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Effect of E-Procurement on the Performance of a Wholesale Pharmacy: A Case of KIPHARMA- Rwanda (2018-2022)

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Abstract

The general objective of this study was to assess the effect of e-procurement on the performance of Kipharma- Rwanda. Especially the study examined the effect of the e-tendering on the performance of KIPHARMA-Rwanda, assessed the effect of e-auction on the performance of KIPHARMA-Rwanda, found out the effects of e-purchasing on the performance of KIPHARMA-Rwanda and found out the effects of e-invoicing on the performance of KIPHARMA-Rwanda. This study refers and uses the theories like Stakeholder Theory and Agency theory. For this study, correlation analysis was used. Both quantitative (questionnaire) and qualitative (interview) research techniques were used by researcher in order to collect data (information) related to the objectives of the study. The entire target population of the study who are supposed to provide the information data related to the objectives of the research study was based on employees of Kipharma-Rwanda who are totalized to 97 employees. The researcher has decided to use a census inquiry method instead of sampling due to the relatively small number of individuals in the population. The research relied on questionnaire technique, interview and Documentation technique. Views that were given by the respondents were analyzed through SPSS 23rd version. The R value of 0.922 indicates a strong positive correlation between the predictors (e-invoicing, e-tendering, e-auction, e-purchasing) and the dependent variable. The R Square value of 0.851 signifies that approximately 85.1% of the variability in the performance of KIPHARMA-Rwanda can be explained by the independent variables in the model. For e-tendering ($\beta = 0.297$, $t = 4.252$, $p = 0.000 < 0.05$). Similarly, e-auction shows a positive effect ($\beta = 0.216$, $t = 3.054$, $p = 0.003 < 0.05$). E-purchasing and e-invoicing also have positive effects, contributing to the performance of KIPHARMA-Rwanda, ($\beta = 0.244$, $t = 2.422$, $p = 0.018 < 0.05$) and ($\beta = 0.247$, $t = 2.530$, $p = 0.013 < 0.05$) respectively. These results indicate that the adoption of e-procurement practices, including e-tendering, e-auction, e-purchasing, and e-invoicing, is associated with positive effects on the performance of KIPHARMA-Rwanda. All p-values are statistically significant at $p < 0.05$, reinforcing the strong relationships. KIPHARMA-Rwanda should focus on enhancing skills related to e-tendering processes, ensuring that all stakeholders are well-equipped to leverage the system effectively.

Keywords: *E-procurement, E-tendering, E- invoicing, E-purchasing, E-auction and Performance.*

1.0 Introduction

According to Shkolnyk (2018) the purchasing of goods and services in the health sector is central because it supports all functions of wholesale pharmacies, hospitals, retail pharmacies where each health unit needs supplies and equipment to accomplish its mission. As emphasized by Coulthard and Fleming (2019), one of the most important challenges in health procurement is how to best utilize information technology in an age of communications revolution; even if technological requirements are met and the implementation of e-procurement systems seems feasible, from a managerial point of view adoption has proven to be a challenging venture. Handfield et al. (2019) concludes that despite numerous benefits that can be obtained from adoption of e-procurement, there have been reports of failures of e-Procurement initiatives in a number of health organizations in developed world like in the USA and the UK; the results are even worse in the developing countries.

In various developing economies exclusively in Asia, industrialized firms' forms economic evolution locomotive and has been recognized as main tradable segment in those economies. Conversely, the government of Rwanda has strategically identified the Transport and Logistics sector as one of the key drivers of economic growth, wealth and job creation and critical for within and cross-border trade. The transport sector is a key contributor to Strategic Pillar 1 (Economic Transformation) under (i) NST1 Priority Area 2 which aims at expanding Sustainable Urbanization from 17.3% (2014) to 35% by 2024; as well as (ii) NST1 Priority Area 4 that promotes industrialization and a structural shift in the export base to high-value goods and services to accelerate exports by 17% annually (RDB, 2022).

Despite the attempts by many researchers to establish the linkage between E-procurement and performance in Rwanda, no empirical studies have been done investigating. This therefore creates a gap in literature that such study pursued to fill. Adoption rate of e-procurement in many private as well public procurement systems has been slow and many health organizations tend to overstate the degree to which they are involved in e-procurement. E-procurement adoption involves large investments of time and money and without absolute certainty that its full potential will be achieved every time, there is need to understand the factors that influence its successful adoption.

Wholesale Pharmacies in Rwanda are therefore facing the challenges of adopting e-procurement due to high resistance to change, poor network connectivity, IT infrastructure, capacity building and leadership support challenges, inadequate readiness to implement the e-procurement, unqualified labor due to new system integration and transparency to conduct proper procedure in giving out right contract to suppliers to mention only a few. There is no specific study was done to assess the effects of e-procurement on the performance at Kipharma.

1.1 Research objectives

The general objective of this study was to assess the effect of e-procurement on the performance of wholesale pharmacy. Specifically, the study aimed to:

- i. To examine the effect of the e-tendering on the performance of KIPHARMA-Rwanda.
- ii. To assess the effect of e-auction on the performance of KIPHARMA-Rwanda.
- iii. To find out the effect of e-purchasing on the performance of KIPHARMA-Rwanda.
- iv. To find out the effect of e-invoicing on the performance of KIPHARMA-Rwanda.

1.2 Research hypotheses

The present study adopted the following research hypotheses:

Ha1: There is a positive significant effect of the e-tendering on the performance of KIPHARMA-Rwanda.

Ha2: There is a positive significant effect of e-auction on the performance of KIPHARMA-Rwanda.

Ha3: There is a positive effect of the e-purchasing on the performance of KIPHARMA-Rwanda.

Ha4: There is positive effect of e-invoicing on the performance of KIPHARMA-Rwanda.

2.0 Literature Review

2.1 Theoretical Framework

For this study, theoretical framework is a thorough look at and evaluation of the existing theories and ideas about the topic under study. It is the process of systematically analyzing and putting together information from different sources in order to get a full picture of issue.

2.1.1 Stakeholder Theory

Stakeholder theory was initially developed by R. Edward Freeman. Freeman stated that corporations should not just concentrate on increasing shareholder profit but also on the interests and requirements of other stakeholders. Several researchers and practitioners expanded on the notion of stakeholder theory, such as Thomas Donaldson, who stressed the ethical and moral components of stakeholder theory, and Archie Carroll, who offered a framework of corporate social responsibility that included stakeholder theory (Freeman *et al.*, 2020). Stakeholder theory is a management theory that says a company should take into account the needs and wants of all of its stakeholders, not just those of its owners or shareholders. People who have a stake in a business include employees, customers, suppliers, communities, and even the environment. Stakeholder theory says that when making decisions and coming up with plans, an organization should think about what is best for all of its stakeholders. This indicates that a corporation should not just concentrate on making profits for its shareholders but also on providing value for all of its stakeholders. By doing so, a business may produce long-term value for itself and its stakeholders (Phillips, 2021).

According to Jones (2021), stakeholder theory highlights the need for stakeholder participation and communication. An organization may better meet its stakeholders' interests and establish deeper connections by interacting with them and understanding their wants and concerns. This may lead to increased trust, loyalty, and support from stakeholders. Stakeholder theory is becoming more significant in current business practice as firms acknowledge the value of social responsibility, sustainability, and ethical conduct. Organizations that follow a stakeholder approach may not only achieve financial success but also provide social and environmental value for the communities they serve.

Stakeholder theory emphasizes understanding and managing the relationships to optimize the benefits of e-procurement while considering the diverse interests and concerns of each stakeholder group. For instance, examining how e-procurement implementation affects supplier relationships, employee workflows, customer satisfaction, and compliance with governmental regulations aligns with stakeholder theory.

2.1.2 Agency Theory

Jensen and Meckling put forward the agency theory, highlighting how a company's management, shareholders, and those who provide significant financing often have differing interests. They discussed how these groups' conflicting objectives can create governance issues. The theory delves into how businesses handle interactions when one party (the principal) hires another (the agent) for tasks, as seen in contract management with suppliers. In this setup, the principal hires agents to perform tasks they themselves can't do. The theory suggests that both the principal and the agent act based on their self-interest, which can lead to

conflicts. When the agent prioritizes their interests over the principal's goals, problems arise, leading to potential termination of the relationship (Macho-Stadler & Pérez-Castrillo, 2021).

Loss is unavoidable when the agent goes against the principal. When the loss is serious, the principal terminates the agent relationship. There is no loss in a situation in which the agents act in the best interests of the principal. If agency losses are to be avoided, agents must always act in the best interests of their principals (David, 2023). Agency theory in the context of studying the effect of e-procurement on the performance of Kipharma-Rwanda, focuses on the relationships and conflicts that arise when one party (the principal) delegates tasks to another (the agent) and how these dynamics influence overall performance.

3.0 Research Methodology

The study adopted both census inquiry and correlation design in order to collect and interpret data. Therefore, both quantitative (questionnaire) and qualitative (interview) research techniques were used by the researcher in order to collect data (information) related to the objectives of the study and for data analysis.

The entire target population of the study who were supposed to provide the information data related to the objectives of the research study was based on employees of Kipharma -Rwanda who are totalized to 97 employees: Finance department, Procurement, Top management, IT department, Distribution, Supply chain department, Accountants, Logistics, Sales department, and Pharmacist. The researcher has decided to use a census inquiry method instead of sampling due to the relatively small number of individuals in the population. With this method, researcher aimed to collect data from every single individual or unit within that population, without selecting a subset through sampling. By doing so, researcher expected to gain an accurate and comprehensive understanding of the entire group under investigation.

Both primary and secondary data sources were utilized, with primary data collected through questionnaires and key informant interviews. Secondary data were obtained through a documentary review process. The research instruments were tested for validity and reliability. Questionnaires, as a primary data collection method, were designed to align with the research objectives, utilizing a mix of close-ended and open-ended questions, primarily based on a Likert scale. Documentary review supplemented the primary data collection process, enhancing the depth of information acquired. For reliability, the Cronbach's alpha values for various variables were calculated, all surpassing the acceptable threshold of 0.7, indicating strong internal consistency. Editing, coding, and tabulation processes were employed to ensure data quality, consistency, and organization.

Data analysis involved Statistical Package for Social Science (SPSS V 21.0) for quantitative analysis. Descriptive statistics like frequencies, percentages, mean scores, and standard deviation were employed. Inferential statistics, including Pearson correlation analysis and multiple regression analysis, were conducted to establish relationships between E-procurement and performance of wholesale pharmacy. Ethical considerations were a priority, ensuring confidentiality by avoiding the disclosure of respondents' identities and maintaining strict confidentiality of sensitive information throughout the study

4.0 Findings

This section shows the findings of this research by presenting it from analysis. Where this is required, interpretations are provided after each table, always taking into consideration the initial research questions. This section thus establishes the ground up on the research questions were answered before drawing conclusion. The analysis was made on the responses obtained from 92 KIPHARMA employees.

Correlation analysis Results

The correlation matrix presented below provides valuable insights into the complex interrelationships among e-tendering, e-auction, e-purchasing, e-invoicing and performance. This matrix quantifies both the strength and direction of the connections between these crucial variables, offering a clearer understanding of their interconnected nature.

Table 1: Correlations Matrix

		e-tendering	e-auction	e-purchasing	e-invoicing	performance
e-tendering	Pearson Correlation	1	.777**	.687**	.648**	.817**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	86	86	86	86	86
e-auction	Pearson Correlation	.777**	1	.695**	.654**	.802**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	86	86	86	86	86
e-purchasing	Pearson Correlation	.687**	.695**	1	.900**	.846**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	86	86	86	86	86
e-invoicing	Pearson Correlation	.648**	.654**	.900**	1	.824**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	86	86	86	86	86
performance	Pearson Correlation	.817**	.802**	.846**	.824**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	86	86	86	86	86

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

Source: Field data, November 2023

The correlation matrix in Table 1 presents strong positive relationships between each e-procurement practice (e-tendering, e-auction, e-purchasing, and e-invoicing) and Performance. Specifically, e-tendering exhibits a strong positive relationship ($r = 0.817, p=0.000 < 0.05$), implying that increased utilization of e-tendering is linked with improved performance of KIPHARMA-Rwanda. Similarly, e-auction demonstrates a strong positive relationship ($r = 0.802, p=0.000 < 0.05$), signifying that enhanced engagement in e-auction is associated with higher levels performance of KIPHARMA-Rwanda. E-purchasing displays a notably strong positive relationship ($r = 0.846, p=0.000 < 0.05$), indicating that greater involvement in e-purchasing practices corresponds to heightened performance of KIPHARMA-Rwanda. Likewise, e-invoicing shows a strong positive relationship ($r = 0.824, p=0.000 < 0.05$), indicating that increased adoption of e-invoicing is linked with improved performance of KIPHARMA-Rwanda. The low p-values indicate that the observed associations are unlikely to have occurred by chance.

The findings are in accordance with the emphasis of Khanna and Pruthi (2019) on the transformative nature of e-procurement. The study's results, demonstrating strong positive relationships between various e-procurement practices and organizational performance, align with the authors' focus on leveraging internet-based technologies to automate procurement tasks, enhance operational efficiency, reduce errors, and improve transparency in the procurement workflow. The findings indicate the positive impact of these e-procurement

practices on overall organizational effectiveness, emphasizing their role in contributing to heightened performance levels.

Regression Analysis

The study also wanted to establish the relationship between e-procurement and performance of wholesale pharmacy. Multiple regression analysis was used to identify the coefficient of model, the analysis of variance (ANOVA) of the model, The section also presents the coefficient of determination.

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.922 ^a	.851	.843	.25843

a. Predictors: (Constant), e-invoicing, e-tendering, e-auction, e-purchasing

Source: Field data, November 2023

Table 2 presents the Model Summary for the regression analysis. The R value of 0.922 indicates a strong positive correlation between the predictors (e-invoicing, e-tendering, e-auction, e-purchasing) and the dependent variable (Performance of KIPHARMA-Rwanda). The R Square value of 0.851 signifies that approximately 85.1% of the variability in the performance of KIPHARMA-Rwanda can be explained by the independent variables in the model.

The findings align with the emphasis of Anupindi and Goel (2018) on the transformative nature of e-procurement. Their focus on the digital evolution of traditional procurement practices through internet-based platforms aligns with the results presented. The positive correlation between e-procurement elements and the performance of KIPHARMA-Rwanda, as indicated by the regression analysis, supports the notion that adopting e-procurement systems optimizes procurement operations, reduces errors, and enhances collaboration with suppliers.

Table 3: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	30.825	4	7.706	115.017	.000 ^b
	Residual	5.410	81	.067		
	Total	36.235	85			

a. Dependent Variable: performance
 b. Predictors: (Constant), e-invoicing, e-tendering, e-auction, e-purchasing

Source: Field data, November 2023

The Analysis of Variance (ANOVA) results in Table 3 indicates a highly significant F-statistic of 115.017 (p = 0.000). The F-statistic assess the overall significance of the regression model, testing whether there is a significant difference between the model with predictors (e-invoicing, e-tendering, e-auction, e-purchasing) and the performance of KIPHARMA-Rwanda. In this case, the small p-value (p = 0.000 < 0.05) associated with the F-statistic indicates that the predictors jointly have a significant impact on explaining the variance in the dependent variable (The performance of KIPHARMA-Rwanda).

The findings are supported by the emphasis of Ferreira and Santos (2020) on the transformative impact of e-procurement. Their focus on cost reduction, operational efficiency, and increased transparency aligns with the study's results, which shows a highly significant impact of e-invoicing, e-tendering, e-auction, and e-purchasing on KIPHARMA-Rwanda's performance. This correlation indicates the significance of e-procurement in achieving organizational

objectives and validates the importance of modern technology in streamlining procurement activities.

Table 4: Coefficients

Model	Unstandardized Coefficients		Standardized	t	Sig.	
	B	Std. Error	Coefficients			
	(Constant)	.122	.163		.748	.457
1	e-tendering	.297	.070	.307	4.252	.000
	e-auction	.216	.071	.223	3.054	.003
	e-purchasing	.244	.101	.255	2.422	.018
	e-invoicing	.247	.098	.250	2.530	.013

a. Dependent Variable: performance

Source: Field data, November 2023

The adopted model presented as follow:

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \epsilon$$

Therefore, The performance of KIPHARMA-Rwanda = 0.122 + 0.297 × e-tendering + 0.216 × e-auction + 0.244 × e-purchasing + 0.247 × e-invoicing + 0.163

Table 4 presents the coefficients for the regression model predicting Organizational Performance based on the predictors e-tendering, e-auction, e-purchasing, and e-invoicing. The constant term has an unstandardized coefficient (B) of 0.122 with a standard error of 0.163 ($p = 0.457 > 0.05$). Moving to the predictors, each of them demonstrates statistically significant relationships with Organizational Performance. Specifically, for every one-unit increase in e-tendering, there is a 0.297 unit increase in the performance of KIPHARMA-Rwanda ($p = 0.000 < 0.05$). Similarly, e-auction shows a positive effect, with a 0.216 unit increase in the performance of KIPHARMA-Rwanda for every one-unit increase in e-auction ($p = 0.003 < 0.05$). E-purchasing and e-invoicing also have positive effects, contributing to the performance of KIPHARMA-Rwanda, with unstandardized coefficients of 0.244 ($p = 0.018 < 0.05$) and 0.247 ($p = 0.013 < 0.05$) respectively. These findings indicate that all the predictors significantly contribute to predicting and positively influencing the performance of KIPHARMA-Rwanda in the context of the regression model.

The t-values indicate the strength and significance of the relationship between each predictor variable (e-tendering, e-auction, e-purchasing, and e-invoicing) and the dependent variable (Organizational performance). For e-tendering, the t-value of 4.252 signifies a strong relationship, indicating that e-tendering has a significant impact on the performance of KIPHARMA-Rwanda. Similarly, e-auction has a t-value of 3.054, denoting a moderately strong relationship. E-purchasing and e-invoicing also exhibit meaningful relationships, with t-values of 2.422 and 2.530, respectively. These results indicate that the adoption of e-procurement practices, including e-tendering, e-auction, e-purchasing, and e-invoicing, is associated with positive effects on the performance of KIPHARMA-Rwanda. All p-values are statistically significant at $p < 0.05$, reinforcing the strong relationships.

The findings align with the emphasis of Roy and Behl (2019) on the transformative nature of e-procurement. The study's results, particularly the coefficients for e-tendering, e-auction, e-purchasing, and e-invoicing, confirm that e-procurement significantly contributes to and positively influences organizational performance. Their idea of e-procurement as a game-changer for efficiency, cost reduction, and data-driven decision-making aligns with the positive outcomes seen in the KIPHARMA-Rwanda regression model.

5.0 Conclusion

The general objective of this study was to assess the effect of e-procurement on the performance of Kipharma- Rwanda. Specifically, the study guided by the following objectives: To examine the effect of the e-tendering on the performance of KIPHARMA-Rwanda, assess the effect of e-auction on the performance of KIPHARMA-Rwanda, find out the effect of e-purchasing on the performance of KIPHARMA-Rwanda, and find out the effect of e-invoicing on the performance of KIPHARMA-Rwanda. The findings from hypothesis testing presented positive and statistically significant effects of various e-procurement practices on the performance of KIPHARMA-Rwanda. Firstly, the hypothesis (Ha1) proposing a positive significant effect of e-tendering on organizational performance is supported with a p-value of 0.000, clearly below the significance threshold. Similarly, the hypothesis (Ha2) regarding the positive impact of e-auction on performance is supported, with a p-value of 0.003. Additionally, Ha3, asserting a positive effect of e-purchasing on performance, is accepted with a p-value of 0.018. Finally, Ha4, indicating a positive effect of e-invoicing, is supported with a p-value of 0.013. Therefore, all hypotheses are accepted, collectively highlighting the beneficial influence of e-tendering, e-auction, e-purchasing, and e-invoicing on enhancing the performance of KIPHARMA-Rwanda.

6.0 Recommendations

In the data analysis and interpretation as shown in above discussion, the study sought to come up with the following recommendations in line with the research objectives as given below. KIPHARMA-Rwanda should focus on enhancing skills related to e-tendering processes, ensuring that all stakeholders are well-equipped to leverage the system effectively. Also, KIPHARMA-Rwanda should establish a strong communication mechanism regarding e-tendering. This involves regular forums, feedback sessions, and surveys to understand the diverse perspectives of stakeholders. Additionally, KIPHARMA-Rwanda should prioritize ongoing training and support for users. Furthermore, KIPHARMA-Rwanda is recommended to establish a strong monitoring and evaluation system for e-auctioning. KIPHARMA-Rwanda should focus on strengthening collaboration with vendors. Moreover, KIPHARMA-Rwanda should examine advanced information flow systems within its e-purchasing framework. KIPHARMA-Rwanda should establish efficient and timely communication channels with relevant stakeholders. Lastly, KIPHARMA-Rwanda is recommended to conduct regular training sessions on invoice accuracy. This includes educating staff on best practices, potential pitfalls, and the importance of precise invoicing.

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