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FIRM'S ICT INFRASTRUCTURE AND PERFORMANCE OF PROCUREMENT PROCESS OF MEDICAL SUPPLIES AMONG PUBLIC LEVEL FIVE HOSPITALS IN UPPER EASTERN REGION, KENYA.

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ABSTRACT

The majority of Kenyan hospitals are encountering challenges such medical stock-out, poor infrastructure, less qualified personnel, outdated equipment, lesser use of ICT, poor health infrastructure, poor leadership and governance. This research explored the impact of the ICT infrastructure on the performance of the procurement process of medical supplies in the public level five hospitals in the upper eastern region, Kenya. It was founded on the resource-based view theory (RBV) theory. The research employed a correlation research design and the quantitative approach. The study population was 30 stakeholders who are prominent in procurement activities in the respective six level five hospitals in the Upper Eastern region. The research employed primary data which was gathered by drop and pick methodology using structured questionnaire. The analysis was performed with Python 3.12.7. The analysis involved the use of both descriptive and inferential statistics in which statistics such as mean percentage frequency and standard deviation were adopted in preliminary analysis and t-test and F-test in hypothesis

testing at 5% level of significance. The analysis employed a regression analysis and diagnostic tests which covered normality tests and heteroscedasticity tests conducted. Findings were summarized in tables and figures. The findings revealed that ICT infrastructure had a statistically significant positive impact on performance of procurement process of medical supplies in the public level five hospitals in Upper Eastern Region Kenya. This study recommended optimizing ICT infrastructure in the hospital procurement processes and standardization of hospitals. The findings of this study implies that the government should increase resources for optimizing ICT infrastructure in public level 5 hospitals to improve the performance of procurement process. The findings of this study would be useful to the public and the private sponsors of medical supplies in the public hospitals, suppliers of medical facilities within the public health sector, and ultimately the users of the health supplies indirectly.

Key Words: **Firm ICT Infrastructure, Resource-Based View Theory, Performance of Procurement Process, Medical Supplies, E-procurement, Public Hospitals.**

1.0 INTRODUCTION

Globally, most governments rely on public procurement systems to convert budgets into important services, mainly in health, education, and infrastructure. The role of procurement is significant for the economic development of the world as well as of countries (Changalima et al., 2021). As reported by the World Health Organization (WHO), health care systems in every region face numerous challenges which vary across different regions (WHO, 2019). According to WHO (2019) these challenges results in poor procurement outcomes that have hindered the proper delivery of health services.

The integration of digital tools such as the integrated financial management information systems (IFMIS) and E-procurement has revolutionized procurement processes globally by enhancing transparency, accountability, and operational efficiency (Celestin & Sujatha, 2024). In the healthcare sector, the IFMIS has majorly been attributed in major functions like, budgeting, accounting, procurement, payments and reporting. These systems have proven essential for streamlining procurement workflows, reducing supplier lead times, and minimizing errors, which are critical for ensuring the timely availability of medical supplies (García-Altés et al., 2023). Atiende and Ndolo (2025) demonstrated that IFMIS and E-procurement adoption by the Kenyan government aimed at correcting some persistent inefficiencies in public procurement. According to Zeng et al. (2022), service delivery in public hospitals has been compromised due to loss of money through scandals. Despite the advancements made so far, there could be still inadequate ICT infrastructure still hindering the effective implementation and utilization of these systems in public hospitals. It is, therefore, important to explore how such tools can be optimized in the procurement of medical supplies to better healthcare.

One of the priorities of any particular government, be it national or county, is provision of quality public health supplies and services. First of all, medical supplies and services are lifesaving, and they cannot be considered like ordinary commercial services and products. According to a report by KHF (2024), more than half of the Kenyan public hospitals indicated a lack of essential medical supplies and drugs. MOH (2021) reports that one out of every

three medical equipment in the public hospitals of Kenya is either in poor condition or non-functional, causing major delays in medical care services for patients. Public hospitals are facing inefficiencies in procurement processes mainly due manual procurement processes, contributing to delays and wastage in public hospitals (Office of the Auditor General, 2024). This problem has resulted to serious suffering with referring patients to private hospitals both domestically and abroad which in return increases the rate of poverty as a result of financial constraints. The ailing public health sector being governed by county governments still remains unable to satisfy even the most basic health care needs for Kenyans. This trend is worrying since it falls short of the country's priority of ensuring enough public health supplies and services and it hinders the government from achieving the Universal Health Coverage and Sustainable Development Goal (SDG3). Upper Eastern region of Kenya has a higher proportion of health facilities that are classified as "under-resourced" compared to more urbanized areas of Kenya (Ministry of Health, 2020). Furthermore, over 50% of public health facilities in the Upper Eastern region experiences shortages of essential medical supplies and drugs (KHF, 2024). Previous studies, such as Nani and Ali (2020), Hassan (2019), Changalima and Mdee (2023), and Kebhe (2019) on internal factors that affect procurement process have focused on other areas, and have neglected the issue of public hospitals. Moreover, it is unclear on how this has influenced the procurement performance of medical suppliers in public hospitals. The study focused on ICT infrastructure and its influence on the performance of procurement process of medical supplies among the public level five hospitals in Upper Eastern region, Kenya.

2.0 OBJECTIVE AND HYPOTHESIS

The objective of this study was to determine the influence of ICT infrastructure on the performance of procurement process of medical supplies among the public level five hospitals in Upper Eastern region, Kenya. The following null hypothesis was tested **Ho_1**.

Ho_1: ICT infrastructure has no statistically significant effect on performance of procurement process of medical supplies among public level five hospitals in the Upper Eastern Region, Kenya.

3.0 LITERATURE REVIEW

This study was anchored by Resource based view theory (RBV) which was first introduced by Wernefelt (1984) and later advanced by Barney (1991), gaining prominence in the 1980s. The theory posits that a firm's competitive advantage stems from its internal resources – specifically that are valuable, rare, inimitable, and non-substitutable (Walker & Brammer 2003). Since procurement is a core organizational function responsible for acquiring essential resources in the right quantities and at the right time, RBV provides a useful lens for understanding how an organization's resources influence its procurement processes and practices. Procurement of medical supplies always involve various stakeholders and business to business approaches. The application of technology in procurement mostly is critical in conducting E-Procurement. The advancement of new technologies such as procurement ICT

infrastructure in the public organizations has been of greatly importance in interacting with various vendors both regionally, national and globally. This theory's relevance includes assertion that critical resources such as technology, human, and finances could give a firm strategic advantage (Karim et al., 2022; Walker & Brammer 2012). Resource Based theory therefore is relevant to the study because it explains the importance of utilizing ICT resources to ensure procurement process of medical supplies among public level five hospitals is well integrated across all departments to ensure its effectiveness.

The RBV theory has two major underlying assumptions relevant to this study. First, the theory could explain how a firm-based resources could help in generating sustainable competitive advantage by assuming the resources are responsible for the results. Second, the RBV theory claims can explain why some organizations continuously outperform peers in the same industry through gaining a higher competitiveness. Despite being widely used, RBV has been criticized. One of the main issues is that it is regarded as tautological, which means that it runs the risk of employing circular reasoning to explain results. Critics contend that it can be challenging to determine which resource combinations actually offer a distinct competitive advantage because different combinations of resources can produce comparable levels of value creation (Priem & Butler, 2001).

Empirically, Nani and Ali (2020) carried out research in Indonesia to explore what makes e-procurement effective within local government procurement service entities (LGPSE). From a randomly chosen sample of 96 entities, they gathered data using questionnaires that reached 289 respondents, including managers and ICT specialists, and achieved a 33% response rate. The analysis, conducted through partial least squares (PLS) at a 5% significance level, showed that strong ICT systems significantly improve efficiency and effectiveness in government procurement. While their study focused on ICT and other factors, the present research examines ICT as a single factor, providing a more focused comprehensive understanding of procurement performance.

Hallikas et al. (2021) examined the impact of data analytics on supply chain performances in Finland in their research on digitizing procurement. Using a conceptual model and hypothesis, the study carried out empirical testing. Data from the industry was gathered through a survey method and then subjected to a structural equation model. The study's conclusions showed a strong and favorable correlation between procurement performance, data analytics capabilities, and digital procurement capabilities. The current study focuses on public hospitals, whereas the previous study concentrated on private businesses. As a result, the procurement goals and the research design used differ.

Evangelista and Hallikas (2022) employed research survey design involving 131 firms to identify the impacts of ICT supply chain management sustainability in Finland. The conclusions of the study revealed that operational and tactical procurement systems made a significant and positive contribution to the sustainability of supply chain

management. In addition, the practices that aimed at promoting sustainable procurement process positively influenced supply chain management performance. The present study however paid attention to the context of Kenya, having different laws and regulations governing procurement than Finland and hence; the context of this study is different. Moreover, the present research utilized a correlational research design, unlike the prior research, which involved a research survey design.

In Tanzania, Marunda (2020) examined what drives performance of procurement processing public institutions, focusing on the Arusha Water Supply and Sanitation Authority (AUWSA). The study found that proper use of ICT infrastructure, particularly e-procurement systems, had a positive effect on procurement outcomes. In a related study, Lesso (2023) surveyed council managers in the Arusha region and reported that effective procurement depends on proper planning, adequate resource allocation, strong ICT systems, and adherence to ethical standards. The two studies highlight the role of technology and management practices in enhancing procurement in Tanzanian state institutions. The present study however, unlike these works examines the selected internal factors that affect the procurement of the medical supplies in the public hospitals in the Upper Eastern region of Kenya, where there is a different institutional and geographical setting.

The study by Muriuki (2021) explored the impact of ICT on state corporations on performance of procurement process in the energy industry of Kenya using a mixed-method design, which combined quantitative SPSS tools with qualitative analysis of content. The results showed that performance of procurement process was strongly positively correlated with ICT adoption. The present research is conducted on the basis of the purchasing of medical supplies by the public hospitals, as compared to the previous research that was conducted on the state corporations in the energy industry. Moreover, the present research employed a quantitative correlational design, which emphasizes a contrasting methodological focus as compared to the mixed-method design adopted by Muriuki (2021).

4.0 CONCEPTUAL FRAMEWORK

A diagrammatic representation of the variables relationship constitutes the conceptual framework. The conceptual framework for the current study is presented in figure 1.

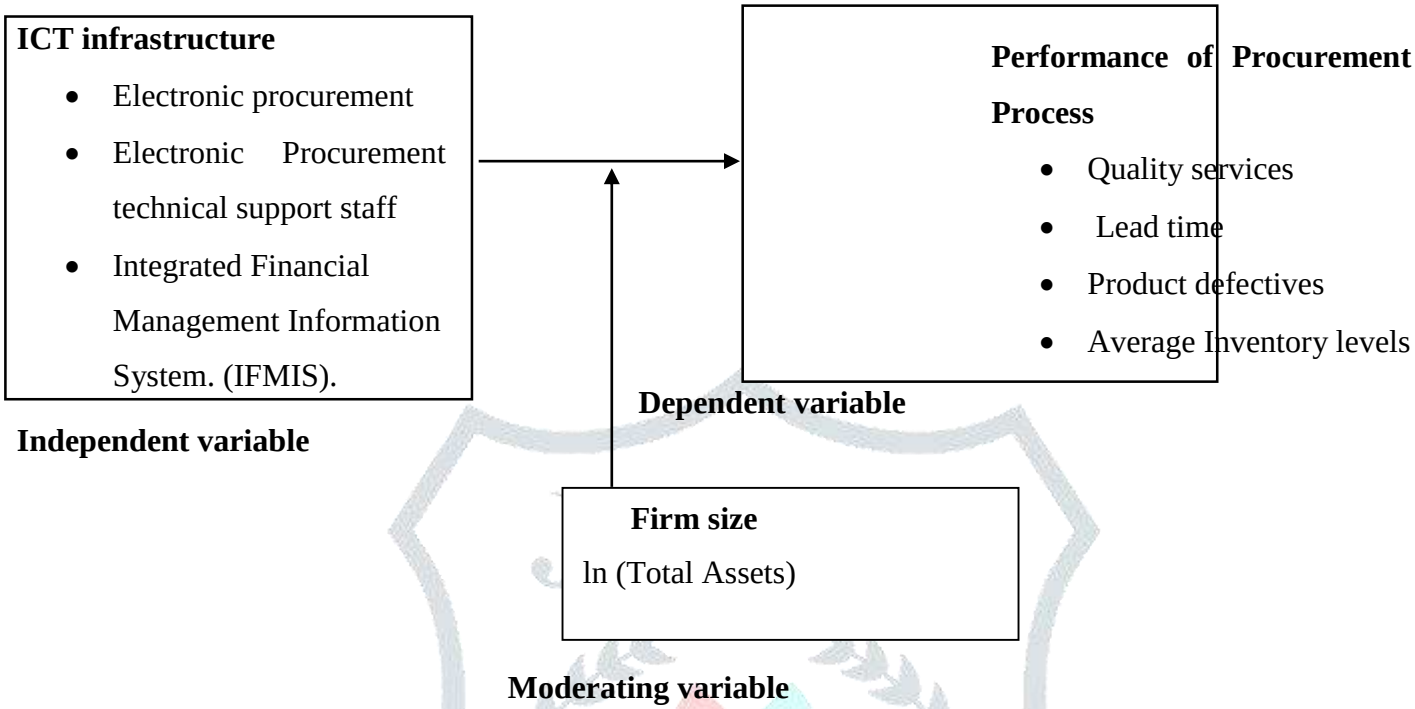

Figure 1 : Conceptual Framework

Source: Researcher 2025

The conceptual framework shows the relationship between the dependent and independent variables. The performance of procurement process is expected to be enhanced by highly usage of ICT infrastructure. It is an investment that supports E-procurement systems and IFMIS that enhances proved by the ICT infrastructure. It is an investment that supports E-procurement systems and IFMIS that enhances workflow in procurement, and boosts e-sourcing, e-tendering, and e-payments.

5.0 METHODOLOGY

In this study, correlational research design was used. As Creswell and Creswell (2018) explain, correlational designs are useful in examining the relationships between variables, which aligned with the study's aim of exploring how internal organizational factors influence performance of procurement process. The study was conducted in Upper Eastern region of Kenya in particular Embu level five hospital, Chuka Referral Hospital, Meru Teaching and Referral Hospital, Isiolo level Five Hospital, Marsabit level Five Hospital and Samburu level five hospital. The target population of the study constituted of 30 key employees from six level five hospitals in Upper Eastern region of Kenya who play significant procurement roles in their respective institutions. Census sampling method was preferred for the study since the population is small and the data collection could cover a complete population providing more exact and accurate information because there is no unit left out

Table 1: Sample Size

No	Specialization	Population Size						
		Chuka Level 5 Hospital	Embu Level 5 Hospital	Meru Level 5 Hospital	Isiolo Level 5 Hospital	Marsabit Level 5 Hospital	Samburu level 5 hospital	**TOTAL**
1	County Pharmacist	1	1	1	1	1	1	**6**
2	County Procurement Officer	1	1	1	1	1	1	**6**
3	Medical Superintendent	1	1	1	1	1	1	**6**
4	Chief Officer of Medical Services	1	1	1	1	1	1	**6**
5	Supply Chain Manager	1	1	1	1	1	1	**6**
	TOTAL	**5**	**5**	**5**	**5**	**5**	**5**	**30**

Source: Researcher, 2025

The main instrument that was used for data collection for this study was a closed ended structured questionnaire which was pretested prior to the collection of data to ensure validity and reliability. The analysis was performed using Python 3.12.7 open-source software in Jupyter notebook environment. This research embraced a linear regression model to determine the impact of ICT infrastructure on the performance of procurement process of medical supplies in the public hospitals within the Upper Eastern region of Kenya. The following model was used in data analysis.

Objectives 1: Model 1: $Y = \beta_0 + \beta X_i + \varepsilon$ …… (i)

Where:

Y = Performance of Procurement Process.

β_0 = the intercept term representing the value of procurement performance when ICT infrastructure is zero

β = Coefficients of ICT infrastructure.

X_i = ICT infrastructure

E = Error Term

This study conducted linear regression diagnostic tests that included normality tests and heteroscedasticity tests. This study utilized Q-Q Plot (quantile-quantile plot) of residuals to assess the normality and considered heteroscedasticity test to assess if the regression model had constant or inequality of residuals of each observed data by conducting Breusch-Pagan Test. This study was approved by Tharaka University Ethical Review Committee for following ethical guidelines in research and acquired NACOSTI permit before the study was conducted.

6.0 RESULTS AND DISCUSSIONS

The current study examined the correlation between the effect of the firm's ICT infrastructure and performance of the procurement process of medical supplies in t public level five hospitals in the Upper Eastern Region of Kenya.

Table 2: Response Rate

Hospital	Target Sample	Actual Response	Percentage (%)
Chuka	5	3	60.0
Embu	5	5	100.0
Isiolo	5	5	100.0
Marsabit	5	3	60.0
Meru	5	5	100.0
Samburu	5	4	80.0
Total	30	25	83.33

Source: Researcher, 2025

Table 5 shows distribution of how the responses were obtained. A response rate of 70 was utilized which was considered optimal for valid conclusions. This study had 83.33% response rate that was considered optimal to give valid conclusions. Descriptive statistics were calculated to provide a description of the study's central tendency and dispersion of the key variables: independent variables (ICT Infrastructure), dependent variable (Procurement Performance), and moderating variable (Firm Size.) The number, average, standard deviation, minimum and maximum for each construct are provided in Table 3.

Table 3: Descriptive Statistics for Main Study Variable

Variable	Count	Mean	Std	Min	Max
ICT Infrastructure	25.0	3.707	0.449	2.667	4.500
Performance	25.0	3.800	0.714	2.500	4.500

Table 3 shows that ICT Infrastructure had 3.71 (SD = 0.45) which reflects overall agreement of the respondents with ICT-related items. Range was between 2.67 to 4.50. Frequency table was used to illustrate distribution of responses as presented in Table 12.

Correlation between dependent and independent variables was calculated using Pearson's Product Moment Correlation coefficient. A coefficient + 1 means perfect positive relationship between variables, -1 means perfect negative relationship between variables, and 0 means no relationship. The correlation results are presented in Table 4.

Table 4: Correlation Matrix of Study Variables
Correlation Matrix with p-values

	Procurement Performance	**ICT infrastructure**
Procurement Performance	R = 1.000 p = <0.001 N = 25	
ICT infrastructure	R = 0.448* p = 0.025 N =25	R = 1.000 p = <0.001 N =25

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

Table 4 shows correlation matrix indicating statistically significant positive relationships between the independent variable. The ICT infrastructure, was found to be moderately, statistically associated with performance of procurement process ($r = 0.448$, $p < 0.025$). Ideally, it would mean that an enabling influence of ICT infrastructure is crucial in improving procurement performance. This study aimed to assess how a firm's ICT infrastructure affects the performance of the procurement process of medical supplies in public level five hospitals in the Upper Eastern region of Kenya. A linear regression model was adopted. The study hypothesized no significant influence of the existed. The sub constructs of ICT infrastructure as obtained from the literature review included: e-procurement, e-procurement technical support staff and Integrated financial management information system (IFMIS). To analyze this objective, the following null hypothesis **Ho_1** was tested.

Ho_1: ICT infrastructure has no statistically significant effect on performance of procurement process of medical supplies among public level five hospitals in the Upper Eastern Region, Kenya.

The results of the linear regression model for ICT infrastructure and procurement performance are presented on Table 5.

Table 5: ICT Infrastructure and Performance of Procurement Process.

Metric	Value
Dependent Variable	Procurement Performance
Independent Variable	ICT infrastructure
R-squared	0.200
Adjusted R-squared	0.166
F-statistic (p-value)	5.764 (p = 0.025)
Coefficient (β)	0.712
Std. Error	0.296
t-value	2.401
p-value	0.025
95% CI	[0.098, 1.325]
Intercept	1.163
Durbin-Watson	1.725

From Table 5, the model yielded an R-squared value of 0.200, indicating that ICT infrastructure accounted for 20.0% of the variance in procurement performance. The adjusted R-squared was 0.166, suggesting that even after adjusting for sample size, ICT infrastructure still explained a significant proportion of the variability in procurement performance. This shows a moderate explanatory power of the model. The overall regression model was statistically significant with an F-statistic of 5.764 and a corresponding p-value of 0.025 ($p < 0.05$). This implies that the model reliably predicts procurement performance and that ICT infrastructure is a meaningful predictor.

The coefficient for ICT infrastructure was $\beta = 0.712$, with a t-value of 2.401 and a p-value of 0.025< 0.05, indicating positive statistical significance at the 5% level. This implies that improvement in ICT infrastructure enhances performance of procurement process in hospitals. One-unit increase in ICT infrastructure causes procurement performance to increase by approximately 0.712 units, holding other factors constant. Therefore, the estimated model predicting performance of procurement process in public level 5 hospitals, using ICT infrastructure as independent variable is as follows:

$Y= 1.163 + 0.712X_1$

Where: Y = Performance of procurement process (dependent variable)

X_1 = ICT infrastructure (independent variable)

1.163 = the intercept term representing the value of procurement performance when ICT infrastructure is zero.

0.712 = Coefficient of ICT infrastructure

The results can be explained in a number of ways in relation to the practical implications, theoretical review and empirical review of related studies. The Resource-Based View (RBV) theory was supported by the positive impact of ICT infrastructure on level five hospitals' procurement performance. Primarily, RBV asserts that distinctive and strategically valuable resources, like cutting-edge ICT systems, give businesses a sustained competitive edge and increase productivity (Karim et al., 2022; Walker & Brammer 2012). ICT tools in procurement improve supply chain processes' timeliness, accuracy, and transparency while lowering mistakes and delays. The findings show that hospitals with strong ICT systems are better equipped to optimize procurement processes, proving that technology investment not only supports but also strategically facilitates procurement excellence.

The current study findings also support some empirical results from other scholars. For instance, these findings align with those of Nani and Ali (2020), Hallikas et al. (2021), Evangelista and Hallikas (2022), Mabhodha and Choga (2021), Kebhe (2019), Muriuki (2021), and Matano et al. (2020) who found ICT infrastructure positively influenced procurement function in private and public institutions. These studies emphasize the critical role that ICT infrastructure plays in enhancing speed and transparency in procurement function of any organization.

Mabhodha and Choga (2021) posit that ICT adoption simplifies procurement and spills over to other areas of operation, whereas Kebhe (2019) established that ICT infrastructure enhances procurement practice in Tanzanian government institutions. In Kenya, Muriuki (2021) established that ICT infrastructure has the effect of greatly enhancing the performance of energy sector state corporations' procurement. Similarly, Matano et al. (2020) noted that the use of e-procurement, specifically e-tendering, facilitated time saving and increased transparency in procurement. Evangelista and Hallikas (2022), through a study of companies with headquarters in Finland, concluded that ICT infrastructure supported sustainability practices and contribute to purchasing performance in a positive way. Likewise, Hallikas et al. (2021) found that digital procurement capabilities mediate supply chain performance improvement, and this proves the strategic benefit of ICT systems. While the current study's multivariate analysis revealed ICT infrastructure had an insignificant beta coefficient when adjusting for leadership and staff competence, its bivariate significance and theoretical basis in previous studies confirm ICT remains a key facilitator of procurement efficiency and transparency.

7.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

The objective of this study was to determine the influence of the firm’s ICT infrastructure on the performance of the procurement process of medical supplies among public level five hospitals in Upper Eastern region of Kenya. The findings from the objective revealed that ICT infrastructure positively and significantly influences procurement performance among public level five hospitals in the Upper Eastern Region of Kenya. This means that adoption of

e-procurement systems, availability of technical support, regular ICT training, and effective IFMS are important drivers of improved procurement processes. Therefore, the null hypothesis (Ho_1) was rejected. In line with the study objective findings, this study recommends public level 5 hospitals management and county governments should increase investment in ICT infrastructure by upgrading e-procurement systems, training staff on emerging digital tools, and providing consistent technical support to improve procurement efficiency and transparency. Future studies could benefit from investigating external environmental factors unlike this study that focused on firms' ICT infrastructure and performance of procurement process of medical supplies

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