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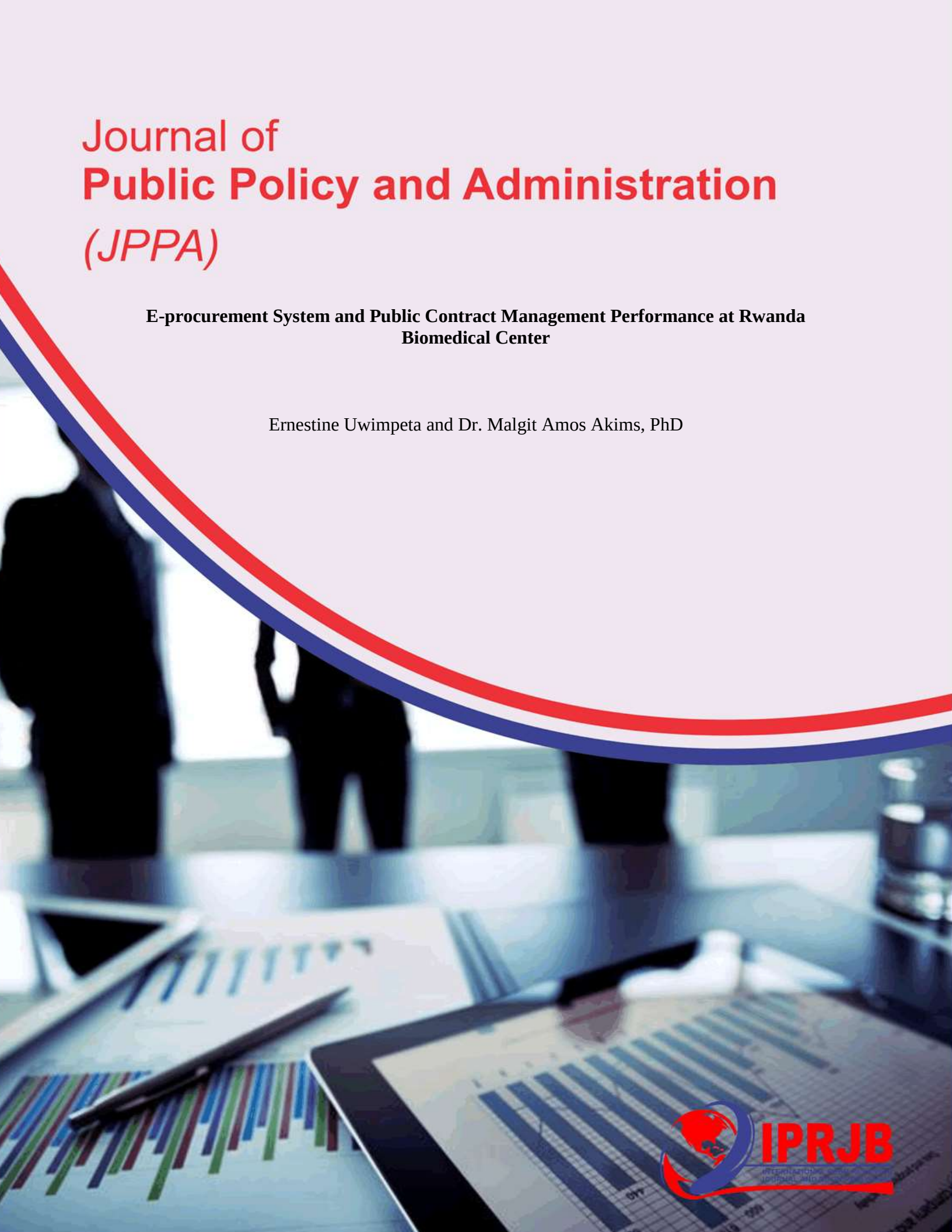

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E-procurement System and Public Contract Management Performance at Rwanda Biomedical Center

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Abstract

Purpose: To investigate the influence of the e-procurement system on public contract management performance at the Rwanda Biomedical Center (RBC).

Methodology: A descriptive research design and a mixed-methods approach were utilized. Data were collected through interview guides, questionnaires, and secondary sources. Employing the purposive sampling method, the study had a sample size of 80 respondents selected from the target population of 102 individuals involved in the contract management process at RBC, using the Krejcie and Morgan (1970) Table.

Findings: In line with regression analysis, findings revealed that among them, E-informing emerged as a highly effective component, with a $\beta = 0.428$ significantly enhancing contract management by facilitating timely communication, improving stakeholder coordination, and reducing information asymmetry. E-sourcing also showed a strong positive influence [$\beta = 0.401$] by promoting transparency and fairness in supplier selection, which directly contributed to better compliance and accountability in contract execution. E-contracting exhibited a moderate impact [$\beta = 0.162$], and e-payment demonstrated a minimal and statistically insignificant influence on overall contract management performance, despite contributing to financial accuracy and compliance.

Unique Contribution to Theory, Practice and Policy: The study recommends that Rwanda Biomedical Center should prioritize enhancing e-informing systems by investing in capacity-building programs to improve stakeholder ICT proficiency and addressing technical challenges such as system downtimes. For e-payment, efforts should enhance its interoperability with other e-procurement tools such as e-purchasing, e-invoicing, automated payment processing, and cash flow management, and implementation barriers to maximize its transactional efficiency and accountability in financial processes.

Keywords: *E-Contracting, E-Informing, E-Payment, E-Sourcing, Public Contract Management, Performance*

JEL Classification Codes: *H83, H57, L86, O33, C83*

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INTRODUCTION

Public contract management is pivotal in ensuring that government projects are executed efficiently, economically, and within the stipulated timelines. In the realm of public administration, effective contract management has increasingly become recognized as essential for achieving policy objectives and delivering public services. According to the Organization for Economic Co-operation and Development (OECD, 2023), public procurement accounts for nearly 13% of the GDP in member countries, reflecting its substantial economic impact. However, the challenges associated with managing public contracts are substantial, particularly in the context of complex public projects and heightened scrutiny from both stakeholders and citizens.

Recent studies underscore the importance of robust contract management frameworks in handling the complexities of modern public projects. Trkman and McCormack (2020) argue that business process reengineering is crucial for enhancing contract management efficiency. Similarly, Neupane, Soar, Vaidya and Yong (2022) highlight that effective contract management can significantly reduce corruption and improve the overall performance of public projects. However, challenges remain, as Lee and Lee (2022) note that many public institutions lack adequate planning and feedback mechanisms, essential for the continuous improvement of contract management practices.

Public contract management's effectiveness is crucial not only for ensuring value for money but also for upholding principles of transparency and accountability in the public sector. According to Rotchanakitumnuai (2021), transparent contract management practices are vital for enhancing good governance by reducing opportunities for corruption and increasing cost-effectiveness. Moreover, integrating innovative technologies and management practices, such as e-procurement system, can significantly improve public contract management's efficiency and effectiveness (Shakya, 2020). In many developing nations, the management of public contracts presents unique challenges due to limited resources, inadequate infrastructure, and sometimes, lack of expertise and experience to monitor or implement the technical specifications, and weak governance structures.

In Rwanda, public procurement constitutes a significant portion of the national budget, making it a critical area for ensuring accountability and efficiency in public spending. The Rwanda Public Procurement Authority (RPPA) reports that in the fiscal year 2021-2022, public procurement accounted for approximately 45% of the national budget, underscoring the importance of effective contract management (Ministry of Finance and Economic Planning, 2022). Despite significant reforms, including the adoption of the e-procurement system “Umucyo”, challenges persist in areas such as contract execution, timely payments, and project delays (OAG, 2019). The Rwandan government has made notable strides in improving public contract management through various reforms aimed at increasing transparency, reducing inefficiencies, and combating corruption.

These efforts align with global trends where governments are prioritizing robust contract management frameworks as a means of ensuring the successful completion of public projects and maintaining public trust. For instance, a study by Khan (2021) emphasizes that effective contract management throughout a contract’s lifecycle, from planning and procurement to execution and

completion, ensures the responsible use of public resources and the achievement of desired outcomes.

The Rwanda Biomedical Center (RBC), as a central agency in the national health system, has undertaken significant reforms to modernize its procurement and contract management practices, particularly through the adoption of e-procurement systems since 2017. Given that the health sector receives a considerable share of public funding, most of which is directed toward procurement, there is a critical need for mechanisms that enhance efficiency, transparency, and accountability (Ministry of Health, 2023). Despite these digital reforms, persistent issues such as contract abandonment, failure to adhere to technical specifications, procurement delays, and inefficiencies in the payment process continue to undermine contract performance (RBC Annual Report, 2022). This study adopts an analytical lens to examine how specific e-procurement functions, namely, e-informing, e-sourcing, e-contracting, and e-payment, influence key dimensions of public contract management performance, including stakeholder coordination, compliance, financial accuracy, and timely execution. By grounding the analysis within Rwanda's broader governance and development frameworks (NST1, NST2, and Vision 2050), the study highlights how strengthening digital procurement capabilities can serve as a strategic lever for improving public sector governance, reducing corruption, and achieving value-for-money outcomes. The findings aim to inform both policy and practice while contributing to scholarly discourse on digital governance in emerging economies.

Problem Statement

Public contract management in Rwanda continues to experience persistent challenges, particularly in ensuring transparency, timely service delivery, efficiency, and accountability. Despite national efforts, such as those articulated in the National Strategy for Transformation (NST1 and NST2) and the Seven-Year Government Programme (7YGP, 2017–2024), to enhance governance through Information and Communication Technology (ICT), performance gaps remain evident within institutions like the Rwanda Biomedical Center (RBC). Although the e-procurement system was introduced as a strategic intervention to streamline procurement processes, fundamental issues such as delayed payments, incomplete contract documentation, and weak compliance mechanisms continue to undermine effective contract execution.

These challenges reflect deeper systemic problems. Governance-related failures such as weak accountability and oversight, technical shortcomings like insufficient contract management expertise, and ICT limitations in system interoperability and user adoption all contribute to underperformance. Notably, internal audit reports and performance reviews at RBC indicate that between 2018 and 2020, fewer than half of public contracts were completed on time and within budget. Financial mismanagement and delays in procurement cycles also led to low recovery rates of public funds. These observations are consistent with findings from various studies, which collectively highlight that e-procurement solutions alone have not been sufficient to address non-compliance, fraud risks, and inefficiencies in public institutions.

Although prior research acknowledges the theoretical benefits of e-informing, e-sourcing, e-contracting, and e-payment, there is limited empirical evidence assessing how these components actually influence measurable contract management outcomes in Rwanda. Specifically, it remains

unclear how these tools affect key performance dimensions such as transparency, timeliness, accountability, compliance, and fairness within contract execution processes. Moreover, much of the available evidence is drawn from secondary audits, without triangulation using firsthand data from stakeholders directly involved in contract management operations. Therefore, this study seeks to address this knowledge and practice gaps by empirically examining the influence of e-procurement systems on public contract management performance at RBC. In doing so, it aims to triangulate audit findings with primary data, including interviews and survey responses, to provide a more holistic and evidence-based understanding of the e-procurement system's effectiveness in enhancing contract governance and service delivery in the public health sector.

General Objective

The main objective of the study was to determine the influence of e-procurement on public contract management performance at the Rwanda Biomedical Center.

Specific Objectives

i. To determine the influence of e-informing on public contract management performance at Rwanda Biomedical Center
ii. To investigate the influence of e-sourcing on public contract management performance at Rwanda Biomedical Center
iii. To examine the influence of e-contracting on public contract management performance at Rwanda Biomedical Center
iv. To determine the influence of e-Payment on public contract management performance at Rwanda Biomedical Center

Research Questions

i. What is the influence of e-informing on the performance of public contract management at Rwanda Biomedical Center?
ii. How does E-sourcing influence the performance of public contract management at Rwanda Biomedical Center?
iii. In what ways does e-contracting influence the performance of public contract management at Rwanda Biomedical Center?
iv. How does e-payment affect the performance of public contract management at Rwanda Biomedical Center?

LITERATURE REVIEW

Theoretical Framework

Agency theory, originally formulated by Jensen and Meckling (1976), explores the relationship between principals (government bodies or funding authorities) and agents (procurement officers, contract managers) who are entrusted to act on behalf of the principal. In public contract management, particularly within the Rwanda Biomedical Center (RBC), this theory becomes highly relevant due to the delegation of complex procurement tasks to agents who may not always align their actions with public interest. The theory highlights risks stemming from information

asymmetry, incentive misalignment, and moral hazard, where agents may act in self-interest, such as manipulating supplier selection, delaying payments to extract rents, or overlooking contract terms, in environments with weak oversight or limited audit capacity.

In Rwanda's context, the Auditor General's reports (OAG, 2021) have revealed repeated instances at RBC where agents failed to comply with procurement laws, resulting in incomplete documentation, unjustified contract variations, and delayed implementation. These illustrate classic agency problems in public procurement. Political patronage and administrative opacity further exacerbate these risks by shielding agents from accountability. E-procurement systems provide a partial remedy to agency problems by introducing digital transparency and reducing discretion. For example, e-informing enhances access to uniform contract data across departments, limiting information asymmetry, while e-sourcing ensures competitive bidding with traceable logs, reducing scope for biased selection. Additionally, e-payment systems, when integrated with public financial management platforms, leave a verifiable audit trail, discouraging fraud or payment manipulation.

Empirical studies such as Kihiu and Mutua (2023) support the assertion that digital procurement tools reduce agency risk by automating decision checkpoints and enforcing standard operating procedures. At RBC, despite the e-GP rollout under the Rwanda Public Procurement Authority (RPPA) since 2017, issues persist due to underutilization of key e-modules and limited staff training, suggesting that agency theory not only explains the rationale for reform but also highlights the need for stronger enforcement and incentives within digital systems to realign agent behavior.

Institutional theory, developed by Meyer and Rowan (1977) and later expanded by DiMaggio and Powell (2021), explains how organizational behavior is shaped by formal structures, societal norms, and regulatory pressures. In the context of public procurement, it helps explain why institutions adopt reforms like e-procurement, not merely for technical efficiency, but often in response to coercive (legal), mimetic (peer pressure), or normative (professional standard) forces. At RBC, the adoption of e-procurement was catalyzed by national policy mandates aimed at aligning with Rwanda's Vision 2020 and NST1 objectives of governance reform and anti-corruption. This reflects coercive institutional pressure from government leadership and international donors. However, the speed and depth of adoption were influenced by internal institutional dynamics, including existing procurement policies, resistance to change, and limited staff ICT capacity. For example, while RBC officially adopted the e-GP platform in line with RPPA guidelines in 2018, audit findings (RBC Annual Report, 2022) show inconsistent system use across departments, reflecting institutional inertia and cultural barriers to digital transition. Some staff continued to rely on manual methods due to insufficient training and fears of system failure or accountability exposure.

Institutional theory also highlights how professional norms, such as compliance expectations by RPPA and peer benchmarking, can accelerate adoption. Regionally, Kenya's Integrated Financial Management Information System (IFMIS) and Uganda's Public Procurement and Disposal of Public Assets (PPDA) authority offer comparative models of institutionalizing digital procurement. Kenya's IFMIS success has been partly attributed to robust training programs, enforced usage policies, and integration with Treasury systems, offering lessons for RBC's policy

and capacity-building efforts. Thus, institutional theory contextualizes RBC's e-procurement reforms within a broader framework of policy compliance, cultural adaptation, and organizational restructuring. It emphasizes that successful digital governance requires more than software deployment; it necessitates institutional readiness, staff empowerment, and reinforcement of normative behaviors aligned with reform goals.

Empirical Review

Empirical research on e-procurement systems in public contract management has underscored the transformative role of digital processes in enhancing efficiency, transparency, and stakeholder engagement across the public sector. Each component: e-informing, e-sourcing, e-contracting, and e-payment, has been examined in depth by different scholars employing diverse methodological approaches, each contributing uniquely to the understanding of contract management performance. In a study focusing on e-informing, Mukamurera, Habimana, and Mugisha (2022) employed a qualitative case study approach to explore the impact of digital dissemination of procurement and contract data in Rwandan public institutions. Their research purpose was to assess how electronic information flow enhances institutional transparency and deters procurement-related corruption. Findings revealed a 25% reduction in reported irregularities and a 30% improvement in stakeholder engagement, attributed to timely and accessible contract-related updates. However, the study's reliance on qualitative narratives presented a methodological limitation, as it lacked inferential statistical analysis that would allow broader generalization. Additionally, a conceptual gap was noted in linking transparency improvements directly to long-term contract enforcement and dispute resolution mechanisms.

Complementing these insights, Niyonzima (2021) conducted a mixed-methods study examining the role of centralized electronic repositories on contract performance. Using survey tools and document analysis, the study reported a 35% increase in document accessibility and a 20% reduction in administrative delays due to streamlined access to procurement archives. While the findings substantiated the operational value of e-informing systems, contextual limitations emerged. The research did not sufficiently address disparities in digital access across urban and rural regions in Rwanda, nor did it explore how these improvements translate into sustained institutional accountability over time. Regarding e-sourcing, Uwizeye and Mugenzi (2021) conducted a quantitative study analyzing the influence of electronic requisition and RFQ systems on procurement efficiency within selected Rwandan government agencies. Their methodology involved structured questionnaires and performance metric reviews. The study found that the adoption of e-sourcing tools led to a 40% reduction in procurement cycle times and a 15% cost saving when compared to traditional procurement practices. Additionally, performance data indicated a 70% increase in supplier participation, suggesting that digital platforms widened competitive bidding. However, the study identified a methodological gap in failing to evaluate how these gains influence downstream phases such as contract negotiation and post-award performance monitoring.

Scholar, Nsabimana (2023) also examined e-sourcing but focused on its application within Rwanda's health sector, particularly in medical equipment procurement. Using performance data analysis and supplier feedback surveys, the study reported that on-time delivery compliance improved by 80%, and procurement transparency scores rose by 25% based on audit reviews.

Unlike Uwizeye and Mugenzi, Nsabimana emphasized the role of automated supplier evaluation in promoting fairness. Nonetheless, a conceptual gap remained in articulating how e-sourcing systems integrate with electronic contract execution tools, and the study did not analyze long-term sustainability or cost-benefit outcomes across multiple fiscal periods. Rutayisire (2021) implemented a quasi-experimental design to assess how digital contract creation and execution influenced cost control and timeliness in infrastructure projects. The study demonstrated that digital templates and workflow automation reduced contract drafting errors by 33% and shortened negotiation phases by 18%. Controlled trials indicated a 25% drop in administrative overheads linked to manual processing. Despite these benefits, Rutayisire noted a methodological limitation in the study's short evaluation window, which did not capture long-term contract performance trends or post-implementation reviews.

A more comprehensive exploration by Mukeshimana, Rutayisire, and Uwitonze (2023) utilized qualitative interviews and policy analysis to examine how automated contracting tools affect compliance and documentation consistency across public entities. Their findings revealed that standard contract templates enhanced regulatory alignment and reduced incidences of missing compliance clauses by 28%. Yet, the research showed a contextual gap, with findings largely drawn from urban institutions, making it difficult to extrapolate impacts across decentralized or rural government agencies. Furthermore, the study did not assess digital mechanisms for dispute resolution or contract renewal, leaving open areas for future inquiry. On the aspect of e-payment systems, Williams and Brown (2020) conducted a comparative financial study using data from European municipalities. Their research aimed to determine how automated payments affect financial accuracy and supplier satisfaction. Findings showed a 40% reduction in processing times, a 35% decrease in payment errors, and a 50% increase in timely disbursements. Additionally, a positive correlation ($p < 0.05$) was established between e-payment adoption and supplier trust. However, their analysis was financially centered and did not examine linkages with other procurement processes, such as automated invoicing or budget monitoring.

In the Rwandan context, Nkurunziza and Ingabire (2023) analyzed the integration of e-payment systems at district hospitals. Through quantitative experimentation and focus group interviews, they documented improved accuracy in payment reconciliation and reduced staff workload. The study highlighted a 20% improvement in vendor satisfaction ratings post-adoption. Still, the authors acknowledged a conceptual gap—while financial transparency improved, the interaction between e-payment and upstream activities like order verification and goods receipt was not assessed. The contextual limitation also lay in the absence of rural institutional representation, affecting the comprehensiveness of the findings.

Efforts to evaluate holistic e-procurement performance have also emerged. Shakya (2020) used a qualitative experimental design to evaluate the cumulative impact of fully integrated e-procurement systems across four public institutions in Nepal. The findings demonstrated a 20% increase in contract performance indicators, including reduced cycle time, improved transparency, and enhanced fairness. However, Shakya's research lacked standardized benchmarks for performance, which presents a methodological limitation for replication or comparative analysis. A conceptual gap also existed in the inability to isolate the impact of individual e-procurement

modules, such as e-contracting versus e-sourcing, in contributing to the overall performance outcomes.

Conceptual Framework

Independent Variable: E-Procurement

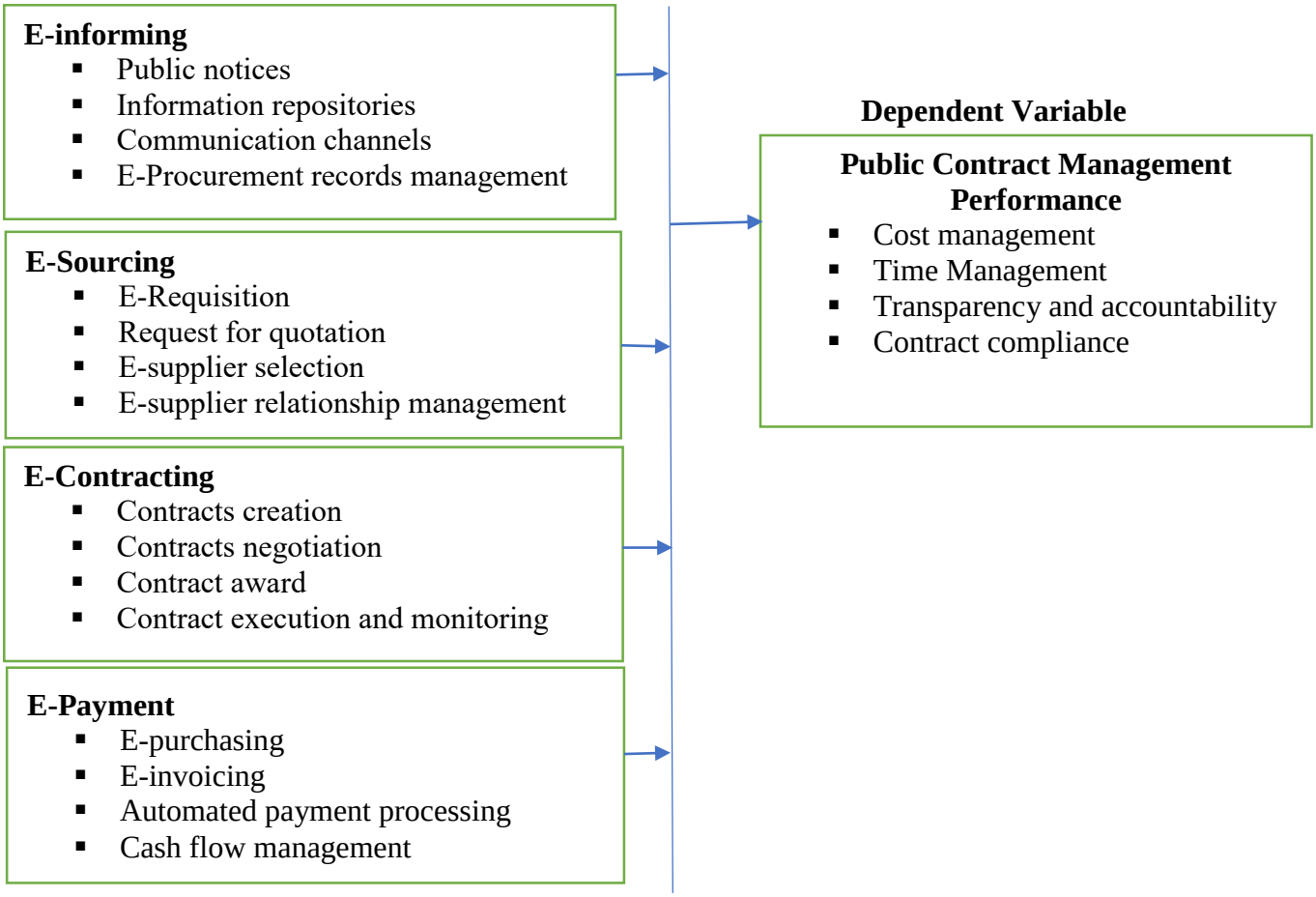

Figure 1: Conceptual Framework

Source: Researcher (2025)

The conceptual framework in Figure 1 illustrates the hypothesized relationships among the four independent variables: E-informing, E-sourcing, E-contracting, E-payment, and their collective influence on the dependent variable, public contract management.

METHODOLOGY

This study adopted a descriptive survey design using a mixed-methods approach to investigate the influence of the e-procurement system on public contract management performance at the Rwanda Biomedical Center. The target population included 102 individuals involved in procurement and contract management, from which a representative sample of 80 was drawn using the Krejcie and Morgan (1970) sample size determination table. A combination of purposive and simple random

sampling techniques was applied to ensure the inclusion of key informants such as procurement staff, management, suppliers, and contract end-users. Primary data were collected through self-administered questionnaires and semi-structured interviews, while secondary data were obtained from organizational documents. Instrument reliability was confirmed using Cronbach's Alpha ($\alpha = 0.7251$), and validity was ensured through expert reviews and triangulation. Quantitative data were analyzed using descriptive and inferential statistics (SPSS version 30), while qualitative data were subjected to thematic analysis. Ethical considerations included informed consent, confidentiality, and voluntary participation.

FINDINGS AND DISCUSSION

The study achieved a high response rate of 94%, with 75 out of 80 targeted respondents fully completing the questionnaire, ensuring scientific representativeness of the sample. The demographic profile revealed a gender distribution of 61% male and 39% female, reflecting potential gender dynamics in public contract management at the Rwanda Biomedical Center (RBC). Respondents occupied diverse roles, including contract end users (39%), management staff (20%), contract managers (17%), suppliers (15%), and procurement staff (9%), illustrating a multi-stakeholder environment essential for a holistic understanding of contract execution. Experience levels varied, with 49.3% having more than six years in project execution, providing both seasoned and fresh perspectives on contract performance. Quantitative findings were primarily derived from descriptive statistics, correlation analysis, and multiple regression models, providing insights into the relationships between the independent and dependent variables. Descriptive statistics, illustrated through frequency tables and charts, summarize respondents' views, while inferential statistics, including correlations and regression coefficients, assess the significance and strength of these relationships. Descriptive findings revealed that a majority of respondents rated e-procurement systems as highly effective, with an overall mean score of 4.23 for e-informing, 4.25 for e-sourcing, 4.33 for e-contracting, and 4.326 For e-payment on a 5-point scale.

Correlation Analyses

This section used correlation analysis to measure the strength and direction of the relationship between e-procurement system dimensions (e-informing, e-sourcing, e-contracting, and e-payment) and public contract management performance. This section provides insights into whether these variables are positively, negatively, or not significantly related.

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Table 1: Correlation Matrix

		E-informing	E-sourcing	E-contracting	E-payment	Public Contract mgt performance
E-informing	Pearson Correlation	--				
	N	75				
E-sourcing	Pearson Correlation	.713**	--			
	Sig. (2-tailed)	<.001				
	N	75	75			
E-contracting	Pearson Correlation	.722**	.749**	--		
	Sig. (2-tailed)	<.001	<.001			
	N	75	75	75		
E-payment	Pearson Correlation	.497**	.513**	.615**	--	
	Sig. (2-tailed)	<.001	<.001	<.001		
	N	75	75	75	75	
Public Contract mgt performance	Pearson Correlation	.533**	.501**	.478**	.289*	--
	Sig. (2-tailed)	<.001	<.001	<.001	.012	
	N	75	75	75	75	75

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Source: SPSS Results (2025)

The correlation matrix in Table 1 reveals significant relationships between the independent variables (e-informing, e-sourcing, e-contracting, and e-payment) and the dependent variable, public contract management performance. Among the independent variables, e-informing shows a moderate positive correlation with public contract management performance (r=0.533, p<0.001), indicating its critical role in enhancing transparency and accessibility of information within contract management processes. This result aligns with findings by Mwakujonga and Mpanduji (2023), who reported that efficient e-informing mechanisms improved communication and decision-making in East Africa's public procurement, emphasizing its substantial influence on contract outcomes.

E-sourcing demonstrates a similar positive correlation with public contract management performance (r=0.501, p<0.001). This highlights its importance in streamlining supplier selection and fostering competitive bidding processes. These results are consistent with Munyaneza's (2021) findings in Rwanda, which reported that e-sourcing improved procurement performance by reducing lead times and enhancing supplier engagement. Munyaneza's correlation of r=0.47

between e-sourcing and procurement outcomes parallels the strength of the relationship observed in this study. E-contracting exhibits a slightly weaker, yet significant, positive correlation with public contract management performance (r=0.478, p<0.001). This reflects its impact on ensuring compliance, reducing contractual disputes, and expediting contract execution. These findings resonate with Shakya (2020), who found that e-contracting technologies enhanced contract management efficiency, though their study reported a weaker correlation of r=0.41, possibly due to differences in sectoral or regional focus.

Interestingly, e-payment shows the weakest, albeit significant, positive correlation with public contract management performance (r=0.289, p=0.012). While this suggests that e-payment plays a less dominant role compared to the other variables, its contribution to financial accuracy and cash flow management remains noteworthy. Niyonzima and Uwizeye (2023) found a similar, albeit stronger correlation (r=0.32), between e-payment systems and improved compliance in public contracts. The slightly lower correlation in this study may stem from variations in implementation effectiveness or differing organizational contexts. The inter-variable correlations reveal notable insights. For instance, e-sourcing and e-contracting show the strongest relationship (r=0.749, p<0.001), suggesting that seamless integration of supplier selection with contractual agreements is pivotal for effective contract management. Mukamurera *et al*. (2022), who observed that combining e-sourcing and e-contracting functionalities significantly improved procurement accuracy and supplier satisfaction, echo this finding.

Overall, the correlations underscore the interconnected nature of e-procurement tools and their collective influence on public contract management performance. Comparisons with the reviewed literature affirm the robustness of these findings, while slight discrepancies highlight the importance of contextual factors, such as sector-specific practices and technological maturity, in shaping these relationships.

Regression analysis on the influence of E-informing

Table 2: Model Summary for E-Informing

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.533[a]	.284	.274	.50065
a. Predictors: (Constant), E-informing				

Source: SPSS Results (2025)

The findings of regression analysis for e-informing in Table 2 reveals a statistically significant relationship with public contract management performance, as evidenced by an R^2 value of 0.284, suggesting that the introduction of e-informing systems explains 28.4% of the variation in contract management performance. This result aligns with prior research that emphasizes the importance of information-sharing technologies in public procurement (González & Martínez, 2021). E-informing facilitates better communication, provides stakeholders with real-time updates, and promotes transparency in procurement processes, which are crucial for enhancing the efficiency and accountability of public contract management.

Table 3: Analysis of Variance Results for E-informing

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7.243	1	7.243	28.896	<.001[b]
	Residual	18.298	73	.251		
	Total	**25.541**	**74**			

a. Dependent Variable: Public Contract management performance
b. Predictors: (Constant), E-informing

Source: SPSS Results (2025)

From ANOVA results, Table 3 indicates that e-informing significantly impacts public contract management performance, with an F-statistic of 28.896 and a p-value less than .001. This suggests that e-informing explains a large portion of the variation in public contract management performance, with the Regression Sum of Squares of 7.243 highlighting its strong influence. The low p-value further confirms that the effect of e-informing is statistically reliable and not due to random variation. These findings emphasize the critical role of information-sharing technologies in improving the efficiency and effectiveness of public procurement processes.

Table 4: Coefficients for E-informing

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.056	.603		1.750	.084
	E-informing	.737	.137	.533	5.376	<.001

a. Dependent Variable: Public Contract Management Performance

Source: SPSS Results (2025)

The findings in Table 4 show a standardized beta coefficient of 0.533 ($t = 5.376$, $p < .001$). This demonstrates that e-informing has a strong positive influence on contract management performance, particularly in improving transparency and accountability in public contract processes.

Regression Analysis on the Influence of E-Sourcing

Table 5: Model Summary for E-sourcing

Source: SPSS Results (2025)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.501[a]	.251	.241	.51178
a. Predictors: (Constant), E-sourcing				

The regression analysis in Table 5 reveals a significant positive impact on public contract management performance, with an R^2 value of 0.251. This indicates that e-sourcing explains 25.1% of the variation in performance outcomes. This result underscores the importance of effective supplier selection and sourcing processes in improving procurement efficiency and

compliance. Karanja (2022) highlighted the critical role of e-sourcing in enhancing procurement performance in public institutions, noting its impact on the quality of supplier relationships and procurement cycle times.

Table 6: Analysis of Variance Results for E-sourcing

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.420	1	6.420	24.513	<.001[b]
	Residual	19.120	73	.262		
	Total	**25.541**	**74**			

a. Dependent Variable: Public Contract management performance
b. Predictors: (Constant), E-sourcing

Source: SPSS Results (2025)

The ANOVA results presented in Table 6 show a statistically significant relationship between e-sourcing and public contract management performance ($F(1, 73) = 24.513$, $p < .001$). This suggests that e-sourcing has a considerable positive impact on procurement outcomes, with the variation in performance explained by the use of e-sourcing. The regression model indicates that e-sourcing plays a critical role in improving the efficiency and effectiveness of public contract management, contributing to overall better procurement practices. The findings align with previous studies, such as those by Kamali and Habineza (2022) who emphasize the positive influence of technological tools like e-sourcing in public procurement. Their study highlights improvements in time and cost efficiency, while findings focus on the broader impact of e-sourcing on procurement performance in public institutions.

Table 7: Coefficients for E-sourcing

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.421	.581		2.444	.017
	E-sourcing	.672	.136	.501	4.951	<.001

a. Dependent Variable: Public Contract management performance

Source: SPSS Results (2025)

The Findings show the standardized beta coefficient of 0.501 ($t = 4.951$, $p < .001$). These findings highlight the significant contribution of e-sourcing to efficiency and compliance in contract management. The standardized beta coefficient of 0.501 ($t = 4.951$, $p < .001$) in Table 7 reinforces these findings, suggesting that e-sourcing plays a crucial role in improving the efficiency, transparency, and overall effectiveness of public procurement. This aligns with Kamali and Habineza (2022), who observed that e-sourcing can significantly enhance time and cost efficiency in public procurement.

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Regression analysis on the influence of E-Contracting

Table 8: Model Summary for E-contracting

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.478[a]	.229	.218	.51950
a. Predictors: (Constant), E-contracting				

Source: SPSS Results (2025)

The regression analysis Findings in Table 8 display an R^2 value of 0.229, shows that the tool has a significant influence on public contract management performance, explaining 22.9% of the variation in performance outcomes ($R^2 = 0.229$). E-contracting systems play an essential role in ensuring compliance and reducing contract disputes by automating and streamlining the contracting process. Habarugira (2021) found that e-contracting led to a 29% reduction in contract disputes within Rwandan public institutions, showcasing the tool's ability to improve accountability and legal compliance.

Table 9: Analysis of Variance Results for E-contracting

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5.840	1	5.840	21.638	<.001[b]
	Residual	19.701	73	.270		
	Total	**25.541**	**74**			

a. Dependent Variable: Public Contract management performance
b. Predictors: (Constant), E-contracting

Source: SPSS Results (2025)

The model in Table 9 results is statistically significant, with $F(1, 73) = 21.638$ and $p < .001$. These ANOVA results indicate that the model examining the impact of e-contracting on public contract management performance is statistically significant, with an F-statistic of 21.638 and a p-value less than .001. This suggests that e-contracting has a significant positive effect on public contract management performance, explaining a substantial amount of the variation in the dependent variable. The Regression Sum of Squares of 5.840 shows the portion of the variation in contract management performance that can be attributed to the independent variable, e-contracting, while the Residual Sum of Squares of 19.701 reflects the unexplained variation. With the large F-statistic relative to the residual variance, it is clear that e-contracting is an important predictor in improving public procurement processes.

Table 10: Coefficients for E-contracting

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.572	.586		2.682	.009
	E-contracting	.626	.135	.478	4.652	<.001
a. Dependent Variable: Public Contract management performance						

Source: SPSS Results (2025)

The standardized beta coefficient of 0.478 ($t = 4.652$, $p < .001$) in Table 10 suggests a significant contribution of e-contracting to improving procurement processes, particularly in ensuring contractual compliance and accountability. These findings are consistent with previous research by Kamali and Habineza (2022), who noted that e-contracting enhances both time and cost efficiency in procurement processes.

Regression Analysis on the Influence of E-Payment

Table 11: Model Summary for E-payment

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.289[a]	.084	.071	.56626
a. Predictors: (Constant), E-payment				

Source: SPSS Results (2025)

The findings in Table 11 imply that e-payment shows a statistically significant, albeit weaker, relationship with public contract management performance, explaining only 8.4% of the variation ($R^2 = 0.084$). This relatively low explanatory power suggests that while e-payment systems contribute to improved financial transparency, their impact on overall contract management performance is less pronounced compared to tools like e-informing, e-sourcing, and e-contracting. Scholars, Johnson Martinez, and Gonzales (2021) highlighted the role of e-payment systems in improving payment accuracy and transparency, reducing financial discrepancies in public contracts.

Table 12: Analysis of Variance Results for E-payment

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.133	1	2.133	6.653	.012[b]
	Residual	23.408	73	.321		
	Total	**25.541**	**74**			
a. Dependent Variable: Public Contract management performance						
b. Predictors: (Constant), E-payment						

Source: SPSS Results (2025)

The model in ANOVA results in Table 12 is statistically significant, with $F(1,73) = 6.653$ and $p = .012$. These results show that e-payment has a statistically significant impact on public contract management performance, with an F-statistic of 6.653 and a p-value of .012, which is less than the standard threshold of .05. This indicates that e-payment significantly explains the variation in

public contract management performance, though to a lesser degree compared to e-sourcing or e-contracting. The Regression Sum of Squares of 2.133 represents the variance in contract management performance that can be attributed to the introduction of e-payment systems, while the Residual Sum of Squares of 23.408 indicates the remaining unexplained variation. Although the impact of e-payment is statistically significant, it appears to have a relatively smaller effect compared to other technological tools like e-sourcing and e-contracting, which is reflected in the smaller F-statistic. Nevertheless, these findings suggest that the integration of e-payment systems contributes to improved procurement processes, supporting previous research that highlights the role of digital financial systems in enhancing efficiency, transparency, and accountability in public procurement.

Table 13: Coefficients for E-payment

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.845	.562		5.067	<.001
	E-payment	.331	.128	.289	2.579	.012

a. Dependent Variable: Public Contract management performance

Source: SPSS Results (2025)

The findings in Table 13 show a standardized beta coefficient of 0.289 ($t = 2.579$, $p = .012$). These findings highlight the significant influence of e-payment on procurement outcomes. This finding aligns with Kamali and Habineza (2022), who emphasized that e-payment systems are effective in reducing payment errors and enhancing financial management in public contracts. Overall, the findings from this study resonate with those of Ruzindana and Kalaskar (2023), who reported that key e-procurement components explained 57.64% of the variance in procurement performance in Rwanda's telecommunication sector. The overall fit of their model ($R^2 = 0.505$) also supports the significant influence of e-procurement tools on adoption and performance outcomes. The present study's findings further reinforce the importance of digital procurement systems in enhancing transparency, efficiency, and compliance in public contract management while also highlighting areas that require system enhancements and integration for optimal effectiveness.

CONCLUSION AND RECOMMENDATIONS

This study addressed the influence of e-informing, e-sourcing, e-contracting, and e-payment on public contract management performance at RBC. E-informing emerged as a highly effective component, significantly enhancing contract management by facilitating timely communication, improving stakeholder coordination, and reducing information asymmetry. E-sourcing also showed a strong positive influence by promoting transparency and fairness in supplier selection, which directly contributed to better compliance and accountability in contract execution. E-contracting exhibited a moderate impact, hindered by integration challenges and inconsistent documentation practices that reduced its potential for streamlining contract processes. The findings indicate that while e-contracting enhances efficiency, its limited adoption and practical implementation reduce its effectiveness. Finally, e-payment demonstrated a minimal and statistically insignificant influence on overall contract management performance, despite

contributing to financial accuracy and compliance. This suggests that its role is more transactional and requires better integration with other e-procurement tools to achieve significant results. These conclusions highlight the varied impact of e-procurement tools and underscore the need for tailored improvements to maximize their contributions to public contract management performance.

Policy Recommendations

The study recommends that RBC prioritize enhancing e-informing systems by investing in capacity-building programs to improve stakeholder ICT proficiency and addressing technical challenges such as system downtimes. For e-sourcing, RBC should integrate advanced supplier evaluation tools and foster buy-in from all stakeholders to further enhance compliance and equity in procurement. To strengthen e-contracting, greater emphasis should be placed on integrating e-contracting tools with other digital systems and standardizing documentation processes to improve reliability and efficiency. Ensuring regular training and monitoring of e-contracting practices can mitigate the challenges identified. For e-payment, efforts should focus on enhancing its interoperability with other e-procurement tools and addressing implementation barriers to maximize its transactional efficiency and accountability in financial processes.

Suggestions for Further Study

Future research should explore the institutional and technical barriers affecting the integration and effectiveness of e-contracting and e-payment tools. Comparative studies examining the implementation of e-procurement systems in other public institutions can provide a broader understanding of best practices and operational benchmarks. Moreover, longitudinal studies investigating the sustainability and cost-benefit dynamics of e-procurement systems would offer insights into their long-term viability and scalability in enhancing public contract management performance.

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