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# DETERMINANTS OF MEDICAL EQUIPMENT AND SUPPLIES AVAILABILITY IN TANZANIA: THE ROLE OF PROCUREMENT AND SUPPLY CHAIN MANAGEMENT A CASE OF KABANGA REFERRAL HOSPITAL IN KIGOMA REGION

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**ABSTRACT**

The study assessed the determinants of medical equipment and supplies availability by examining the effects of organizational, technological, and environmental factors. A case study research design was employed at Kabanga Referral Hospital. The study targeted 100 participants, and 100 respondents successfully completed the questionnaire. Purposive sampling was used to select participants. Data were collected through questionnaires and interviews. Qualitative data were analyzed using content analysis, while quantitative data were analyzed using descriptive statistics and multiple regression analysis.

Findings for the first objective indicated that organizational factors had a positive and statistically significant relationship with the availability of medical equipment and supplies ($\beta = 0.821$, $p = 0.000$). For the second objective, results showed that technological factors also had a positive and statistically significant relationship with the availability of medical equipment and supplies ($\beta = 0.547$, $p = 0.001$). Regarding the third objective, environmental factors were found to have a positive and statistically significant relationship with the availability of medical equipment and supplies ($\beta = 0.691$, $p = 0.000$).

The study concluded that organizational, technological, and environmental factors collectively determine the availability of medical equipment and supplies in regional hospitals. Strong organizational structures, effective management, clear roles and responsibilities, adequate staffing, and appropriate use of technology enhance procurement efficiency, ensure timely delivery, and improve the overall availability of resources for health service delivery. The study recommends that the government should invest in health infrastructure and reliable electricity supply to support timely delivery and proper storage of medical equipment and supplies. In addition, health sector facilities should strengthen internal management systems, build staff capacity, and adopt appropriate technologies to improve procurement and distribution efficiency.

**KEY WORDS:** Procurement, Supply chain management, Organizational factors, Technological factors, Environmental factors, public hospitals

## 1. INTRODUCTION

The availability of medical equipment and supplies is a critical component of healthcare service delivery worldwide. In developed nations, procurement and supply chain management systems for medical equipment and supplies are highly advanced, ensuring minimal stock outs and efficient distribution to healthcare facilities (WHO, 2022). Countries such as the United States, Germany, and Japan have well-established procurement frameworks that leverage digital supply chain solutions, predictive analytics, and strategic supplier partnerships to enhance medical supply availability (Johnson & Patel, 2021). These nations have also integrated automated inventory management and real-time tracking systems, significantly reducing delays and inefficiencies in the medical supply chain (Smith et al., 2023). Despite these advancements, developing countries continue to struggle with procurement inefficiencies that hinder the consistent availability of essential medical supplies. In Africa, the mean availability of essential medicines and equipment in public health facilities is significantly lower than in private facilities, largely due to fragmented procurement systems, limited funding, and weak regulatory frameworks (WHO, 2021). Many countries in sub-Saharan Africa, including Kenya, Nigeria, and Uganda, face persistent challenges related to procurement delays, supplier inefficiencies, and logistical

constraints that contribute to frequent stockouts (Mwangi et al., 2022). These challenges are exacerbated by over-reliance on donor funding and centralized procurement models that fail to address local supply chain inefficiencies (Arney et al., 2019).

Tanzania, as part of sub-Saharan Africa, has made efforts to improve the procurement and supply chain management of medical equipment and supplies. The Public Procurement Regulatory Authority (PPRA) plays a key role in overseeing procurement processes to ensure transparency, competitiveness, and value for money in public health facilities (URT, 2021). However, several procurement challenges persist, including prolonged tendering processes, inadequate supplier performance, and financial constraints that lead to frequent stockouts of medical supplies (Twaweza, 2021). A report by the Controller and Auditor General (CAG) (2022) highlighted that approximately TZS 11.2 billion worth of medical equipment and supplies were not delivered by the Medical Stores Department (MSD), despite payments being made, due to weak contract management and procurement inefficiencies. Additionally, delays in procurement processes have been linked to disruptions in healthcare service delivery, with some facilities experiencing shortages for up to 20 months (CAG, 2023). The complexity of the medical supply chain in Tanzania further exacerbates these issues. Procurement entities often lack the technical capacity and digital tools necessary to enhance supply chain visibility and efficiency (Bryson, 2022). Moreover, contract management issues, such as failure to meet delivery timelines and inadequate quality assurance, continue to affect the availability of essential medical equipment and supplies (MSH, 2020).

To address these challenges, Tanzania has begun implementing strategic procurement reforms, including supplier performance monitoring, digital procurement solutions, and decentralized supply chain models aimed at improving availability and accessibility of medical supplies (Mussa, 2023). However, gaps remain in the effective execution of these strategies, necessitating further research on the determinants of medical equipment and supply availability in Tanzanian healthcare facilities. This study, therefore, seeks to examine the determinants of medical equipment and supply availability, with a specific focus on the role of procurement and supply chain management at Kabanga Referral Hospital in Kigoma Region.

## 2. LITERATURE REVIEW

This study is guided by Transaction Cost Analysis theory and the Supply Chain Operations Reference approach, which together provide a strong lens for explaining why some public hospitals experience persistent shortages of medical equipment and supplies despite having formal procurement systems. Transaction Cost Analysis emphasizes that procurement outcomes are shaped by the costs of planning, negotiating, monitoring, and enforcing contracts under uncertainty and information asymmetry (Rindfleisch, 1997; Bendera, 2020). In public health facilities, these transaction costs increase when procurement roles are unclear, decisions are delayed, supplier performance is weak, and contract monitoring is inconsistent, conditions that often lead to late deliveries, non-delivery, or poor-quality supplies. Transaction Cost Analysis assumes decision makers operate under bounded rationality and that opportunism may occur when parties exploit loopholes or weak oversight, particularly where information is not equally distributed between buyers and suppliers (Robert, 2021). As a result, hospitals are likely to face stock outs when procurement systems cannot effectively manage uncertainties related to supplier reliability, budget disbursement, transport constraints, and operational disruptions. Although Transaction Cost Analysis is valuable in explaining governance and contract management problems, it may understate broader structural constraints such as infrastructure limitations and policy implementation gaps that characterize rural and regional settings (Bryson, 2022). Nonetheless, Transaction Cost Analysis remains appropriate for this study because it explains how organizational and institutional weaknesses increase procurement risks and delays, thereby lowering availability of medical equipment and supplies. The Supply Chain Operations Reference approach complements Transaction Cost Analysis by describing availability as a supply chain performance outcome that depends on how well organizations plan, source, deliver, and manage returns across the supply chain (Supply Chain Council, 1996; CIPS, 2019). The Supply Chain Operations Reference approach links processes with performance metrics such as reliability, responsiveness, agility, cost, and asset management, including inventory control and utilization (Merickova, 2021; Munedzimwe, 2020). In the hospital context, this approach helps explain how weak forecasting, delayed ordering, limited visibility of stock levels, and poor distribution arrangements reduce reliability and responsiveness, resulting in stock outs and irregular replenishment. While this approach is strong in mapping processes and performance dimensions, it may not fully capture governance related opportunism and contract enforcement challenges, which are better explained by Transaction Cost Analysis (Arney et al., 2019). Therefore, using both frameworks strengthens the conceptual explanation of how organizational, technological, and environmental factors shape availability of medical equipment and supplies in a public hospital setting.

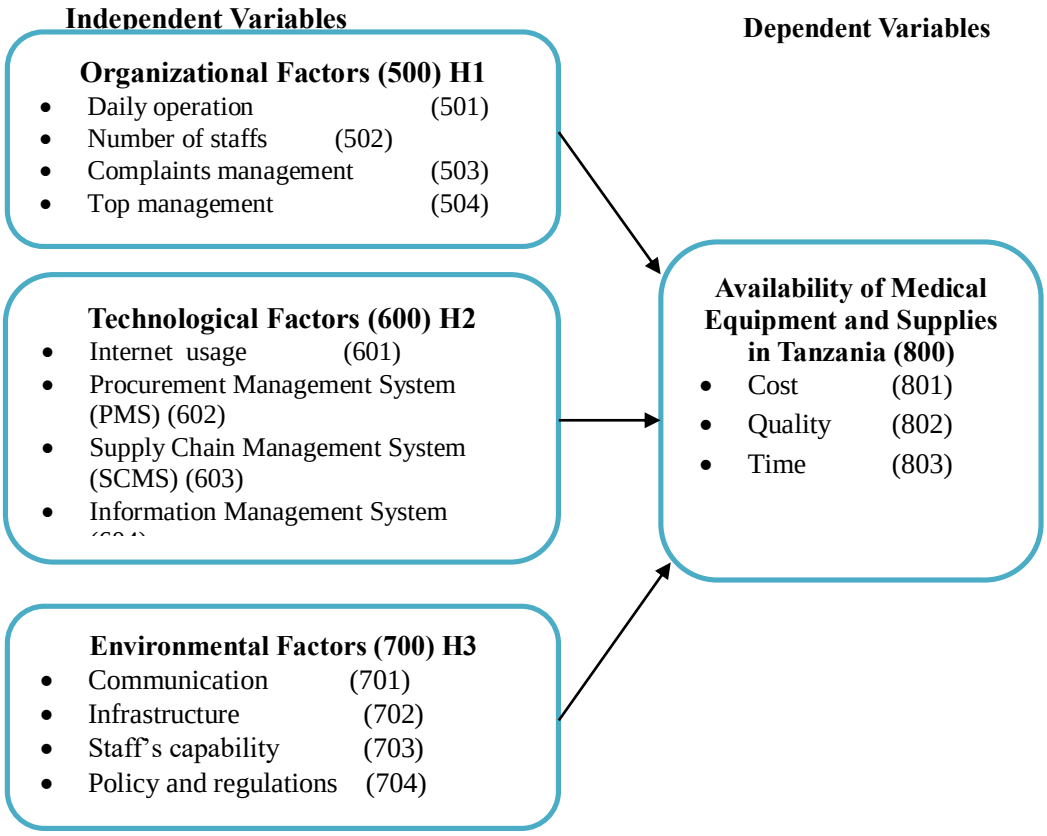
Conceptually, procurement refers to the process of acquiring goods, works, or services, including requirement specification, tendering, evaluation, contract award, and contract management within a transparent and auditable

framework (URT, 2011; Bryson, 2022). Supply chain management refers to the coordinated management of sourcing, storage, distribution, and information flows to ensure commodities reach end users efficiently and reliably (CIPS, 2019). Medical equipment and supplies include medical devices requiring calibration, maintenance and user training, as well as essential consumables used for diagnosis and treatment, depending on classification (MSH, 2020; WHO, 2020). In this study, availability refers to the extent to which required medical equipment and supplies are accessible at the facility when needed, often reflected through reduced stock out frequency, shorter replenishment lead time, adequate quantities, and consistent service levels (WHO, 2020). Empirically, research across different contexts shows that organizational factors are major determinants of availability of medical equipment and supplies. Adzimah et al. (2019), in a study of hospitals in Ghana, reported that effective procurement planning, coordination, and compliance with established procedures improved health commodity delivery and reduced shortages. The study emphasized that institutional commitment and staff awareness of supply chain processes enhance performance, although it focused more on general commodity management and less on facility specific operational bottlenecks common in remote settings. Munedzimwe (2020), examining medicine stock management in South African primary health facilities, found that inadequate human resource capacity, weak supervision, and poor adherence to procedures contributed to persistent stock outs. The study further noted that limited communication between facilities and upstream suppliers increased uncertainty and reduced responsiveness, an outcome consistent with both Supply Chain Operations Reference responsiveness and Transaction Cost Analysis information asymmetry. In Tanzania, Njau (2019) found that procurement unit performance is strongly shaped by staff competence and internal systems, implying that organizational capability and leadership support are essential for procurement effectiveness. Similarly, Bendera (2020), focusing on Muhimbili National Hospital, found that organizational issues such as decision-making processes, financial capacity, and stakeholder coordination strongly influence procurement performance. However, much of this evidence is concentrated in large urban or national level facilities, leaving a gap in understanding how organizational constraints manifest in regional hospitals such as Kabanga Referral Hospital.
Evidence also shows that technological factors significantly influence procurement efficiency and availability of medical equipment and supplies. WHO (2020) notes that inadequate information systems, weak consumption data, and limited communication platforms contribute to poor forecasting and delayed replenishment across many African medicine supply chains. Njau (2019) reported that information and communication technology systems improve procurement unit efficiency by strengthening record management, transparency, and coordination. Consistent with this, Bendera (2020) identified a strong positive relationship between technological capacity and procurement performance, implying that adoption of procurement management systems and inventory technologies can reduce errors, improve ordering accuracy, and prevent avoidable stock outs. At the national level, strategic reviews and policy-oriented studies in Tanzania also highlight that limited digital integration and weak logistics information flows can undermine the supply chain even where formal systems exist (Robert, 2021). Despite these findings, many studies emphasize medicines more than medical equipment and supplies as a broader category, and fewer studies quantify the effect of technology on availability outcomes at a single regional hospital level using regression-based evidence, an empirical gap addressed by the current study.

Environmental factors such as infrastructure, transport conditions, regulatory environment, supplier market characteristics, and utility reliability can constrain availability of medical equipment and supplies even when internal hospital systems are well managed. WHO (2020) documents challenges including inadequate storage facilities, weak temperature control, limited distribution planning, and constrained budgets, all of which reduce supply chain reliability. In Tanzania, Sikika (2019) reported persistent shortages of essential medical supplies in districts, long waiting times after ordering through MSD channels, and disruptions to clinical services such as elective surgeries due to insufficient supplies. These constraints reflect environmental barriers such as funding flow challenges, distribution delays, and administrative bottlenecks. Audit reports have also pointed to non-delivery or delayed delivery of supplies even after payments, reflecting broader system level issues including contract enforcement, logistics weaknesses, and institutional coordination gaps (CAG, 2019; CAG, 2022; CAG, 2023). While studies like Zomboko et al. (2018) identified regulatory and governance challenges in procurement of donated equipment, they did not sufficiently address how rural and regional environmental constraints such as road networks, seasonal disruptions, and electricity instability interact with procurement systems to affect availability. The current study strengthens the evidence base by explicitly incorporating environmental predictors and testing their influence on availability at Kabanga Referral Hospital. Overall, the reviewed literature shows consistent agreement that availability of medical equipment and supplies is influenced by organizational capability, technological readiness, and environmental conditions. However, several gaps remain. Many studies focus on national systems or medicines alone rather than the broader category of medical equipment and supplies within a regional hospital context (Sikika, 2019; WHO, 2020). A number of studies are descriptive and do not quantify the relative contribution of organizational, technological, and environmental

factors simultaneously using multivariate models, limiting the ability to identify the strongest predictors (Njau, 2019; Robert, 2021). Limited empirical attention has been given to Kabanga Referral Hospital and similar regional facilities in Kigoma Region where contextual constraints may differ from urban referral hospitals. This study addresses these gaps by applying a case study design at Kabanga Referral Hospital and using both qualitative insights and multiple regression analysis to assess how organizational, technological, and environmental factors determine availability of medical equipment and supplies. Based on the literature and guiding theories, the study conceptualizes a direct relationship where organizational factors, technological factors, and environmental factors serve as independent variables influencing the dependent variable, availability of medical equipment and supplies. In line with Transaction Cost Analysis, improved organizational governance and contract monitoring reduce uncertainties and opportunism, while in line with the Supply Chain Operations Reference approach, strengthened planning, sourcing, and delivery processes improve supply chain reliability and responsiveness, ultimately increasing availability in the hospital setting.

**Figure 2.1: Conceptual Framework**




**Source: Researcher (2025)**

## 3. METHODOLOGY

This study employed a mixed methods research methodology to examine the determinants of medical equipment and supplies availability at Kabanga Referral Hospital in Kigoma Region, Tanzania. A case study design was adopted to facilitate an in-depth assessment of procurement and supply chain management practices, their application within the hospital procurement cycle, and how they relate to the availability of medical equipment and supplies within the hospital operating environment. The study was guided by the pragmatism philosophy, which supports integrating quantitative and qualitative approaches to generate comprehensive and problem focused evidence that explains both measurable relationships and contextual implementation realities.

A mixed research approach was applied. The quantitative strand focused on measuring the relationship between organizational factors, technological factors, and environmental factors and the availability of medical equipment and supplies. Organizational factors included issues such as daily operational efficiency, management

support, staffing adequacy, and timely handling of service needs. Technological factors included stability of internet services, use of information management systems, use of supply chain management systems, and use of procurement management systems. Environmental factors included compliance with policies and regulations, infrastructure adequacy, communication effectiveness, and staff capability within the broader operating environment. Structured questionnaires were administered to hospital employees across key departments including administration, accounts, procurement and supply, pharmacy, laboratory, radiology, doctors, nursing, and dental units, since these departments directly influence or depend on the availability of medical equipment and supplies. The qualitative strand involved semi structured interviews with selected key informants to obtain deeper explanations regarding procurement decision making, contract and supplier management, ordering and replenishment processes, technology use, infrastructure constraints, and contextual challenges affecting timely availability. Documentary review of relevant procurement plans, purchase requisitions, delivery notes, store records, and audit reports was also conducted to complement primary data and strengthen triangulation.

The study population consisted of 138 employees working at Kabanga Referral Hospital who are directly involved in procurement, store management, financial processes, clinical service delivery, and utilization of medical equipment and supplies. Using Yamane formula, a sample size of 100 respondents was determined. Purposive sampling was applied to select questionnaire respondents and interview participants because it enabled the researcher to obtain information from staff who possess relevant knowledge and experience on procurement and supply chain processes and on availability challenges. Reliability of the questionnaire was tested using Cronbach alpha, and the results indicated acceptable internal consistency with alpha values above 0.7 across the study constructs. Content validity was ensured through expert review, alignment of items with study objectives, and triangulation through the use of questionnaires, interviews, and documentary review. Quantitative data were analyzed using descriptive statistics and multiple regression analysis in SPSS to determine whether organizational factors, technological factors, and environmental factors significantly predict availability of medical equipment and supplies. Qualitative data were analyzed using content analysis to identify recurring patterns and explanatory themes related to procurement and supply chain implementation realities and availability outcomes. Ethical considerations were observed throughout the study, including obtaining permission prior to data collection, securing informed consent from participants, ensuring confidentiality and anonymity, and maintaining voluntary participation.

## 4. FINDINGS

Data were analyzed using appropriate statistical techniques consistent with the specific objectives of the study. Descriptive statistical analysis constituted the primary analytical approach and was employed to summarize, organize, and present the collected data in a clear and interpretable manner. The analysis was conducted using the Statistical Package for Social Sciences, which facilitated the generation of frequency distributions, measures of central tendency including means, measures of dispersion including standard deviations, as well as distributional statistics including skewness and kurtosis. Descriptive statistics were used to profile respondents' demographic characteristics and to examine response patterns related to perceptions of the influence of organizational factors, technological factors, and environmental factors on the availability of medical equipment and supplies at Kabanga Referral Hospital. Frequency distributions provided an overview of response tendencies, while mean scores indicated the overall level of agreement with key study statements. Standard deviations were used to assess the degree of variability in respondents' views, thereby indicating the consistency of responses across the sample.

In addition, skewness and kurtosis statistics were examined to assess the normality of data distribution. The results indicated that the data approximated a normal distribution, which supported the application of parametric inferential techniques. This diagnostic assessment was important in confirming the appropriateness of conducting multiple regression analysis to examine the relationships and predictive effects between the independent variables and the dependent variable. Consequently, the descriptive analysis provided a strong empirical foundation for subsequent inferential analyses, including regression analysis, which was conducted to determine the magnitude and significance of the effects of organizational, technological, and environmental factors on the availability of medical equipment and supplies at Kabanga Referral Hospital.

### 4.1 Organizational Factors on the Availability of Medical Equipment and Supplies

The study examined the influence of organizational factor on the availability of medical equipment in Tanzania. To achieve this, the researcher collected data from Kabanga hospital's employees using a survey questionnaire. As shown in Table 4.4, the descriptive statistics indicate that most respondents agreed they manage efficiently daily operations (Mean=4.11, SD=0.091). Respondents also agreed that they collaborate fully with top management to achieve organizational goals (Mean=3.84, SD=1.143). In addition, they agreed that they address

promptly customers' complaints (Mean=3.81, standard deviation=1.042). Finally, respondents agreed that they have sufficient staff to handle all tasks effectively (Mean=3.70, standard deviation=1.020).

**Table 4.1: Organizational Factors**

| Responses | N | Mean | Std. Deviation |
|---|---|---|---|
| We manage efficiently our daily operations. | 100 | 4.11 | 1.091 |
| We collaborate fully with top management to achieve organizational goals. | 100 | 3.84 | 1.143 |
| We address promptly our customers' complaints. | 100 | 3.81 | 1.042 |
| We have sufficient staff to handle all tasks effectively. | 100 | 3.70 | 1.020 |
| **Aggregate Mean** | **100** | **3.87** | **1.074** |
| **Valid N (list wise)** | **100** | | |

**Sources: Field Data (2025)**

Based on the results (Table 4.1), the findings show that most health sectors in Tanzania manage their daily operations efficiently. This is shown by an aggregate mean of 3.87 and a standard deviation of 1.074. Staff collaborate fully with management and address customers' complaints promptly. They have sufficient staff to handle tasks effectively. Furthermore, during the interview, the respondents said that,

> *…. Organizational factors play a big role. For example, delays in decision-making affect how quickly we can order medical equipment. Also, lack of clear roles in the procurement team sometimes causes stock-outs. When responsibilities are well-defined, equipment and supplies are available on time.*

Additionally, the respondents claimed that,

> *…. Management support and planning are critical. If the hospital management prioritizes procurement and ensures proper budgeting, medical equipment is usually available. But when organizational coordination is weak, some departments struggle to get the necessary supplies for patients.*

### 4.2 Technological Factors on the Availability of Medical Equipment and Supplies

The study examined the influence of technological factor on the availability of medical equipment in Tanzania. To achieve this, the researcher collected data from Kabanga hospital's employees using a survey questionnaire. As shown in Table 4.2, the descriptive statistics indicate that most respondents agreed they have stable internet to support organizational operations (Mean=3.89, SD=0.875). Respondents also agreed that they use the information management system to manage information effectively (Mean=3.88, SD=0.820). In addition, they agreed that they utilize the supply chain management system to manage our supply chain operation (Mean=3.82, standard deviation=0.925). Finally, respondents agreed that they effectively use the procurement management system in our procurement processes (Mean=3.72, standard deviation=0.954).

**Table 4.2: Technological Factors**

| Responses | N | Mean | Std. Deviation |
|---|---|---|---|
| We have stable internet to support organizational operations. | 100 | 3.89 | .875 |
| We use the information management system to manage information effectively. | 100 | 3.88 | .820 |
| We utilize the supply chain management system to manage our supply chain operation. | 100 | 3.82 | .925 |
| We effectively use the procurement management system in our procurement processes. | 100 | 3.72 | .954 |
| **Aggregate Mean** | **100** | **3.83** | **.894** |
| **Valid N (list wise)** | **100** | | |

**Sources: Field Data (2025)**

Based on the results (Table 4.5), the findings show that most health sectors in Tanzania have stable internet and use different technologies to support their operations. This is shown by an aggregate mean

of 3.83 and a standard deviation of 0.894. They use information management system, supply chain management system, and procurement management system to support their operations. Furthermore, during the interview, the respondents said that,

> *…. Technology makes a big difference. For instance, using computerized inventory systems helps track medical equipment and supplies in real time. When the system is functional, we rarely face stock-outs*

Moreover, the respondents claimed that,

> *…. Access to technology improves availability. For example, automated ordering and monitoring tools allow us to reorder supplies before they run out. Without such tools, delays and shortages are common.*

### 4.3 Environment Factors on the Availability of Medical Equipment and Supplies

The study examined the influence of environment factor on the availability of medical equipment in Tanzania. To achieve this, the researcher collected data from Kabanga hospital's employees using a survey questionnaire. As shown in Table 4.6, the descriptive statistics indicate that most respondents agreed they comply with policies and regulations in their operations (Mean=3.75, SD=1.313). Respondents also agreed that they have capable staff to perform their responsibilities effectively (Mean=3.62, SD=1.309). In addition, they agreed that they have adequate infrastructure to support their operations (Mean=3.58, standard deviation=1.224). Finally, respondents agreed that they maintain effective communication during our operations (Mean=3.57, standard deviation=0.987).

**Table 4.3: Environmental Factors**

| Responses | N | Mean | Std. Deviation |
|---|---|---|---|
| We comply with policies and regulations in our operations. | 100 | 3.75 | 1.313 |
| We have capable staff to perform their responsibilities effectively. | 100 | 3.62 | 1.309 |
| We have adequate infrastructure to support our operations. | 100 | 3.58 | 1.224 |
| We maintain effective communication during our operations. | 100 | 3.57 | .987 |
| **Aggregate Mean** | **100** | **3.63** | **1.208** |
| **Valid N (listwise)** | **100** | | |

**Sources: Field Data (2025)**

Based on the results (Table 4.3), the findings show that most health sectors in Tanzania maintain effective communication during their operation. This is shown by an aggregate mean of 3.63 and a standard deviation of 1.208. They have adequate infrastructure and capable staff to perform their responsibilities effective. They also comply with policies and regulations in their operations. Furthermore, during the interview, the respondents said that,

> *…. Environmental factors, especially poor road networks and seasonal heavy rains, make it difficult for suppliers to deliver medical equipment on time. Sometimes trucks carrying supplies get stuck, and this causes delays in availability of essential items.*

Moreover, the respondents claimed that,

> *…. Power fluctuations and unreliable electricity in the region also affect availability. Some equipment requires stable power for storage and operation, but when electricity is inconsistent, it delays both usage and distribution of critical medical supplies.*

### 4.4 Regression Analysis

The study employed multiple regression analysis to test the relationship between the independent variable and dependent variable. The independent variables include organizational factors, technological factors, and environmental factors. The dependent variable is availability of medical equipment and supplies. This technique enabled the researcher to determine the extent to which these predictors influence the availability of medical equipment and supplies. However, before running the regression analysis, the study tested its assumptions. The study also tested the assumptions of regression analysis. These assumptions include normality, outliers, and multicollinearity. Normality was tested to determine whether the data followed a normal distribution. Outliers were also tested to check for the presence of outlier problems. These tests were conducted using skewness and a

kurtosis from descriptive statistics in SPSS (Table 4.7). For normal distribution and absence of outliers, skewness should be less than 3 and kurtosis less than 10 (Kline, 2023).

**Table 4.4: Normality**

| | N | Skewness | | Kurtosis | |
|---|---|---|---|---|---|
| Responses | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| Organizational factors | 100 | -1.727 | .241 | 2.951 | .478 |
| Technological factors | 100 | .035 | .241 | -.143 | .478 |
| Environmental factors | 100 | -1.150 | .241 | .637 | .478 |
| Availability of medical equipment and supplies | 100 | -1.497 | .241 | 2.247 | .478 |
| Valid N (listwise) | 100 | | | | |

**Sources: Field Data (2025)**

From Table 4.4, skewness for organizational factor is -1.727 and kurtosis is -2.951. For technological factor, skewness is 0.035 and kurtosis is -.143. In terms of environmental factor, skewness is -1.150, and kurtosis is 0.637. For the availability of medical equipment and supplier, skewness is -1.497 and kurtosis is 2.247. These results indicate that the data were normally distributed and showed no outlier problems. Thus, the assumption for regression analysis was met. Furthermore, multicollinearity was tested to determine whether independent variables were highly correlated ($r<0.90$). This test was done using the variance inflation factor (VIF) and tolerance in SPSS (Table 4.8). Absence of multicollinearity problem is confirmed when VIF is less than 10 and tolerance is greater than 0.2 (Pallant, 2020).

**Table 4.5: Multicollinearity**

| | | Collinearity Statistics | |
|---|---|---|---|
| Model | | Tolerance | VIF |
| 1 | Organizational factor | .523 | 1.912 |
| | Technological factor | .916 | 1.092 |
| | Environmental factor | .415 | 8.723 |

a. Dependent Variable: Availability of medical equipment and supplies

**Sources: Field Data (2025)**

From Table 4.5, tolerance for organizational factor is 0.523 and VIF is 1.912. For technological factor, tolerance is 0.916 and VIF is 1.092. In terms of environmental factor, tolerance is 0.415 and VIF is 8.723. These results indicate that no multicollinearity problems existed among the predictors. Thus, the assumption was satisfied.

### 4.5 Model Summary

In regression analysis, the study examined the fitness of the model. This test was done using the model summary in SPSS (Table 4.6). The summary shows the relationship between the predictors and the dependent variable. R represents overall strength of the relationship. $R^2$indicates the contribution of each predictor to the dependent variable. Sig. F change shows the significance of each predictor in the model.

**Table 4.6: Model Summary**

| | | | | | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .952[a] | .907 | .903 | 1.00004 | .907 | 310.401 | 3 | 96 | .000 |

a. Predictors: (Constant), Organizational factor, technological factor, and environmental factor

b. Dependent Variable: Availability of medical equipment and supplies

**Source: Field Data (2025)**

From Table 4.6, the model has an R of 0.952 and an $R^2$ is 0.907. The results also show that Sig. F change is 0.000. These findings indicate that organizational factor, technological factor, and environmental factor make

significant contributions to the availability of medical equipment and supplies. This implies that changes in these predictors account for 90.7% of the variance in the availability of medical equipment and supplies.

**Analysis of Variance**

The study also determined the difference among predictors. This test was done using an analysis of variance (ANOVA) in SPSS (Table 4.10). The significance value (sig) indicates whether the regression model is statistically significance. For this statistically significance of the model, sig should be less than 0.05 or 5% (Pallant, 2020).

**Table 4.7: ANOVA**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 921.582 | 3 | 307.194 | 310.401 | .000[a] |
| | Residual | 95.008 | 96 | 0.990 | | |
| | Total | 1016.590 | 99 | | | |

a. Predictors: (Constant), Organizational factor, technological factor, and environmental factor

b. Dependent Variable: Availability of medical equipment and supplies

**Sources: Field Data (2025)**

From Table 4.7, the regression sum of squares is 726.410 with 3 degrees of freedom. The results also show that the mean square is 242.137, and the F-statistic is 62.618 with sig. of 0.000. These results indicate that the regression model is statistically significant. This implies that organizational factor, technological factor, and environmental factor together significantly explain variations in the availability of medical equipment and supplies.

**Regression Coefficient**

The regression coefficient shows the relationship between the predictors and the dependent variable. It also indicates the significance of this relationship. Beta values show the direction of the relationship, while sig. indicates the statistical significance level (Table 4.8).

**Table 4.8: Regression Coefficient**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | .237 | .799 | | .297 | .767 |
| | Organizational factor | .828 | .044 | .821 | 18.922 | .000 |
| | Technological factor | .456 | .078 | .547 | 5.860 | .001 |
| | Environmental factor | .589 | .079 | .691 | 7.464 | .000 |

a. Dependent Variable: Availability of medical equipment and supplies

**Source: Field Data (2025)**

From Table 4.8, the results show that organizational factor has a positive and significant relationship with the availability of medical equipment and supplies (β = 0.821, P-value=0.000). This implies that a one-unit increase in organizational factor leads to a 0.821-unit increase in the availability of medical equipment and supplies. Therefore, organizational factor can contribute to the availability of medical equipment and supplies in Tanzania. Moreover, in Table 4.8, the results show that technological factor has a positive and significant relationship with the availability of medical equipment and supplies (β = 0.547, P-value=0.001). This implies that a one-unit increase in technological factor leads to a 0.547-unit increase in the availability of medical equipment and supplies. Therefore, technological factor can contribute to the availability of medical equipment and supplies in Tanzania. From Table 4.8, the results show that environmental factor has a positive and significant relationship with the availability of medical equipment and supplies (β = 0.691, P-value=0.000). This implies that a one-unit increase in environmental factor leads to a 0.691-unit increase in the availability of

medical equipment and supplies. Therefore, technological factor can contribute to the availability of medical equipment and supplies in Tanzania.

## 5. DISCUSSIONS OF THE FINDINGS

### 5.1 Organizational Factor on the Availability of Medical Equipment and Supplies

Based on the descriptive statistics, the findings show that most health sectors in Tanzania manage their daily operations efficiently. Staff collaborate fully with management. They address customers' complaints promptly. They have sufficient staff to handle tasks effectively. This is similar to Adzimah et al. (2019) in Ghana. They found that effective procurement and supply enhance medical equipment delivery in hospitals. Similarly, Munedzimwe (2020) revealed that lack of human resources and weak communication contribute to stock-outs in South African health facilities. Further, WHO (2020) outlined that inadequate information systems, poor storage facilities, and weak distribution planning affect medicine availability in African countries. These studies show that organizational capacity directly affects the availability of medical resources.

The interview findings also confirmed that organizational factors play a big role. Delays in decision-making affect how quickly medical equipment can be ordered. Lack of clear roles in the procurement team sometimes causes stock-outs. When responsibilities are well-defined, equipment and supplies are available on time. Management support and planning are also critical. If the hospital management prioritizes procurement and ensures proper budgeting, medical equipment is usually available. However, when organizational coordination is weak, some departments struggle to get the necessary supplies for patients.

These findings are also supported by regression analysis. Organizational factors have a positive and significant relationship with the availability of medical equipment and supplies. A one-unit improvement in organizational factors leads to an increase in equipment and supply availability. Therefore, strengthening organizational factors can substantially improve medical supply availability in regional hospitals. These findings are similar to Merickova (2021). Clear roles, competitive selection of suppliers, and frequent contract monitoring improve procurement performance in hospitals. Similarly, Bendera (2020) found that decision-making, financial capacity, and stakeholder relationships strongly influence procurement effectiveness. Twaweza (2021) noted that poor oversight and weak coordination contribute to medicine stock-outs in Tanzanian public health facilities. These studies align with the regression findings of the current study.

The findings support the Transaction Cost Analysis (TCA) theory. The theory posits that effective management of procurement contracts reduces uncertainties, opportunism, and irrational decision-making (Rindfleisch, 1997; Bendera, 2020). Proper monitoring ensures value for money and timely delivery of supplies (Bryson, 2022). Additionally, the SCOR model emphasizes planning, sourcing, and process reliability to improve supply chain performance (Merickova, 2021; Munedzimwe, 2020). Effective organizational structures enable hospitals to achieve these theoretical expectations.

### 5.2 Technological Factor on the Availability of Medical Equipment and Supplies

Based on the descriptive statistics, the findings show that most health sectors in Tanzania have stable internet and use different technologies to support their operations. They use information management systems, supply chain management systems, and procurement management systems to support their daily tasks. This is similar to Adzimah et al. (2019) in Ghana, who found that effective use of information and supply chain systems enhances medical equipment delivery in hospitals. Similarly, Njau (2019) revealed that access to technology improves procurement efficiency and staff performance in Tanzanian health facilities. Further, WHO (2020) outlined that inadequate information systems contribute to stock-outs and poor medicine availability in African countries. These studies indicate that technological capacity directly affects the availability of medical resources.

The interview findings also confirmed that technology plays a big role. For instance, using computerized inventory systems helps track medical equipment and supplies in real time. When the system is functional, stock-outs are rare. Access to technology improves availability. Automated ordering and monitoring tools allow hospitals to reorder supplies before they run out. Without such tools, delays and shortages are common. From regression, the results show that technological factors have a positive and significant relationship with the availability of medical equipment and supplies. A one-unit increase in technological factor leads to an increase in availability. Therefore, improving technological capacity can substantially enhance medical supply availability in regional hospitals.

These findings are similar to Merickova (2021), who found that the adoption of modern information systems improves procurement performance in hospitals. Similarly, Bendera (2020) reported that technological capacity strongly influences procurement efficiency and decision-making. Additionally, Twaweza (2021) noted that poor

ICT infrastructure contributes to stock-outs in Tanzanian public health facilities. These studies align with the regression findings of the current study. The findings support the Transaction Cost Analysis (TCA) theory. The theory posits that effective management of contracts, supported by technology, reduces uncertainties, opportunism, and irrational decision-making (Rindfleisch, 1997; Bendera, 2020). Proper ICT systems ensure value for money and timely delivery of supplies (Bryson, 2022). Additionally, the SCOR model emphasizes planning, sourcing, and process reliability to improve supply chain performance (Merickova, 2021; Munedzimwe, 2020). Effective technological systems enable hospitals to achieve these theoretical expectations.

### 5.3 Environmental Factor on the Availability of Medical Equipment and Supplies

Based on the descriptive statistics, the findings show that most health sectors in Tanzania maintain effective communication during operations. They have adequate infrastructure and capable staff. They also comply with policies and regulations in their activities. This is similar to Adzimah et al. (2019) in Ghana, who found that effective procurement and supply enhance medical equipment delivery in hospitals. Similarly, Munedzimwe (2020) revealed that lack of resources and weak communication contributes to stock-outs in South African health facilities. Additionally, WHO (2020) outlined that poor infrastructure and unreliable utilities affect medicine availability in African countries. These studies show that environmental factors directly affect the availability of medical resources.

The interviews confirmed that environmental conditions affect supply. Poor road networks and seasonal rains make delivery difficult. Trucks carrying medical supplies sometimes get stuck. This causes delays in availability. Power fluctuations and unreliable electricity also affect operations. Some equipment requires stable power for storage and use. When electricity is inconsistent, supply and usage of critical items are delayed. The regression results show that environmental factors have a positive and significant relationship with the availability of medical equipment and supplies. A one-unit increase in environmental factors leads to an increase in equipment availability. Therefore, strengthening environmental support systems can improve availability in Tanzanian hospitals. These findings are similar to Merickova (2021), who reported that infrastructure and energy stability influence procurement outcomes. Likewise, Bendera (2020) found that physical environment and stakeholder networks shape procurement performance. Twaweza (2021) also noted that poor transport and unreliable power supply contribute to stock-outs in Tanzanian health facilities. These studies align with the regression findings of the current study.

The findings support the Transaction Cost Analysis (TCA) theory. The theory posits that contract management is influenced by uncertainties, opportunism, and irrational decisions (Rindfleisch, 1997; Robert, 2021). Environmental risks like poor roads or power shortages increase transaction costs and delays. Effective monitoring reduces these risks and ensures value for money (Bryson, 2022). Additionally, the SCOR model emphasizes planning, sourcing, and reliability in supply chain operations (Merickova, 2021; Munedzimwe, 2020). Reliable infrastructure and utilities enable hospitals to meet these theoretical expectations.

## 6. CONCLUSIONS AND RECOMMENDATIONS

The study concludes that organizational factors, technological factors, and environmental factors are key determinants of the availability of medical equipment and supplies at Kabanga Referral Hospital. The descriptive findings indicate general agreement among respondents that the hospital manages daily operations efficiently, collaborates with management, and uses relevant systems such as information management, supply chain management, and procurement management systems to support supply chain activities. Respondents also acknowledged the importance of compliance with policies and regulations, staff capability, infrastructure adequacy, and communication in supporting procurement and supply operations. The regression results further show that organizational factors, technological factors, and environmental factors have positive and statistically significant influences on the availability of medical equipment and supplies. This implies that improvements in internal management systems, use of appropriate technologies, and strengthening of the enabling environment contribute to better availability outcomes. Overall, the findings suggest that improving availability requires not only operational efforts within the hospital but also strengthened systems, capacity, and supportive infrastructure that reduce procurement delays, enhance ordering accuracy, and improve supply chain responsiveness.

Based on the study findings, it is recommended that Kabanga Referral Hospital strengthens internal organizational capacity by improving procurement planning, enhancing coordination across user departments, ensuring clear roles and responsibilities within procurement and store functions, and strengthening supervision and accountability in contract and supplier management. The hospital should also enhance staff capacity through

continuous training on procurement procedures, inventory management, and contract monitoring to ensure timely ordering, effective follow up, and reduction of avoidable stock outs. In addition, the hospital should strengthen technological support by improving stability of internet services and ensuring effective use of procurement management systems, inventory tracking tools, and information management systems to improve visibility of stock levels, reduce manual errors, and support timely replenishment decisions. Furthermore, environmental constraints should be addressed through collaboration with relevant authorities and stakeholders to improve infrastructure and reliability of electricity supply, strengthen communication channels with suppliers and distribution points, and enhance compliance mechanisms that ensure timely delivery and quality assurance. Strengthening these areas will support the hospital to improve consistent availability of medical equipment and supplies, enhance service delivery, and improve patient care outcomes in the region

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