efficiency. Source: Authors' computation (2025).

4.5 Multiple Linear Regression Results and Hypothesis Testing

4.5.1 ANOVA and Model Significance

Table 4.5 presents the ANOVA results for the full multiple regression model. The model is highly significant overall ($F(5,205) = 117.84, p < 0.001$), confirming that the five e-procurement dimensions collectively provide a statistically robust and meaningful prediction of performance levels.

Table 4.4: ANOVA Result of Full Multiple Regression Model

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression (Full Model)	100.489	5	20.098	117.840	0.000***
Residual	34.981	205	0.171	—	—
Total	135.470	210	—	—	—

Notes: *** $p < 0.001$. Dependent variable: Performance Levels (PL). Source: Authors' computation (2025).

4.5.2 Regression Coefficients and Hypothesis Decisions

Table 4.5 presents the multiple regression coefficient results. The full model explains 74.1% of variance in performance levels ($R = 0.861$; $R^2 = 0.741$; Adjusted $R^2 = 0.735$), representing a highly substantial level of explanatory power that confirms the five e-procurement dimensions as the primary determinants of organizational performance levels in the sampled agencies.

Adoption Level (AL) is the strongest predictor of performance levels ($\beta = 0.284$, $t = 4.982$, $p < 0.001$, 95% CI approximately [0.171, 0.397]), leading to the rejection of H_{01} . This finding indicates that a one-unit increase in the adoption level score is associated with a 0.284-unit increase in performance levels, controlling for all other dimensions. The primacy of adoption level is theoretically consistent with the Resource-Based View that the performance returns to e-procurement investment are only realized when the system is actively and comprehensively embedded in daily procurement operations. This finding aligns with Myovela et al. (2023) and Mohungoo et al. (2020), both of whom identify adoption depth as the critical gateway variable through which e-procurement technical capabilities translate into operational performance.

Integration Level (IL) is the second-strongest predictor ($\beta = 0.212$, $t = 3.593$, $p < 0.001$), leading to the rejection of H_{05} . This result demonstrates that connecting the e-procurement system with financial management, budgeting, and auditing systems generates independent performance improvements beyond what adoption and feature utilisation alone achieve. This finding provides empirical support for Systems Theory's interdependence principle that e-procurement performs optimally as part of an integrated institutional system rather than as a standalone application. The strong effect of integration on performance is consistent with Masudin et al.'s (2021) finding in Indonesia and with OECD (2016) policy analysis that institutional digital integration is the multiplier that amplifies all other e-procurement benefits.

System Quality (SQ) significantly predicts performance levels ($\beta = 0.198$, $t = 3.143$, $p = 0.002$), leading to the rejection of H_{02} . This result confirms that the technical reliability, data accuracy, ease of use, and responsiveness of the e-procurement platform independently predict performance outcomes beyond adoption behaviour. This finding resonates with Aminah et al.'s (2018) demonstration that system quality is a primary driver of user satisfaction with e-procurement platforms in Indonesian public organizations.

Feature Utilisation (FU) significantly predicts performance levels ($\beta = 0.173$, $t = 2.836$, $p = 0.005$), leading to the rejection of H_{03} . The finding confirms that agencies which deploy the full spectrum of e-tendering, e-bidding, contract management, and e-invoicing functionalities experience measurably higher performance levels than those using a subset of available features. The relatively smaller coefficient compared to adoption and integration levels suggests that feature utilisation's performance contribution is partially realized through

and amplified by higher adoption and integration levels: comprehensive feature use is most impactful when embedded within a high-adoption, well-integrated system architecture. The lower feature utilisation mean scores for advanced functions (contract management: Mean = 3.82; e-invoicing: Mean = 3.86) documented in Table 4.3 suggest that significant performance gains remain unrealized in many agencies, particularly for contract monitoring and financial processing efficiency.

Staff Training (ST) significantly predicts performance levels ($\beta = 0.149$, $t = 2.328$, $p = 0.021$), leading to the rejection of H04. Although ST records the smallest significant coefficient in the model, its significance at the 5% level confirms that capacity building independently generates performance improvements beyond those achieved through system deployment and integration. The finding is theoretically consistent with Vaidya et al.'s (2006) critical success factor analysis and with Scovia and Jonath's (2024) finding that training adequacy is a primary determinant of e-procurement benefit realization in Ugandan public institutions. The lower relative coefficient of staff training compared to adoption, integration, and system quality may reflect the lagged nature of training effects: training investments generate performance improvements over time as skills are consolidated, but their immediate performance impact may be partially absorbed into the adoption level and feature utilisation scores within the cross-sectional measurement window of this study.

Table 4.5: Multiple Regression Coefficients of E-Procurement Dimensions on Performance Levels

Predictor Variable	β (Unstd.)	Std. Err.	β (Std.)	t-stat	p-value	Interpretation
(Constant)	1.214	0.173	—	7.017	0.000***	—
Adoption Level (AL)	0.284	0.057	0.301	4.982	< 0.001***	H1 Supported
System Quality (SQ)	0.198	0.063	0.208	3.143	0.002***	H2 Supported
Feature Utilisation (FU)	0.173	0.061	0.184	2.836	0.005***	H3 Supported
Staff Training (ST)	0.149	0.064	0.157	2.328	0.021**	H4 Supported
Integration Level (IL)	0.212	0.059	0.224	3.593	< 0.001***	H5 Supported
R = 0.861 R² = 0.741 Adjusted R² = 0.735 F(5,205) = 117.84, p < 0.001						

Notes: HC-robust standard errors. *** $p < 0.001$, ** $p < 0.05$. Dependent variable: Performance Levels (PL). Respondent Role and Years of Experience included as controls but not significant ($p > 0.20$). Source: Authors' computation (2025).

5. Conclusion

This study examined the effect of e-procurement systems on performance levels of selected public agencies in Akure, Ondo State, Nigeria. Using a quantitative descriptive-correlational design with structured questionnaire data from 211 respondents across seven purposively selected agencies, and employing multiple linear regression with HC-robust standard errors and comprehensive diagnostic validation, the study

generated rigorous empirical evidence on the specific mechanisms through which e-procurement system effectiveness translates into organizational performance improvement.

The central empirical finding is unambiguous: e-procurement systems significantly and substantially improve organizational performance levels in Nigerian public agencies when measured across the multi-dimensional framework of adoption level, system quality, feature utilisation, staff training, and integration level. The full model explains 74.1% of variance in performance levels (Adjusted $R^2 = 0.735$), confirming that e-procurement effectiveness is the dominant determinant of agency performance outcomes. All five e-procurement dimensions are statistically significant independent predictors, confirming that performance improvement is not reducible to a single dimension of digital procurement capability but requires coordinated development across all five operational areas.

Adoption level and integration level are the two most powerful performance drivers, confirming the Resource-Based View and Systems Theory predictions: performance advantages from e-procurement emerge when the system is deeply embedded in daily operations and fully connected with complementary organizational systems. Feature utilisation underperformance particularly for advanced functions such as contract management and e-invoicing identifies a specific gap between installed system capability and realized performance benefits, attributable in part to documented training deficits. The study validates the principal-agent theory in the Nigerian subnational context: e-procurement's documented improvements in transparency, auditability, and accountability reflect the system's capacity to reduce information asymmetry and constrain opportunistic procurement behaviour.

Public agencies in Akure and Ondo State should prioritize deep adoption not just formal implementation of e-procurement systems by institutionalizing digital procurement processes as mandatory for all procurement transactions above threshold values. The documented adoption-performance relationship ($\beta = 0.284$) indicates that marginal improvements in adoption depth generate the largest marginal performance returns among all five dimensions. Agencies should develop and regularly update Procurement Digitalization Plans that specify adoption targets by department and procurement category, with quarterly monitoring of utilization metrics.

Feature utilization should be expanded, particularly for contract management and electronic invoicing functions which recorded the lowest utilization scores (Mean = 3.82 and 3.86 respectively). Given that these functions represent the highest-value components of the e-procurement lifecycle directly affecting contract execution quality and payment cycle efficiency agencies should designate system champions within each department to promote advanced feature adoption, provide peer coaching, and document workflow benefits to build internal advocacy for comprehensive utilization.

The Ondo State Bureau of Public Procurement should incorporate e-procurement performance metrics including adoption rates, feature utilization scores, procurement cycle time, and contract execution timeliness into its annual agency performance assessment framework. This will create institutional accountability for e-procurement performance outcomes and provide the ongoing monitoring data needed to track the sustainability of performance improvements documented in this study. The Bureau should also develop sector-specific e-procurement implementation guidelines that recognize the different procurement profiles of health, works, education, and finance agencies, enabling targeted performance improvement strategies for each institutional context.

Declaration of Conflicting Interests

The authors declare no potential conflicts of interest with respect to the research, authorship and publication of this article.

Funding

The author received no financial support for the research, authorship and publication of this article.

References

- Adjei - Bamfo, P., Domfeh, K. A., Bawole, J. N., Ahenkan, A., Maloreh - Nyamekye, T., Adjei-Bamfo, S., & Darkwah, S. A. (2020). An e-government framework for assessing readiness for public sector e-procurement in a lower-middle income country. *Information Technology for Development*, 26(4), 742 <https://doi.org/10.1080/02681102.2020>.
- Adjorlolo, G., Tang, Z., Wauk, G., Sarfo, P. A., Braimah, A. B., Safo, R. B., & N-yanyi, B. (2025). Evaluating corruption-prone public procurement stages for blockchain integration using AHP approach. *Systems*, 13(4), 267.
- Aduwo, E. B., Ibem, E. O., Afolabi, A., Oluwunmi, A. O., Tunji-Olayeni, P. F., Ayo-Vaughan, E. A., Uwakonye, U., & Oni, A. A. (2020). Exploring anti-corruption capabilities of e-procurement in construction project delivery in Nigeria. *Construction Economics and Building*, 20(1).
- Afolabi, A., Ibem, E. O., Aduwo, E. B., Tunji-Olayeni, P. F., & Oluwunmi, A. O. (2019). Critical success factors (CSFs) for e-procurement adoption in the Nigerian construction industry. *Buildings*, 9(2), 47.
- Aminah, S., Ditari, Y., Kumaralalita, L., Hidayanto, A. N., Phusavat, K., & Anussornnitisarn, P. (2018). E-procurement system success factors and their impact on transparency perceptions: Perspectives from the supplier side. *Electronic Government, an International Journal*, 14(2), 177.
- Andrews, R., Boyne, G. A., & Walker, R. M. (2011). Strategy content and organizational performance: An empirical analysis. *Public Administration Review*, 71(5), 715–728.
- Arjanto, P., & Telussa, R. P. (2024). Educational management strategies: Linking infrastructure, student activities, and academic performance. *JPPPI*, 10(3), 163–174.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.
- Belisari, S., Binci, D., & Appolloni, A. (2020). E-procurement adoption: A case study about the role of two Italian advisory services. *Sustainability*, 12(18), 7476.
- Boulding, K. E. (1956). General systems theory—The skeleton of science. *Management Science*, 2(3), 197–208.
- Boyne, G. A. (2002). Public and private management: What's the difference? *Journal of Management Studies*, 39(1), 97–122.
- Bureau of Public Procurement. (2020). Public Procurement Act 2007 and procurement guidelines. Federal Government of Nigeria.
- Chan, A. P. C., & Owusu, E. K. (2022). Evolution of electronic procurement: Contemporary review of adoption and implementation strategies. *Buildings*, 12(2), 198.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE.
- Croom, S., & Brandon-Jones, A. (2007). Impact of e-procurement: Experiences from implementation in the UK public sector. *Journal of Purchasing and Supply Management*, 13(4), 294–303.

- Govindan, K., Jain, P., Singh, R. K., & Mishra, R. (2023). Blockchain technology as a strategic weapon to bring procurement 4.0 truly alive. *Transportation Research Part E*, 181, 103352.
- Graycar, A. (2022). Corrupt procurement: Rethinking the roles of principals and agents. *Policy Design and Practice*, 5(3), 276.
- Hochstetter, J., Vásquez, F., Diéguez, M., Bustamante, A., & Arango-López, J. (2023). Transparency and e-government in electronic public procurement as sustainable development. *Sustainability*, 15(5), 4672.
- Hood, C. (1991). A public management for all seasons? *Public Administration*, 69(1), 3–19.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics*, 3(4), 305–360.
- Katz, D., & Kahn, R. L. (1978). *The social psychology of organizations* (2nd ed.). Wiley.
- Knack, S., Biletska, N., & Kacker, K. (2018). Deterring kickbacks and encouraging entry in public procurement markets. *The World Bank Economic Review*, 33(2), 287.
- Kochanova, A., Hasnain, Z., & Larson, B. (2016). Does e-government improve government capacity? *World Bank Policy Research Working Paper* 7657.
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3), 607–610.
- Maagi, B., & Mwakalobo, A. (2023). Practitioners' perception of the effect of e-procurement practices on time saving in public procurement in Tanzania. *OALib*, 10(5).
- Marei, A., Daoud, L., Ibrahim, M., & Al-Jabaly, S. M. (2020). Moderating role of top management support in electronic procurement usage of Jordanian firms. *Management Science Letters*, 1121.
- Masudin, I., Aprilia, G. D., Nugraha, A., & Restuputri, D. P. (2021). Impact of e-procurement adoption on company performance: Evidence from Indonesian manufacturing industry. *Logistics*, 5(1), 16.
- Mircea, M., Stoica, M., & Ghilic-Micu, B. (2022). Analysis of the impact of blockchain and Internet of Things (BIoT) on public procurement. *IEEE Access*, 10, 63353.
- Mohungoo, I., Brown, I., & Kabanda, S. (2020). A systematic review of implementation challenges in public e-procurement. In *Lecture Notes in Computer Science*. Springer.
- Moore, M. H. (1995). *Creating public value: Strategic management in government*. Harvard University Press.
- Moynihan, D. P. (2008). *The dynamics of performance management*. Georgetown University Press.
- Myovela, G., Ng'elenge, H., & Kisawike, B. (2023). Factors affecting the adoption of electronic procurement in the public sector: The case of Songwe District Council. *East African Journal of Business and Economics*, 6(2), 53.
- Nawi, M. N. M., Roslan, S., Salleh, N. A., Zulhumadi, F., & Harun, A. N. (2016). The benefits and challenges of e-procurement implementation: A case study of Malaysian company. *DOAJ*.
- OECD. (2016). *Preventing corruption in public procurement*. OECD Publishing.
- Ondo State Bureau of Public Procurement. (2022). *Procurement regulatory framework and operational guidelines*. Ondo State Government.
- Salifu, Z., Nangpiire, C., Dawdi, A.-A., & Yussif, F. (2022). Assessing the extent of electronic procurement adoption challenges in the public sector of Ghana. *Research Square*.
- Santiso, C. (2022). Govtech against corruption: What are the integrity dividends of government digitalization? *Data & Policy*, 4.
- Scott, W. R. (2014). *Institutions and organizations: Ideas, interests, and identities* (4th ed.). Sage.

- Scovia, A., & Jonath, A. (2024). The electronic government procurement system in Uganda: Challenges and benefits. *International Journal of Research and Innovation in Social Science*, 2598.
- Silalahi, S., Hanif, R. A., Supriono, S., Hariyani, E., & Wiguna, M. (2023). Determinants influencing fraud prevention in e-procurement: Empirical evidence from Indonesia. *Innovative Marketing*, 19(4), 199.
- Sultan, B., Al-Hammad, I., Alothman, A., & AlSehli, G. (2025). Bridging the literature gap on eProcurement systems: Insights from Saudi Arabia's sustainable development transition. *Sustainability*, 17(8), 3429.
- Toyin, J. O., Azhar, S., Sattineni, A., & Fasoyinu, A. A. (2024). Influence of information and communication technology application in construction jobsites. *Journal of Information Technology in Construction*, 29, 444.
- Vaidya, K., Sajeev, A. S. M., & Callender, G. (2006). Critical factors that influence e-procurement implementation success in the public sector. *Journal of Public Procurement*, 6(1-2), 70-99.
- Van Dooren, W., Bouckaert, G., & Halligan, J. (2015). *Performance management in the public sector* (2nd ed.). Routledge.
- von Bertalanffy, L. (1968). *General system theory: Foundations, development, applications*. George Braziller.
- Waci, J. M., Kariuki, P. W., & Mwirigi, P. M. (2024). Procurement practices and value for money in state corporations in Kenya. *PLOS ONE*, 19(6).
- World Bank. (2016). *Benchmarking public procurement 2017: Assessing public procurement regulatory systems in 180 economies*. World Bank Group.
- Wuraola, T., Adekunbi, R., & Madu, I. (2021). Electronic procurement systems and administrative effectiveness in Nigerian public institutions. *Journal of Public Administration and Governance*, 11(2), 44-63.
- Zahra, F., Abdullah, M. I., Din, M., Thahir, H., Harun, H., & Ali, J. K. (2021). The role of e-purchasing in government procurement fraud reduction through expanding market access. *International Journal of Data and Network Science*, 6(1), 1